UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 20-F

☐ **REGISTRATION STATEMENT PURSUANT TO SECTION 12(b) OR (g) OF THE SECURITIES EXCHANGE ACT OF 1934**

OR

☒ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the fiscal year ended December 31, 2019

OR

☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

OR

☐ **SHELL COMPANY REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

Commission File Number: 001-36515

MATERIALISE NV
(Exact name of Registrant as specified in its charter)

Not Applicable
(Translation of Registrant's name into English)

Kingdom of Belgium
(Jurisdiction of incorporation or organization)

Technologielaan 15, 3001 Leuven, Belgium
(Address of principal executive offices)

Peter Leys, telephone +32 (16) 39 66 11, facsimile +32 (16) 39 66 00, Technologielaan 15, 3001 Leuven, Belgium
(Name, Telephone, E-mail and/or Facsimile number and Address of Company Contact Person)

Securities registered or to be registered pursuant to Section 12(b) of the Act:

Title of each class	Name of each exchange on which registered
American Depositary Shares, each representing one Ordinary Share, no nominal value per share	**The NASDAQ Stock Market LLC**
Ordinary Shares, no nominal value per share*	**The NASDAQ Stock Market LLC**

* Not for trading but only in connection with the registration of the American Depositary Shares pursuant to the requirements of the Securities and Exchange Commission.

Securities registered or to be registered pursuant to Section 12(g) of the Act: None.

Securities for which there is a reporting obligation pursuant to Section 15(d) of the Act: None.

The number of outstanding shares of each of the issuer's classes of capital or common stock as of December 31, 2019 was: 53,172,513 Ordinary Shares

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. ☐ Yes ☒ No

If this report is an annual or transition report, indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934. ☐ Yes ☒ No

Note – Checking the box above will not relieve any registrant required to file reports pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934 from their obligations under those Sections.

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. ☒ Yes ☐ No

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). ☐ Yes ☐ No

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or an emerging growth company. See the definition of “large accelerated filer,” “accelerated filer,” and “emerging growth company” in Rule 12b-2 of the Exchange Act.

Large accelerated filer	☐	Accelerated filer	☒
Non accelerated filer	☐	Emerging growth company	☐

If an emerging growth company that prepares its financial statements in accordance with U.S. GAAP, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards† provided pursuant to Section 13(a) of the Exchange Act. ☐

† The term “new or revised financial accounting standard” refers to any update issued by the Financial Accounting Standards Board to its Accounting Standards Codification after April 5, 2012.

Indicate by check mark whether the registrant has filed a report on and attestation to its management’s assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. ☒

Indicate by check mark which basis of accounting the registrant has used to prepare the financial statements included in this filing:

U.S. GAAP ☐	International Financial Reporting Standards as issued by the International Accounting Standards Board ☒	Other ☐

If “Other” has been checked in response to the previous question, indicate by check mark which financial statement item the registrant has elected to follow. ☐ Item 17 ☐ Item 18

If this is an annual report, indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). ☐ Yes ☒ No

(APPLICABLE ONLY TO ISSUERS INVOLVED IN BANKRUPTCY PROCEEDINGS DURING THE PAST FIVE YEARS)

Indicate by check mark whether the registrant has filed all documents and reports required to be filed by Sections 12, 13 or 15(d) of the Securities Exchange Act of 1934 subsequent to the distribution of securities under a plan confirmed by a court. ☐ Yes ☐ No

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INTRODUCTION

Except as otherwise required by the context, references to (i) "Materialise," "Company," "we," "us" and "our" are to Materialise NV and its subsidiaries, (ii) "ACTech" are to ACTech Holding GmbH and its subsidiaries, which we acquired in 2017, and (iii) "Engimplan" are to Engimplan Engenharia De Implante Indústria E Comércio Ltda., in which we acquired a controlling interest in 2019.

Our trademark portfolio contained 148 registered trademarks and 9 pending trademark applications as of December 31, 2019. All other trademarks or trade names referred to in this annual report are the property of their respective owners. Solely for convenience, the trademarks and trade names in this annual report are referred to without the ® and ™ symbols, but such references should not be construed as any indicator that their respective owners will not assert, to the fullest extent under applicable law, their rights thereto.

All references in this annual report to "U.S. dollars" or "$" are to the legal currency of the United States and all references to "€" or "euro" are to the currency introduced at the start of the third stage of the European economic and monetary union pursuant to the treaty establishing the European Community, as amended.

SPECIAL NOTE REGARDING FORWARD-LOOKING INFORMATION

This annual report includes certain forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, or the Securities Act, and Section 21E of the Securities Exchange Act of 1934, as amended, or the Exchange Act, concerning our business, operations and financial performance and condition as well as our plans, objectives and expectations for our business operations and financial performance and condition. Any statements that are not of historical facts may be deemed to be forward-looking statements. You can identify these forward-looking statements by words such as "believes," "estimates," "anticipates," "expects," "plans," "intends," "may," "could," "might," "will," "should," "aims," or other similar expressions that convey uncertainty of future events or outcomes. Forward-looking statements appear in a number of places throughout this annual report and include statements regarding our intentions, beliefs, assumptions, projections, outlook, analyzes or current expectations concerning, among other things, our intellectual property position, research and development projects, acquisitions, results of operations, cash needs, spending of the remaining net proceeds from our initial public offering, capital expenditures, financial condition, liquidity, prospects, growth and strategies, regulatory approvals and clearances, the markets and industry in which we operate and the trends and competition that may affect the markets, industry or us. In particular, under "Item 5. Operating and Financial Review and Prospects—D. Trend Information" of this annual report and in the notes to our audited consolidated financial statements, we discuss, based on our current assessment of the novel coronavirus (COVID-19), or coronavirus, pandemic, how our business, results of operations, and financial condition could be impacted during the year 2020.

By their nature, forward-looking statements involve risks and uncertainties because they relate to events, competitive dynamics and industry change, and depend on economic circumstances that may or may not occur in the future or may occur on longer or shorter timelines than anticipated. Although we believe that we have a reasonable basis for each forward-looking statement contained in this annual report, we caution you that forward-looking statements are not guarantees of future performance and involve known and unknown risks, uncertainties and other factors that are in some cases beyond our control. All of our forward-looking statements are subject to risks and uncertainties that may cause our actual results to differ materially from our expectations.

Actual results could differ materially from our forward-looking statements due to a number of factors, including, without limitation, risks related to:

- our ability to enhance and adapt our software, products and services to meet changing technology and customer needs;
- fluctuations in our revenue and results of operations;
- impacts on our business, financial condition and results of operations from the current global health crisis related to the coronavirus pandemic;
- changes in volumes and patterns of customer electricity usage;
- our ability to operate in a highly competitive and rapidly changing industry;
- our ability to adequately increase demand for our products and services;
- our collaborations, in-licensing arrangements, joint ventures, strategic alliances or partnerships with third-parties;
- our ability to integrate acquired businesses or technologies effectively;

- our dependence upon sales to certain industries;
- our relationships with suppliers;
- our ability to attract and retain senior management and other key employees;
- any disruptions to our service center operations, including by accidents, natural disasters or otherwise;
- our ability to raise additional capital on attractive terms, or at all, if needed to meet our growth strategy;
- our ability to adequately protect our intellectual property and proprietary technology;
- our international operations;
- our ability to comply with applicable governmental laws and regulations to which our products, services and operations are subject; and
- other risk factors as set forth under "Item 3. Key Information—D. Risk Factors."

Any forward-looking statements that we make in this annual report speak only as of the date of such statement, and we undertake no obligation to update such statements to reflect events or circumstances after the date of this annual report or to reflect the occurrence of unanticipated events. Comparisons of results for current and any prior periods are not intended to express any future trends or indications of future performance, unless expressed as such, and should only be viewed as historical data. You should, however, review the factors and risks we describe in the reports we will file from time to time with the U.S. Securities and Exchange Commission, or the SEC, after the date of this annual report. See "Item 10. Additional Information—H. Documents on Display."

You should also read carefully the factors described in "Item 3. Key Information—D. Risk Factors" and elsewhere in this annual report to better understand the risks and uncertainties inherent in our business and underlying any forward-looking statements. As a result of these factors, we cannot assure you that the forward-looking statements in this annual report will prove to be accurate. Furthermore, if our forward-looking statements prove to be inaccurate, the inaccuracy may be material. In light of the significant uncertainties in these forward-looking statements, you should not regard these statements as a representation or warranty by us or any other person that we will achieve our objectives and plans in any specified timeframe, or at all.

PART I

ITEM 1. IDENTITY OF DIRECTORS, SENIOR MANAGEMENT AND ADVISERS

Not applicable.

ITEM 2. OFFER STATISTICS AND EXPECTED TIMETABLE

Not applicable.

ITEM 3. KEY INFORMATION

A. Selected Financial Data

The tables below contain a summary of our financial data as of and for years ended December 31, 2019, 2018, 2017, 2016 and 2015, which have been derived from our consolidated financial statements prepared in accordance with International Financial Reporting Standards, as issued by the International Accounting Standards Board, which we refer to as IFRS. Our consolidated financial statements and the related notes as of and for the years ended December 31, 2019, 2018 and 2017 appear elsewhere in this annual report.

Our historical results are not necessarily indicative of the financial results to be expected in any future periods. You should read this information in conjunction with our consolidated financial statements and related notes included elsewhere in this annual report, as well as the section entitled “Item 5. Operating and Financial Review and Prospects.”

The Company has applied IFRS 16 as from January 1, 2019 by using the modified retrospective approach, not restating comparatives for the 2018 reporting period. The reclassifications and the adjustments arising from the new leasing standard are recognized in the opening balance sheet on January 1, 2019.

Consolidated Statements of Financial Position Data:

	As of December 31,				
in 000€	2019	2018	2017	2016	2015
Inventories and contracts in progress	12,696	9,986	11,027	7,870	5,387
Trade receivables	40,977	36,891	35,582	27,479	22,843
Cash and cash equivalents	128,897	115,506	43,175	55,912	50,726
Total assets	349,294	313,225	234,678	161,920	144,136
Total liabilities	206,619	177,236	157,624	82,887	61,181
Net assets(1)	142,675	135,989	77,054	79,033	82,955
Total equity	142,675	135,989	77,054	79,033	82,955

(1) Net assets represents total assets less total liabilities.

Consolidated Income Statements Data:

in 000€	For the year ended December 31, 2019	2018	2017	2016	2015
Revenue	196,679	184,721	142,573	114,477	102,035
Cost of sales	(86,972)	(82,299)	(62,952)	(46,706)	(42,963)
Gross profit	**109,707**	**102,422**	**79,621**	**67,771**	**59,072**
Research and development expenses	(23,348)	(22,416)	(19,959)	(17,682)	(18,186)
Sales and marketing expenses	(52,989)	(46,303)	(38,935)	(36,153)	(36,832)
General and administrative expenses	(31,786)	(32,310)	(24,876)	(20,041)	(15,045)
Net other operating income	5,432	3,771	4,541	6,212	7,102
Operating profit (loss)	**7,016**	**5,164**	**392**	**107**	**(3,889)**
Financial expenses	(3,682)	(4,864)	(4,728)	(2,437)	(2,470)
Financial income	1,377	3,627	3,210	2,039	3,511
Share in loss of joint venture	(392)	(475)	(469)	(1,018)	(401)
Profit (loss) before taxes	**4,319**	**3,452**	**(1,595)**	**(1,309)**	**(3,249)**
Income taxes	(2,595)	(425)	(522)	(1,710)	389
Net profit (loss) for the year	**1,724**	**3,027**	**(2,117)**	**(3,019)**	**(2,860)**
Net profit (loss) attributable to:					
The owners of the parent	1,646	3,027	(2,117)	(3,019)	(2,807)
Non-controlling interest	78	—	—	—	(53)
Earnings per share attributable to the owners of the parent					
Basic	0.03	0.06	(0.04)	(0.06)	(0.06)
Diluted	0.03	0.06	(0.04)	(0.06)	(0.06)
Weighted average number of ordinary shares for basic earnings per share (´000)	52,915	49,806	47,325	47,325	47,224
Weighted average number of ordinary shares adjusted for effect of dilution (´000)	53,987	50,697	47,325	47,325	47,224
Consolidated Statements of Comprehensive Income Data:					
Net profit (loss)	1,724	3,027	(2,117)	(3,019)	(2,860)
Other comprehensive income (loss), net of taxes	245	(47)	(691)	(1,833)	624
Total comprehensive income (loss) for the year, net of taxes	1,969	2,980	(2,808)	(4,852)	(2,236)

Other Data (unaudited):

in 000€	For the year ended December 31, 2019	2018	2017	2016	2015
Adjusted EBITDA (unaudited)(1)	26,656	23,526	14,610	9,458	3,687

(1) We calculate EBITDA as net profit (loss) for the year plus income taxes, financial expenses (less financial income), depreciation and amortization, and share in loss of joint venture. We calculate Adjusted EBITDA by adding non-cash share-based compensation expenses and acquisition-related expenses of business combinations to EBITDA. Disclosure in this annual report of EBITDA and Adjusted EBITDA, which are non-IFRS financial measures, is intended as a supplemental measure of our performance that is not required by, or presented in accordance with, IFRS. EBITDA and Adjusted EBITDA should not be considered as alternatives to net profit or any other performance measure derived in accordance with IFRS. Our presentation of EBITDA and Adjusted EBITDA should not be construed to imply that our future results will be unaffected by unusual or non-recurring items. For additional information, see “Item 5. Operating and Financial Review and Prospects—A. Operating Results—Other Financial Information.” The following table reconciles net profit to EBITDA and Adjusted EBITDA for the periods presented:

in 000€	For the year ended December 31, 2019	2018	2017	2016	2015
Net profit (loss)	1,724	3,027	(2,117)	(3,019)	(2,860)
Income taxes	2,595	425	522	1,710	(389)
Financial expenses	3,682	4,864	4,728	2,437	2,470
Financial income	(1,377)	(3,627)	(3,210)	(2,039)	(3,511)
Depreciation and amortization	19,198	17,287	12,576	8,374	6,810
Share in loss of joint venture	392	475	469	1,018	401
EBITDA (unaudited)	**26,214**	**22,451**	**12,968**	**8,481**	**2,921**
Non-cash share-based compensation expenses[a]	302	1,075	1,033	977	766
Acquisition-related expenses of business combinations[b]	140	—	609	—	—
Adjusted EBITDA (unaudited)	**26,656**	**23,526**	**14,610**	**9,458**	**3,687**

(a) Non-cash share-based compensation expenses represent the cost of equity-settled and cash-settled share-based payments to employees.
(b) Acquisition-related expenses of business combinations represent fees and costs in connection with the acquisition of ACTech in 2017 and the Engimplan acquisition in 2019.

B. Capitalization and Indebtedness

Not applicable.

C. Reasons for the Offer and Use of Proceeds

Not applicable.

D. Risk Factors

Risks Relating to Our Business

We may not be able to maintain or increase the market share or reputation of our software and other products and services that they need to remain or become a market standard.

The additive manufacturing, or 3D printing, industry is rapidly growing on a global scale and is subject to constant innovation and technological change. A variety of technologies compete against one another in our market, which is driven, in part, by technological advances and end-user requirements and preferences, as well as by the emergence of new standards and practices. As the additive manufacturing market evolves, the industry standards that are adopted and adhered to are a function of the inherent qualities of the technology as well as the willingness of members of the industry to adopt them. To remain competitive, we depend in large part on our ability to increase and maintain market share and influence in the industry in order to be recognized as a market standard. Nonetheless, in the future, our influence in setting standards for the additive manufacturing industry may be limited and the standards adopted by the market may not be compatible with our present or future products and services.

We may not be successful in continuing to enhance and adapt our software, products and services in line with developments in market technologies and demands.

Our present or future software, products and services could be rendered obsolete or uneconomical by technological advances by one or more of our present or future competitors or by other technologies. Our ability to remain competitive will depend, in large part, on our ability to enhance and adapt our current software, product and services to developments in market technologies and demands and to enhance and develop new 3D printing software solutions, products and services. We believe that to remain competitive we must continuously enhance and expand the functionality and features of our products, services and technologies. However, there can be no assurance that we will be able to:

- maintain and enhance the market share of our current products, services and technologies;
- enhance our existing product, services and technologies;

- continue to leverage advances in 3D printing technology;
- develop new products, services and technologies that address the increasingly sophisticated and varied needs of prospective end-users;
- respond to technological advances and emerging industry standards and practices on a cost-effective and timely basis;
- develop products and services that are cost effective or that otherwise gain market acceptance; or
- adequately protect our intellectual property as we develop new products, services and technologies and anticipate intellectual property claims from third parties.

The research and development programs that we are currently engaged in, or that we may establish in the future, may not be successful and our significant investments in these programs may be lost.

To remain competitive, we currently, and we intend to continue to, invest significant amounts in various research and development programs. There can be no assurances, however, that these research and development programs will improve our existing additive manufacturing software solutions, products and services or create new software, products or services. Even if some of these programs are successful, it is possible that the new software, products or services developed from such programs will not be commercially viable, that new 3D printing technologies that we, or others, develop will eventually supplant our current 3D printing technologies, that changes in the manufacturing or use of 3D printers will adversely affect the need or demand for our software, products or services or that our competitors will create or successfully market 3D printing technologies that will replace our solutions, products and services in the market. As a result, any of our software solutions, products or services may be rendered obsolete or uneconomical and our significant investments in all or some of our research and development programs may be lost.

Existing and increased competition may reduce our revenue and profits.

The market segments in which we operate, Materialise Software, Materialise Medical and Materialise Manufacturing, are characterized by vigorous competition, by entry of competitors with innovative technologies, by consolidation of companies with complementary products, services and technologies, and by entry of large corporations in any one or more of our market segments.

In particular, the barriers to enter the software, medical and industrial markets with 3D printing solutions are decreasing rapidly.

In the Materialise Software segment, the availability of computing devices with continually expanding performance at progressively lower prices contributes to the ease of market entry. Additionally, there are certain open source software applications that are being offered free of charge or for a nominal fee that can place additional competitive pressure on us. In addition, 3D printer manufacturers, which closely work with their customers, may successfully bundle their own software solutions with their equipment, which may make our independent software solutions obsolete. In addition, companies that have greater financial, technical, sales and marketing and other resources, including market leaders with significant in-house capacities in software development, or existing computer-aided design, or CAD, or computer-aided manufacturing, or CAM, software providers, may, at any point in time, enter the additive manufacturing market and very rapidly gain a significant share of the markets that we target.

In the Materialise Medical segment, medical device companies are investing in 3D printing solutions that may compete with our software solutions, products and services. Companies that initially rely on us to enter the additive manufacturing market for medical applications may, as they gain experience and as 3D printing technology gains strategic importance, decide to develop their own in-house solutions and enter the market themselves with their own software, products or services, thus becoming competitors and denying us continued access to their distribution channels.

In the Materialise Manufacturing segment, as additive manufacturing gains importance as a strategic technology, our customers are likely to bring 3D manufacturing in-house and reduce or even discontinue using our 3D printing services. In addition, competitors with more efficient or profitable business models, superior techniques or more advanced technologies may take market share away from us.

Because of these and other factors, competitive conditions in the industry are likely to intensify in the future. Increased competition could result in price reductions, reduced revenue and operating margins and loss of market share, any of which would likely harm our results of operations.

We rely on collaborations with users of our additive manufacturing solutions to be present in certain large scale markets and, indirectly, to expand into potentially high-growth specialty markets. Our inability to continue to develop or maintain these relationships in the future could harm our ability to remain competitive in existing markets and expand into other markets.

Our strategy includes entering into collaborations with our customers in certain large-scale markets and leveraging these collaborations to enter into other underserved specialty markets. For example, in the medical market, we have entered into collaborations with Zimmer Biomet Holdings, Inc., or Zimmer Biomet, Encore Medical, L.P. (d/b/a DJO Surgical), or DJO Surgical, DePuy Synthes Companies of Johnson & Johnson, or DePuy Synthes, Limacorporate Spa, or Lima, Mathys AG, or Mathys, Corin Ltd, or Corin, Medtronic Inc., or Medtronic, and Abbott Laboratories Inc., or Abbott. Increased adoption of our software, products and services, especially in potentially high-growth specialty markets, will depend in part on our current and future collaborators' willingness to continue to adopt our additive manufacturing solutions in their markets and on our ability to continue to collaborate with these and other players. Certain of our customers that have initially relied on our 3D printing software and services have announced their intention to bring their 3D printing operations in-house and enter the market themselves, and other customers may also do so in the future as they gain experience and as 3D printing technology gains strategic importance, thus denying us continued access to their distribution channels. In addition, a change of control of any of our collaboration partners may negatively impact our relationship. If we are not able to maintain our existing collaborations and develop new collaborative relationships, our foothold in larger markets and expansion into potentially high-growth specialty markets could be harmed significantly.

Our revenue and results of operations may fluctuate.

Our revenue and results of operations may fluctuate from quarter-to-quarter and year-to-year and are likely to continue to vary due to a number of factors, many of which are not within our control. You should not rely on our past results as an indication of our future performance.

Fluctuations in our results of operations and financial condition may occur due to a number of factors, including, but not limited to, those listed below and those identified throughout this annual report:

- our ability to continue, renew or replace relationships with key customers;
- the degree of market acceptance of our software and our products;
- the mix of software, products and services that we sell during any period, as well as the mix of the various markets in which we make sales during said periods;
- a decline in new or renewed periodic licenses or maintenance contracts;
- delays in the introduction of new features;
- the entry of new competitors into our market;
- the development and degree of market acceptance of new competitive systems or processes by others;
- changes in our pricing policies or those of our competitors, including our responses to price competition;
- changes in the amount we spend in our marketing and other efforts;
- delays between our expenditures to develop, acquire or license new technologies and processes, and the generation of sales related thereto;
- the amounts we spend on, and the success rate of, our research and development activities;
- changes in the regulatory environment, including changes in regulatory laws and regulations and the interpretation thereof, applicable to our software programs, products or services;
- delays in obtaining regulatory approval for our software programs, products or services;
- interruptions to or other problems with our website and interactive user interface, information technology systems, manufacturing processes or other operations;
- general economic and industry conditions that affect end-user demand and end-user levels of product design and manufacturing, including the adverse effects of global economic uncertainties such as the recent global economic uncertainty related to the novel coronavirus pandemic; and
- changes in accounting rules and tax laws.

Demand for additive manufacturing generally and our additive manufacturing software solutions, products and services in particular may not increase adequately.

The industrial and medical industries are generally dominated by conventional production methods with limited use of additive manufacturing technology in certain specific instances. If additive manufacturing technology, in particular but not limited to, for the production of end parts does not gain more mainstream market acceptance, or gains market acceptance at a significantly slower pace than currently expected, or if the marketplace adopts additive manufacturing based on a technology other than the technologies that we currently use or serve, we may not be able to meet our growth objectives or increase or sustain the level of sales of our additive manufacturing software solutions, products and services, and our results of operations would be adversely affected as a result.

We are dependent upon sales to certain industries.

Our revenue from products are currently relatively concentrated in the industrial and medical industries, and particularly in the automotive and orthopedic/cranio-maxillofacial segments within such industries, respectively. To the extent any of these industries experiences a downturn and we are unable to penetrate and expand in other industries, our results of operations may be adversely affected. Additionally, if any of these industries or their respective suppliers or other providers of manufacturing services develop new technologies or alternatives to manufacture the products that are currently manufactured using our 3D printing software, products and services, it may adversely affect our results of operations.

If our relationships with suppliers, including with limited source suppliers of consumables, were to terminate or our manufacturing arrangements were to be disrupted, our business could be adversely affected.

We purchase consumables and other components that are used in our production from third-party suppliers. We currently use only a limited number of suppliers for several of the consumables for our print materials. Our reliance on a limited number of vendors involves a number of risks, including:

- potential shortages of some key consumables or other components;
- printed material performance or quality shortfalls, if traceable to particular consumables or other components, since the supplier of the faulty consumable or component cannot readily be replaced;
- discontinuation of a consumable or other component on which we rely;
- potential insolvency of these vendors; and
- reduced control over delivery schedules, manufacturing capabilities, quality and costs.

If certain suppliers were to decide to discontinue production, or the supply to us, of a consumable or other component that we use, the unanticipated change in the availability of supplies, or unanticipated supply limitations, could cause delays in, or loss of, sales, increased production or related costs and, consequently, reduced margins, and damage to our reputation. In addition, because we use a limited number of suppliers, increases in the prices charged by our suppliers may have an adverse effect on our results of operations, as we may be unable to find a supplier who can supply us at a lower price. As a result, the loss of a limited source supplier could adversely affect our relationships with our customers and our results of operations and financial condition.

We depend on the knowledge and skills of our senior management and other key personnel, and if we are unable to retain and motivate them or recruit additional qualified personnel, our operations could suffer.

Our success depends upon the continued service and performance of our senior management and other key personnel, including engineers, designers, software developers and product managers, and our ability to identify, hire, develop, motivate and retain qualified personnel in the future. Competition for senior management and key employees in our industry is intense and we cannot guarantee that we will be able to retain our personnel or attract new, qualified personnel. We may need to invest significant amounts of cash and equity to attract and retain new employees and we may not realize returns on these investments. The loss of the services of members of our senior management or key employees could prevent or delay the implementation and completion of our strategic objectives, could divert management's attention to seeking certain qualified replacements or could adversely affect our ability to manage our company effectively. Each member of senior management as well as our key employees may resign at any time. Only some of the members of our senior management are subject to non-competition agreements, which may also be difficult to enforce. Accordingly, the adverse effect resulting from the loss of certain members of senior management or other key employees could be compounded by our inability to prevent them from competing with us. We do not carry key-man insurance on any member of our senior management team or other key personnel. If we lose the ability to hire and retain key executives and employees with a diversity and high level of skills in appropriate domains (such as research and development and sales), it could have a material adverse impact on our business activities and results of operations.

In addition, the success of our acquisitions may depend in part on our ability to retain senior management and other key personnel of the acquired company following the acquisition and to continue to attract such persons to our company. For example, the companies we acquire may depend on small teams of founders and senior managers with extensive market knowledge and relationships or that exercise substantial influence over the acquired business. As result, the loss of such persons could adversely affect us.

We may need to raise additional capital from time to time in order to meet our growth strategy and may be unable to do so on attractive terms, or at all.

We intend to continue to make investments to support the growth of our business and may require additional funds to respond to business challenges, including the need to implement our growth strategy, increase market share in our current markets or expand into other markets, or broaden our technology, intellectual property or service capabilities. Accordingly, we may require additional investments of capital from time to time, and our existing sources of cash and any funds generated from operations may not provide us with sufficient capital. For various reasons, including any noncompliance with existing or future lending arrangements, additional financing, may not be available when needed, or may not be available on terms favorable to us. If we fail to obtain adequate capital on a timely basis or if capital cannot be obtained on terms satisfactory to us, we may not be able to achieve our planned rate of growth, which will adversely affect our results of operations.

Our international operations subject us to various risks, and our failure to manage these risks could adversely affect our results of operations.

We face significant operational risks as a result of doing business internationally, such as:

- fluctuations in foreign currency exchange rates;

- potentially longer sales and payment cycles;
- potentially greater difficulties in collecting accounts receivable;
- potentially adverse tax consequences, including liabilities imposed from inconsistent enforcement;
- challenges in providing solutions across a significant distance, in different languages and among different cultures;
- the impact of global public health crises, such as the coronavirus pandemic currently impacting almost all large economies worldwide;
- transportation delays;
- becoming subject to the different, complex and changing laws, regulations and court systems of multiple jurisdictions and compliance with a wide variety of foreign laws, treaties and regulations;
- reduced protection of, or significant difficulties in enforcing, intellectual property rights in certain countries;
- difficulties in staffing and managing foreign operations, particularly in new geographic locations;
- restrictions imposed by local labor practices and laws on our business and operations, including unilateral cancellation or modification of contracts;
- expropriation or nationalization of property;
- rapid changes in government, economic and political policies and conditions, political or civil unrest or instability, terrorism or pandemics, epidemics and other similar outbreaks or events;
- operating in countries with a higher incidence of corruption and fraudulent business practices;
- seasonal reductions in business activity in certain parts of the world, particularly during the summer months in Europe;
- costs and difficulties of customizing products for foreign countries; and
- tariffs, trade barriers and other regulatory or contractual limitations on our ability to sell or develop our products in certain foreign markets.

We maintain important software research and development and engineering centers in Malaysia and Ukraine. In Malaysia, the government may exercise substantial control over certain sectors of the economy through regulation and state ownership. In Ukraine, the political and economic situation, in general, and the relations among Ukraine, United States, the European Union and Russia, in particular, remain unstable. We continue to monitor the situation in Ukraine and have a risk mitigation plan designed to limit the impact on our operations in case of escalation of the instability in that region. However, escalation could have a significant impact on our operations, in particular in the event where internet services would no longer be available in Ukraine or where the situation would become such that our employees would no longer be able to work from their homes. Our facility in Ukraine does not focus on sales to the Ukrainian market and mainly provides supporting activities for our global operations. Any material disruption of these supporting activities, however, could significantly impact our ability to further develop our products and to continue to service our customers globally. Moreover, changes in the laws and regulations of Malaysia or Ukraine, or in their interpretation or enforcement, including with respect to operations such as ours, which rely to a large extent on local private entrepreneurs, may significantly impact our activities in Malaysia or Ukraine, which would limit our future growth and adversely affect our results of operations. In addition, in August 2019, we acquired a 75% interest in Engimplan, a Brazil-based manufacturer of orthopaedic and cranio-maxillofacial (CMF) implants and instruments. Brazil has experienced recent political and economic uncertainty and instability, including as a result of country-wide money laundering and corruption probes. Our failure to manage the market and operational risks associated with our international operations effectively could limit the future growth of our business and adversely affect our results of operations.

Our international operations pose currency risks, which may adversely affect our results of operations and net income.

Our results of operations may be affected by volatility in currency exchange rates and our ability to effectively manage our currency transaction risks. In general, we conduct our business, earn revenue and incur costs in the local currency of the countries in which we operate. During the year ended December 31, 2019, approximately 71% of our revenue was generated, and approximately 72% of our total costs were incurred in euros. As we continue to expand internationally, our exposure to currency risks will increase. Historically, we have not managed our foreign currency exposure in a manner that would eliminate the effects of changes in foreign exchange rates. Changes in exchange rates between the foreign currencies in which we do business and the euro will affect our revenue, cost of sales, and operating margins, and could result in exchange losses in any given reporting period.

Changes in tax laws, treaties or regulations could adversely affect our financial results.

Our future effective tax rates could be adversely affected by changes in tax laws, treaties and regulations, both internationally and domestically, including possible changes to the patent income deduction and innovation income deduction regime in Belgium or the way it proportionately impacts our effective tax rate. An increase of our future effective tax rates could have a material adverse effect on our business, financial position, results of operations and cash flows.

We may engage in acquisitions or investments that could disrupt our business, cause dilution to our shareholders and harm our financial condition and results of operations.

We have in the past and intend to continue to evaluate opportunities to acquire or invest in, companies that we believe have products, services, competencies or capabilities that are a strategic or commercial fit with any of our businesses or that otherwise offer opportunities for our company. For example, in August 2019, we acquired a 75% interest in Engimplan, a Brazil-based manufacturer of orthopaedic and CMF implants and instruments.

In connection with acquisitions or investments, we may:

- issue American Depositary Shares, or ADSs, or other forms of equity that would dilute our existing shareholders' percentage of ownership;
- incur debt and assume liabilities; and/or
- incur amortization expenses related to intangible assets or incur large and immediate write-offs.

If we complete an acquisition or investment, we cannot assure you that it will ultimately strengthen our competitive position or that it will be viewed positively by customers, suppliers, employees, financial markets or investors. Furthermore, future acquisitions or investments could pose numerous additional risks to our operations, including:

- problems integrating the purchased business, products, services or technologies;
- challenges in achieving strategic objectives, cost savings and other anticipated benefits;
- increases to our expenses;
- due diligence investigations failing to discover undisclosed liabilities or risks affecting the acquired businesses;
- the assumption of significant liabilities that exceed the limitations of any applicable indemnification provisions or the financial resources of any indemnifying party;
- inability to maintain relationships with key customers, vendors and other business partners of our current or acquired businesses;
- diversion of management's attention from their day-to-day responsibilities;
- difficulty in maintaining controls, procedures and policies during the transition and integration;
- entrance into marketplaces where we have no or limited prior experience and where competitors have stronger marketplace positions;
- potential loss of key employees, particularly those of the acquired entity; and
- historical financial information may no longer be representative or indicative of our results as a combined company.

Alternatively, while certain acquisitions or investments may be of strategic importance for the execution of our business plan, we may not ultimately be able to complete such acquisitions or investments on favorable terms, or at all, which may in turn materially affect our ability to grow or even cause us to lose market share, and could have a material adverse effect on our business, financial condition and results of operations.

We may enter into collaborations, in-licensing arrangements, joint ventures, strategic alliances or partnerships with third parties that may not result in the development of commercially viable products or the generation of significant future revenue.

In the ordinary course of our business, we may enter into collaborations, in-licensing arrangements, joint ventures, strategic alliances or partnerships to develop proposed products or services and to pursue new markets. For example, in the Materialise Medical segment, we have collaborations with leading medical device companies and academic institutions for the development and distribution of our surgical planning software, services, and products, including with Zimmer Biomet, DJO Surgical, DePuy Synthes, Lima, Medtronic, Abbott, Corin, Mathys and the University of Michigan. Furthermore, in the Materialise Software segment, we have established collaborations with Siemens PLM, or Siemens, and Essentium Inc., or Essentium, and, in the Materialise Manufacturing segment, we have established collaborations with HOYA Vision Care Company,

or HOYA, PTC Inc., or PTC, BASF 3D Printing Solutions GmbH and Essentium. Proposing, negotiating and implementing collaborations, in-licensing arrangements, joint ventures, strategic alliances or partnerships may be a lengthy and complex process. Other companies, including those with substantially greater financial, marketing, sales, technology or other business resources, may compete with us for these opportunities or arrangements. We may not succeed in maintaining, renewing or extending existing collaborations or in identifying, securing, or completing any such new transactions or arrangements in a timely manner, on a cost-effective basis, on acceptable terms or at all. We may also not realize the anticipated benefits of any such transaction or arrangement. In particular, these collaborations may not result in the development of products or services that achieve commercial success or result in significant revenue and could be terminated prior to developing any products or services.

Additionally, we may not be in a position to exercise sole decision making authority regarding the transaction or arrangement, which could create the potential risk of creating impasses on decisions, and our collaboration partners may have economic or business interests or goals that are, or that may become, inconsistent with our economic or business interests or goals. It is possible that conflicts may arise with our current or future collaboration partners, such as conflicts concerning the achievement of performance milestones, or the interpretation of terms under any agreement, such as those related to financial obligations, the ownership or license rights or control of intellectual property developed before or during the collaboration or indemnification. If any conflicts arise with our current or future collaboration partners, they may act in their self-interest, which may be adverse to our best interest, and they may breach their obligations to us. In addition, we have limited control over the amount and timing of resources that our current collaboration partners or any future collaboration partners devote to our collaboration partners' or our future products or services. Disputes with our collaboration partners may result in litigation or arbitration that would increase our expenses and divert the attention of our management. Further, these transactions and arrangements are contractual in nature and may be terminated or dissolved under the terms of the applicable agreements and, in such event, we may not continue to have rights to the products or access to the markets relating to such transaction or arrangement or may need to purchase such rights at a premium.

Failure to comply with applicable anti-corruption legislation could result in fines, criminal penalties and an adverse effect on our business.

We operate in a number of countries throughout the world, and are committed to doing business in accordance with applicable anti-corruption laws. We are subject, however, to the risk that our officers, directors, employees, agents and collaboration partners may take action determined to be in violation of such anti-corruption laws, including the U.S. Foreign Corrupt Practices Act of 1977, the U.K. Bribery Act 2010 and the Belgian Penal Code, as well as trade sanctions administered by the Office of Foreign Assets Control and the U.S. Department of Commerce. Any such violation could result in substantial fines, sanctions, civil and/or criminal penalties or curtailment of operations in certain jurisdictions, and might adversely affect our results of operations. In addition, actual or alleged violations could damage our reputation and ability to do business.

Errors or defects in our software or other products could cause us to incur additional costs, lose revenue and business opportunities, damage our reputation and expose us to potential liability.

Sophisticated software and complex 3D printed products may contain errors, defects or other performance problems at any point in the life of the product. If errors or defects are discovered in our current or future software or other products, we may not be able to correct them in a timely manner, or provide an adequate response to our customers. We may therefore need to expend significant financial, technical and management resources, or divert some of our development resources, in order to resolve or work around those defects. We may also experience an increase in our service and warranty costs. Particularly in the medical sector, errors or defects in our software or products could lead to claims by patients against us and our customers and expose us to lawsuits that may damage our and our customers' reputations. Claims may be made by individuals or by classes of users. Our product liability and related insurance policies may not apply or sufficiently cover any product liability lawsuit that arises from defective software or products. Customers such as our collaboration partners may also seek indemnification for third party claims allegedly arising from breaches of warranties under our collaboration agreements.

Errors, defects or other performance problems in our software or other products may also result in the loss of, or delay in, the market acceptance of our software, our products and related 3D printing or engineering services or postponement of customer deployment. Such difficulties could also cause us to lose customers and, particularly in the case of our largest customers, the potentially substantial associated revenue which would have been generated by our sales to companies participating in our customer's supply chain. Technical problems, or the loss of a customer with a particularly important global reputation, could also damage our own business reputation and cause us to lose new business opportunities.

We rely on our information technology systems to manage numerous aspects of our business and customer and supplier relationships, and a disruption of these systems could adversely affect our results of operations.

We rely on our information technology systems and databases to manage numerous aspects of our business and to provide analytical information to management. Our information technology systems allow us to, among other things, optimize our software development and research and development efforts, organize our in-house 3D printing services logistics, efficiently purchase products from our suppliers, provide other procurement and logistic services, ship and invoice products to our customers on a timely basis, maintain cost-effective operations and generally provide service to our customers. Our information technology systems are an essential component of our business and growth strategies, and a disruption to our information technology systems could significantly limit our ability to manage and operate our business efficiently. Although we take steps to secure our information technology systems, including our computer systems, intranet and internet sites, email and other telecommunications and data networks, the security measures we have implemented may not be effective and our systems may be vulnerable to, among other things, damage and interruption from power loss, including as a result of natural disasters, computer system and network failures, loss of telecommunication services, operator negligence, loss of data, security breaches, computer viruses and other disruptive events. Any such disruption could adversely affect our reputation, brand and financial condition.

A breach of security in our products or computer systems may compromise the integrity of our products, harm our reputation, create additional liability and adversely impact our financial results.

We make significant efforts to maintain the security and integrity of our product source code and computer systems. The risk of a security breach or disruption, particularly through cyber attack or cyber intrusion, including by computer hackers, foreign governments and cyber terrorists, has increased as the number, intensity and sophistication of attempted attacks and intrusions from around the world have increased. These threats include identity theft, unauthorized access, DNS attacks, wireless network attacks, viruses and worms, advanced persistent threat (APT), application centric attacks, peer-to-peer attacks, phishing, backdoor trojans and distributed denial of service (DDoS) attacks. Any of the foregoing could attack our products and computer systems. Despite significant efforts to create and continuously reinforce the security barriers to such programs, it is virtually impossible for us to entirely eliminate this risk. Like all software products and computer systems, our software products and computer systems are vulnerable to such cyber attacks, and our computer systems have been subject to certain cyber security incidents in the past. The impact of cyber attacks could disrupt the proper functioning of our software products and computer systems, cause errors in the output of our or our customers' work, allow unauthorized access to sensitive, proprietary or confidential information of our company, our customers or the patients that we and our customers serve through our medical solutions. Moreover, as we continue to invest in new lines of products and services we are exposed to increased security risks and the potential for unauthorized access to, or improper use of, the information of our product and service users. If any of the foregoing occur, our reputation may suffer, customers may stop buying our products or services, we could face lawsuits and potential liability, and our results of operations could be adversely affected.

We rely on third party technology, platform, carriers, server and hardware providers, and a failure of service by these providers could adversely affect our business and reputation.

We rely upon a third party provider to host our main servers. If this provider is unable to handle current or higher volumes of use, experiences any interruption in operations or ceases operations for any reason or if we are unable to agree on satisfactory terms for a continued hosting relationship, we would be forced to enter into a relationship with other service providers or assume hosting responsibilities ourselves. If we are forced to switch hosting facilities, we may not be successful in finding an alternative service provider on acceptable terms or in hosting the computer servers ourselves. We may also be limited in our remedies against our third party hosting provider in the event of a failure of service. A failure or limitation of service or available capacity by our third party hosting provider could adversely affect our business and reputation.

Workplace accidents or environmental damage could result in substantial remedial obligations and damage to our reputation.

Accidents or other incidents that occur at our service centers and other facilities or involve our personnel or operations could result in claims for damages against us. In addition, in the event we are found to be financially responsible, as a result of environmental or other laws or by court order, for environmental damages alleged to have been caused by us or occurring on our premises, we could be required to pay substantial monetary damages or undertake expensive remedial obligations. The amount of any costs, including fines or damages payments that we might incur under such circumstances could substantially exceed any insurance we have to cover such losses. Any of these events, alone or in combination, could have a material adverse effect on our business, financial condition and results of operations and could adversely affect our reputation.

Our operations are subject to environmental laws and other government regulations that could result in liabilities in the future.

We are subject to local environmental laws and regulations governing our operations, including, but not limited to, emissions into the air and water and the use, handling, disposal and remediation of hazardous substances. A certain risk of environmental liability is inherent in our production activities. Under certain environmental laws, we could be held solely or jointly and severally responsible, regardless of fault, for the remediation of any hazardous substance contamination at our service centers and other facilities and the respective consequences arising out of human exposure to such substances or other environmental damage. We may not have been and may not be at all times in complete compliance with environmental laws, regulations and permits, and the nature of our operations exposes us to the risk of liabilities or claims with respect to environmental and worker health and safety matters. If we violate or fail to comply with environmental laws, regulations and permits, we could be subject to penalties, fines, restrictions on operations or other sanctions, and our operations could be interrupted. The cost of complying with current and future environmental, health and safety laws applicable to our operations, or the liabilities arising from past releases of, or exposure to, hazardous substances, may result in future expenditures. Any of these developments, alone or in combination, could have a material adverse effect on our business, financial condition and results of operations.

If our service center operations are disrupted, sales of our 3D printing services, including the medical devices that we print, may be affected, which could have an adverse effect on our results of operations.

We have six 3D printing service centers in Europe, the United States and Asia, including our principal 3D printing service center located in Leuven, Belgium. If the operations of these facilities are materially disrupted, whether by fires or other industrial accidents, extreme weather, natural disasters, labor stoppages, acts of terror, or otherwise, we would be unable to fulfill customer orders for the period of the disruption, we would not be able to recognize revenue on orders, we could suffer damage to our reputation, and we might need to modify our standard sales terms to secure the commitment of new customers during the period of the disruption and perhaps longer. Depending on the cause of the disruption, we could incur significant costs to remedy the disruption and resume providing 3D printing services. Such a disruption could have an adverse effect on our results of operations.

We could experience unforeseen difficulties in building and operating key portions of our 3D printing infrastructure.

We have designed and built our own 3D printing operations, 3D printer platforms and other key portions of our technical infrastructure through which we serve our products and services, and we plan to continue to expand the size of our infrastructure through expanding our 3D printing facilities. The infrastructure expansion we may undertake may be complex, and unanticipated delays in the completion of these projects or availability of components may lead to increased project costs, operational inefficiencies, or interruptions in the delivery or degradation of the quality of our products. In addition, there may be issues related to this infrastructure that are not identified during the design and implementation phases, which may only become evident after we have started to fully utilize the underlying equipment, that could further degrade the user experience or increase our costs.

We may not have adequate insurance for potential liabilities, including liabilities arising from litigation.

In the ordinary course of business, we have been, and in the future may be, subject to various product and non-product related claims, lawsuits and administrative proceedings seeking damages or other remedies arising out of our commercial operations, including litigation related to defects in our software or other products. We maintain insurance to cover our potential exposure for a number of claims and losses. However, our insurance coverage is subject to various exclusions, self-retentions and deductibles, may be inadequate or unavailable to protect us fully, and may be cancelled or otherwise terminated by the insurer. Furthermore, we face the following additional risks related to our insurance coverage:

- we may not be able to continue to obtain insurance coverage on commercially reasonable terms, or at all, including with respect to our activities in the medical industry;
- we may be faced with types of liabilities that are not covered under our insurance policies, such as environmental contamination, terrorist attacks or alleged infringements of third parties' intellectual property rights, and that exceed any amounts that we may have reserved for such liabilities;
- the amount of any liabilities that we may face may exceed our policy limits; and
- we may incur losses resulting from the interruption of our business that may not be fully covered under our insurance policies.

Even a partially uninsured claim of significant size, if successful, could have a material adverse effect on our business, financial condition, results of operations and liquidity. However, even if we successfully defend ourselves against any such claim, we could be forced to spend a substantial amount of money in litigation expenses, our management could be required to spend valuable time defending these claims and our reputation could suffer, any of which could adversely affect our results of operations.

Current and future global economic uncertainties and political conditions may adversely affect our results of operations.

Our results of operations could be substantially affected not only by global economic conditions, but also by local operating, economic, public health or environmental conditions, which can vary substantially by market. Unfavorable conditions can depress sales in a given market and may result in actions that adversely affect our margins, constrain our operating flexibility or result in charges that are unusual or non-recurring. Certain macroeconomic events, such as adverse conditions in the global economy, including most recently with the market disruptions caused by the containment measures taken by almost all countries with major economies in response to the coronavirus pandemic, the consequences of the exit by the United Kingdom from the European Union (commonly referred to as "Brexit") and the economic and political challenges facing China, Brazil and certain Eurozone countries, could have a more wide-ranging and prolonged impact on the general business environment, which could also adversely affect us. These economic developments could affect us in numerous ways, many of which we cannot predict. We are unable to predict the likely duration and severity of the current disruption in financial markets and adverse economic conditions, or the effects these disruptions and conditions could have on us.

In addition, political and economic developments could also result in changes to legislation or reformation of government policies, rules and regulations, including in relation to tax and trade. Such changes could have a significant impact on our business by increasing the cost of doing business, affecting our ability to sell our software, products and services and negatively impacting our profitability. For example, on January 31, 2020, the United Kingdom ceased to be a member state of the European Union. As of that date, the United Kingdom entered a transitional period with the European Union, which is expected to continue through December 31, 2020. During this transitional period, the United Kingdom retains access to the E.U. single market and customs union and the United Kingdom and the European Union are expected to attempt to negotiate various aspects of their future relationship following the transitional period, including a free trade deal. The long-term effects of Brexit will depend on the agreements or arrangements between the United Kingdom and the European Union, and the extent to which the United Kingdom retains access to the E.U. markets both during and after the transitional period. The longer term economic, legal, political and social framework to be put in place between the United Kingdom and the European Union is unclear at this stage and is likely to lead to ongoing political and economic uncertainty and periods of exacerbated volatility in both the United Kingdom and in wider European markets for some time. Although it is unknown what the final terms of the United Kingdom's future relationship with the European Union will be, it is possible that there will be greater restrictions on imports and exports between the United Kingdom and European Union countries and increased regulatory complexities. These changes may adversely affect our operations and financial results.

Additionally, in the United States, President Trump's administration has discussed, and in some cases implemented, changes with respect to certain tax and trade policies, tariffs and other government regulations affecting trade between the United States and other countries. For

example, trade relations between the United States and China were, at times, significantly strained during calendar 2019, as both countries imposed increased tariffs on the importation of certain product categories. While it is not possible to predict whether or when any additional changes will occur or what form they may take, the implementation of a border tax, tariff or higher customs duties on our products imported into the United States or on raw materials we import into the United States, or any potential corresponding actions by other countries in which we do business, could negatively impact our financial performance. In addition, other countries may change their business and trade policies in anticipation of or in response to increased import tariffs and other changes in the United States' trade policy and regulations, which could also negatively impact our financial performance.

The coronavirus global health crisis could have a material adverse impact on our business, results of operations, financial condition, cash flows or liquidity.

The outbreak of a novel coronavirus, was first identified in December 2019 in Wuhan, China, and has since spread globally. In response to the pandemic, governments worldwide have closed business, restricted travel and implemented emergency quarantines, and businesses and individuals have reduced travel, cancelled meetings and events and implemented work-from-home policies, which have caused significant disruption to the global economy and normal business operations. The coronavirus public health crisis may have broader macroeconomic implications, including a decrease in or halt to economic growth, the effects of which could be long lasting.

In an effort to protect the health and safety of employees, we, and many of our customers, partners, suppliers and other counterparties, currently require that employees work from home and restrict travel as much as possible, which affects, among other things, their ability to attend industry events and to engage in commercial visits. In the event we or our customers, partners, suppliers and other counterparties maintain or expand these restrictions, we may suffer disruptions to business operations, including the closure of manufacturing facilities, warehouses and logistics supply chains worldwide. Furthermore, the coronavirus and the responses thereto could have a range of other effects on us. For example, the implementation of business continuity plans in a fast-moving public health emergency could have an adverse effect on our internal controls (potentially giving rise to significant deficiencies or material weaknesses) and increase our vulnerability to information technology and other systems disruptions.

As of the date of this report, we are unable to predict the duration and severity of the spread of the coronavirus and the political and economic responses thereto and as a result, we are unable to assess with certainty its impact on our business and operations, results of operations, financial condition, cash flows and liquidity. The coronavirus and related responses are developing rapidly, making their impact highly uncertain, and are subject to many factors beyond our control, such as the speed of contagion, the implementation of effective preventative and containment measures, the development of effective medical solutions, the timing and scope of governmental restrictions on public gatherings, mobility and other activities, financial and other market reactions, and reactions and responses of the public. In particular, although we have included under "Item 5. Operating and Financial Review and Prospects —D. Trend Information" of this annual report and in the notes to our audited consolidated financial statements a discusion, based on our current assessment of the coronavirus pandemic, of how our business, results of operations, and financial condition could be impacted during the year 2020, this discussion should be considered as highly uncertain. While we expect we will suffer adverse effects, the more severe the outbreak is and the longer it lasts, the more likely it is that the effects on us and our business will be materially adverse.

We face potential liability related to the privacy and security of personal information we collect.

In particular, but not exclusively, in connection with our Materialise Medical segment, we may have access to personal information that is subject to a number of U.S. federal and state, E.U. and other applicable foreign laws protecting the confidentiality of certain patient health or other private information, including patient records, and restricting the use and disclosure of that protected information.

In the United States, we are subject to the Health Insurance Portability and Accountability Act, or HIPAA, the Health Information Technology for Economic and Clinical Health Act of 2009, regulations issued pursuant to these statutes, state privacy and security laws and regulations. These statutes, regulations and contractual obligations impose numerous requirements regarding the use and disclosure of personal health information with which we must comply. In addition, a new privacy law, the California Consumer Privacy Act, or CCPA, effective as of January 1, 2020, requires, among other things, covered companies, including us, to provide new disclosures to California consumers and afford such consumers the ability to opt out of certain sales of personal information. We cannot yet predict the impact of the CCPA on our business or operations, but it may require us to modify our data processing practices and policies and to incur substantial costs and expenses in an effort to comply.

In the European Union, the General Data Protection Regulation, or the GDPR, was passed on May 24, 2016, and replaced the E.U. Data Protection Directive when it came into force on May 25, 2018. GDPR introduced new data protection requirements in the European Union, unprecedented regulatory risk for non-compliant data processors and controllers and sizeable penalties for serious breaches—up to €20 million or 4% of global turnover, whichever is higher. The GDPR also significantly expands the territorial reach of existing E.U. data protection and privacy rules. Our business processes have been and continue to be modified in order to incorporate the requirements of the GDPR.

In ensuring continued compliance with the E.U. regime, our transfer of any personal data from the European Union to the United States must be done in a manner which satisfies E.U. cross-border data transfer requirements. While this may be achieved under the E.U.-U.S. "Privacy Shield," the legality of this regime has been challenged on a number of occasions in European courts. We will need to take steps to mitigate the risk of the Privacy Shield being invalidated as happened to the previous "Safe Harbour" regime. Adherence to the Privacy Shield is not, however, mandatory. U.S.-based companies are permitted to rely either on their adherence to the E.U.-U.S. Privacy Shield or on the other authorized means and procedures to transfer personal data provided by the GDPR, such as the inclusion of standard contractual clauses in contracts between controllers and processors.

In addition, the use and disclosure of personal health and other private information is subject to regulation in other jurisdictions in which we do business or expect to do business in the future. Those jurisdictions may attempt to apply such laws extraterritorially or through treaties or other arrangements with European governmental entities. We might unintentionally violate such laws, such laws may be modified and new laws may be enacted in the future which may increase the chance that we violate them. For example, the GDPR contains rules relating to the collection and processing of personal information, which are not identical to the current rules under national privacy laws and which contain more strict provisions. Any such developments, or developments stemming from enactment or modification of other laws, or the failure by us to comply with their requirements or to accurately anticipate the application or interpretation of these laws could create material liability to us, result in adverse publicity and negatively affect our medical business.

Our failure to accurately anticipate the application or interpretation of these statutes, regulations and contractual obligations as we develop our medical and other products and services, a failure by us to comply with their requirements (e.g., evolving encryption and security requirements) or an allegation that defects in our medical or other products have resulted in noncompliance by our customers could create material civil and/or criminal liability for us, resulting in adverse publicity and negatively affecting our medical business. Any legislation or regulation in the area of privacy and security of personal information could affect the way we operate and could harm our business. The costs of compliance with, and the other burdens imposed by, these and other laws or regulatory actions may prevent us from selling our solutions or increase the costs associated with selling our products and services, and may affect our ability to invest in or jointly develop our products and services in the United States, the European Union and in foreign jurisdictions. Further, we cannot assure you that our privacy and security policies and practices will be found sufficient to protect us from liability or adverse publicity relating to the privacy and security of personal information.

Risks Related to Our Materialise Medical Segment and Regulatory Environment

Our medical business, financial condition, results of operations and cash flows could be significantly and negatively affected by substantial government regulations.

Our medical products are subject to rigorous regulation by the European Commission, the U.S. Food and Drug Administration, or the FDA, and numerous other applicable governmental authorities. In general, the development, testing, manufacturing and marketing of our medical products are subject to extensive regulation and review by numerous governmental authorities in the European Union, the United States, Canada, Brazil, Japan and Australia, and in other markets where we are currently active or may become active in the future. The regulatory process requires the expenditure of significant time, effort and expense to bring new medical products to market, and we cannot be certain that we will receive regulatory approvals, certifications or registrations in any country in which we plan to market our medical products.

The laws and regulations, including the requirements for approvals, certifications or registrations and the time required for regulatory review, vary from country to country. The regulatory approval process outside the European Union and the United States may include all of the risks associated with obtaining CE or FDA clearance or approval in addition to other risks. Clearance or approval by the FDA in the United States, or conformity assessment and affixing a CE mark in the European Economic Area, or EEA, does not ensure approval or certification by regulatory authorities in other countries, and approval or certification by one foreign regulatory authority does not ensure approval by regulatory authorities in other countries. We may be required to perform additional pre-clinical or clinical studies even if FDA clearance or approval, or the right to bear the CE label, has been obtained. We may not obtain regulatory approvals or certifications outside the European Union and the United States on a timely basis, if at all. If we fail to receive necessary approvals to commercialize our medical products in jurisdictions outside the European Union and the United States on a timely basis, or at all, our medical business, financial condition and results of operations could be adversely affected.

As a manufacturer of medical devices, we participate in the Medical Device Single Audit Program, or MDSAP, which is a prerequisite for market entry in Canada, and which makes results from external audits by an accredited auditing organization available to the regulatory authorities of the United States, Canada, Brazil, Japan and Australia. A single audit is used in lieu of multiple separate audits or inspections by participating regulatory authorities or their representatives, reducing the overall number of audits or inspections. However, the auditing organization must inform regulatory authorities directly when certain non-conformity thresholds are reached, enabling participating regulatory authorities to immediately undertake actions appropriate for their jurisdictions.

In addition, we are required to implement and maintain stringent reporting, labeling and record keeping procedures and make our facilities and operations subject to periodic inspections, both scheduled and unannounced, by the regulatory authorities. The medical device industry is also subject to a myriad of complex laws and regulations governing reimbursement, which varies from jurisdiction to jurisdiction in the European Union and which includes Medicare and Medicaid reimbursement in the United States as well as healthcare fraud and abuse laws, with these laws and regulations being subject to interpretation. In many instances, the industry does not have the benefit of significant regulatory or judicial interpretation of these laws and regulations. In certain public statements, governmental authorities have taken positions on issues for which little official interpretation was previously available. Some of these positions appear to be inconsistent with common practices within the industry but that have not previously been challenged.

Various governmental agencies have become increasingly vigilant in recent years in their investigation of various business practices. Governmental and regulatory actions against us can result in various actions that could adversely impact our medical operations, including:

- the recall or seizure of products;

- the suspension or revocation of the authority necessary for the production or sale of a product;
- the delay of our ability to introduce new products into the market;
- the suspension of shipments from particular manufacturing facilities;
- the issuance of warning letters or untitled letters;
- the imposition of operating restrictions;
- the imposition of injunctions, fines and penalties;
- the exclusion of our products from being reimbursed by healthcare programs in the European Union or U.S. federal and state healthcare programs (such as Medicare, Medicaid, Veterans Administration health programs and Civilian Health and Medical Program of the Uniformed Services);
- the delay or denial of customs clearance of our products for import in certain jurisdictions; and
- other civil or criminal sanctions against us.

Failure to comply with applicable regulatory requirements could also result in civil actions against us and other unanticipated expenditures. Any of these actions, in combination or alone, or even a public announcement that we are under investigation for possible violations of these laws, could have a material adverse effect on our medical business, financial condition, results of operations and cash flows. If investigated, we cannot assure that the costs of defending or resolving those investigations or proceedings would not have a material adverse effect on our financial condition, results of operations and cash flows.

In many of the countries in which we market our medical products, we are subject to regulations affecting, among other things, clinical efficacy, product standards, packaging requirements, labeling requirements, import/ export restrictions, tariff regulations, duties and tax requirements. Many of the regulations applicable to our medical surgical guides, models, implants and software products in these countries are similar to those of the European Commission and the FDA. In addition, in many countries the national health or social security organizations require our medical products to be qualified before they can be marketed with the benefit of reimbursement eligibility. Failure to receive or delays in the receipt of relevant foreign qualifications also could have a material adverse effect on our medical business, financial condition, results of operations and cash flows.

As the government regulators in the European Union, United States and elsewhere have become increasingly stringent, we may be subject to more rigorous regulation by governmental authorities in the future.

Modifications to our medical products marketed in the United States may require new 510(k) clearances or premarket approvals, or may require us to cease marketing or recall the modified products until clearances are obtained.

Any modification to a 510(k)-cleared device that could significantly affect its safety or efficacy, or that would constitute a major change in its intended use, technology, materials, packaging and certain manufacturing processes, may require a new 510(k) clearance or, possibly, a premarket approval, or PMA. The FDA requires every manufacturer to make the determination regarding the need for a new 510(k) clearance or PMA in the first instance, but the FDA may (and often does) review the manufacturer's decision. The FDA may not agree with a manufacturer's decision regarding whether a new clearance or approval is necessary for a modification, and may retroactively require the manufacturer to submit a premarket notification requesting 510(k) clearance or an application for PMA. We have made modifications to our medical products in the past and may make additional modifications in the future that we believe did not or will not require additional clearances or approvals. No assurance can be given that the FDA would agree with any of our decisions not to seek 510(k) clearance or PMA. If the FDA requires us to cease marketing and recall the modified device until we obtain a new 510(k) clearance or PMA, our medical business, financial condition, results of operations and future growth prospects could be materially adversely affected. Further, our medical products could be subject to recall if the FDA determines, for any reason, that our products are not safe or effective. Any recall or FDA requirement that we seek additional approvals or clearances could result in significant delays, fines, increased costs associated with modification of a product, loss of revenue and potential operating restrictions imposed by the FDA.

Healthcare policy changes, including legislation to reform the U.S. healthcare system, could adversely affect us.

From time to time, legislation is drafted and introduced that could significantly change the statutory provisions governing the clearance or approval, manufacture and marketing of a medical device. In addition, regulations and guidance are often revised or reinterpreted in ways that may significantly affect our medical business and our medical products. It is impossible to predict whether legislative changes will be enacted or regulations, guidance or interpretations changed, and what the impact of such changes, if any, may be.

For instance, in 2010, the U.S. Patient Protection and Affordable Care Act, as amended by the U.S. Health Care and Education Reconciliation Act of 2010, or collectively, the PPACA, was enacted, which included, among other things, the following measures: a Patient-Centered Outcomes Research Institute to oversee, identify priorities in and conduct comparative clinical effectiveness research; reporting and disclosure requirements on device manufacturers for any "transfer of value" made or distributed to prescribers and other healthcare providers, effective March 30, 2013 (referred to as the Physician Sunshine Payment Act); payment system reforms including a national pilot program on payment bundling to encourage hospitals, physicians and other providers to improve the coordination, quality and efficiency of certain healthcare services through bundled payment models, beginning on or before January 1, 2013; and an independent payment advisory board that will submit recommendations to reduce Medicare spending if projected Medicare spending exceeds a specified growth rate. Some of the provisions of the PPACA have yet to be fully implemented, while certain provisions have been subject to U.S. judicial and Congressional challenges. Efforts to repeal and replace the PPACA have been ongoing since the 2016 election, but it is unclear if these efforts will be successful. Since January 2017, President Trump has signed Executive Orders and other directives designed to delay, circumvent or loosen the implementation of certain provisions requirements mandated by the PPACA or otherwise circumvent some of the requirements for health insurance mandated by the PPACA. In addition, as part of the December 2017 Tax Cuts and Jobs Act, the "individual mandate," which required individuals to purchase insurance, was repealed. Furthermore, in December 2018, a U.S. District Court Judge in the Northern District of Texas ruled that the PPACA is unconstitutional in its entirety because such individual mandate was repealed, although the U.S. District Court Judge and President Trump, among others, have acknowledged the ruling will have no immediate effect pending appeal. Thus, the full impact of the PPACA, any law repealing or replacing elements of it, and the political uncertainty surrounding any repeal or replacement legislation on our business remains unclear.

We cannot predict what healthcare programs and regulations will be ultimately implemented at the U.S. federal or state level, or at the E.U. level or within the implementing legislation of the individual E.U. Member States, or the effect of any future legislation or regulation. However, these provisions as adopted could meaningfully change the way healthcare is delivered and financed, and may materially impact numerous aspects of our medical business. In particular, any changes that lower reimbursements or reduce medical procedure volumes could adversely affect our medical business and results of operations.

In addition, in the future there may continue to be additional proposals relating to the reform of the healthcare systems of the United States, the European Union, any individual Member State of the European Union or any other jurisdiction where we may operate. For example, on April 5, 2017, the Medical Devices Regulation (Regulation (EU) 2017/745) was adopted. Subject to any postponement of the implementation of the Medical Devices Regulation by the European Council and European Parliament, the regulation will become effective on May 26, 2020. Once effective, the new regulation will, among other things:

- strengthen the rules on placing devices on the market and reinforce surveillance once they are available;
- establish explicit provisions on manufacturers' responsibilities for the follow-up of the quality, performance and safety of devices placed on the market;
- improve the traceability of medical devices throughout the supply chain to the end-user or patient through a unique identification number;
- set up, as of 2022, a central database to provide patients, healthcare professionals and the public with comprehensive information on products available in the European Union; and
- strengthen rules for the assessment of certain high-risk devices, such as implants, which may have to undergo an additional check by experts before they are placed on the market.

Transition from the regulation of our products under the current E.U. regulatory framework to regulation under the Medical Devices Regulation may require a substantial transition effort by us. In addition, detail as to how certain aspects of the Medical Devices Regulation will be applied remains unclear. Failure to update our quality system and regulatory documentation could delay our transition to compliance with the Medical Devices Regulation and delay or prevent us from obtaining new CE Certificates of Conformity under the Regulation. As a result, transition from compliance with the current E.U. regulatory framework to the Medical Devices Regulation could result in disruption to our business in the European Economic Area, which could adversely affect our business, results of operation and financial condition.

Furthermore, initiatives sponsored by government agencies, legislative bodies and the private sector to limit the growth of healthcare costs, including price regulation and competitive pricing, are ongoing in markets where we do business. We could experience a negative impact on our results of operations due to increased pricing pressure in certain or all of the markets in which we operate. Governments, hospitals and other third-party payors could reduce the amount of approved reimbursements for our products. Reductions in reimbursement levels or coverage or other cost-containment measures could unfavorably affect our future results of operations.

The use, including the misuse or off-label use, of our medical services and products may be deemed unauthorized use or improper promotion, which could harm our image in the marketplace or result in injuries that lead to product liability suits and could be costly to our business or result in regulatory sanctions.

Medical decisions may only be made and operations may only be executed by trained professionals who are authorized to do so in the jurisdictions in which they operate.

Our medical services and products are generally designed to support surgeons in the planning and performance of their operations. In our medical software products set up, training and engineering support, we make it very clear that responsibility for medical decisions rests

exclusively with the responsible surgeon, who is responsible for carefully reviewing and explicitly approving the surgical plan and/or the design of the medical device that is proposed by our software and engineers. Nonetheless, we cannot assure that patients, hospitals, surgeons or other parties will not try to hold us responsible for all or a part of the medical decisions underlying the operations that we support, exposing us to potential litigation or civil and criminal liability for unauthorized medical decision-making. Such actions or liability could lead governmental agencies to conclude that our products or services are used improperly, all of which could significantly damage our reputation and could materially impair the continued adoption of our medical services and product offering in the market.

In the markets in which we operate, our medical promotional materials and training methods must comply with numerous applicable laws and regulations, including the prohibition on the promotion of a medical device for a use that has not been cleared or approved by the relevant regulator or supervisory body. Use of a device outside of its cleared or approved indication is known as "off-label" use. If a relevant governmental authority determines that our medical promotional materials or training constitute promotion of an off-label use, it could request that we modify our training or promotional materials or subject us to regulatory or enforcement actions, including the issuance of an untitled letter, a warning letter, injunction, seizure, civil fine and criminal penalties. In that event, our reputation could be damaged and adoption of our medical products would be impaired. Although we train our sales force not to promote our medical products for off-label uses, and our instructions for use in all markets specify that our products are not intended for use outside of those indications cleared for use, competent regulatory agency could conclude that we have engaged in off-label promotion. In addition, there may be increased risk of injury if surgeons attempt to use our medical products off-label.

Surgeons also may misuse our medical products or use improper techniques if they are not adequately trained, potentially leading to injury and an increased risk of product liability. Product liability claims are expensive to defend and could divert our management's attention and result in substantial damage awards against us. Any of these events could adversely affect our medical business, results of operations and reputation and our ability to attract and retain customers for our products and services.

If our marketed medical devices are defective or otherwise pose safety risks, the relevant governmental authorities could require their recall, or we may initiate a recall of our products voluntarily.

The relevant governmental authorities may require the recall of commercialized products in the event of material deficiencies or defects in design or manufacture or in the event that a product poses an unacceptable risk to health. Manufacturers, on their own initiative, may recall a product if any material deficiency in a device is found. A government mandated or voluntary recall could occur as a result of an unacceptable risk to health, component failures, manufacturing errors, design or labeling defects or other deficiencies and issues. Recalls of any of our medical products would divert managerial and financial resources and have an adverse effect on our financial condition and results of operations. Any recall could impair our ability to produce our medical products in a cost-effective and timely manner in order to meet our customers' demands. We also may be required to bear other costs or take other actions that may have a negative impact on our future revenue and our ability to generate profits. We may initiate voluntary recalls involving our medical products in the future that we determine do not require notification of the relevant regulatory body. If a governmental agency disagrees with our determinations, they could require us to report those actions as recalls. A future recall announcement could harm our reputation with customers and negatively affect our revenue. In addition, the relevant authority could take enforcement action for failing to report the recalls when they were conducted.

If our Materialise Medical segment products cause or contribute to a death or a serious injury, or malfunction in certain ways, we will be subject to medical device reporting regulations, which can result in voluntary corrective actions or agency enforcement actions.

Under the FDA medical device reporting regulations, or MDR, we are required to report to the FDA any incident in which our medical product has malfunctioned and would be likely to cause or contribute to a death or serious injury if the malfunction happened again. If we fail to report these events to the FDA within the required timeframes, or at all, the FDA could take enforcement action against us. Any adverse event involving our medical products could result in future voluntary corrective actions, such as recalls or customer notifications, or agency action, such as inspection, mandatory recall or other enforcement action. Any corrective action, whether voluntary or involuntary, as well as defending ourselves in a lawsuit, will require the dedication of our time and capital, distract management from operating our business, and may harm our reputation and financial results.

In the EEA, we must comply with the E.U. Medical Device Vigilance System, the purpose of which is to improve the protection of health and safety of patients, users and others by reducing the likelihood of reoccurrence of incidents related to the use of a medical device. Under this system, incidents must be reported to the competent authorities of the Member States of the EEA. An incident is defined as any malfunction or deterioration in the characteristics and/or performance of a device, as well as any inadequacy in the labeling or the instructions for use which, directly or indirectly, might lead to or might have led to the death of a patient or user or of other persons or to a serious deterioration in their state of health. Incidents are evaluated by the EEA competent authorities to whom they have been reported, and where appropriate, information is disseminated between them in the form of National Competent Authority Reports. The E.U. Medical Device Vigilance System is further intended to facilitate a direct, early and harmonized implementation of Field Safety Corrective Actions, or FSCAs, across the Member States of the EEA where the device is in use. An FSCA is an action taken by a manufacturer to reduce a risk of death or serious deterioration in the state of health associated with the use of a medical device that is already placed on the market. An FSCA may include the recall, modification, exchange, destruction or retrofitting of the device. FSCAs must be communicated by the manufacturer or its legal representative to its customers and/or to the end users of the device through Field Safety Notices.

Our Materialise Medical segment's 3D printing operations are required to operate within a quality management system that is compliant with the regulations of various jurisdictions, including the requirements of ISO 13485, and the U.S. Quality System Regulation, which is costly and could subject us to enforcement action.

We are subject to the regulations of various jurisdictions regarding the manufacturing process for our medical products, including the requirements of ISO 13485. Within the United States, we are required to comply with the Quality System Regulation, which covers, among other things, the methods of documentation of the design, testing, production, control, quality assurance, labeling, packaging, sterilization, storage and shipping of our medical products. Compliance with these regulations is costly and time-consuming. In addition, the FDA enforces the Quality System Regulation through periodic announced and unannounced inspections of manufacturing facilities. The failure by a manufacturer to comply with applicable statutes and regulations administered by the FDA and other regulatory bodies, or the failure to timely and adequately respond to any adverse inspectional observations or product safety issues, could result in, among other things, any of the following enforcement actions:

- untitled letters, warning letters, fines, injunctions, consent decrees and civil penalties;
- customer notifications or repair, replacement, refunds, recall, detention or seizure of our medical products;
- operating restrictions or partial suspension or total shutdown of production;
- refusing or delaying requests for 510(k) clearance or PMA of new products or modified products;
- withdrawing 510(k) clearances or PMAs that have already been granted;
- refusal to grant export approval for our medical products; or
- criminal prosecution.

For example, during 2019, The National Health Surveillance Agency of Brazil (ANVISA) conducted inspections of Engimplan's manufacturing facilities in response to claims that unapproved products were being produced. Although the investigations did not result in any penalties or sanctions imposed by ANVISA, Engimplan may be subject to increased regulatory oversight as a result of these investigations.

Any regulatory enforcement actions could impair our ability to produce our medical products in a cost-effective and timely manner in order to meet our customers' demands. We also may be required to bear other costs or take other actions that may have a negative impact on our future revenue and our ability to generate profits. Furthermore, our key component suppliers may not currently be or may not continue to be in compliance with all applicable regulatory requirements, which could result in our failure to produce our medical products on a timely basis and in the required quantities, if at all.

We may be subject to or otherwise affected by U.S. federal and state, European or other healthcare laws, including fraud and abuse and health information privacy and security laws, and could face substantial penalties if we are unable to fully comply with such laws.

Healthcare regulation by U.S. federal and state, European or other governments could significantly impact our medical business. Healthcare fraud and abuse and health information privacy and security laws potentially applicable to our medical operations include:

- the U.S. federal Anti-Kickback Law, which constrains our marketing practices and those of our independent sales agencies, educational programs, pricing, bundling and rebate policies, grants for physician-initiated trials and continuing medical education, and other remunerative relationships with healthcare providers, by prohibiting, among other things, soliciting, receiving, offering or providing remuneration, intended to induce the purchase or recommendation of an item or service reimbursable under a U.S. federal healthcare program, such as the Medicare or Medicaid programs;
- U.S. federal false claims laws which prohibit, among other things, knowingly presenting, or causing to be presented, claims for payment from Medicare, Medicaid, or other third-party payors that are false or fraudulent;
- HIPAA, and its implementing regulations, which created federal criminal laws that prohibit executing a scheme to defraud any healthcare benefit program or making false statements relating to healthcare matters and which also imposes certain regulatory and contractual requirements regarding the privacy, security and transmission of individually identifiable health information;
- U.S. state laws analogous to each of the above federal laws, such as anti-kickback and false claims laws that may apply to items or services reimbursed by any third-party payor, including commercial insurers, and state laws governing the privacy and security of certain health information, many of which differ from each other in significant ways and often are not preempted by HIPAA, thus complicating compliance efforts; and

- similar foreign laws and regulations governing healthcare fraud and abuse, patient data privacy, interactions with healthcare professionals and related laws and regulations that apply to us in the countries in which we operate.

If our past or present operations are found to be in violation of any of such laws or any other governmental regulations that may apply to us, we may be subject to penalties, including civil and criminal penalties, damages, fines, exclusion from U.S. federal healthcare programs and the curtailment or restructuring of our operations. Similarly, if the healthcare providers or entities with whom we do business are found to be non-compliant with applicable laws, they may be subject to sanctions, which could also have a negative impact on us. Any penalties, damages, fines, curtailment or restructuring of our operations could adversely affect our ability to operate our medical business and our financial results. The risk of our company being found in violation of these laws is increased by the fact that many of them have not been fully interpreted by the regulatory authorities or the courts, and their provisions are open to a variety of interpretations. Further, the PPACA, among other things, amends the intent requirement of the U.S. federal anti-kickback and criminal health care fraud statutes. A person or entity no longer needs to have actual knowledge of this statute or specific intent to violate it. In addition, the PPACA provides that the government may assert that a claim including items or services resulting from a violation of the U.S. federal anti-kickback statute constitutes a false or fraudulent claim for purposes of the false claims statutes. Any action against us for violation of these laws, even if we successfully defend against them, could cause us to incur significant legal expenses and divert our management's attention from the operation of our business.

Risks Related to Our Intellectual Property

If we are unable to obtain patent protection for our products or otherwise protect our intellectual property rights, our business could suffer.

We rely on a combination of patents, copyrights, trademarks, trade secrets, confidentiality and other contractual arrangements with our employees, end-users and others to maintain our competitive position. Our success depends, in part, on our ability to obtain patent protection for or maintain as trade secrets our proprietary products, technologies and inventions and to maintain the confidentiality of our trade secrets and know-how, operate without infringing upon the proprietary rights of others and prevent others from infringing upon our business proprietary rights.

Despite our efforts to protect our proprietary rights, it is possible that competitors or other unauthorized third parties may obtain, copy, use or disclose or otherwise circumvent our technologies, software, inventions, processes or improvements. We cannot assure investors that any of our existing or future patents or other intellectual property rights will be enforceable, will not be challenged, invalidated or circumvented, or will otherwise provide us with meaningful protection or any competitive advantage. In addition, our pending patent applications may not be granted, and we may not be able to obtain foreign patents or elect to file applications corresponding to our U.S., European or other patents. We intend to expand our business to certain countries that may not provide the same level of patent or other intellectual property protection as the United States and the European Union. Even if we assert our patents or obtain additional patent or similar protection in such countries, effective enforcement of such patents or other rights may not be available. If our patents do not adequately protect our technology, our competitors may be able to offer products or services similar to ours or potential customers may gain illegal access to our proprietary technology. Our competitors may also be able to develop similar technology independently or design around our patents, and we may not be able to detect the unauthorized use of our proprietary technology or take appropriate steps to prevent such use. Any of the foregoing events would lead to increased competition and lower revenue or gross margins, which could adversely affect our results of operations.

Moreover, ongoing changes to the U.S. patent laws may impact our ability to obtain and enforce our intellectual property rights. In recent years, the courts have interpreted U.S. patent laws and regulations differently, and in particular the U.S. Supreme Court has decided a number of patent cases and continues to actively review more patent cases than it has in the past. Some of these changes or potential changes may not be advantageous for us, and may make it more difficult to obtain adequate patent protection or to enforce our patents against parties using them without a license or payment of royalties. These changes could increase the costs and uncertainties surrounding the prosecution of our patent applications and the enforcement or defense of our patent rights, all of which could have a material adverse effect on our business and financial condition.

We may not be able to protect our trade secrets and intellectual property.

While some of our technology is licensed under patents belonging to others or is covered by process patents which are owned or applied for by us, much of our technology is not protected by patents. Furthermore, patents are jurisdictional in nature and therefore only protect us in certain markets, rather than globally. We have devoted substantial resources to the development of our technology, trade secrets, know-how and other unregistered proprietary rights. While we enter into confidentiality and invention assignment agreements intended to protect such rights, such agreements can be difficult and costly to enforce or may not provide adequate remedies if violated. Such agreements may be breached and confidential information may be willfully or unintentionally used or disclosed in violation of the agreements, or our competitors or other parties may learn of the information in some other way. We cannot legally prevent one or more other companies from developing similar or identical technology to our unpatented technology and accordingly, it is likely that, over time, one or more other companies may be able to replicate our technology, thereby reducing our technological advantages. If we do not protect our technology or are unable to develop new technology that can be protected by patents or as trade secrets, we may face increased competition from other companies, which may adversely affect our results of operations.

We may incur substantial costs enforcing or acquiring intellectual property rights and defending against third-party claims as a result of litigation or other proceedings.

In connection with the enforcement of our intellectual property rights, opposing third parties from obtaining patent rights or disputes related to the validity or alleged infringement of our or third-party intellectual property rights, including patent rights, we have been and may in the future be subject or party to claims, negotiations or complex, protracted litigation.

While we strive to avoid infringing the intellectual property rights of third parties, we cannot provide any assurances that we will be able to avoid any claims that our products and technology, including the technology that we license from others, infringe the intellectual property rights of third parties. Patent applications in the United States and most other countries are confidential for a period of time until they are published, and the publication of discoveries in scientific or patent literature typically lags actual discoveries by several months or more. As a result, the nature of claims contained in unpublished patent filings around the world is unknown to us, and we cannot be certain that we were the first to conceive inventions covered by our patents or patent applications or that we were the first to file patent applications covering such inventions. Furthermore, it is not possible to know in which countries patent holders may choose to extend their filings under the Patent Cooperation Treaty or other mechanisms. Moreover, the patent landscape in the field of 3D printing is very complex and freedom to operate examinations are costly and time-consuming. We have not obtained extensive freedom to operate reports in the past for each and all of our products and services, nor do we intend to install on a general basis freedom to operate examinations for our future products and services. In addition, we may be subject to intellectual property infringement claims from individuals, vendors and other companies, including those that are in the business of asserting patents, but are not commercializing products or services in the field of 3D printing, or our collaboration partners or our other customers may seek to invoke indemnification obligations to involve us in such intellectual property infringement claims. Furthermore, although we maintain certain procedures to help to ensure that the items we 3D print on behalf of customers do not infringe upon the intellectual property rights of others, we cannot be certain that our procedures will be effective in preventing any such infringement.

Intellectual property disputes and litigation, regardless of the merit or resolution, could cause us to incur significant costs in enforcing, or responding to, defending and resolving such claims. In addition, such claims can be costly and disruptive to our business operations by diverting attention and energies of management and key technical personnel, by prohibiting or otherwise impairing our ability to commercialize new or existing products or services and by increasing our costs of doing business. We may not prevail in any such dispute or litigation, and an adverse decision in any legal action involving intellectual property rights, including any such action commenced by us, could limit the scope of our intellectual property rights and the value of the related technology. Third-party claims of intellectual property infringement successfully asserted against us may require us to redesign infringing technology or enter into costly settlement or license agreements on terms that are unfavorable to us, prevent us from manufacturing or licensing certain of our products, subject us to injunctions restricting our sale of products and use of infringing technology, cause severe disruptions to our operations or the markets in which we compete, impose costly damage awards or require indemnification of our sales agents and end-users. In addition, as a consequence of such claims, we may incur significant costs in acquiring the necessary third-party intellectual property rights for use in our products and services or developing non-infringing substitute technology. Any of the foregoing developments may have a material adverse effect on our business, financial condition and results of operations.

Obtaining and maintaining our patent protection depends on compliance with various procedural, documentary, fee payment and other requirements imposed by governmental patent agencies, and our patent protection could be reduced or eliminated for non-compliance with these requirements.

Periodic maintenance fees on any issued patent are due to be paid to governmental patent agencies, including the U.S. Patent and Trademark Office, or USPTO, in several stages over the lifetime of the patent. The USPTO and various foreign governmental patent agencies require compliance with a number of procedural, documentary, fee payment and other similar provisions during the patent application process. While an inadvertent lapse can in many cases be cured by payment of a late fee or by other means in accordance with the applicable rules, there are situations in which noncompliance can result in lapse of the patent or patent application, resulting in partial or complete loss of patent rights in the relevant jurisdiction. Non-compliance events that could result in lapse of a patent or patent application include, but are not limited to, failure to respond to official actions within prescribed time limits, non-payment of fees and failure to properly legalize and submit formal documents. If we or our licensors fail to maintain the patents and patent applications covering our products and processes, our competitive position could be adversely affected.

We may be subject to claims that our employees have wrongfully used or disclosed alleged trade secrets of their former employers.

Certain of our past and present employees were previously employed at other companies, including our competitors or potential competitors. Some of these employees executed proprietary rights, non-disclosure and non-competition agreements in connection with such previous employment. Although we try to ensure that our employees do not use the proprietary information or know-how of others in their work for us, we may be subject to claims that we or these employees have used or disclosed intellectual property, including trade secrets or other proprietary information, of any such employee's former employer. We are not aware of any threatened or pending claims related to these matters, but in the future litigation may be necessary to defend against such claims. If we fail in defending any such claims, in addition to paying monetary damages, we may lose valuable personnel or intellectual property rights. Even if we are successful in defending against such claims, litigation could result in substantial costs and be a distraction to management.

If disputes arise, we could lose rights that are important to our business or be subject to restrictions on the conduct of our business.

We have license agreements with respect to certain intellectual property that is important to our business and that may include exclusivity and non-competition undertakings. Disputes may arise between the counterparties to these agreements and us that could result in termination of these agreements. If we fail to comply with our obligations under our intellectual property-related agreements, or misconstrue the scope of the rights granted to us or restrictions imposed on us under these agreements, the counterparties may have the right to terminate these

agreements or sue us for damages or equitable remedies, including injunctive relief. Termination of these agreements, the reduction or elimination of our rights under these agreements, or the imposition of restrictions under these agreements that we have not anticipated may result in our having to negotiate new or reinstated licenses with less favorable terms, or to cease commercialization of licensed technology and products. This could materially adversely affect our business.

Certain technologies and patents have been developed with collaboration partners and we may face restrictions on this jointly developed intellectual property.

We have entered into collaborations with a number of industrial and medical device companies and academic institutions, including Zimmer-Biomet, DJO Surgical, DePuy Synthes, Lima, Mathys, Siemens, BASF 3D Printing Solutions GmbH, FluidDa NV, or FluidDa, the University of Michigan, and HOYA. We have, in some cases individually and in other cases along with our collaboration partners, filed for patent protection for a number of technologies developed under these agreements and may in the future file for further intellectual property protection and/or seek to commercialize such technologies. Under some of these agreements, certain intellectual property developed by us and the relevant partner may be subject to joint ownership by us and the partner and our commercial use of such intellectual property may be restricted, or may require written consent from, or a separate agreement with, the partner. In other cases, we may not have any rights to use intellectual property solely developed and owned by the partner. If we cannot obtain commercial use rights for such jointly-owned intellectual property or partner-owned intellectual property, our future product development and commercialization plans may be adversely affected. For additional information, see “Item 4. Information on the Company—B. Business Overview—Intellectual Property.”

Our use of open source software may expose us to additional risks and harm our intellectual property.

Some of our proprietary software, including some of our 3D printing software, may use or incorporate open source software. Some open source software licenses require users who distribute open source software as part of their own software product to publicly disclose all or part of the source code to such software product or make available any derivative works of the open source code on unfavorable terms or at no cost. We monitor, on an ongoing basis, whether our proprietary software, including that in our 3D printing software, would make use of any open source software that could require us to disclose our proprietary source code, which could adversely affect our business.

Risks Related to the ADSs

The ADSs may experience price and volume fluctuations.

The stock market generally has experienced extreme price and volume fluctuations that have often been unrelated or disproportionate to the operating performance of listed companies. Broad market and industry factors may negatively affect the market price of the ADSs, regardless of our actual operating performance. The market price and liquidity of the market for the ADSs may be higher or lower than the price you paid and may be significantly affected by numerous factors, some of which are beyond our control. These factors include:

- significant volatility in the market price and trading volume of securities of companies in our sector, which is not necessarily related to the operating performance of these companies;
- the mix of products that we sell, and related services that we provide, during any period;
- delays between our expenditures to develop and market new products and the generation of sales from those products;
- changes in the amount that we spend to develop, acquire or license new products, technologies or businesses;
- changes in our expenditures to promote our products and services;
- success or failure of research and development projects of us or our competitors;
- announcements of acquisitions by us or one of our competitors;
- the general tendency towards volatility in the market prices of shares of companies that rely on technology and innovation;
- changes in regulatory policies or tax guidelines;
- changes or perceived changes in earnings or variations in operating results;
- any shortfall in revenue or net income from levels expected by investors or securities analysts; and
- general economic trends and other external factors.

Any of these could result in a material decline in the price of the ADSs. In particular, the stock market has recently experienced significant price and volume fluctuations as a result of the coronavirus. This volatility has had a significant impact on the market price of securities issued by many companies across many industries.

Members of our board of directors and senior management own a significant percentage of our ordinary shares and are able to exert significant influence over matters subject to shareholder approval.

Members of our board of directors and senior management beneficially owned approximately 64.1% of our outstanding ordinary shares (including ordinary shares represented by ADSs), as of December 31, 2019. These shareholders have significant influence over the election of members of our board of directors and the outcome of corporate actions requiring shareholder approval, including dividend policy, mergers, share capital increases, amendments of our articles of association and other extraordinary transactions. For example, these shareholders may be able to influence the outcome of elections of members of our board of directors, amendments of our organizational documents, or approval of any merger, sale of assets, or other major corporate transactions. In addition, our articles of association provide that, as long as Wilfried Vancraen, our founder and Chief Executive Officer, Hilde Ingelaere, an Executive Vice President of our company who is also Mr. Vancraen's spouse, and their three children, Linde, Sander and Jeroen Vancraen, or collectively the Family Shareholders, control, directly or indirectly, in the aggregate at least 20% of the voting rights attached to our ordinary shares, a majority of our directors must be appointed by our shareholders from a list of candidates proposed by the Family Shareholders. This concentration of ownership within this group of shareholders and the rights of the Family Shareholders prevent or discourage unsolicited acquisition proposals or offers for our ordinary shares or ADSs that you may feel are in your best interest as one of our shareholders. The interests of these existing shareholders or the Family Shareholders may not always coincide with your interests or the interests of other shareholders, and they may act in a manner that advances their best interests and not necessarily those of other shareholders, including seeking a premium value for their ordinary shares, which might affect the prevailing market price for the ADSs.

The dilutive effect of our warrants and convertible bonds could have an adverse effect on the future market price of the ADSs or otherwise adversely affect the interests of our shareholders.

Based on outstanding granted warrants and outstanding convertible bonds, as of December 31, 2019, there were outstanding granted warrants to subscribe for an aggregate of 893,672 ordinary shares at a weighted average exercise price of €7.88 per share, and €1.0 million of outstanding convertible bonds convertible into an aggregate of 508,904 ordinary shares at a conversion price of €1.97 per share. The warrants and convertible bonds likely will be exercised or converted if the market price of the ADSs equals or exceeds the applicable exercise or conversion price. To the extent such securities are exercised or converted, additional ordinary shares will be issued, which would dilute the ownership of existing shareholders.

You may not have the same voting rights as the holders of our ordinary shares and may not receive voting materials in time to be able to exercise your right to vote.

Except as described in the deposit agreement related to the ADSs, holders of ADSs are not able to exercise voting rights attaching to the ordinary shares evidenced by the ADSs on an individual basis. Under the terms of the deposit agreement, holders of ADSs may instruct the depositary to vote the ordinary shares underlying their ADSs, but only if we ask the depositary to ask for their instructions. Otherwise, holders of ADSs are not able to exercise their right to vote, unless they withdraw our ordinary shares underlying the ADSs they hold to vote them in person or by proxy. However, holders of ADSs may not know about the meeting far enough in advance to withdraw those ordinary shares. If we ask for the instructions of holders of ADSs, the depositary, upon timely notice from us, will notify holders of ADSs of the upcoming vote and arrange to deliver our voting materials to them. Upon our request, the depositary will mail to holders of ADSs a shareholder meeting notice which contains, among other things, a statement as to the manner in which voting instructions may be given, including an express indication that such instructions may be given or deemed given to the depositary to give a discretionary proxy to a person designated by us if no instructions are received by the depositary from holders of ADSs on or before the response date established by the depositary. However, no voting instruction shall be deemed given and no such discretionary proxy shall be given with respect to any matter as to which we inform the depositary that (i) substantial opposition exists, or (ii) such matter materially and adversely affects the rights of shareholders. We cannot guarantee that holders of ADSs will receive the voting materials in time to ensure that they can instruct the depositary to vote their shares. In addition, the depositary's liability to holders of ADSs for failing to execute voting instructions or for the manner of executing voting instructions is limited by the deposit agreement. As a result, holders of ADSs may not be able to exercise their right to give voting instructions or to vote in person or by proxy and they may not have any recourse against the depositary or our company if their shares are not voted as they have requested or if their shares cannot be voted.

You may not receive distributions on our ordinary shares represented by the ADSs or any value for them if it is illegal or impractical to make them available to holders of ADSs.

Under the terms of the deposit agreement, the depositary for the ADSs has agreed to pay to you the cash dividends or other distributions it or the custodian receives on our ordinary shares or other deposited securities after deducting its fees and expenses. You will receive these distributions in proportion to the number of our ordinary shares your ADSs represent. However, in accordance with the limitations set forth in the deposit agreement, it may be unlawful or impractical to make a distribution available to holders of ADSs. We have no obligation to take any other action to permit the distribution of the ADSs, ordinary shares, rights or anything else to holders of ADSs. This means that you may not receive the distributions we make on our ordinary shares or any value from them if it is unlawful or impractical to make them available to you. These restrictions may have a material adverse effect on the value of your ADSs.

We have no present intention to pay dividends on our ordinary shares in the foreseeable future and, consequently, your only opportunity to achieve a return on your investment during that time is if the price of the ADSs appreciates.

We have no present intention to pay dividends on our ordinary shares in the foreseeable future. Any recommendation by our board of directors to pay dividends will depend on many factors, including our financial condition, results of operations, legal requirements and other factors. Furthermore, pursuant to Belgian law, the calculation of amounts available for distribution to shareholders, as dividends or otherwise, must be determined on the basis of our non-consolidated statutory financial statements prepared under generally accepted accounting principles in Belgium, or Belgian GAAP. In addition, in accordance with Belgian law and our articles of association, we must allocate each year an amount of at least 5% of our annual net profit under our statutory non-consolidated accounts (prepared in accordance with Belgian GAAP) to a legal reserve until the reserve equals 10% of our share capital. Our legal reserve currently meets this requirement. As a consequence of these facts, there can be no assurance as to whether dividends or other distributions will be paid out in the future or, if they are paid, their amount.

As a foreign private issuer, we are exempt from a number of rules under the U.S. securities laws and are permitted to file less information with the SEC than U.S. domestic issuers. This may limit the information available to holders of ADSs.

We are a "foreign private issuer," as defined in the rules and regulations of the SEC and, consequently, we are not subject to all of the disclosure requirements applicable to U.S. domestic issuers. For example, we are exempt from certain rules under the Exchange Act that regulate disclosure obligations and procedural requirements related to the solicitation of proxies, consents or authorizations applicable to a security registered under the Exchange Act. In addition, our officers, directors and principal shareholders are exempt from the reporting and "short-swing" profit recovery provisions of Section 16 of the Exchange Act and related rules with respect to their purchases and sales of our securities. Moreover, we are not required to file periodic reports and consolidated financial statements with the SEC as frequently or as promptly as U.S. domestic issuers. Accordingly, there may be less publicly available information concerning our company than there is for U.S. public companies. As a foreign private issuer, we file an annual report on Form 20-F within four months of the close of each year ended December 31 and furnish reports on Form 6-K relating to certain material events promptly after we publicly announce these events. However, although we intend to continue to issue quarterly financial information, because of the above exemptions for foreign private issuers, we are not required to do so, and, therefore, our shareholders will not be afforded the same protections or information generally available to investors holding shares in public companies organized in the United States.

We may lose our foreign private issuer status in the future, which could result in significant additional costs and expenses.

As a foreign private issuer, we are not required to comply with all the periodic disclosure and current reporting requirements of the Exchange Act and related rules and regulations. The determination of foreign private issuer status is made annually on the last business day of an issuer's most recently completed second fiscal quarter. Accordingly, we will next make a determination with respect to our foreign private issuer status on June 30, 2020. There is a risk that we will lose our foreign private issuer status in the future.

We would lose our foreign private issuer status if, for example, more than 50% of our assets are located in the United States and more than 50% of our outstanding ordinary shares are held of record by U.S. residents. As of December 31, 2019, 3.1% of our assets were located in the United States. The regulatory and compliance costs to us under U.S. securities laws as a U.S. domestic issuer may be significantly greater than the costs we incur as a foreign private issuer. If we are not a foreign private issuer, we will be required to file periodic reports and registration statements on U.S. domestic issuer forms with the SEC, which are more detailed and extensive in certain respects than the forms available to a foreign private issuer. We would be required under current SEC rules to prepare our consolidated financial statements in accordance with U.S. GAAP and modify certain of our policies to comply with corporate governance practices associated with U.S. domestic issuers. Such conversion and modifications would involve significant additional costs. In addition, we may lose our ability to rely upon exemptions from certain corporate governance requirements on U.S. stock exchanges that are available to foreign private issuers such as the ones described above and exemptions from procedural requirements related to the solicitation of proxies.

We have identified material weaknesses in our internal controls over financial reporting and if we fail to establish and maintain an effective system of internal control over financial reporting, we may not be able to accurately report our financial condition, results of operations or cash flows, which may adversely affect investor confidence in us.

The Sarbanes-Oxley Act requires, among other things, that we maintain effective internal control over financial reporting and disclosure controls and procedures. In particular, we are required, under Section 404 of the Sarbanes-Oxley Act, to perform system and process evaluations and testing of our internal controls over financial reporting to allow management and our independent registered public accounting firm to report on the effectiveness of our internal control over financial reporting. This assessment must include disclosure of any material weaknesses in our internal control over financial reporting identified by our management or our independent registered public accounting firm. A material weakness is a control deficiency, or combination of control deficiencies, in internal control over financial reporting that results in more than a reasonable possibility that a material misstatement of annual or interim consolidated financial statements will not be prevented or detected on a timely basis. Section 404 of the Sarbanes-Oxley Act also generally requires an attestation from our independent registered public accounting firm on the effectiveness of our internal control over financial reporting. Our independent registered public accounting firm may issue a report that is adverse in the event it is not satisfied with the level at which our controls are documented, designed or operating. Our remediation efforts may not enable us to avoid a material weakness in the future.

Although we have implemented an internal control system and devoted significant resources into internal audit, accounting, IT and other functions to improve our internal control system, our compliance with Section 404 will require that we incur further substantial accounting expenses and continue to expend significant management efforts to further implement and maintain our internal control system. We may not be able to further implement or maintain an effective internal control system or complete our evaluation, testing and any required remediation in a timely fashion. In connection with the preparation of this annual report, during the evaluation and testing process, we identified material weaknesses in our internal control over financial reporting, and concluded that our internal control over financial reporting was not effective as of December 31, 2019. See "Item 15. Controls and Procedures." We cannot assure you that we will be able to remedy the material weaknesses in a timely fashion or at all, or that there will not be material weaknesses or significant deficiencies in our internal control over financial reporting in the future. Any failure to maintain internal control over financial reporting could severely inhibit our ability to accurately report our financial condition, results of operations or cash flows. If we are unable to remedy any of the material weaknesses and conclude that our internal control over financial reporting is effective, or if our independent registered public accounting firm determines we have a material weakness or significant deficiency in our internal control over financial reporting, we could lose investor confidence in the accuracy and completeness of our financial reports, the market price of the ADSs could decline, and we could be subject to sanctions or investigations by the NASDAQ Stock Market, the SEC or other regulatory authorities. Failure to remedy any material weakness in our internal control over financial reporting, or to implement or maintain other effective control systems required of public companies, could also restrict our future access to the capital markets.

We have incurred and will incur significant increased costs as a result of operating as a company whose ADSs are publicly traded in the United States, and our management is required to devote substantial time to new compliance initiatives.

As a company whose ADSs are publicly traded in the United States, we have incurred and will incur significant legal, accounting, insurance and other expenses that we did not incur prior to our initial public offering. In addition, the Sarbanes-Oxley Act, the Dodd-Frank Wall Street Reform and Consumer Protection Act and related rules implemented by the SEC and the NASDAQ Stock Market have imposed various requirements on public companies, including requiring establishment and maintenance of effective disclosure and financial controls. These costs have increased now that we are no longer an emerging growth company eligible to rely on exemptions under the JOBS Act from certain disclosure and governance requirements. Our management and other personnel need to devote a substantial amount of time to these compliance initiatives. Moreover, these rules and regulations increase our legal and financial compliance costs and make some activities more time-consuming and costly. These laws and regulations could also make it more difficult and expensive for us to attract and retain qualified persons to serve on our board of directors or its committees. Furthermore, if we are unable to satisfy our obligations as a public company, we could be subject to delisting of the ADSs, fines, sanctions and other regulatory action and potentially civil litigation.

You may be subject to limitations on the transfer of your ADSs.

Your ADSs are transferable on the books of the depositary. However, the depositary may close its books at any time or from time to time when it deems doing so expedient in connection with the performance of its duties. The depositary may close its books from time to time for a number of reasons, including in connection with corporate events such as a rights offering, during which time the depositary needs to maintain an exact number of ADS holders on its books for a specified period. The depositary may also close its books in emergencies, and on weekends and public holidays. The depositary may refuse to deliver, transfer or register transfers of the ADSs generally when our share register or the books of the depositary are closed, or at any time if we or the depositary thinks that it is advisable to do so because of any requirement of law or of any government or governmental body, or under any provision of the deposit agreement, or for any other reason in accordance with the terms of the deposit agreement. As a result, you may be unable to transfer your ADSs when you wish to.

If securities or industry analysts do not publish research or reports about our business, or if they adversely change their recommendations regarding the ADSs, the market price for the ADSs and trading volume could decline.

The trading market for the ADSs is influenced by research or reports that industry or securities analysts publish about our business. If one or more analysts who cover us downgrade the ADSs, the market price for the ADSs would likely decline. If one or more of these analysts cease to cover us or fail to regularly publish reports on us, we could lose visibility in the financial markets, which, in turn, could cause the market price or trading volume for the ADSs to decline.

It may be difficult for investors outside Belgium to serve process on or enforce foreign judgments against us or our directors and senior management.

We are a Belgian limited liability company. None of the members of our board of directors and senior management is a resident of the United States. All or a substantial portion of the assets of such non-resident persons and most of our assets are located outside the United States. As a result, it may not be possible for investors to effect service of process upon such persons or on us or to enforce against them or us a judgment obtained in U.S. courts. Original actions or actions for the enforcement of judgments of U.S. courts relating to the civil liability provisions of the federal or state securities laws of the United States are not directly enforceable in Belgium. The United States and Belgium do not currently have a multilateral or bilateral treaty providing for reciprocal recognition and enforcement of judgments, other than arbitral awards, in civil and commercial matters. In order for a final judgment for the payment of money rendered by U.S. courts based on civil liability to produce any effect on Belgian soil, it is accordingly required that this judgment be recognized or be declared enforceable by a Belgian court in accordance with Articles 22 to 25 of the 2004 Belgian Code of Private International Law. Recognition or enforcement does not imply a review of the merits of the case and is irrespective of any reciprocity requirement. A U.S. judgment will, however, not be recognized or declared enforceable in Belgium if it infringes upon one or more of the grounds for refusal which are exhaustively listed in Article 25 of the Belgian Code of Private International Law. These grounds mainly require that the recognition or enforcement of the foreign judgment should not be a manifest violation of public policy, that the foreign courts must have

respected the rights of the defense, that the foreign judgment should be final, and that the assumption of jurisdiction by the foreign court may not have breached certain principles of Belgian law. In addition to recognition or enforcement, a judgment by a federal or state court in the United States against us may also serve as evidence in a similar action in a Belgian court if it meets the conditions required for the authenticity of judgments according to the law of the state where it was rendered. The findings of a federal or state court in the United States will not, however, be taken into account to the extent they appear incompatible with Belgian public policy.

Holders of ADSs are not treated as shareholders of our company.

Holders of ADSs with underlying shares in a Belgian limited liability company are not treated as shareholders of our company, unless they withdraw our ordinary shares underlying the ADSs that they hold. The depository is the holder of the ordinary shares underlying the ADSs. Holders of ADSs therefore do not have any rights as shareholders of our company, other than the rights that they have pursuant to the deposit agreement.

We are a Belgian limited liability company but are not a listed company in Belgium, and shareholders of our company may have different and in some cases more limited shareholder rights than shareholders of a listed company in Belgium or of a U.S. listed corporation.

We are organized as a limited liability company (naamloze vennootschap / société anonyme) under the laws of Belgium. Our corporate affairs are governed by Belgian corporate law. From a Belgian corporate law point of view, we qualify as a public company (een vennootschap die een openbaar beroep op het spaarwezen heeft gedaan / une société ayant fait publiquement appel à l'épargne), but not as a listed company (genoteerde vennootschap / société cotée) because none of our securities are listed on any regulated market in the EEA. The Belgian corporate law provisions that are applicable to Belgian listed companies do therefore not apply to us. Furthermore, we are not subject to most of the disclosure obligations applicable to Belgian listed companies. As a result, shareholders of our company may not enjoy certain of the rights and protection generally afforded to shareholders of a Belgian listed company.

You should also be aware that the rights provided to our shareholders under Belgian corporate law and our articles of association differ in certain respects from the rights that you would typically enjoy as a shareholder of a U.S. corporation under applicable U.S. federal and state laws.

Under Belgian corporate law, except in certain limited circumstances, our shareholders may not ask for an inspection of our corporate records, while under Delaware corporate law any shareholder, irrespective of the size of his or her shareholdings, may do so. Shareholders of a Belgian corporation are also unable to initiate a derivative action, a remedy typically available to shareholders of U.S. companies, in order to enforce a right of our company, in case we fail to enforce such right ourselves, other than in certain cases of director liability under limited circumstances. In addition, a majority of our shareholders may release a director from any claim of liability we may have, including if he or she has acted in bad faith or has breached his or her duty of loyalty, provided, in some cases, that the relevant acts were specifically mentioned in the convening notice to the shareholders' meeting deliberating on the discharge. In contrast, most U.S. federal and state laws prohibit a company or its shareholders from releasing a director from liability altogether if he or she has acted in bad faith or has breached his or her duty of loyalty to the company. Finally, Belgian corporate law does not provide any form of appraisal rights in the case of a business combination. For additional information on these and other aspects of Belgian corporate law and our articles of association, see "Item 10. Additional Information—B. Memorandum and Articles of Association." As a result of these differences between Belgian corporate law and our articles of association, on the one hand, and U.S. federal and state laws, on the other hand, in certain instances, you could receive less protection as a shareholder of our company than you would as a shareholder of a U.S. corporation.

The implementation of the recent reform of the Belgian Companies Code may adversely affect the rights of our shareholders.

A new Belgian Companies Code was approved by the Belgian Parliament that entered into force on May 1, 2019. For existing companies like us there is a transition regime providing for a staggered applicability of the new provisions. Certain parts of the new code apply to us as of January 1, 2020. The full transition must be completed by the earlier of (i) the next extraordinary shareholders' meeting that amends our articles of association or (ii) January 1, 2024. On the date of this annual report, we have not yet initiated or implemented any changes as a result of such new Companies Code. However, we or our shareholders may propose changes to our articles of association following the entry into force of the new Belgian Companies Code that could impact our shareholders' rights.

As a foreign private issuer, we are not subject to certain NASDAQ Stock Market corporate governance rules applicable to U.S. listed companies.

We rely on provisions in the Listing Rules of the NASDAQ Stock Market that permit us to follow our home country corporate governance practices with regard to certain aspects of corporate governance. This allows us to follow Belgian corporate law and the Belgian Company Code, which differ in significant respects from the corporate governance requirements applicable to U.S. companies listed on the NASDAQ Global Select Market. See "Item 16G. Corporate Governance."

Holders of ADSs or ordinary shares have limited rights to call shareholders' meetings or to submit shareholder proposals, which could adversely affect their ability to participate in the governance of our company.

Except under limited circumstances, only the board of directors may call a shareholders' meeting. Shareholders who collectively own at least 20% of the ordinary shares of our company may require the board of directors or the statutory auditor to convene a special or an extraordinary general meeting of shareholders. As a result, the ability of holders of the ADSs or ordinary shares to participate in and influence the governance of our company is limited.

Holders of the ADSs have limited recourse if we or the depositary fail to meet our respective obligations under the deposit agreement or if they wish to involve us or the depositary in a legal proceeding.

The deposit agreement expressly limits the obligations and liability of us and the depositary. Neither we nor the depositary will be liable to the extent that liability results from the fact that we:

- are prevented or hindered in performing any obligation by circumstances beyond their control;
- exercise or fail to exercise discretion under the deposit agreement;
- perform our obligations without negligence or bad faith;
- take any action based upon advice of or information from legal counsel, accountants, any person presenting shares for deposit, any holder of the ADSs or any other qualified person; or
- rely on any documents we believe in good faith to be genuine and properly executed.

In addition, neither we nor the depositary has any obligation to participate in any action, suit or other proceeding in respect of the ADSs which may involve it in expense or liability unless it is indemnified to its satisfaction. These provisions of the deposit agreement will limit the ability of holders of the ADSs to obtain recourse if we or the depositary fails to meet our respective obligations under the deposit agreement or if they wish to involve us or the depositary in a legal proceeding.

Investors may not be able to participate in equity offerings, and ADS holders may not receive any value for rights that we may grant.

In accordance with Belgian corporate law, our articles of association provide for preferential subscription rights to be granted to our existing shareholders to subscribe on a pro rata basis for any issue for cash of new shares, convertible bonds or warrants that are exercisable for cash, unless such rights are cancelled or limited by resolution of our shareholders' meeting or the board of directors. Our shareholders' meeting or board of directors may cancel or restrict such rights in future equity offerings. In addition, certain shareholders (including those in the United States, Australia, Canada or Japan) may not be entitled to exercise such rights even if they are not cancelled unless the rights and related shares are registered or qualified for sale under the relevant legislation or regulatory framework. As a result, there is the risk that investors may suffer dilution of their shareholding should they not be permitted to participate in preference right equity or other offerings that we may conduct in the future.

If rights are granted to our shareholders, as the case may be, but if by the terms of such rights offering or for any other reason, the depositary may not either make such rights available to any ADS holders or dispose of such rights and make the net proceeds available to such ADS holders, then the depositary may allow the rights to lapse, in which case ADS holders will receive no value for such rights.

Shareholders in jurisdictions with currencies other than the euro face additional investment risk from currency exchange rate fluctuations in connection with their holding of our shares.

Any future payments of dividends on shares will be denominated in euro. The U.S. dollar—or other currency—equivalent of any dividends paid on our shares or received in connection with any sale of our shares could be adversely affected by the depreciation of the euro against these other currencies.

In order to satisfy our obligations as a public company, we may need to hire additional qualified accounting and financial personnel and consultants with appropriate experience.

As a public company, we need to establish and maintain effective disclosure and financial controls. We have hired additional accounting and financial personnel and consultants with experience and technical accounting knowledge in this respect, but we may need to hire additional personnel and consultants with appropriate experience and technical accounting knowledge. It is difficult to recruit and retain such personnel and consultants, and our operating expenses and operations are and will be impacted by the direct costs of their employment or engagement and the indirect consequences related to the diversion of management resources from research and development efforts.

We do not expect to be a passive foreign investment company for U.S. federal income tax purposes; however, there is a risk that we may be classified as a passive foreign investment company, which could result in materially adverse U.S. federal income tax consequences to U.S. investors.

We do not expect to be a passive foreign investment company, or a PFIC. However, the relevant rules are not entirely clear and certain aspects of the tests will be outside our control; therefore, no assurance can be given that we will not be classified as a PFIC for any taxable year. If you are a U.S. taxpayer and we are determined to be a PFIC at any time during your holding period, you may be subject to materially adverse consequences, including additional tax liability and tax filing obligations. See "Item 10. Additional Information—E. Taxation—U.S. Taxation—Passive Foreign Investment Company."

ITEM 4. INFORMATION ON THE COMPANY

A. History and Development of the Company

Materialise NV was incorporated in Belgium on June 28, 1990 as a limited liability company under Belgian company law.

On August 6, 2019, we acquired 75% of the shares of Engimplan through a combined acquisition of existing and new shares through our Brazilian subsidiary Engimplan Holding Ltda., or Engimplan Holding. Engimplan is a Brazil-based manufacturer of orthopaedic and CMF implants and instruments. As part of this transaction, we have gained access to Engimplan's local production facility and we intend to expand Engimplan's portfolio with our 3D printed implants and expertise and leverage Engimpla's existing partner and distribution network in Brazil. We believe that the combination of our expertise in 3D printed medical solutions and Engimplan's innovative product portfolio will help accelerate the introduction of 3D printed, personalized implants and instruments in the Brazilian market.

As of October 1, 2019, all the assets and liabilities of Materialise UK Ltd., our wholly owned subsidiary, were transferred to Meridian Technique Ltd., also our wholly owned subsidiary as part of a global restructuring to enable us to operate as one legal entity in the United Kingdom.

Our principal executive and registered offices are located at Technologielaan 15, 3001 Leuven, Belgium. Our telephone number is +32 (16) 39 66 11. We are registered with the Register of Legal Entities of Leuven under the number 0441.131.254. Our agent for service of process in the United States is Materialise USA, LLC, located at 44650 Helm Ct., Plymouth, Michigan 48170, telephone number (734) 259-6445. Our internet website is www.materialise.com. The information contained on, or accessible through, our website is not incorporated by reference into this annual report and should not be considered a part of this annual report.

The SEC maintains an internet website that contains reports, proxy and information statements, and other information regarding issuers that file electronically with the SEC at www.sec.gov.

Capital Expenditures (Property Plant and Equipment and Intangible Assets)

Our capital expenditures amounted to €15.7 million, €20.9 million and €35.0 million for the years ended December 31, 2019, 2018, and 2017, respectively. In 2019, our main capital expenditures were €0.8 million for a cleanroom in Belgium, €1.2 million for a new building in Germany, €1.1 million for medical projects, and €8.8 million for new machines and installations in Belgium, Germany, Poland and the United States. In 2018, our main capital expenditures were €10.7 million for new machines and installations in Belgium and Germany, €2.5 million for land and buildings in Germany and €1.8 million for information technology equipment. In 2017, our main capital expenditures were €12.8 million related to building constructions in Belgium and Poland and €11.9 million for new machinery and installations in Belgium, Poland and Germany

B. Business Overview

Our Mission

Our mission is to innovate product development that results in a better and healthier world, through our software and hardware infrastructure, and an in-depth knowledge of additive manufacturing.

Our Company

We are a leading provider of additive manufacturing and medical software and of sophisticated 3D printing services. Since our founding in 1990 by our Chief Executive Officer, Wilfried Vancraen, we have consistently focused on developing innovative applications of additive manufacturing technologies. We believe our proprietary software platforms, which enable and enhance the functionality of 3D printers and of 3D printing operations, have become a market standard for professional 3D printing. We believe that our commitment to enabling 3D printing technologies has significantly supported and accelerated the acceptance and proliferation of additive manufacturing in the industrial and medical sectors and will continue to play an instrumental role as the industry evolves. In the healthcare sector, we bring software and medical devices to the market. Our medical software products include surgical planning tools that allow medical professionals to make 3D printable designs of the human anatomy. Our medical devices include surgical guides as well as customized medical implants. In our 3D printing service centers, including what we believe to be one of the world's largest single-site additive manufacturing service center in Leuven, Belgium, we print medical devices, prototypes, production parts, and consumer products. Our customers are active in a wide variety of industries, including healthcare, automotive, aerospace, art and design and consumer products. As of December 31, 2019, our team consisted of 2,177 full-time equivalent employees, or FTEs, and fully dedicated consultants. Our portfolio of intellectual property features 290 patents and 157 pending patent applications as of December 31, 2019. For the year ended December 31, 2019, we generated €196.7 million of revenue, representing 6.5% growth over the prior year, a net profit of €1.7 million and Adjusted EBITDA of €26.7 million. For a description of Adjusted EBITDA and a reconciliation of our net profit to our Adjusted EBITDA, see "Item 5. Operating and Financial Review and Prospects—A. Operating Results—Other Financial Information."

Our Core Competencies

Our established and proven business model integrates our three research-based core competencies: (i) software development, (ii) 3D printing, and (iii) engineering, which act as complementary incubators for our new products and function as integrated support centers for our existing products. The interaction and synergies among our software development, 3D printing and engineering teams position us well to continuously develop and support innovative applications of 3D printing that often integrate all three core competencies.

Software Development. Our expertise in developing 3D printing software originated from our efforts to enable 3D printing applications and to continually improve processes within our own additive manufacturing operations. As a result of our continued deployment over the course of more than 25 years of human, intellectual and economic capital to software development, a number of our products, including Magics and Streamics, have evolved into industry-leading flagship products. Our software development team works in close partnership with the commercial groups that are active in our various market segments through project teams that support our various products and services. These project teams rely, in turn, on research and development groups that develop libraries of software code that can be shared in multiple products and services across various markets. We have an established quality management system for the development of our software products that is ISO 9001:2015 certified. We are also ISO 13485:2016 certified for our medical applications and our medical applications comply with the regulatory requirements of several jurisdictions, including Europe and the United States.

3D Printing. As a pioneer in the additive manufacturing industry, we believe we have an extensive history of 3D printing millions of parts utilizing a broad array of technologies, often in highly regulated environments, for thousands of commercial, industrial and medical customers. We operate some of the most sophisticated printing machines currently available on the market, as well as our own proprietary stereolithography-based technology, Mammoth, to provide a very broad range of technologies, sizes, materials and finishing degrees and to address the needs of customers across a large number of potential markets. Production is organized in multiple production lines that are dedicated to the Medical and the Industrial Production segments that we serve. Our 3D printing group, which operates in an ISO 9001:2015-certified quality management system, in an ISO 13485:2016-certified system for the production of medical devices, and in an EN9100:2016 as well as EASA POA certified system for the production of plastic aerospace parts, has its own maintenance and research team that utilizes an in-house laboratory facility where products can be tested. The wide variety of products that are processed by our multiple production lines are logistically streamlined through our proprietary database systems that manage the entire process from order intake to 3D printing to final shipment. As of December 31, 2019, we operated a total of 181 3D printers, six vacuum casting machines and 28 computer numeric control, or CNC, machines at these service centers. (See "—Manufacture and Supply" for more detailed information about the printers we operate).

Engineering. Our engineering expertise is integral to our entire business, as it enhances our software development and 3D printing expertise. Our engineers work in teams that support customers in different market segments. These teams work directly with our customers to identify new, and customize and refine existing, 3D printing applications and to increase productivity, efficiency and ease of use across all aspects of the solutions we provide. Our engineering teams have particular expertise in industrial and medical applications, including patient-specific surgical guides, models and implants with the applicable market clearances. Our teams are highly specialized, especially in the medical field, and include quality controllers, development researchers for new hardware concepts and trainers who bring new engineers to the required level of expertise. Our engineers operate within the framework of a certified quality management system. Our engineering teams make extensive use of our proprietary software tools and have direct access to our 3D printing center where developments can be tested in an actual production environment.

Our Market Segments

The product and service offerings developed by our three core competencies are offered through a market oriented organization that is active across three principal market segments: (i) Materialise Software, (ii) Materialise Medical, and (iii) Materialise Manufacturing. We believe that our customers benefit significantly from the synergistic interplay between our core competencies and the three market segments on which we focus and which provide constant end-user feedback to the product development and support teams within our core competencies. For example, we believe our software programs have become globally leading products in the markets we serve as a result of many factors including the sharing of knowledge within our central software development group as well as our in-house production operations, which enable us to continuously innovate, refine and focus our software solutions and provide us with valuable insight into our customers' objectives and needs. Similarly, certain aspects of the equipment, processes and know-how that enable us to print surgical guides cleared by the FDA, and CE-labeled implants are applicable to certain industrial markets we serve, including automotive and aerospace, where our customers have stringent requirements for high quality precision parts.

Our discussion below of the growth opportunities for each of our market segments is based on our medium and long term expectations for these segments. In the short term, we expect both the 3D printing industry and our business will be impacted by the current coronavirus pandemic, although we cannot predict with certainty the impact the pandemic will have. For more information, see "Item 5. Operating and Financial Review and Prospects—D. Trend Information" below.

Our Materialise Software Segment

In our Materialise Software segment, we offer proprietary software worldwide through programs and platforms that enable and enhance the functionality of 3D printers and of 3D printing operations. We have developed software that interfaces between almost all types of industrial 3D printers, and various software applications and capturing technologies, including CAD/CAM packages and 3D scanners, by enabling data preparation and process planning. Our programs interface with machines manufactured by leading original equipment manufacturers, or OEMs, such as Sindoh Co. Ltd., EOS GmbH, Essentium Inc., HP Inc., The ExOne Company, Renishaw PLC, SLM Solutions Group AG, Stratasys Ltd., Trumpf GmbH & Co. KG, Uniontech Corporation and Voxeljet AG. In addition, we have entered into partnership agreements with leading CAD, CAM and product lifecycle management, or PLM, companies such as Siemens, HCL Technologies Ltd., or HCL, and PTC, for the integration of our additive manufacturing technology into Siemens' NX software, HCL's CAMworks, and PTC's Creo software. This enables the streamlining of the design to manufacturing process for products being produced using additive manufacturing. We offer software that enables our customers to more efficiently organize the entire workflow of a 3D printing operation with multiple 3D printing machines, many operators and complex data flow and logistical

requirements. We believe that the capabilities of our software products and their unique compatibility with almost all 3D printing systems continue to set standards in the professional 3D printing software market. Customers operating machines from multiple OEMs and customers running large 3D printing operations are among those who can benefit the most from our software packages and we believe that in many cases those customers demand compatibility with our software from the systems of OEMs.

As of December 31, 2019, our Materialise Software segment had a team of approximately 303 FTEs and fully dedicated consultants, with approximately 36.2% based at our headquarters in Belgium and the remaining employees distributed throughout our local field offices in China, Germany, Japan, Malaysia, Ukraine, the United Kingdom and the United States.

Business Model. We generate revenue in our Materialise Software segment from our software licenses, maintenance contracts, hardware controller sales for our Materialise Controllers and custom software development services. Additionally, we offer consultancy and training services. We license our software products to our customers on either a time-based or perpetual basis, in which case we offer annual maintenance contracts that provide for software updates and support. We charge our custom software development services either on a time and material or on a fixed-cost basis. For the years ended December 31, 2019, 2018 and 2017, our Materialise Software segment generated revenue of €41.7 million, €37.4 million and €35.8 million, respectively, representing 21.2%, 20.2% and 25.1% of our total revenue, respectively, and 11.5%, 4.5% and 18.8% growth over the prior year, respectively.

Software Products. We have a diversified portfolio comprised of software applications addressing different 3D market opportunities. Our decades of experience in the additive manufacturing industry are reflected in the sophisticated 3D printing software and business management tools we provide for our customers. We believe that each of our software applications is, or has the potential of becoming, one of the leading technologies in its domain. We believe that our neutral platform approach positions our software to drive greater innovation and choice across the 3D printer software ecosystem, and provides 3D printer users with more powerful and flexible printing capabilities.

In particular, we offer the following software applications:

- *Magics.* Magics enables customers to import a wide variety of CAD formats and to export standard tessellation language, or STL, files ready for additive manufacturing. Magics' applications include repairing and optimizing 3D models; analyzing parts; making process-related design changes on customers' STL files; designing support structures; documenting customer projects; nesting multiple parts in a single print run; and process planning.

Our Magics platform is enhanced with modules that further expand functionality and utility for our customers. For instance, the Magics Import Module plays an important role in efficiently moving CAD designs through to manufactured products by importing nearly all standard CAD formats into Magics. The Magics Structures Module was designed to help customers to reduce weight and material usage in their designs. We also have developed logistical modules such as the Magics SG Module, which offers tools for support structure design during the 3D printing process, and the Magics Sintermodule, which offers solutions for automated part nesting, protecting small and fragile parts and locating them after building. The Magics Simulation module enables our users to simulate the build process virtually, and optimize the build preparation based on the results, thus reducing build failures and improving the result.

In addition to offering state-of-the-art data preparation functionality to our users, our Magics platform also focuses on automation and other productivity improvements and brings interconnectivity to machines and enterprise software platforms.
Specific versions of the Magics application were also brought to the market by us:

- *Magics Essentials*: an entry-level package offering premium data preparation functionality (but without machine connectivity), that can be used in combination with machine build preparation software offered by machine vendors. The package is available on a monthly or annual rental basis, through e-commerce.
- *Magics Print*: This software combines the most important build preparation tools (Materialise Magics) and straightforward build file generation technology (Materialise Build Processor). This package is sold to machine manufacturers so that they can bundle it with their machines to offer their customers a complete, high-value service package that can get them started with 3D printing. Magics Print is available for DLP and metal technologies, and we plan to work together with Essentium Inc. to develop a version tailored at industrial FDM/Essentium's high speed extrusion machines.

Users of Magics Essentials and Magics Print can upgrade to our expert Materialise Magics platform in case they want the full data and build preparation functionality at their disposal in one package, potentially extended with the above mentioned speciality modules.

- *Streamics.* Complementary to Magics is our Streamics product, which is a central additive manufacturing logistics and control system that links operators, 3D printers (including those from various OEMs and based on different technologies), processes, materials and shipment flows together to improve customer service and save time and money. Streamics provides a user-friendly, server-based system, which centralizes our customers' project data and makes it easier to collaborate among team members and communicate with customers. The configurable modules are designed to facilitate communication, support the organization and execution of data preparation, plan machine capacity, and guide post-processing steps, allowing additive manufacturing teams to quickly adapt to business and market changes.
- *3-maticSTL.* 3-maticSTL is a versatile application that permits, among other things, design modification, design simplification, 3D texturing, re-meshing and forward engineering directly to standard additive manufacturing STL files. Using Materialise consultancy services, targeted design automation solutions can be created for specific work flows.

- *MiniMagics and MiniMagics^{Pro}.* MiniMagics and MiniMagics^{Pro} provide solutions for our customers working in data preparation, or in quoting and quality control teams. MiniMagics allows customers to view STL files and communicate in an efficient way with their account manager by seeing the same visualization of the part on their respective screens. MiniMagicsPro is a professional STL file communication tool that allows account managers to access multiple file formats and exchange annotations and comments with the customer, and generate quotations taking into account file quality and the appropriate build orientation of each part. MiniMagics Pro is designed to give our customers' quality control and finishing teams the ability to compare measurement results with the initial design and deliver professional quality reports.
- *Build Processors and Machine Control Software.* We work in close collaboration with a wide variety of 3D printer OEMs to develop customized and integrated solutions for their additive manufacturing machines. Our build processors automatically translate the 3D model data into layer data to provide sliced geometry and can link the latter with the appropriate build parameters to feed the machine control software. Another key benefit of our build processors is that they allow for a two-way communication between Magics and 3D printers. In essence, the build processor not only tells the machine what to do, but is also capable of receiving feedback from the machine allowing the operator to trace and store data on specific jobs for quality control and other purposes. Our machine control software interprets sliced build data that is transferred to 3D printers and steers such machines, helping to ensure smooth and trouble-free production. We also develop the metal build processors in Materialise Bremen and as a consequence we are able to cover a wide range of metal 3D printers. Furthermore, licensing and integrating our build processor framework, companies such as Siemens and PTC can also leverage the extensive ecosystem of build processors we have developed together with OEMs. Powered by our build processor framework and the appropriate build processor, users of Siemens and PTC CAD packages can seamlessly connect directly to the printer from within the CAD application.
- *e-Stage.* e-Stage is a software solution that increases additive manufacturing productivity by automating STL support generation, optimizing the STL build process, and reducing the time our customers spend on finishing work such as build support removal and sanding. e-Stage is designed to allow our customers to use less material, to be able to 3D nest and to minimize failed builds. e-Stage for plastic has been commercially available since September 2007, and in the fall of 2017, we released e-Stage for metal. In 2018, we won the TCT SOFTWARE AWARD 2018 for e-Stage for metal.
- *Materialise Controller.* Materialise Controller controls and steers additive manufacturing machines using embedded Materialise software, and is fully integrated into the Materialise 3D printing software platform. It is engineered towards research and development applications, machine manufacturers and those who want to control or adapt the production process to their specific needs.

Sales and Marketing. We market and distribute our software directly through our sales force as well as through our own website and third-party distributors. Our Belgian team oversees our global marketing strategy and sales processes. Our local field office employees manage sales for particular markets and provide pre- and post-sales technical support to our customers. In addition, OEMs and local dealers often distribute our software products together with their 3D printers, with our software enhancing the printers' value proposition and broadening the suite of applications available to the machines. Our sales force will typically follow up on these OEM or distributor sales to offer follow on products and services to the machine users. We intend to continue focusing on managing sales by third-party distributors through our "channel partner program", which is designed to provide our resellers and distributors with valuable resources and support in order to assist them in achieving their sales goals. We believe that this focus has led to an increase of approximately 50% in third-party distributor sales in the year ended December 31, 2019.

Customers. We believe we have a reputation for providing high-quality software in the marketplace and have strong relationships with leading multinational customers and other key users of additive manufacturing. The customers for our Materialise Software segment include 3D printing OEMs as well as manufacturers in a variety of other industries, such as the automotive, aerospace, consumer goods and hearing aid industries, and external 3D printing service bureaus. Our Materialise Software segment customer base is spread across Asia, Europe and the Americas.

For the years ended December 31, 2019, 2018 and 2017, our ten largest customers in the Materialise Software segment represented 21.5%, 23.8% and 23.0%, respectively, of our Materialise Software segment's revenue.

Competition. In our Materialise Software segment, we face indirect competition from the software developed by 3D printing OEMs, which are often more "closed ecosystem"-oriented (i.e., only focused on their own machines), and from companies that offer software that addresses one or more specific functional areas covered by our software solutions, such as providers of traditional CAD solutions. We compete directly with other providers of additive manufacturing management and machine control software, including open source software providers.

Growth Opportunities. As the number of internal and external service or production centers across the 3D printing industry grows with these 3D printing operations running more complex mixes of machines from different manufacturers and based on various technologies, as 3D printing will be increasingly used for the manufacturing of complex or customized end parts, and as the number of 3D printer manufacturers increases with certain new players initially focusing more on the hardware than on the software component of their 3D printers, we believe the demand for highly performing industrial 3D printing software platforms is likely to grow accordingly. Furthermore, we believe that the worldwide market for additive manufacturing software is tied to the growth of the overall additive manufacturing sector and in particular the number of industrial 3D printing systems in operation. We expect that the volume of industrial 3D printing systems sold will grow with increased adoption of additive manufacturing processes, and that 3D printing software, in particular in the professional segment of the market, will increasingly be needed to interface with these systems and allow for more efficient operation of those systems.

We believe that we can continue to expand our market penetration through expanding relationships with customers and OEMs, and through the continued innovation of our software products to adapt to and meet market demands. In order to be able to do so, we intend to bring our teams closer to our customer base worldwide, which will require continued investments in the expansion of our marketing and sales presence. In order to be able to meet the demands of new entrants on the market and to better address the needs of the end parts market, we also intend to continue to invest significantly in the development of our software tools and solutions, including furthering their compatibility with as many 3D printers on the market as possible. For example, we believe the market for metal-based printing will be a key growth area in the additive manufacturing industry and, while we believe we currently have a strong market position in software for metal printing, we are also committed to research and development of metal-based technologies, such as machine integration and porous structures generation.

Our Materialise Medical Segment

In our Materialise Medical segment, our product and services offering addresses what we believe to be long-term trends in the medical industry towards personalized, functional and evidence-based medicine.

As of December 31, 2019, our Materialise Medical segment consisted of approximately 763 FTEs and fully dedicated consultants, with approximately 26.8% based at our headquarters in Belgium and the remaining employees distributed throughout our local offices in Australia, Brazil, China, Colombia, France, Germany, Japan, Malaysia, Ukraine, the United Kingdom and the United States.

Business Model. We generate revenue in our Materialise Medical segment through clinical services and medical software. We sell medical devices that we print for our customers and sell licenses to our medical software packages and software maintenance contracts. We also provide custom software development and engineering services, for which we charge either on a time and material or fixed-cost basis. The majority of the medical devices that we printed in 2019 were surgical guides (and related bone models) that were distributed to surgeons through our collaboration partners Corin, DJO Surgical, DePuy Synthes, Lima, Mathys, Smith & Nephew, Stryker and Zimmer Biomet. We also print patient-specific implants that we sell directly to hospitals or distribute through partners such as DePuy Synthes. The customer base for our medical software products includes academic institutions, medical device companies and hospitals. For the years ended December 31, 2019, 2018 and 2017, our Materialise Medical segment generated revenue of €60.8 million, €52.3 million and €42.8 million, respectively, representing 30.9%, 28.3% and 30.0% of our total revenue, respectively, and 16.4%, 22.0% and 13.0% growth over the prior year, respectively.

Medical Software. Our software allows medical-image based analysis and engineering as well as patient-specific design of surgical devices and implants. Our customers include leading research institutes, renowned hospitals and major medical device companies. Our medical software packages often serve as an introduction to our capabilities and in certain cases lead to custom software developments and clinical services opportunities. Our medical software packages are:

- *Materialise Mimics Innovation Suite.* The Materialise Mimics Innovation Suite is a complete set of tools developed for biomedical professionals that allows them to perform a multitude of engineering operations based on medical imaging data. The suite consists of several complementary products and services, including Materialise Mimics, Materialise 3-matic, engineering services and medical models, as well as consultancy and custom software development.
- *Materialise Mimics.* Materialise Mimics is software addressing medical professionals specifically developed for medical image processing that can be used to segment accurate 3D models from medical imaging data (for example, from CT or MRI) to measure accurately in 2D and 3D and to export 3D models for additive manufacturing or to Materialise 3-matic. These patient-specific models can be used for a variety of engineering applications directly in Materialise Mimics or Materialise 3-matic, or may be exported to third party software focused on statistical analysis, CAD or finite element analysis (which is used to predict how a product reacts to real-world forces such as vibration, heat and fluid flow).
- *Materialise 3-matic.* Materialise 3-matic focuses on anatomical design and is able to combine CAD tools with pre-processing capabilities directly on the anatomical data coming from Materialise Mimics. It enables our customers to conduct thorough 3D measurements and analysis, design a patient-specific implant, a surgical guide, or a benchtop model, and to prepare the anatomical data and/or resulting implants for simulation
- *Materialise OrthoView.* Materialise OrthoView is a 2D digital pre-operative planning and templating solution for orthopedic surgeons. The software imports a digital X-ray image from a Picture Archiving and Communication System, or PACS, and positions the templates of suitable prostheses on the X-ray image at the correct scale. Materialise OrthoView currently serves more than 12,000 orthopedic surgeons in 60 countries globally, focusing primarily on joint replacements. We acquired OrthoView Holdings Limited in October 2014, and have included the OrthoView solution in our portfolio of pre-operative planning solutions.
- *Materialise Mimics inPrint.* With Materialise Mimics inPrint, clinicians can easily create files for 3D printing and use anatomically accurate models to help simulate or evaluate options for patient-specific surgical treatment. This software was designed specifically around the needs of clinicians to integrate seamlessly into their existing workflow. Materialise Mimics inPrint allows clinicians to get patient images from PACS and directly import them to start the 3D printing process. The software is compatible with digital imaging and communications in medicine, or DICOM, standard, which ensures easy connections with all modern imaging systems. By sharing virtual or printed 3D models as an interactive PDF on any device, communication is both immediate and clear with co-workers, the surgical team and patients. We have received FDA 510(k) clearance, pursuant to which we are permitted to certify certain 3D printer and software combinations for anatomically accurate model printing in hospitals.
- *Materialise ProPlan CMF.* Materialise ProPlan CMF is a software package developed for oral, maxillofacial, nose, throat and plastic surgeons. The software allows surgeons to pre-operatively plan their surgeries in 3D based on (CB)CT or MRI images using a set of tools to analyze, measure and reconstruct the patient's anatomy. With the software the surgeon can also plan the movements (translations and rotations) of the mandible or maxilla and preplan the reconstruction of defects.
- *Materialise Mimics Enlight.* Materialise Mimics Enlight planning software enables clinicians and hospitals to scale their 3D planning for cardiovascular procedures. Mimics Enlight is based on the strengths of Materialise's Mimics Innovation Suite. Created in collaboration with Henry Ford Health System in Detroit, Michigan, Mimics Enlight is intended to support patient selection and planning for structural heart and vascular therapy. The first application introduced through Mimics Enlight was released and cleared by the FDA in 2019 for transcatheter mitral valve replacement, or TMVR, procedures and provides a streamlined, easy-to-use clinical workflow for planning complex procedures to correct mitral regurgitation.

Clinical Services. Using our FDA-cleared and CE compliant medical software, we analyze 3D medical images of patients and provide doctors with virtual surgical planning services for their review and approval. In most cases, we also design and 3D print surgical guides that uniquely fit a specific patient and allow the surgeon to conduct the operation in accordance with the approved surgical plan. In certain circumstances, we deliver 3D printed customized patient-specific medical implants.

In our 3D printing centers in Belgium, Japan and the United States, we have separate production lines, with an aggregate of 32 machines that only print devices for our Materialise Medical segment.

We believe that our medical image-based simulation and planning software and 3D printing technology can assist medical device companies, hospitals and clinicians in solving complex problems, ranging from virtual preparation tools, over patient-specific surgical guides, to patient-specific implants which can contribute to increased quality of life.

Utilizing our SurgiCase Connect tool, surgeons upload CT or MRI medical image data and submit their cases to us, track their cases and review them as interactive virtual 3D models. SurgiCase Connect enables our clinical engineers to better support the surgeons in the creation of surgical plans and guides. Surgeons using our clinical services work together with our clinical engineers to turn their patients' medical image data into virtual surgical plans, and patient-specific 3D printed precise surgical and customized anatomical models to optimize intervention planning. For indications such as shoulder surgery, we have optimized and automated our 3D planning capabilities to provide surgical plans within a short timeframe and at a high quality that does not require an anatomical model to be provided. In the framework of our collaborations with certain leading medical device companies, our SurgiCase Connect tool is rebranded and adapted to the specific product offering and needs of our collaboration partners.

Our 3D printed surgical guides include joint replacement guides for knee, shoulder and hip replacement surgeries, osteotomy guides and CMF guides, and our 3D printed implants include hip-revision implants, shoulder and CMF implants. The surgical guides we print for U.S. based patients are FDA-cleared, and to the extent required by law, our medical devices for EEA-based patients bear the appropriate CE labels. We address large surgical markets in orthopedics and CMF through collaboration agreements with leading medical device companies, including Zimmer-Biomet, DJO Surgical, DePuy Synthes, and Lima. Pursuant to these agreements, we print joint replacement and/or CMF guides that our collaboration partners distribute under their own brands, together with their own implants, in the United States, Canada, South Africa, Latin America, Europe, China, Japan and Australia. We leverage our collaboration partners' distribution capabilities to extend our reach into these large markets, and our collaboration partners utilize our 3D printing-related expertise to provide surgical planning and customized devices to surgeons. We also address certain high value-added, specialty applications by providing the full solution ourselves, including the delivery of implants and guides directly to the hospital or surgeon. Such applications include customized CMF, hip revision, and shoulder implants in a patented porous matrix configuration and osteotomy guides. Our CMF implants, hip revision, shoulder implants and/or osteotomy guides are currently distributed in Europe, South Africa, the United States, Canada and Singapore. Through Engimplan, we also distribute implants and instruments in Brazil, offering both traditional and 3D printed CMF implants as well as a broader portfolio that includes additional new product lines for spine, trauma and sport medicine.

We also work with customers to print anatomical models that may be used for a wide range of applications such as sizing of medical devices, clinical trials, training, patient communications and marketing. For example, our HeartPrint service provides 3D printed cardiovascular anatomical models. These models are printed using our proprietary process that makes possible a superior final product that is flexible. We also print transparent or multi-color models for better visualization of the anatomy. Each of our core competencies was instrumental in developing the HeartPrint technology.

Sales and Marketing. We distribute our medical software through our direct sales force, our website and PACS partners (some of which partners also include our OrthoView solutions in their product offering to hospitals). We distribute our 3D printed medical devices primarily through our agreements with our collaboration partners such as Zimmer Biomet and Depuy Synthes. In specialty markets, we market and distribute our 3D printed medical devices and other clinical services through our experienced engineers who develop a close collaboration with key opinion leaders in each of these market segments.

All our activities in our Materialise Medical segment are coordinated and supervised from our headquarters in Belgium, which supervises product management and sales of our medical devices and software products.

Customers. The customers for our Materialise Medical segment mainly include medical device companies, hospitals, universities, research institutes and industrial companies. For the year ended December 31, 2019, partner sales to medical companies collectively represented 51.2% and total software revenue represented 31.9% of our total Materialise Medical segment revenue. Most of our other clinical service sales to customers are executed on the basis of single transaction contracts or purchase orders. These contracts and purchase orders lay out the pricing, delivery and other terms of the order.

Collaboration Partners. We collaborate with leading medical device companies and academic institutions for the development and distribution of our surgical planning software, services, and products, including with Zimmer Biomet, DJO Surgical, DePuy Synthes, Lima, Mathys, Medtronic, Abbott, Corin and the University of Michigan. Pursuant to these arrangements, we develop and license software and sell surgical guides, including for use in the fields of knee and shoulder replacement, CMF and thoracic procedures that our collaboration partners may then distribute under their own brands, together with their own implants, mainly in the United States, Europe, Japan and Australia. In addition, we grant licenses to collaboration partners to use, market and distribute such software or surgical guides. Some of the licenses we have granted to our products and software provide for exclusive rights, including with respect to a particular field of medicine or to the software or product developed during the collaboration, and certain collaboration partners may have rights of first refusal with respect to related products or collaborations. The compensation structures under these arrangements vary and may include an upfront fee, royalties, milestone payments linked to certain targets, and fees for the service, maintenance and training we provide in connection with our software and products.

Competition. In our Materialise Medical segment, we compete with a number of companies that provide image based software, 3D printed surgical models or medical devices, such as 3DSystems, Stratasys, Simple Ware, Pie Medical, WITHIN Lab, GE Additive, Siemens as well as with medical device companies that are developing in-house capacity to offer 3D printed medical devices and related software services.

Growth Opportunities. The Materialise Medical segment is the market where we believe we can most directly realize our mission statement and contribute to a healthier world. We are currently investing significantly in the development of new product offerings as well as in the expansion of our distribution channel in the various sub-segments of our Materialise Medical segment as well as in new territories, such as Brazil.

In the implant business, the extensive clinical evidence that OBL SA has developed with key opinion leaders over the last few years regarding the efficacy of our customized CMF implant solutions has enabled us to build an extensive portfolio of customized CMF implants and guides. We bring this portfolio to the market through collaborations with partners such as DePuy Synthes and also directly in certain markets that are not subject to our collaboration agreements, such as France and Brazil.

As a result of the trend that we see in the medical community towards more patient-specific devices and treatments, as well as towards more advanced planning, a growing number of academic, clinical and commercial researchers are focusing on customized medical treatments. Because these new products and treatments can only be brought to the market in compliance with very strict regulatory requirements, we believe there is an opportunity for safe and stable medical software tools, such as our Mimics Innovation Suite, that can pass significant regulatory scrutiny. We also believe that increasing regulatory requirements provide opportunities for our clinical services as we can leverage our significant medical sector experience and strong quality management systems.

We are investing significantly in the development of new solutions for other sub-markets, including planning tools for the cardiovascular markets in the shorter term and the pneumology markets in the longer term.

We believe that our medical services and software may also help to reduce the clinical trial effort and expense for medical device companies by allowing more efficient bench-top modelling, testing and simulations and by increasing efficiency in the selection of eligible patients.

We have also developed other applications, such as malunion and osteotomy surgical guides. We intend to further diversify our product portfolio through product development and entering into new collaborations.

As we intend to continue to invest in product development and market penetration, we will require certain capital commitments and may experience an impact to our revenue and profitability levels in the near term. However, we expect such investments to form the basis of stable annual revenue growth in the longer term.

Our medical engineering services offerings, which we continue to build, assist medical device companies in their designs. Our engineers not only serve the CMF and orthopedic field but also the cardiovascular field where new and customized approaches are being developed and sizing of devices is an important development area. As product managers in the medical device industry continue to recognize the value of, and need for, specialized advice and assistance in the design of new 3D printable devices, our medical engineering services may grow accordingly.

Our Materialise Manufacturing Segment

In our Materialise Manufacturing segment, we primarily offer 3D printing services to industrial and commercial customers, the majority of which are located in Europe. In addition, we have identified, and provide 3D printing services to, certain specialty growth markets in both the industrial and consumer marketplaces.

Many of the parts we print require functionality that cannot be delivered using other production processes. We believe that our industrial customers value the high quality, accuracy, complexity, durability, functionality and diversity in terms of size, scale and materials of the 3D printing services that we can offer. We deliver products to highly regulated industries, such as aerospace, healthcare, machine manufacturing, quality control equipment and consumer goods, where our applications, technology and hardware capabilities enable us to adhere to high quality standards in a certified production environment.

As of December 31, 2019, our Materialise Manufacturing segment consisted of 775 FTEs and fully dedicated consultants, with 25.7% based at our headquarters in Belgium and the remaining employees distributed throughout our local field offices in Austria, the Czech Republic, France, Germany, India, Italy, Poland, Spain, Ukraine, the United States and the United Kingdom.

In October 2017, we acquired ACTech, a full-service manufacturer of complex metal parts. This acquisition increased the scope of our Materialise Manufacturing segment's operations, in particular in the prototyping of highly complex, full production grade metal components, and had a significant impact on our results of operations for both the fourth quarter of 2017 and the year ended December 31, 2017, as well as the year ended December 31, 2018 and December 31, 2019.

Business Model. We generate revenue in our Materialise Manufacturing segment through the sale of parts that we print for our customers and design and engineering services. We charge for our design and engineering services either on a time or on a fixed-cost basis. For the years ended December 31, 2019, 2018 and 2017, our Materialise Manufacturing segment generated revenue of €94.2 million, €95.0 million and €63.7 million, respectively, representing 47.9%, 51.4% and 44.7% of our total revenue, respectively, and a 0.8% decrease and 49.0% and 37.3% increase, as applicable, over the prior year, respectively.

B2B (Business-to-Business) Services. We offer the following services in our Materialise Manufacturing segment:

- *Additive Manufacturing Solutions.* We provide design and engineering services and rapid prototyping and additive manufacturing of production parts to customers serving the automotive, consumer goods, industrial goods, art and architecture and aerospace markets. In our service centers in Belgium, the Czech Republic, Poland and Germany, as of December 31, 2019, we operated 149 3D printers, six vacuum casting machines and 20 CNC machines, producing both prototypes and production parts based on our customers' product designs. Our service centers offer a variety of 3D printing technologies including stereolithography, laser sintering, FDM (also known as Filament Fusion), PolyJet, powder binding, Multi Jet Fusion, selective laser melting(or SLM), vacuum casting and foundry parts based on sand-printed moulds. In order to meet specific customer needs for very large printed parts, we developed Mammoth, our own proprietary stereolithography technology, which we believe is capable of printing parts larger than those produced using any other stereolithography technology by utilizing a build area of approximately 1.26 cubic meters with a length of 2 meters. We currently operate 15 Mammoth 3D printers in our Belgian service center.
- *Niche Industrial and Consumer Solutions*. We have developed additive manufacturing solutions that serve certain specialty industrial applications. Our RapidFit+ business utilizes additive manufacturing to provide the automotive market with customized, highly precise and, in certain cases, patent protected measurement and fixturing tools. Through the use of additive manufacturing technology, we believe that RapidFit+ fixtures provide more functionality and flexibility than the traditional fixtures that are currently widely used in the automotive industry. We also offer production tooling that we believe has substantially better ergonomics and improved functionality than traditional fixtures. ACTech also provides specialized additive manufacturing solutions. In particular, ACTech provides prototyping of highly complex metal components through casting techniques that result in products that have a production grade performance. The casting is done using state-of-the-art 3D printed sand molds, while the final functionality of the components is achieved by a fully integrated post processing of the components in our CNC workshop.

In the consumer market, i.materialise, our global online 3D printing service that caters to the "home professional." Designers, students, inventors and everyday consumers who want to create something unique can utilize our online service to produce their own products and, if they desire, share their products with, and even offer them for sale to others through our platform. Users can upload their 3D designs, choose from a large selection of materials and colors, and instantly see the price for such models in the desired scale and quantities. Users can also buy 3D printed products from the catalogue of .MGX by Materialise or other third party designs on our i.materialise website. In 2016, we fully integrated the i.materialise platform into our Materialise Manufacturing segment.

Sales and Marketing. We market our services to our additive manufacturing solutions business customers using our sales force and through our website. Our more complex product offerings are addressed directly by our specialized sales managers who are located throughout Europe in close proximity to our larger accounts and who align our customers' needs with the wide range of 3D printing technologies that we offer. More straightforward products can be ordered directly by our customers through our "Materialise OnSite" web portal, a proprietary automated system that takes orders, provides quotes and manages the printing process from start to finish, and allows customers to track the manufacturing and shipment process of their product online. Within our larger sales teams, specialized sales managers focus either on rapid prototyping, which is our traditional and well-established market, or the additive manufacturing of end-use production parts, which is the market where we see opportunities for significant growth. Our marketing team in Belgium oversees our global marketing strategy. In addition, employees at our Belgian headquarters and in our local field offices manage sales for particular markets and accounts and provide back office and production management support to our customers.

All sales for our online sales platform are through our website, and managed mainly from our headquarters in Belgium. We have a separate team dedicated to the fixtures market where our account managers' thorough technical knowledge is key to effectively managing our RapidFit+ application.

In addition, as a result of its specific product portfolio, we have dedicated sales, marketing and project teams based in Germany (Freiberg), the United States and India for ACTech products.

Customers. The customers for our Materialise Manufacturing segment are from a wide variety of industries, including automotive, aerospace, healthcare, industrial machining, art and design and consumer products For these customers, we offer a complete set of services ranging from co-creation, to design and engineering, rapid prototyping, and certified manufacturing of end-use parts, including the RapidFit+ service offered to automotive customers.

Through our co-creation offering, we work together with customers to solve complex design challenges and to discuss how the introduction of 3D printing can affect product development, manufacturing workflow, business models and customer experiences. For example, a co-creation with HOYA, in collaboration with Hoet Design Studio, saw the launch of the world's first vision-centric, 3D-tailored eyewear solution, Yuniku, in the fall of 2016. Yuniku enables individualized lens and frame design through a sophisticated end-to-end digital supply chain, which includes a custom 3D scanner and software platform, co-created by us and HOYA, directly linked to our manufacturing factory where we provide our Certified Additive Manufacturing services. In 2017, we started shipping the first Yuniku scanners. In 2018, together with our partners Mclaren (L'Amy) for titanium printed eyewear and Impressio, respectively, we won the Silmo d'Or in the Technological Innovation category and a Silmo d'Or for the Best Sun Glasses.

Through our design and engineering service, we also provide support for those customers looking for support in their initial concept design or with maximizing a design for 3D printing. Our design and engineering team, which is comprised of highly specialized designers and CAD engineers, offers dedicated design and software support for additive manufacturing, including remodeling and file preparation, as well as 3D scanning and measuring.

The customers of both our Materialise OnSite and i.materialise platforms order through our website. Materialise OnSite customers tend to be industrial customers looking to rapid prototype parts quickly and reliably, often taking advantage of fast-lane machines to ensure short lead times for time-critical projects. For i.materialise, while there is a potential to address the wide consumer market with this platform, we prefer to describe our current customers as "home professionals." Our i.materialise client base includes independent designers and CAD hobbyists that often sell their creations or their services to others, including, in certain instances, through the i.materialise gallery. Through i.materialise's APIs, companies can also partner with i.materialise to give their own customers a cloud-based, 3D-printing solution on their website, streamlining the ordering, manufacturing and shipping processes through a direct link to our factory for 3D printing. Since 2016, Microsoft has been using the i.materialise API to offer a cloud-based 3D print solution for Windows 10 users, and PTC did the same for Creo 4.0 software users.

Most of our straightforward additive manufacturing and rapid prototyping solutions are executed on the basis of single transaction contracts or purchase orders with the customer. These contracts and purchase orders lay out the pricing, delivery and other terms of the order. For our Certified Additive Manufacturing service an entirely new approach to ensure parts are made according to agreed standards is required, for which we have set processes to onboard new customers. An example of this is our dedicated aerospace manufacturing line, backed by certifications EN9100 and EASA Part 21G, through which we are currently manufacturing plastic parts for, among others, Airbus's A350 XWB. We expect that as demand for our Certified Additive Manufacturing service grows, more long-term agreements may be entered into.

For the automotive manufacturers and their suppliers that use our RapidFit+ service, the fixtures are custom engineered by dedicated teams. Our RapidFit+ customers, which include their quality departments, expect that fixtures meet high accuracy standards. A number of automotive OEMs in Europe are currently considering our innovative solution as a potential new standard, while a solid base of automotive Tier 1 suppliers in Europe has embraced RapidFit as one of their fixture solutions.

Competition. In our additive manufacturing solutions business, we compete with a number of companies that provide industrial 3D printing services, including ARK, Cresilas, Protolabs and 3D Systems Corporation. In addition, larger accounts tend to move their 3D printing production in-house once their orders have reached certain volumes, which not only creates opportunities for our Materialise Software segment but also for our Materialise Manufacturing segment in terms of capacity balancing services. In the measurement and quality control fixture market addressed by RapidFit+, we are not aware of any direct competition coming from 3D printing companies. We do have competition, however, from a large group of smaller companies that are active in this field. While there are multiple startup companies seeking to address the home 3D printing services market, we believe that Shapeways and Sculpteo are the most prominent direct competitors of i.materialise based on their global reach. i.materialise focuses on standing out as a brand in terms of service and reliability.

Growth Opportunities. We believe that there is particular potential to grow our presence in the markets for additive manufacturing of complex and/or unique end products, including for instance certain parts for the aviation industry and eyewear products. In recent years, more companies have been using additive manufacturing for production across a broad range of industrial sectors, including aerospace, orthopedic implants, surgical guides, dental copings and hearing devices. Additive manufacturing is also being used to manufacture specialty furniture, accessories for the home and office, personal accessories, fashion products, jewelry and footwear.

For industrial end parts, we intend to continue to selectively invest in the expansion and creation of certified 3D manufacturing environments that meet the high standards of the specialized segments of the industrial production market that we focus on. In addition, we believe that our local sales teams, which are in close proximity to our customers, as well as our engineering teams, which can bring in additional expertise where required, are important and rather unique assets in this market that are worthwhile to continue to invest in.

Geographic Information. Our revenues by geographical area for the year ended December 31, 2019 were 30.3% for the Americas, 59.9% for Europe & Africa and 9.8% for Asia, as compared to 23.8% for the Americas, 65.2% for Europe & Africa and 11.1% for Asia, for the same period in 2018, and 24.6% for the Americas, 61.7% for Europe & Africa and 13.7% for Asia, for the same period in 2017. See "Item 5. Operating and Financial Review and Prospects —A. Operating Results."

Manufacture and Supply. We produce our 3D printed products at our service centers in Belgium, the Czech Republic, Germany, Poland, Japan and the United States. We print substantially all of products in-house using a variety of technologies, including stereolithography, laser sintering, FDM (also known as Filament Fusion), PolyJet, powder binding, Multi Jet Fusion, Powder Bed Fusion and vacuum casting, and only subcontract the manufacture of products if certain other technologies (such as CNC machined components) are required or for capacity balancing purposes. As of December 31, 2019, we operated a total of 181 3D printers and six vacuum casting machines at these service centers, which include distinct areas dedicated to the machinery, quality control, cleaning and labeling of our products. The table below provides selected information about our 3D printers:

Technology	Size	Manufacturer	Number
Stereolithography	Small/Medium Size	3D Systems Corporation	34
	Medium Size	Materialise	2
	Mammoth	Materialise(1)	15
PolyJet	Connex	Stratasys Ltd.	4
FDM	Small Size(2)	Stratasys Ltd.	2
	Medium Size(3)	Stratasys Ltd.	18
	Large Size(4)	Stratasys Ltd.	17
Laser Sintering	Small Size	EOS GmbH	11
	Medium Size	3D Systems Corporation/ EOS GmbH	23
	Large Size	EOS GmbH	24
Multi Jet Fusion	Medium Size	HP	9
Powder Binding	Large Size	ExOne	3
Vacuum Casting	Small Size	MCP HEK GmbH	1
	Medium Size	MCP HEK GmbH	2
	Medium Size	SCHUHL	1
	Large Size	MCP HEK GmbH	2
Direct Metal Laser Sintering	Medium Size	EoS GmbH	8
	Medium Size	Concept Laser GmbH	6
	Medium Size	Renishaw/SLM Solutions	2
	Large Size	SLM Solutions	3

(1) We have proprietary stereolithography machines based on our patented curtain coat technologies. The original curtain coat machines had a medium sized build volume. These medium sized machines have subsequently been adapted to become the extra-large sized Mammoth machines.
(2) Small size machines are machines with a build volume of less than 250×250×250 mm.
(3) Medium size machines have a build volume of less than 500×500×500 mm.
(4) Large size machines have a build volume of more than 500×500×500 mm.

As of December 31, 2019, 32 printers produced parts exclusively for our Materialise Medical segment, while the other 149 printers and six vacuum casting machines printed parts for our Industrial Production segment.

As of December 31, 2019, all of our 3D printers and vacuum casting machines were either owned or held under a lease-contract. At the end of the lease agreements (which are typically for a period of five years), we have an option to purchase the machines for a value of approximately 1.6% of their original value. We are responsible for the maintenance of such leased equipment.

We devote significant time and attention to the quality control of our products during the printing process by maintaining a comprehensive quality control program, which, among other things, includes the control and documentation of all material specifications, operating procedures, equipment maintenance and quality control methods. In addition, we inspect all of our raw materials to be used in our products throughout the printing process. We control our production orders through the use of labels or visual references on our internal database, bar-codes, controlled prints and routers, which enables us to trace our products during the printing process. Upon completion of the production process, we package and label our products.

The raw materials used in the printing of our products are mainly aluminium, titanium alloy and stainless steel powders, epoxy based photocurable resins, PA12 and thermoplastic polyurethane, or TPU, based powders and a suite of thermoplastic filaments like ABS and Ultem and following the ACTech acquisition, aluminium, cast iron and steel, quartz sand and furanic resin binder.

With the exception of FDM and PolyJet -materials, we believe that none of our other raw material requirements is limited to any significant extent by critical supply or price volatility. We continuously look for second sourcing of our raw materials in order not to be dependent on a single supplier in case a supply issue was to occur. We monitor the costs of our raw materials in order to optimize the cost/performance whilst not jeopardizing the expectations of our customers and the safe use of the materials in critical applications. With our strategic partnership with BASF 3D Printing Solutions GmbH, we are working towards offering to the market open solutions in terms of materials and software through which the user of additive manufacturing equipment can choose functionalities that best suit the user.

Our 3D printing operations for our patient-specific surgical guides, models and implants are subject to extensive regulation. We operate a certified quality management system in line with the U.S. Quality System Regulation, good manufacturing practice regulations and ISO 13485. We are registered with regulatory authorities in the United States, Europe, Canada, Australia and other jurisdictions. We CE mark our products where required. Our service centers are subject to periodic and sometimes unannounced inspections by regulatory authorities, including inspections by the FDA.

Research and Development

We have an ongoing research and development program to improve and expand the capabilities of our existing technology portfolio, which reflects our continued investments in a range of disciplines, including software development, industrial, mechanical and biomedical engineering, physics and chemistry.

We have a long history of research and development through collaborations, which augment our internal development efforts. Our earliest joint research projects date from the early 1990s with market leading collaboration partners such as Siemens AG, Zeneca and the University of Leuven (*Katholieke Universiteit Leuven*), or KU Leuven. Many of our innovations are based on industrial collaborations such as those with Phonak Staefa Switzerland, Zimmer Biomet, DePuy Synthes, and BASF SE and its subsidiaries. As of December 2019, we were active in 28 government funded research projects and we also employed two researchers with a publicly funded scholarship. With our platform technologies and strong track record in successful commercialization of scientific innovations, we receive many requests for participation in new development projects. While we strongly protect our intellectual property in our core competencies, many of our products require collaborations in order to create healthy ecosystems for their successful implementation.

As of December 31, 2019, we had approximately 80 active research and development projects in various stages of completion and approximately 380 FTEs and fully dedicated consultants working on research and development in our facilities in Belgium, France, Germany, the United Kingdom, the United States, Ukraine, China and Malaysia.

For the year ended December 31, 2019, our research and development expenses were €23.3 million, or 11.9% of our revenue (15.1% excluding ACTech), as compared to €22.4 million, or 12.1% (15.9% excluding ACTech) of our revenue, in 2018 and €20.0 million, or 14.0% (15.1% excluding ACTech) of our revenue, in 2017.

Our research and development projects include (but are not limited to) the following:

1. various software development projects including projects related to engineering and design for 3D printing, and improving existing technological challenges (for example, the handling of large amounts of data and advanced image segmentation), which are expected to benefit both our Materialise Software and Materialise Medical segments;
2. research projects to understand and develop cutting-edge software tools for industrially relevant additive manufacturing technologies (powder bed fusion for plastics (laser sintering) and metal (laser melting), stereolithography, FDM (also known as Filament Fusion), non-laser based power bed fusion, DLP-based printing and inkjet based technologies);
3. research projects in our Materialise Medical segment to develop patient specific surgical planning tools or surgical guides or implants for orthopaedic, CMF and cardiovascular surgeries;

4. release of a research version of Mimics software that allows post-operative analysis of implant placement using x-ray data;
5. a research and development project on smart digital technologies for the large scale personalization of wearables;
6. a research project in our Materialise Medical segment regarding automation of segmentation of medical images and using them for population analysis; and
7. several research projects related to improving the maturity, reliability and quality of the additive manufacturing process, which are expected to benefit our three segments.

In addition, our strategic partnership with BASF New Business GmbH focuses on collaboration for research and development activities in multiple areas, primarily focusing on the introduction of new plastic materials in additive processes. One of the new products developed by the partnership was TPU material for HP Multi Jet Fusion.

We also regularly apply for research and development grants and subsidies under European, Belgian, British, French and German, grant rules. The majority of these grants and subsidies are non-refundable. We have received grants and subsidies from different authorities, including the Flemish government (VLAIO, or Vlaams Agentschap Innoveren en Ondernemen), the European Union (FP7 and H2020 framework programs) and BMBF, the German Federal Ministry of Education and Research.

We expect to continue to invest significantly in research and development in the future.

Intellectual Property

We regard our intellectual property rights as valuable to our business and protect our technology portfolio through a combination of patent, copyright, trademark, trade secret and other intellectual property laws, confidentiality and other contractual provisions and other measures. The nature and extent of legal protection associated with each such intellectual property right depends on, among other things, the type of intellectual property right and the given jurisdiction in which such right arises.

As of December 31, 2019, our portfolio of intellectual property features 290 issued patents and an additional 157 pending patent applications primarily in the United States, the European Union and Japan. Of these, our issued patents expire between approximately 2020 and 2035, while our currently pending patent applications will generally remain in effect for 20 years from the date of the initial applications. We believe that, while our patents provide us with a competitive advantage, our success depends primarily on our business development, applications know-how and ongoing research and development efforts. Accordingly, we believe that the expiration of any single patent, or the failure of any single patent application to result in an issued patent, would not be material to our business or financial position.

As is the case in the 3D printing industry generally, the development of our products, processes and materials has required considerable experience, manufacturing and processing know-how and research and development activities. We protect our proprietary products, processes and materials as trade secrets through nondisclosure and confidentiality agreements with our employees, consultants and customers.

In addition, we own the trademark registrations for “Materialise” (Benelux, United States, United Kingdom, International, Malaysia, India and Thailand), and trademark registrations and pending applications for many of our services and software solutions, including “Streamics,” “Mimics,” “3-matic,” “Inspector,” “Magics,” “RapidFit+,” “MGX by Materialise,” “Heartprint,” “ADaM,” “Engineering on Anatomy” and “Surgicase,” among others.

We are party to various licenses and other arrangements that allow us to practice and improve our technology under a broad range of patents, patent applications and other intellectual property, including agreements with our collaboration partners, Zimmer Biomet, DJO Surgical, DePuy Synthes, Global Orthopaedic Technology, Lima, Mathys, Stryker, Corin, Siemens, FluidDa, HOYA, the University of Michigan and PTC.

There can be no assurance that the steps we take to protect our proprietary rights will be adequate or that third parties will not infringe or misappropriate such rights. We have been subject to claims and expect to be subject to legal proceedings and claims from time to time in the ordinary course of our business. In particular, we may face claims from third parties that we have infringed their patents, trademarks or other intellectual property rights. Such claims, even if not meritorious, could result in the expenditure of significant financial and managerial resources. Any unauthorized disclosure or use of our intellectual property could make it more expensive to do business and harm our operating results.

Seasonality

End markets such as healthcare, automotive, aerospace and consumer products may experience some seasonality. While the historical impact of seasonality on the revenue of our Materialise Medical and Materialise Manufacturing segments has not been material, the project related nature of our ACTech business, may make our Materialise Manufacturing segment more susceptible to fluctuations, although not necessarily in a seasonal pattern. Historically, the revenue of our Materialise Software segment has been greater in the fourth quarter, as compared to the revenue of each of the other quarters. A number of our customers make their initial software purchase in the fourth quarter prior to the end of their annual budget cycle and tend to renew, extend or broaden the scope of their licenses on the anniversary date of their first purchase. In addition, we have in the past often brought new releases on the market in the third quarter of the calendar year, which may also have an impact on sales in the subsequent quarter.

Regulatory / Environmental Matters

Environmental Matters

Our facilities and operations are subject to extensive U.S. federal, state and local, European and other applicable foreign environmental and occupational health and safety laws and regulations. These laws and regulations govern, among other things, air emissions; wastewater discharges; the generation, storage, handling, use and transportation of hazardous materials; the handling and disposal of hazardous wastes; the cleanup of contamination; and the health and safety of our employees. Under such laws and regulations, we are required to obtain permits from governmental authorities for some of our operations. If we violate or fail to comply with these laws, regulations or permits, we could be fined or otherwise sanctioned by regulators. We could also be held responsible for costs and damages arising from any contamination at our past or present facilities or at third-party waste disposal sites.

Our headquarters in Belgium and ACTech's headquarters in Germany, follow the ISO 14001:2015 criteria for an effective environmental management system and are ISO 14001:2015 certified.

Compliance with laws and regulations relating to the discharge of materials into the environment or otherwise relating to the protection of the environment has not had a material impact on capital expenditures, earnings or the competitive position of our subsidiaries and us. We are not the subject of any legal or administrative proceedings relating to the environmental laws of Belgium or any country in which we have facilities. We have not received any notices of any violations of any such environmental laws.

Healthcare Regulatory Matters

In our Materialise Medical segment, we are subject to extensive and complex U.S. federal, state and local, European and other applicable foreign healthcare and medical devices laws and regulations.

Both before and after approval or clearance our medical products and product candidates are subject to extensive regulation. In the United States, the FDA under the Federal Food, Drug and Cosmetic Act primarily regulates us. In Europe and in other foreign jurisdictions in which we sell our medical products, many of the regulations applicable to our medical devices and products in these countries are similar to those of the FDA. Together, these regulations govern, among other things and where applicable, the following activities in which we are involved:

- product development;
- product testing;
- product clinical trial compliance;
- product manufacturing;
- product labeling and instructions for use;
- product safety, product safety reporting, recalls and field corrective actions;
- product packaging and storage;
- product registration, market clearance or approval;
- product modifications;
- product marketing, advertising and promotion;
- product import and export, restrictions, tariff regulations, duties and tax requirements;
- product sales and distribution;
- post-market surveillance, including reporting of deaths or serious deterioration in the state of health and malfunctions that, if they were to recur, could lead to death or serious deterioration in the state of health;
- record keeping procedures;
- registration for reimbursement; and

- necessity of testing performed in country by distributors for licenses.

Failure to comply with the Federal Food, Drug and Cosmetic Act could result in, among other things, warning letters, civil penalties, delays in approving or refusal to approve a medical device candidate, product recall, product seizure, interruption of production, operating restrictions, suspension or withdrawal of product approval, injunctions or criminal prosecution. In non-U.S. countries, failure to comply with applicable laws and regulations could result in similar actions, and in the suspension or withdrawal of Quality Management System certification which may be a prerequisite to market medical devices.

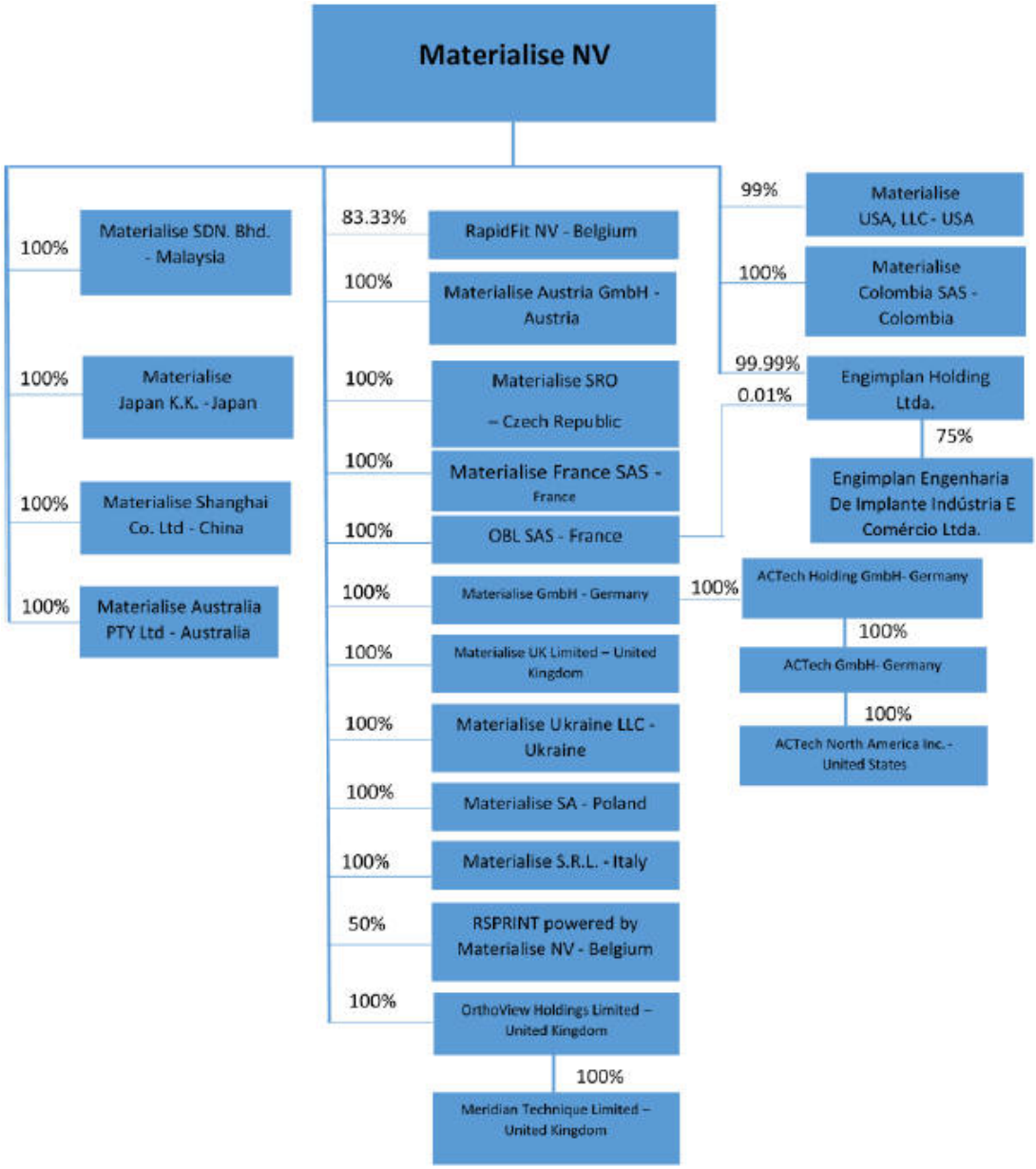
The time required to obtain clearance required by foreign countries may be longer or shorter than that required for FDA clearance, and requirements for licensing a product in a foreign country may differ significantly from FDA requirements.

Moreover, these laws and regulations are subject to change. For example, in April 2017, the Medical Devices Regulation was adopted in the European Union, which is requiring us to adopt certain measures in anticipation of its effectiveness. For more information, see “Item 3. Key Information—D. Risk Factors—Risks Related to Our Materialise Medical Segment and Regulatory Environment—Healthcare policy changes, including legislation to reform the U.S. healthcare system, could adversely affect us.”

We are in the process of obtaining MDSAP certification. This program allows an MDSAP-recognized auditing organization to conduct a single regulatory audit of a medical device manufacturer that satisfies the relevant requirements of the regulatory authorities participating in the program. To the extent that we do business in the participating jurisdictions, certain major non-conformities identified under this program may be escalated to the regulatory authorities of the United States, Canada, Japan, Australia and Brazil. The Canadian regulatory authority, Health Canada, has made participation in MDSAP a mandatory requirement for medical device manufacturers importing products to Canada. Failure to achieve timely certification under MDSAP may impact our capability to do business in Canada. In addition, failure to address escalated issues reported to the participating authorities may impact our capability to do business in the respective jurisdictions.

C. Organizational Structure

The following illustrates our corporate structure as of the date of this annual report:



RapidFit NV Shareholders' Agreement

On June 27, 2013, we entered into a shareholders' agreement with PMV-TINA Comm.VA, or PMV, with respect to our subsidiary RapidFit NV, of which we own 83.33% and PMV owns 16.66%. Pursuant to the agreement, we have the right to appoint four out of the five members of the board of directors and PMV has the right to appoint one director, who has approval rights for certain company decisions and transactions, including with respect to certain acquisitions, dispositions or pledges of assets, the budget, officers, and issuance or offering of shares of RapidFit NV. The shareholders' agreement contains provisions regarding restrictions against the transfer of shares, put and call options, anti-dilution warrants, liquidation preference, tag along rights and drag along rights. For additional information regarding the accounting treatment of the put and call options and warrants, see Note 13 to our audited consolidated financial statements.

D. Property, Plants and Equipment

Our corporate headquarters and our largest 3D printing service center are located in Leuven, Belgium. We currently own office and service spaces in Belgium as well as in the Czech Republic, France, Germany, Poland and the United States. We also lease other service centers and sales offices, which are located in Austria, Belgium, Brazil, China, France, Germany, India, Japan, Malaysia, Ukraine, the United Kingdom, the United States, Poland, Colombia, Australia and Italy. The aggregate annual lease payments for our facilities in 2019, 2018 and 2017 were €2.1 million, €1.8 million and €1.7 million, respectively. The table below provides selected information regarding our facilities.

Location	Ownership	Use	Approximate Area	Lease Expiration
Leuven, Belgium	Owned	Corporate headquarters; production	50,614.35 sq. m.	N/A
Leuven, Belgium	Leased	Warehouse	200 sq. m.	March 31, 2021
Ghent, Belgium	Leased	Office/Production	547 sq. m.	December 31, 2023
Plymouth, Michigan, United States	Owned	Office; production; parking	3.89 acres	N/A
Ann Arbor, Michigan, United States	Leased	Office/Production	2,771 sq. ft.	October 31, 2023
Saint Marcel les Valence, France	Owned	Office	1,100 sq. m.	N/A
Yokohama, Japan	Leased	Office	515.58 sq. m.	March 31, 2021
Kawasaki, Japan	Leased	Production	205 sq. m.	May 19, 2021
Ústí nad Labem, Czech Republic	Owned	Office; production	16,013 sq. m.	N/A
Vienna, Austria	Leased	Office	44 sq. m.	December 31, 2021
Gilching, Germany	Leased	Office	399 sq. m.	December 31, 2021
Bremen, Germany	Leased	Office	650 sq. m.	December 31, 2020
Bremen, Germany	Leased	Office; production	916 sq. m.	June 30, 2020 (partially) and Indefinite Term (partially)
Bremen, Germany	Owned	Office	6724 sq. m.	N/A
Petaling Jaya, Malaysia	Leased	Office	13,935 sq. ft. 6,403 sq. ft.	May 31, 2024 May 31, 2024
Malakoff, France	Leased	Office	564.40 sq. m.	May 31 30, 2028
Kiev, Ukraine	Leased	Office	3,384.8 sq. m.	June 29, 2028
Kiev, Ukraine	Leased	Office	171 sq. m.	December 31, 2021
Sheffield, United Kingdom	Leased	Office	1,575 sq. ft.	January 31, 2020 (partially) and November 30, 2020 (partially)
Southampton, United Kingdom	Leased	Office	3,340 sq. ft.	April 22, 2023
Shanghai, China	Leased	Office	1,200 sq. m.	June 8, 2021

Medellin, Colombia	Leased	Office	247.25 sq. m.	August 31, 2020
	Leased	Office	64.06 sq. m.	January 31, 2021
Wroclaw, Poland	Owned	Office; production	2.3975 hectare	N/A
Gold Coast, Australia	Leased	Office	38 sq. m.	January 1, 2022
Milan, Italy	Leased	Office	55 sq. m.	December 31, 2023
Freiberg, Germany	Owned	Office, Production, Parking (Land)	26,277 sq. ft.	N/A
Freiberg, Germany	Owned	Office, warehouse, parking (Land)	7,996 sq. m.	N/A
Ann Arbor, Michigan, United States	Leased	Office	1,987 sq. ft.	December 31, 2020
Bangalore, India	Leased	Office	2,000 sq. ft.	March 31, 2022
Rio Claro, Brazil	Leased	Corporate Offices, R&D Laboratory, Production	4,092.27 sq. m.	August 5, 2029

See also “—B. Business Overview—Manufacture and Supply” for information about the printers we operate, “—Regulatory / Environmental Matters—Environmental Matters” for information about environmental matters and “Item 5. Operating and Financial Review and Prospects —B. Liquidity and Capital Resources—Indebtedness” for information about indebtedness secured by mortgages.

ITEM 4A. UNRESOLVED STAFF COMMENTS

Not applicable.

ITEM 5. OPERATING AND FINANCIAL REVIEW AND PROSPECTS

The following discussion and analysis should be read in conjunction with the information set forth in "Item 3. Key Information—A. Selected Financial Data," and our consolidated financial statements and accompanying notes included elsewhere herein.

This section contains forward-looking statements that involve risks and uncertainties. Our actual results could differ materially from those contained in forward-looking statements. Factors that could cause or contribute to such differences include, without limitation, those discussed in the sections entitled "Item 3. Key Information—D. Risk Factors," "Special Note Regarding Forward-Looking Information" and "Item 4. Information on the Company—B. Business Overview" and elsewhere in this annual report.

A. Operating Results

Overview

Company Overview

We are a leading provider of additive manufacturing and medical software and of sophisticated 3D printing services. Our customers are active in a wide variety of industries, including healthcare, automotive, aerospace, art and design and consumer products. Since our founding in 1990 by our Chief Executive Officer, Wilfried Vancraen, we have consistently focused on developing innovative applications of additive manufacturing technologies. We believe our proprietary software platforms, which enable and enhance the functionality of 3D printers and of 3D printing operations, have become a market standard for professional 3D printing. We believe that our commitment to enabling 3D printing technologies has significantly supported and accelerated the acceptance and proliferation of additive manufacturing and will continue to play an instrumental role as the industry evolves. In the healthcare sector, our technology is responsible for the design and manufacture of customized, patient-specific medical devices that includes both surgical guides (and related bone models) as well as customized implants. In our 3D printing service centers, including what we believe to be one of the world's largest single-site additive manufacturing service center in Leuven, Belgium, we print medical devices, prototypes, production parts, and consumer products. As of December 31, 2019, our team consisted of 2,177 FTEs, and fully dedicated consultants. Our portfolio of intellectual property featured 290 patents and 157 pending patent applications as of December 31, 2019. For the year ended December 31, 2019, we generated €196.7 million of revenue, representing 6.5% growth over the prior year, net profit of €1.7 million and an adjusted EBITDA of €26.7 million. For a description of Adjusted EBITDA and a reconciliation of our net profit to our Adjusted EBITDA, see "—Other Financial Information" below.

ACTech Acquisition

On October 4, 2017, we acquired ACTech, a full-service manufacturer of complex metal parts. As described in more detail below, the acquisition increased the scope of our Materialise Manufacturing segment's operations and had a significant impact on our results of operations for both the fourth quarter of 2017 and the year ended December 31, 2017, as well as the years ended December 31, 2018 and December 31, 2019, resulting in increases to our revenues and operating expenses, among other items.

Private Placement and Public Offering

On July 19, 2018, we closed a private placement of 1,953,125 newly issued ordinary shares to BASF Antwerpen for gross proceeds of approximately $25 million.

On July 27, 2018, we closed a follow-on public offering of a total of 3,450,000 ADSs at a public offering price of $13.00 per ADS for gross proceeds of $44.9 million.

We raised approximately $65.2 million (or €55.9 million, based on the exchange rate as of December 31, 2018) in aggregate net proceeds from such private placement and follow-on public offering, collectively.

Acquisition of Majority Interest in Engimplan

On August 6, 2019, we acquired 40% of the shares and voting interest of Engimplan and subsequently increased our shareholding in Engimplan to 75% with a capital increase in Engimplan.

The Brazil-based company is a specialized manufacturer of orthopaedic and CMF implants and instruments. Engimplan operates within our Materialise Medical segment.

Seasonality

End markets such as healthcare, automotive, aerospace and consumer products may experience some seasonality. While the historical impact of seasonality on the revenue of our Materialise Medical and Materialise Manufacturing segments has not been material, the project-related nature of our ACTech business, which we acquired in the fourth quarter of 2017, may make our Materialise Manufacturing segment more susceptible

to fluctuations, although not necessarily in a seasonal pattern. Historically, the revenue of our Materialise Software segment has been greater in the fourth quarter as compared to the revenue of each of the other quarters. A number of our customers make their initial software purchase in the fourth quarter prior to the end of their annual budget cycle and tend to renew, extend or broaden the scope of their licenses on the anniversary date of their first purchase. In addition, we have in the past often brought new releases on the market in the third quarter of the calendar year, which may also have an impact on sales in the subsequent quarter.

Growth Strategy

In our Materialise Software segment, we expect that the demand for software platforms such as ours, which interface with virtually all 3D printers, is likely to grow as sales of 3D printing systems, in particular for professional use, continue to grow. We believe that we can continue to increase the market penetration of our software platforms by expanding relationships with OEMs, CAD/computer aided manufacturing, or CAM, companies as well as with industrial users of 3D printers. In order to be able to do so, we intend to bring our teams closer to our customer base worldwide, which will require important investments in the expansion of our marketing and sales presence. In order to be able to meet, in particular, the demands of new entrants to the additive manufacturing market and the end parts manufacturing market, we intend to also invest significantly in the development of our software products, including in order to better address the needs of the high volume manufacturing and of the mass customization markets.

In our Materialise Medical segment, we believe that we are well placed to assist the larger medical device companies with our technological solutions, as these companies gradually expand their presence in the medical 3D printing market, in particular in the orthopaedic and CMF markets. We also intend to continue to invest in the development of new software, planning and related device offerings, in new fields such as cardiovascular and pulmonology. We also see growing opportunities in the hospital market. Because customized medical products and treatments can only be brought to the market in compliance with very strict regulatory requirements, we believe there is an opportunity for providers of safe medical software tools, such as our company, that can pass significant regulatory scrutiny.

In our Materialise Manufacturing segment, we believe that demand for 3D printing services will continue to grow. We believe that there is particular potential to grow our presence in the markets for additive manufacturing of end products (including end products that can be customized on a large scale, such as wearables). For end parts, we intend to continue to invest in the expansion and creation of certified 3D manufacturing environments that meet the high standards of the specialized segments of the industrial market that we focus on. In addition, we believe that the cooperation between our local sales teams, which are in close proximity to our customers, and our engineering teams, which can bring in additional expertise where required, is an important asset to further increase our customer base. We have further integrated i.materialise in our Materialise Manufacturing segment. The acquisition of ACTech has allowed us to better position our metal 3D printing offering, in particular in the market of the production of unique or small batches of complex metal parts (including pre-production prototypes) for the automotive industry. We engage in co-creation sessions with carefully chosen partners who have the intention of transforming their manufacturing ecosystem through the use of 3D printing. Our initiatives in the eyewear market are a good example of the result of these co-creation sessions. We believe that there is potential for similar partnerships in other markets.

Our growth strategies for each of our market segments are based on our medium and long term expectations for these segments. In the short term, we expect both the 3D printing industry and our business will be impacted by the current coronavirus pandemic, although we cannot predict with certainty the impact the pandemic will have. For more information, see “—Trend Information” below.

Recent Developments

See Note 27 to our audited consolidated financial statements for disclosure of significant transactions and significant changes in our financial condition or results of operations that occurred subsequent to December 31, 2019. In addition, see “—Trend Information” below.

Key Income Statement Items

Revenue

Revenue is generated primarily by the sale of our software and 3D printed and complex manufactured products and services.

In our Materialise Software segment, we generate revenues from software licenses, maintenance contracts and custom software development services and sales of Materialise Controller.

In our Materialise Medical segment, we generate revenue through the sale of medical devices that we print or manufacture for our customers and from the sale of licenses on our medical software packages, software maintenance contracts and custom software development and engineering services.

In our Materialise Manufacturing segment, we generate most of our revenue through the sale of parts that we print or produce for our customers.

Software. Software revenue is comprised of perpetual and time-based licenses, maintenance revenue and software development service fees. Our software products are mainly licensed pursuant to one of two payment structures: (i) perpetual licenses, for which the customer pays an initial fee for a perpetual license and subsequently pays fees for maintenance under separate maintenance contracts, generally on an annual basis, or (ii) time-based licenses (generally annual licenses), for which the customer pays equal periodic fees to keep the license active. Perpetual licenses require the payment of fees for maintenance, technical support and product updates. Time-based licenses entitle the customer to corrective maintenance and product updates without additional charge. We generally recognize revenue from our time-based licenses and our maintenance revenue ratably on a straight-line basis over the term of the applicable license or maintenance contracts. Our software revenue depends upon both incremental sales of software licenses to both new and existing customers and renewals of existing time-based licenses and maintenance contracts. Sales and renewals are also driven by our customers' usage and budget cycle. Software development services are typically charged either on a time and materials basis or on a fixed fee basis.

3D printed products and services. 3D printed products revenue is derived from our network of 3D printing service centers. Our service centers not only utilize our 3D printing technology to print products but are also full-service operations that provide support and services such as pre-production collaboration prior to printing the product. Revenue from 3D printed products depends upon the volume of products that we print for our customers. Sales of these products are linked to the number of our 3D printing machines that are installed and active worldwide. We have dedicated teams and production lines for industrial applications and medical applications. All medical products require a highly regulated production environment. Whereas both segments use the same 3D printing technologies, the complex combination of our engineering and software solutions in connection with medical applications results in higher margins for our medical applications.

Production of limited runs of highly complex casted metal parts. Casted products revenue is derived from ACTech's network, with its production unit in Freiberg, Germany. ACTech is utilizing casting technology, including 3D printing technology for mould making, and offers full-service project operations, including project and pre-production collaboration, and high-end complex finishing services.

Cost of Sales

Our cost of sales includes raw materials, external subcontracting services, labor costs, manufacturing overhead expenses, depreciation and reserves for inventory obsolescence. Our manufacturing overhead expenses include quality assurance, manufacturing engineering, material procurement, inventory control, facilities, equipment and information technology and operations supervision and management.

Research and Development Expenses

Our research and development activities primarily consist of engineering and research programs associated with our products under development as well as research and development activities associated with our core technologies and processes. Research and development expenses are primarily related to employee compensation, including salary, fringe benefits, share-based compensation and temporary employee expenses. We also incur expenses for software and materials, supplies, costs for facilities and equipment, depreciation, and outside design and outside research support.

Development expenditures on an individual project are recognized as an intangible asset when we can demonstrate:

- the technical feasibility of completing the intangible asset so that the asset will be available for use or sale;
- the intention to complete and the ability to use or sell the asset;
- how the asset will generate future economic benefits;
- the availability of resources to complete the asset; and
- the ability to measure reliably the expenditure during development.

We have determined that the conditions for recognizing internally generated intangible assets from proprietary software, guides and other product development activities are not met until shortly before the products are available for sale, unless either (i) we have strong evidence that the above criteria are met and a detailed business plan is available showing the asset will on a reasonable basis generate future economic benefits or (ii) the development is done based upon specific request of the customer, we have the intention to market the product to parties other than the customer, the development is subject to an agreement and the substance of the agreement is that the customer reimburses us for a significant portion of the development expenses incurred. As such, development expenditures not satisfying the above criteria and expenditures on the research phase of internal projects are recognized in the consolidated income statement as incurred.

Sales and Marketing Expenses

Our sales and marketing expenses primarily consist of employee compensation, including salary, fringe benefits and share-based compensation for our marketing, sales and business development functions. Other significant expenses include travel, depreciation, product demonstration samples, brochures, websites and trade show expenses.

General and Administrative Expenses

Our general and administrative expenses primarily consist of employee compensation, including salary, fringe benefits and share-based compensation for our executive, financial, human resources, information technology support and regulatory affairs and administrative functions. Other significant expenses include outside legal counsel, independent auditors and other outside consultants, insurance, facilities, depreciation and information technologies expenses.

Net Other Operating Income

Net other operating income consists primarily of withholding tax exemptions for qualifying researchers, development and government grants, partial funding of research and development projects, currency exchange results on purchase and sales transactions the amortization of intangible assets from business combinations, and the write-off of trade receivables.

Government grants are recognized when there is reasonable assurance that the grant will be received and all attached conditions will be complied with. When the grant relates to development costs or another expense, it is recognized as income over the grant period necessary to match the income on a systematic basis to the costs that it is intended to compensate. When the grant relates to the construction of buildings, it is recognized as income over the depreciation period of the related building.

Such grants have been received from the federal and regional governments and from the European Union in the forms of grants linked to certain of its research and development programs, reduced payroll taxes and the financing of the construction of an office building in Leuven, Belgium and in Freiberg, Germany.

Where retention of a government grant is related to assets or to income and dependent on the Company satisfying certain criteria, it is initially recognized as deferred income. When the criteria for retention have been satisfied, the deferred income balance is released to other operating income in the consolidated income statement on a systematic basis over the periods in which the entity recognizes as expenses the related costs for which the grants are intended to compensate.

Any government grants recognized as income do not have any unfulfilled conditions or other contingencies attached to them, as otherwise we would not be recognizing income for such.

Financial Expenses

Our financial expenses primarily include costs associated with currency exchange differences and with interest payments on our debt obligations.

Critical Accounting Policies and Accounting Estimates

The preparation of our consolidated financial statements requires management to make judgments, estimates and assumptions that affect the reported amounts of revenue, expenses, assets and liabilities, and the accompanying disclosures. Uncertainty about these assumptions and estimates could result in outcomes that require a material adjustment to the carrying amount of assets or liabilities for future periods.

On an ongoing basis, we evaluate our estimates, assumptions and judgments, including those related to revenue recognition, development expenses, share-based payment transactions, income taxes, impairment of goodwill, intangible assets and property, plant & equipment and business combinations.

We based our assumptions and estimates on parameters available when the consolidated financial statements were prepared. Existing circumstances and assumptions about future developments, however, may change due to market changes or circumstances arising beyond our control. Such changes are reflected in the assumptions when they occur.

Revenue Recognition

Our revenue recognition policies require management to make significant estimates. Management analyzes various factors, including a review of specific transactions, historical experience, creditworthiness of customers and current market and economic conditions. Changes in judgments based upon these factors could impact the timing and amount of revenue and cost recognized and thus affects our results of operations and financial condition. The significant estimates and judgments relate to:

- The assessment whether a performance obligation is distinct in a bundled sale(s) transaction;

- Estimates of the variable considerations and the assessment of the revenue constraint limitation;
- Estimates of the stand-alone selling prices for each distinct performance obligation; and
- The stage of completion of our customized development of software components for customers when revenue is satisfied over time.

We make significant judgments when performing the assessment of whether a performance obligation is distinct from the other performance obligations in a contract, i.e., whether the good or service has a benefit for the customer on its own or together with readily available resources and/or whether the good or service is highly interrelated or a significant input with another good or service delivered, or whether it significantly modifies or customizes another good or service. Relevant judgments include the following:

- Whether the software license is distinct from the 3D printed guides – in most cases with contracts with collaboration partners in the Materialise Medical segment, the software license is combined with the manufacturing of the 3D printed guides as the software license has no benefit for the customer without the manufacturing services. We have also implemented a new “Plan Only” feature where the collaboration partners can benefit from a virtual plan produced with the software license without the manufacturing of any physical product. Such Plan Only features are recognized in revenue as a separate performance obligation based on the usage by the collaboration partner.
- Whether the development services are distinct from other performance obligations – in most cases, those performance obligations are distinct however for one contract with a collaboration partner in the Materialise Medical segment, the software license is combined with the license and the 3D printed guides as one “distinct” performance obligation

For the stand-alone selling prices, we are using prices from price list or historical prices for similar transactions. However, in certain cases, such information is not immediately available, and in such cases, we estimate the stand-alone selling price by using a cost-plus or another estimate. In addition, for certain performance obligations such as development services, stand-alone selling prices also require an estimate of the time to complete the development.

Certain contracts include estimates of variable considerations within the transaction price and assessing the revenue constraint, such as:

- Quantities/volume sold for fixed prices in relation to, but not limited to, manufacturing of 3D printed products, software licenses sold and maintenance renewals;
- Contractual prices may be different based on volume purchased during a certain period;
- FTE expenses for development or other services billed on a time & material basis; and
- Volume rebates.

The method applied to estimate the variable consideration is dependent on the number of possible scenarios and the probability of each scenario. In case there are many possible scenarios with a wide range of probabilities (each less than 50%), we will use the expected value method while the most likely method is used when there is a scenario with a higher probability (more than 50%).

Variable consideration is not a constraint when, based on historical experience, high reliable business forecast and/or the timeframe of the estimates, we determine that there is a high probability that this will not result in a future revenue reversal.

We determine the stage of completion for development contracts satisfied over time by comparing labor hours incurred to-date to the estimated total labor hours required to complete the project. We consider labor hours to be the most reliable, available measure of progress on these projects. Adjustments to estimates to complete are made in the periods in which facts resulting in a change become known. When the estimate indicates that a loss will be incurred, such loss is recorded in the period identified. Significant judgments and estimates are involved in determining the percent complete of each contract. Different assumptions could yield materially different results.

Development Expenses

Under International Accounting Standards 38, or IAS 38, internally generated intangible assets from the development phase are recognized if certain conditions are met. These conditions include the technical feasibility, intention to complete, the ability to use or sell the asset under development, and the demonstration of how the asset will generate probable future economic benefits. The cost of a recognized internally generated intangible asset comprises all directly attributable cost necessary to make the asset capable of being used as intended by management. In contrast, all expenditures arising from the research phase are expensed as incurred.

Determining whether internally generated intangible assets from development are to be recognized as intangible assets requires significant judgment, particularly in determining whether the activities are considered research activities or development activities, whether the product enhancement is substantial, whether the completion of the asset is technically feasible considering a company-specific approach and the probability of future economic benefits from the sale or use.

We have determined that the conditions for recognizing internally generated intangible assets from proprietary software, guide and other product development activities are not met until shortly before the products are available for sale, unless either (i) we have strong evidence that the above criteria are met and a detailed business plan is available showing the asset will on a reasonable basis generate future economic benefits or (ii) the development is done based upon specific request of the customer, we have the intention to market the product also to other parties than the customer, the development is subject to an agreement and the substance of the agreement is that the customer reimburses us for a significant portion of the development expenses incurred. As such, development expenditures not satisfying the above criteria and expenditures on the research phase of internal projects are recognized in the consolidated income statement as incurred. This assessment is monitored by us on a regular basis.

We have determined that the criteria for internally generated intangible assets were met for two projects in 2018: (1) the software development of a new planner for hospitals within the cardiovascular field and (2) the process to obtain FDA and E.U. approval for a 3D printed tracheal splint within the Materialise Medical segment. The first project was successfully completed in 2019. For the latter, we determined that there is a low risk that FDA approval will not be obtained although clinical trials have to be started and commercialization is not expected before 2022. This assessment was made by management based on several factors including the developed product itself, the exclusive patent rights obtained on the developed product, the successful application of the product on a number of patients as part of the emergency exception use obtained from the FDA and the continued discussions to speed up the trial duration and commercialization. The product is also expected to receive E.U. approval for commercialization by the end of 2020. However, there can be no assurance that such approvals will be obtained. The total amount capitalized for the tracheal splint amounted to K€1,376 as of December 31, 2019 and the total amount capitalized for the new planner for hospitals amounted to K€461.

Share-Based Payment Transactions

We measure the cost of equity-settled transactions with employees by reference to the fair value of the equity instruments at the date at which they are granted and measured the cost of cash-settled transactions by reference to the fair value of the equity instrument at the date of reporting. We have applied the Black-Scholes valuation model to estimate fair value. Using this model requires management to make assumptions with regards to volatility and expected life of the equity instruments. The assumptions used for estimating fair value for share-based payment transactions are disclosed in Note 14 to our consolidated financial statements and are estimated as follows:

- The dividend return is estimated by reference to the historical dividend payment. Currently, this is estimated to be zero as no dividends have been paid since inception;
- Expected volatility is estimated based on the average annualized volatility of the volatility of our shares (until September 2016: of a number of quoted peers in the 3D printing industry and the volatility of our shares);
- Estimated life of the warrant is determined to be until the first exercise period which is typically the month after vesting; and
- Fair value of the shares is determined based on the share price of our ADSs on Nasdaq at the date of valuation. For the grants prior to the initial public offering, the fair value of the shares was estimated based on a discounted cash flow model with three-year cash flow projections and a multiple of EBITDA determined based on a number of quoted peers in the 3D printing industry.

Income Taxes

Deferred tax assets are recognized for unused tax losses to the extent that it is probable that taxable profit will be available against which the losses can be utilized. Significant management judgment is required to determine the amount of deferred tax assets that can be recognized, based upon the likely timing and the level of future taxable profits together with future tax planning strategies.

As of December 31, 2019, we had €37.4 million (2018: €25.3 million; 2017: €11.9 million) of tax losses carry forward and other tax credits such as investment tax credits (and notional interest deductions in 2017 and 2016), of which €25.2 million related to Materialise NV (2018: €15.6 million; 2017:€4.6 million). These losses relate to Materialise NV and subsidiaries that have a history of losses in countries where these losses do not expire (except for the notional interest deductions of €0.0 million in 2019 (2018: €0.0 million; 2017: €0.3 million)) and may not be used to offset taxable income elsewhere our consolidated group.

With respect to the unused tax losses of Materialise NV, no deferred tax assets have been recognized given that it in view of the Belgian Patent Income Deduction and Innovation Income Deduction systems, there is an uncertainty to what extent these tax losses will be used in future years. Effective as of July 1, 2016, the new Innovation Income Deduction system replaced the former Patent Income Deduction system. Under the grandfathering rule, the Patent Income Deduction system can still be applied until June 30, 2021. The Belgian Patent Income Deduction system allows companies to deduct 80% of the qualifying gross patent income from the taxable basis. Under the Innovation Income Deduction system, companies can deduct up to 85% of their net innovation income from the taxable basis. Based on our analysis in 2019, we have assessed that no deferred tax asset should be accounted for with respect to our unused tax losses in Belgium.

With respect to the unused tax losses of our subsidiaries, deferred tax assets have been recognized in 2019 for the amount of €0 million (2018: €0; 2017: €0 million). We have not recognized deferred tax assets on unused tax losses totaling €10.7 million in 2019 (2018: €11.9 million; 2017: €7.9 million) given that it is not probable that sufficient positive taxable base will be available in the foreseeable future against which these tax losses can be utilized.

If we were able to recognize all unrecognized deferred tax assets, net profit would have increased by €6.9 million in 2019, in which €23.1 million of tax losses would have been utilized. Further details on taxes are disclosed in Note 22.10 to our consolidated financial statements.

Impairment of Goodwill, Intangible Assets and Property, Plant & Equipment

We had goodwill for a total amount of €20.2 million as of December 31, 2019 (2018: €17.5 million; 2017: €17.6 million) which has been subject to an impairment test. Goodwill is tested for impairment based on a discounted cash flow model with cash flows for the next five years derived from the budget and a residual value considering a perpetual growth rate. The value in use is sensitive to the discount rate used for the discounted cash flow model as well as the expected future cash-inflows and the growth rate used for extrapolation purposes. The key assumptions used to determine the value in use for the different cash generating units, or CGUs, are disclosed and further explained in Note 5 to our consolidated financial statements.

We capitalized development expenses for a total amount of €1.3 million as at December 31, 2019, in respect of products under development which are not in the condition intended by management and as such are not amortized. These development expenses have been subject to an impairment test based on a discounted cash flow, or DCF, model with cash flows derived from the latest business plan for the products. The value in use is sensitive to the discount rate (11.38% applied) used for the DCF model as well as the expected commercialization date for the products and the expected future cash inflows after commercialization. See “—Development Expenses” above for further information.

We are in the process of building or refurbishing a number of machines that allow for the use of recycled powder and reduce the scrap rate, which are expected to bring significant production benefits to our consolidated group. We aim to complete the project in 2020. The total carrying value of these assets under construction is €1.8 million as at December 31, 2019. These assets have been subject to an impairment test based on a DCF model using five years of projected cash flows. The present value is sensitive to the discount rate (10.0% applied) used for the DCF model, the expected date the assets may be used in production and the expected future net cash inflows (revenue minus production costs). See Note 7 to our audited consolidated financial statements for additional information.

When events or changes in circumstances indicate that the carrying amount of the intangible assets and property, plant & equipment may not be recoverable, we estimate the value in use for the individual assets, or when not possible, at the level of CGUs to which the individual assets belong. No impairment charges were recorded during 2019 (or in 2018 or 2017).

Business Combinations

We determine and allocate the purchase price of an acquired business to the assets acquired and liabilities assumed as of the business combination date. The purchase price allocation process requires us to use significant estimates and assumptions, including:

- estimated fair value of the acquired intangible assets;
- estimated fair value of property, plant and equipment; and
- estimated fair value of the contingent consideration.

The contingent consideration as included in the financial statements is recorded at fair value at the date of acquisition and is reviewed on a regular basis, at least annually. The fair value of the contingent consideration is based on risk-adjusted future cash flows of different scenarios discounted using appropriate interest rates. The structure of the possible scenarios and the probability assigned to each one of them is reassessed by management at every reporting period and requires judgement from management about the outcome and probability of the different scenarios as well as the evolution of the variables.

While we are using our best estimates and assumptions as part of the purchase price allocation process to accurately value assets acquired and liabilities assumed at the date of acquisition, our estimates and assumptions are inherently uncertain and subject to refinement. Examples of critical estimates in valuing certain of the intangible assets we have acquired or may acquire in the future include but are not limited to:

- future expected cash flows from customer contracts and relationships, software license sales and maintenance agreements;
- the fair value of the plant and equipment;
- the fair value of the deferred revenue; and
- discount rates.

Provision for Expected Credit Losses, or ECLs, of Trade Receivables and Contract Assets

We use a provision matrix to calculate ECLs for trade receivables and contract assets. The provision rates are based on days past due for groupings of various customer segments that have similar loss patterns (i.e., by legal entity).

The provision matrix is initially based on our historical observed default rates. We will calibrate the matrix to adjust the historical credit loss experience with forward-looking information. For instance, if forecast economic conditions (i.e., gross domestic product) are expected to deteriorate over the next year which can lead to an increased number of defaults, the historical default rates are adjusted. At every reporting date, the historical observed default rates are updated and changes in the forward-looking estimates are analyzed.

The assessment of the correlation between historical observed default rates, forecast economic conditions and ECLs is a significant estimate. The amount of ECLs is sensitive to changes in circumstances and of forecast economic conditions. Our historical credit loss experience and forecast of economic conditions may also not be representative of a customer's actual default in the future. Information about the ECLs on our trade receivables and contract assets is disclosed in Note 25 to our consolidated financial statements.

Convertible Loan Granted to FluidDa

We account for the convertible loan granted to FluidDa in January 2019, with a notional amount of €2.5 million, at fair value. The carrying value of the convertible loan amounts to €2.8 million at December 31, 2019. FluidDa is a private start-up company which delivers contract research organization, or CRO, services for drug development and develops medical devices that require EMA and/or FDA approval. FluidDa is currently loss-making. In determining the fair value of the convertible loan, we consider different contractual parameters such as the repayment and conversion scenarios and dates. In addition, we must make significant estimates such as (i) the discount rate, (ii) the probability and timing of each repayment and conversion scenario, and (iii) the amount of a qualified capital increase that will determine the conversion factor. The convertible loan has a duration of seven years with a 10.0% annual interest rate which is capitalized. We have applied a discount factor of 13.88% that is based on the estimated weighted average cost of capital of FluidDa, reflecting the uncertainty in relation to FluidDa's ability to be successful and the applied estimates by our consolidated group.

At December 31, 2019, we determined that the fair value of the convertible loan was not significantly different than its carrying value. Changes in significant assumptions may lead to a significant increase or decrease in the fair value of the convertible loan. An increase or decrease in the applied discount rate by 2.0% would lead to a change in fair value by €0.27 million or €0.30 million, respectively.

Changes in useful life for certain assets

The Group reviews the useful life for the intangible assets and property, plant and equipment on an annual basis considering the current facts and circumstances available. This review has resulted in 2019 in a re-assessement of the useful life for certain specific assets in the categories buildings, fixtures, vehicles and machinery. We refer to Note 7 to our consolidated financial statements for the impact of the change in useful lifes during the year 2019.

Leases IFRS 16 – Estimating the Discount Rate and Probability of Exercising Extension Options/Termination Options and Purchase Options

As we cannot always determine the interest rate implicit in lease contracts, we must estimate the incremental borrowing rate to measure certain lease liabilities such as buildings. For buildings, we use the property yield as a reference to determine the incremental borrowing rate. For other assets, we generally use the interest rate implicit in the lease contract or apply the incremental borrowing rate for a portfolio of similar assets. The incremental borrowing rate reflects what we "would have to pay", which requires estimation when no observable rates are available or when they need to be adjusted to reflect the terms and conditions of the lease.

In addition, certain lease contracts may have extension options, termination options (in the case of property leases) and/or purchase options (in the case of leases). We estimate whether it is reasonably certain that such options will be exercised, which impacts the lease term in the case of extension options and termination options and the period over which the lease assets are depreciated in the case of purchase options.

Recent Accounting Pronouncements

The standards and interpretations that are issued, but not yet effective, up to the date of issuance of our financial statements are disclosed in our financial statements included elsewhere in this annual report.

Of those standards that are not yet effective, none are expected to have a material impact on our financial statements in the period of initial application.

Other Financial Information

We believe EBITDA and Adjusted EBITDA are meaningful measures to our investors to enhance their understanding of our financial performance. Although EBITDA and Adjusted EBITDA are not necessarily a measure of our ability to fund our cash needs, we understand that it is frequently used by securities analysts, investors and other interested parties as a measure of financial performance and to compare our performance with the performance of other companies that report EBITDA or Adjusted EBITDA. Management believes these non-IFRS measures to be important measures as they exclude the effects of items which primarily reflect the impact of long-term investment and financing decisions, rather than the performance of our day-to-day operations. As compared to net profit, these measures are limited in that they do not reflect the periodic costs of certain capitalized tangible and intangible assets used in generating revenues in our business, or the charges associated with impairments. Management evaluates such items through other financial measures such as capital expenditures and cash flow provided by operating activities. We believe that these measurements are useful to measure a company's ability to grow or as a valuation measurement. Our calculation of EBITDA and Adjusted EBITDA may not be comparable to similarly titled measures reported by other companies.

We calculate EBITDA as net profit plus income taxes, financial expenses (less financial income), depreciation and amortization, and share in loss of joint venture. We calculate Adjusted EBITDA by adding non-recurring initial public offering related expenses, non-cash share-based compensation expenses and acquisition-related expenses of business combinations to EBITDA. Disclosure in this annual report of EBITDA and Adjusted EBITDA, which are non-IFRS financial measures, is intended as a supplemental measure of our performance that is not required by, or presented in accordance with, IFRS. EBITDA and Adjusted EBITDA should not be considered as alternatives to net profit or any other performance measure derived in accordance with IFRS. Our presentation of EBITDA and Adjusted EBITDA should not be construed to imply that our future results will be unaffected by unusual or non-recurring items.

Reconciliation of Net Profit to Adjusted EBITDA (unaudited) on a Consolidated Basis

	For the year ended December 31,		
in 000€	**2019**	**2018**	**2017**
Net profit (loss)	1,724	3,027	(2,117)
Income taxes	2,595	425	522
Financial expenses	3,682	4,864	4,728
Financial income	(1,377)	(3,627)	(3,210)
Depreciation and amortization	19,198	17,287	12,576
Share in loss of joint venture	392	475	469
EBITDA (unaudited)	**26,214**	**22,451**	**12,968**
Non-cash share-based compensation expenses(1)	302	1,075	1,033
Acquisition-related expenses of business combinations(2)	140	—	609
Adjusted EBITDA (unaudited)	**26,656**	**23,526**	**14,610**

(1) Non-cash share-based compensation expenses represent the cost of equity-settled and cash-settled share-based payments to employees.
(2) Acquisition-related expenses of business combinations represent fees and costs in connection with the acquisition of ACTech in 2017 and the Engimplan acquisition in 2019.

Results of Operations

Comparison of Years Ended December 31, 2019 and 2018

in 000€, except percentages	For the year ended December 31, 2019	2018	% Change
Revenue	196,679	184,721	6.5%
Cost of sales	(86,972)	(82,299)	5.7%
Gross profit	**109,707**	**102,422**	**7.1%**
Research and development expenses	(23,348)	(22,416)	4.2%
Sales and marketing expenses	(52,989)	(46,303)	14.4%
General and administrative expenses	(31,786)	(32,310)	-1.6%
Net other operating income	5,432	3,771	44.0%
Operating profit	**7,016**	**5,164**	**35.9%**
Financial expenses	(3,682)	(4,864)	0
Financial income	1,377	3,627	0
Share in loss of joint venture	(392)	(475)	0
Profit before taxes	**4,319**	**3,452**	
Income taxes	(2,595)	(425)	0
Net profit	**1,724**	**3,027**	-43.0%

Comparison of Years Ended December 31, 2019 and 2018 by Segment

in 000€	Materialise Software	Materialise Medical	Materialise Manufacturing	Total segments	Unallocated	Consolidated
For the year ended December 31, 2019						
Revenues	41,654	60,808	94,156	196,618	61	196,679
Segment Adjusted EBITDA	13,812	10,774	12,154	36,740	(10,084)	26,656
Segment Adjusted EBITDA %	33.2%	17.7%	12.9%	18.7%	—	13.6%
For the year ended December 31, 2018						
Revenues	37,374	52,252	94,956	184,582	139	184,721
Segment Adjusted EBITDA	11,536	10,252	10,785	32,573	(9,047)	23,526
Segment Adjusted EBITDA %	30.9%	19.6%	11.4%	17.6%	—	12.7%

(1) Unallocated related Revenues consist of occasional one-off sales by our core competencies not allocated to any of our segments. Unallocated related Segment Adjusted EBITDA consist of corporate research and development, corporate headquarter costs and other operating income (expense).

Revenue. Revenue was €196.7 million in the year ended December 31, 2019 compared to €184.7 million in the year ended December 31, 2018, an increase of €12 million, or 6.5%.

Revenue by geographical area is presented as follows:

in 000€	For the year ended December 31, 2019	2018
Americas	59,630	43,917
Europe & Africa	117,784	120,378
Asia-Pacific	19,265	20,426
Total	**196,679**	**184,721**

Revenue generated in Europe & Africa decreased by €2.6million, or 2.2%, in the year ended December 31, 2019 compared to the year ended December 31, 2018, mainly due to lower revenue from our Materialise Manufacturing segment, which was partly offset by increased revenue from our Materialise Software and our Materialise Medical segments.. Revenue generated throughout the Americas increased by €15.7 million, or 35.8%, in the year ended December 31, 2019 compared to the year ended December 31, 2018, with a strong revenue increase for all our segments Revenue generated in Asia-Pacific decreased by €1.2 million, or 5.7%, in the year ended December 31, 2019 compared to the year ended December 31, 2018.

Revenue from our Materialise Software segment increased 11.4% from €37.4 million in the year ended December 31, 2018 to €41.7 million in the year ended December 31, 2019. Recurrent revenue, consisting of limited license fees and maintenance fees, grew 20.0%. Non-recurrent revenue, mainly consisting of perpetual fees, increased 4.3%. Deferred revenue from license and maintenance fees increased to €3.1 million, compared to €2.8 million in the year ended December 31, 2018.

Revenue from our Materialise Medical segment increased €8.6 million, or 16.4%, from €52.3 million in the year ended December 31, 2018 to €60.8 million in the year ended December 31, 2019, including €2.4 million from Engimplan. Medical software revenue grew by 18.3% from 2018 to 2019. Within our medical software department recurrent revenue from annual and renewed licenses and maintenance fees increased by 20.0%, reflecting the implementation of our strategy focused on products with defined contractual periods. Our non-recurrent revenue from perpetual licenses and services decreased by 3.3%. These recurrent revenues represented 77.7% of all medical software revenues in the year ended December 31, 2019, compared to 73.7% in the year ended December 31, 2018. Revenues from medical devices and services grew 17.6% in the year ended December 31, 2019, due to the revenue increase from partner sales business lines (especially in CMF), and Engimplan. As of December 31, 2019, our Materialise Medical segment operated 32 3D printers, as compared to 32 as of December 31, 2018.

Revenue from our Materialise Manufacturing segment decreased from €95.0 million in the year ended December 31, 2018 to €94.2 million in the year ended December 31, 2019, representing a decrease of €0.8 million. During 2019, we had moderate single-digit revenue growth in the first three quarters, which was offset by a decrease of 11% in the fourth quarter, reflecting lower activity in both our traditional manufacturing and ACTech business lines, which were affected by the softened macro-economic environment. As of December 31, 2019, Materialise Manufacturing operated 149 3D printers, six vacuum casting machines and 20 CNC machines, as compared to 149, six and 19 as of December 31, 2018, respectively. Although the total number of 3D printers did not change from the year ended December 31, 2018 to the year ended December 31, 2019, we replaced certain printers with printers we believe to be more efficient. Four metal 3D printers were added, while four older plastic 3D printers were put out of operation during the year ended December 31, 2019.

Cost of sales. Cost of sales was €87.0 million in the year ended December 31, 2019, compared to €82.3 million in the year ended December 31, 2018, representing an increase of €4.7 million, or 5.7%. This increase in cost of sales was mainly due to increased payroll expenses and the inclusion of Engimplan's cost of sales as of August 1, 2019.

Gross profit. The overall gross profit margin (gross profit divided by our revenue) amounted to 55.8% in the year ended December 31, 2019, compared to 55.4% in the year ended December 31, 2018. The improved margin reflected a combination of the following factors: a change in sales mix, which was positively affected by the growing importance of our software revenues and negatively affected by the growing cost of sales from medical devices (specifically, our Engimplan and CMF business lines); and improvements in efficiency in general in all of our business lines.

Research and development, or R&D, sales and marketing, or S&M, and general and administrative, or G&A, expenses. R&D, S&M and G&A expenses increased, in the aggregate, to €108.1 million in the year ended December 31, 2019, compared to €101.0 million in the year ended December 31, 2018. R&D expenses increased from €22.4 million to €23.3 million, S&M expenses increased from €46.3 million to €53.0 million and G&A expenses decreased from €32.3 million to €31.8 million. The R&D cost increase excludes €0.9 million of expenditures in 2019 that were capitalized as intangible assets and related to our tracheal splint project. In total, the intangible assets related to this development project amounted to K€1,651 on our balance sheet at December 31, 2019.

Net other operating income. Net other operating income increased from €3.8 million in the year ended December 31, 2018 to €5.4 million in the year ended December 31, 2019. The variance was mainly due to higher grant income and an improvement of our bad debt position.

Net financial expense (financial expenses and financial income). In each of 2018 and 2019, the net financial expense mainly related to the net interest expense from loans and deposits of financial institutions. The net financial expense increased from €1.2 million in the year ended December 31, 2018 to € 2.3 million in the year ended December 31, 2019. This variance was due to an increase of net interest expense and bank charges.

Income taxes. Income taxes in the year ended December 31, 2019 resulted in an expense of €2.6 million, which was a combination of deferred tax bookings and income taxes due over the result for the period.

Net profit. As a result of the factors described above, net profit was €1.7 million in the year ended December 31, 2019 compared to a net profit of €3.0 million in the year ended December 31, 2018, or a decrease of €1.3 million.

EBITDA. As a result of the factors described above, our consolidated EBITDA increased from €22.5 million in the year ended December 31, 2018 to €26.2 million in the year ended December 31, 2019, an increase of €3.8 million, or 16.8%, and our total segment EBITDA increased from €32.6 million in the year ended December 31, 2018 to €36.7 million in the year ended December 31, 2019, an increase of €4.2 million, or 12.8%. The 2019 EBITDA includes Engimplan's contribution of €0.7 million.

Our Materialise Software segment's Adjusted EBITDA increased from €11.5 million in the year ended December 31, 2018 to €13.8 million in the year ended December 31, 2019, an increase of €2.3 million, or 19.7%. This segment's Adjusted EBITDA margin (the segment's Adjusted EBITDA divided by the

segment's revenue) increased from 30.9% for the year ended December 31, 2018 to 33.2% in the year ended December 31, 2019. The decrease in the Adjusted EBITDA margin was due to revenue growth of 11.4% (which was affected positively by sales mix with a higher portion of recurrent sales), partly offset by an increase in operating expenses by 11.7%, reflecting continued investments in S&M. R&D costs were flat, while G&A expenses decreased.

Our Materialise Medical segment's Adjusted EBITDA increased from €10.3 million in the year ended December 31, 2018 to €10.8 million in the year ended December 31, 2019. The segment's Adjusted EBITDA margin decreased from 19.6% in the year ended December 31, 2018 to 17.7% in the year ended December 31, 2019. Excluding Engimplan's contribution, the margin was 17.4% in 2019. The segment's Adjusted EBITDA margin was affected negatively by a changed sales mix in our medical devices business (CMF's production revenue grew significantly resulting in higher cost of sales), and our operating expenses, which grew in the aggregate by 16.4%. The increase in our operating expenses was mainly due to an increase in remuneration expenses.

Our Materialise Manufacturing segment's Adjusted EBITDA increased from €10.8 million in the year ended December 31, 2018 to €12.2 million in the year ended December 31, 2019. The Adjusted EBITDA margin of this segment increased from 11.4% in the year ended December 31, 2018 to 12.9% in the year ended December 31, 2019. While the gross margin remained stable, operating expenses (S&M, R&D, and G&A) decreased slightly and net other operating income (including grants) increased.

Reconciliation of Net Profit to Segment Adjusted EBITDA

in 000€	For the year ended December 31, 2019	2018
Net profit	**1,724**	**3,027**
Income taxes	2,595	425
Finance costs	3,682	4,864
Finance income	(1,377)	(3,627)
Share in loss of joint venture	392	475
Operating profit	**7,016**	**5,164**
Depreciation and amortization	19,198	17,287
Corporate research and development	1,859	1,913
Corporate headquarters costs	11,077	10,358
Other operating (income) expense	(2,410)	(2,149)
Segment Adjusted EBITDA (unaudited)	**36,740**	**32,573**

Comparison of Years Ended December 31, 2018 and 2017

in 000€, except percentages	For the year ended December 31, 2018	2017	% Change
Revenue	184,721	142,573	29.6%
Cost of sales	(82,299)	(62,952)	30.7%
Gross profit	**102,422**	**79,621**	28.6%
Research and development expenses	(22,416)	(19,959)	12.3%
Sales and marketing expenses	(46,303)	(38,935)	18.9%
General and administrative expenses	(32,310)	(24,876)	29.9%
Net other operating income (expenses)	3,771	4,541	-17.0%
Operating profit	**5,164**	**392**	1217.3%
Financial expenses	(4,864)	(4,728)	
Financial income	3,627	3,210	
Share in loss of joint venture	(475)	(469)	
Profit (loss) before taxes	**3,452**	**(1,595)**	
Income taxes	(425)	(522)	
Net profit (loss)	**3,027**	**(2,117)**	-243.0%

Comparison of the Years Ended December 31, 2018 and 2017 by Segment

in 000€	Materialise Software	Materialise Medical	Materialise Manufacturing	Total segments	Unallocated (1)	Consolidated
For the year ended December 31, 2018						
Revenues	37,374	52,252	94,956	184,582	139	184,721
Segment Adjusted EBITDA	11,536	10,252	10,785	32,573	(9,047)	23,526
Segment Adjusted EBITDA %	30.9%	19.6%	11.4%	17.6%	0.0%	12.7%
For the year ended December 31, 2017						
Revenues	35,770	42,841	63,712	142,323	250	142,573
Segment Adjusted EBITDA	13,926	4,400	4,439	22,765	(8,155)	14,610
Segment Adjusted EBITDA %	38.9%	10.3%	7.0%	16.0%	0.0%	10.2%

(1) Unallocated Revenues consist of occasional one-off sales by our core competencies not allocated to any of our segments. Unallocated Segment Adjusted EBITDA consists of corporate research and development, corporate headquarter costs and other operating income (expense).

Revenue. Revenue was €184.7 million in the year ended December 31, 2018 compared to €142.6 million in the year ended December 31, 2017, an increase of €42.1 million, or 29.6%.

Revenue by geographical area is presented as follows:

	For the year ended December 31	
in 000€	2018	2017
Americas	43,917	35,120
Europe & Africa	120,378	87,940
Asia-Pacific	20,426	19,513
Total	**184,721**	**142,573**

Revenue generated in Europe & Africa increased by €32.4 million, or 36.9% in the year ended December 31, 2018 compared to the year ended December 31, 2017, mainly as a result of the consolidation of ACTech's full year revenue and the increased revenue in our Materialise Medical segment, boosted by revenue from medical device partnerships. Revenue generated throughout the Americas increased by €8.8 million or 25.0% in the year ended December 31, 2018 compared to the year ended December 31, 2017, also mainly because of ACTech's full year consolidation effect and the revenue growth in our Materialise Medical segment. Revenue generated in Asia-Pacific increased by €0.9 million, or 4.7% in the year ended December 31, 2018 compared to the year ended December 31, 2017.

Revenue from our Materialise Software segment increased 4.5% from €35.8 million in the year ended December 31, 2017 to €37.4 million in the year ended December 31, 2017 Recurrent revenue, consisting of limited licence fees and maintenance fees, grew 18.0%. Non-recurrent revenue, mainly consisting of perpetual fees, decreased 4.6%. Deferred revenue from license and maintenance fees increased €2.8 million in the year ended December 31, 2018 compared to €1.3 million in the year ended December 31, 2017.

Revenue from our Materialise Medical segment increased €9.4 million or 22.0% from €42.8 in the year ended December 31, 2017 to €52.3 million in the year ended December 31, 2018. Medical software growth was 9.1% in total. Within our medical software department recurrent revenue from annual and renewed licenses and maintenance fees increased by 17.1%, reflecting the result of our strategy implementation, focusing on products with defined contractual periods. Our revenue from perpetual licenses and services decreased by 8.4%. These recurrent revenues represented 73.7% of all medical software revenues in the year ended December 31, 2018, compared to 68.7% in the year ended December 31, 2017. Revenues from medical devices and services grew 29.3%, entirely due to the revenue increase from partner sales, especially in our business lines of CMF, shoulder, and knee devices. At December 31, 2018, Materialise Medical operated 32 3D printers, as compared to 24 at December 31, 2017.

Revenue from our Materialise Manufacturing segment increased from €63.7 million in the year ended December 31, 2017 to €95.0 million in the year ended December 31, 2018, representing an increase of €31.2 million, or 49.1%. Revenue from the ACTech business that was acquired in October 2017 contributed €43.4 million in 2018. At December 31, 2018, Materialise Manufacturing operated 149 3D printers, six vacuum casting machines and 19 CNC machines, as compared to 155, 6, and 16 at December 31, 2017 respectively. The decrease of the 3D printers is mainly due to the 5 powder binding machines no longer used for consumer printing commercial purposes. four metal 3D printers were added, while five older plastic 3D printers have been put out of operation.

As a result of the ACTech acquisition, our revenue is distributed differently in 2018 than in 2017. During the year ended December 31, 2018, aggregated over our various segments, 29.5% of our revenue was derived from Materialise Software and Materialise Medical software licenses and related services, as compared to 36.1% in the year ended December 31, 2017. Furthermore 51.4% of our revenues was gained from the sale of printed industrial and consumer products (including €43.4 million from ACTech's business), compared to 44.7% in the year ended December 31, 2017, and 19.1% of our revenue was obtained from the sale of medical devices (guides as well as implants). These were brought to the market together with complex software planning solutions, including royalties and other fees, and contribute to the total revenue at the same level as compared to the year ended December 31, 2017.

Cost of sales. Cost of sales was €82.3 million in the year ended December 31, 2018, compared to €63.0 million in the year ended December 31, 2017, representing an increase of €19.5 million, or 30.6%. This increase in cost of sales is entirely due to increased purchases of goods and services, payroll expenses and depreciation expenses from the acquired ACTech business at the beginning of the 4th quarter of 2017. The total cost of sales of ACTech business amounted to €28.7 million in 2018.

Gross profit. The overall gross profit margin (gross profit divided by our revenue) amounted to 55.4% in the year ended December 31, 2018, compared to 55.8% in the year ended December 31, 2017.

Research and development, or R&D, sales and marketing, or S&M and general and administrative, or G&A, expenses. R&D, S&M and G&A expenses increased, in the aggregate, to €101.0 million in the year ended December 31, 2018 coming from €83.8 million in the year ended December 31, 2017. €9.2 million of the R&D, S&M and G&A expenses relate to the newly acquired ACTech business, compared to €2.1 million in the year ended December 31, 2017.. Excluding the ACTech business, R&D expenses increased from €20.0 million to €22.4 million, S&M expenses increased from €38.9 million to €46.3 million (including €3.2 million of ACTech), and G&A expenses (including €6.0 million of ACTech) increased from €24.9 million to €32.3 million.

Net other operating income. Net other operating income decreased from €4.5 million in the year ended December 31, 2017 to €3.8 million in the year ended December 31, 2018. The variance is primarily due to the increase of the provision for doubtful receivables, including the impact of the new IFRS 9 accounting standard.

Financial result (financial expenses and financial income). In 2018, the net financial result mainly relates to the net interest expense from loans and deposits of financial institutions. The net financial result decreased from €(1.5) million in the year ended December 31, 2017 to €(1.2) million in the year ended December 31, 2018. This variance is due to an increase of net interest expense, entirely offset by positive variances related to foreign currency results, and net other financial income.

Income taxes. Income taxes in the year ended December 31, 2018 resulted in an expense of €0.4 million, which was a combination of deferred tax bookings, and income taxes due over the result for the period.

Net profit. As a result of the factors described above, the net profit is €3.0 million in the year ended December 31, 2018 compared to a net loss of €2.1 million in the year ended December 31, 2017, or an increase of €5.1 million.

EBITDA. As a result of the factors described above, our consolidated EBITDA increased from €13.0 million in the year ended December 31, 2017 to €22.5 million in the year ended December 31, 2018, an increase of €7.5 million or 73.1%, and our total segment adjusted EBITDA increased from €22.8 million in the year ended December 31, 2017 to €32.6 million in the year ended December 31, 2018, an increase of €9.8 million, or 43.1%. The 2017 EBITDA includes ACTech's contribution of €9.4 million.

Our Materialise Software segment's adjusted EBITDA decreased from €13.9 million in the year ended December 31, 2017 to €11.5 million in the year ended December 31, 2018, a decrease of €2.4 million, or 17.3%. This segment's adjusted EBITDA margin (the segment's adjusted EBITDA divided by the segment's revenue) decreased from 38.9% for the year ended December 31, 2017 to 30.9% in the year ended December 31, 2018. The decrease in the adjusted EBITDA margin is due to a moderate revenue growth of 4.5% (affected negatively because of the sales mix with a higher portion of recurrent sales and deferred revenue impact) while operating expenses increased by 18.3%, reflecting continued investments in sales and marketing, research and development and G&A expenses.

Our Materialise Medical segment's adjusted EBITDA increased from €4.4 million in the year ended December 31, 2017 to €10.3 million in the year ended December 31, 2018. The segment's adjusted EBITDA margin increased from 10.3% in the year ended December 31, 2017 to 19.6% in the year ended December 31, 2018. This improvement is due to the increase of the segment's gross margin by 28.6%, mainly reflecting the positive impact of the medical devices revenue growth, compared to an increase of 6.1% across the segment's operational expenses.

Our Materialise Manufacturing segment's adjusted EBITDA increased from €4.4 million in the year ended December 31, 2017 to €10.8 million in the year ended December 31, 2018. Excluding ACTech's contribution of €9.4 million, the adjusted EBITDA margin of this segment decreased from 5.4% in the year ended December 31, 2017 to 2.7% in the year ended December 31, 2018, as a result of decreased revenue and increased operating expenses.

Reconciliation of Net Profit to Segment Adjusted EBITDA

in 000€	For the year ended December 31, 2018	2017
Net profit (loss)	**3,027**	**(2,117)**
Income taxes	425	522
Finance costs	4,864	4,728
Finance income	(3,627)	(3,210)
Share in loss of joint venture	475	469
Operating profit	**5,164**	**392**
Depreciation and amortization	17,287	12,576
Corporate research and development	1,913	2,017
Corporate headquarters costs	10,358	9,690
Other operating income (expense)	(2,149)	(1,910)
Segment Adjusted EBITDA (unaudited)	**32,573**	**22,765**

B. Liquidity and Capital Resources

Prior to our initial public offering, we historically funded our operations principally from cash generated from operations and borrowings. On June 30, 2014, we completed our initial public offering of 8,000,000 ADSs at a public offering price of $12.00 per ADS, and received net proceeds of approximately $88.3 million. On July 19, 2018, we completed a private placement of 1,953,125 newly issued ordinary shares to BASF Antwerpen for gross proceeds of approximately $25 million. On July 27, 2018, we sold 3,450,000 ADSs in our follow-on public offering at a public offering price of $13.00 per ADS, and received net proceeds of approximately $40.2 million. As we continue to grow our business, we envision funding our operations through multiple sources, including the remaining proceeds from our initial public offering, our private placement to BASF Antwerpen and our follow-on offering, and future earnings and cash flow from operations and borrowings.

We expect our main uses of cash in the future will be funding our business operations, capital expenditures and loan reimbursements, acquisitions and partnerships. We believe that we will have sufficient liquidity to satisfy the operating requirements of our business through the next 12 months.

Our liquidity plans are subject to a number of risks and uncertainties, including those described in the section of this annual report titled "Item 3. Key Information—D. Risk Factors," some of which are outside of our control. Macro-economic conditions, including the impact of the COVID-19 pandemic on the global economy, could hinder our business plans, which could, in turn, adversely affect our financing strategy.

Cash Flows

The table below summarizes our cash flows from operating activities, investing activities and financing activities for the years ended December 31, 2019, 2018 and 2017.

in 000€	For the year ended December 31, 2019	2018	2017
Net cash flow from operating activities	28,402	28,320	9,951
Net cash flow from/(used in) investing activities	(25,617)	(22,133)	(59,249)
Net cash flow from/(used in) financing activities	10,781	65,235	38,041
Net increase of cash and cash equivalents	**13,566**	**71,422**	**(11,257)**

Comparison of Years Ended December 31, 2019 and 2018

Net cash flow from operating activities was €28.4 million in the year ended December 31, 2019 compared to €28.3 million in the year ended December 31, 2018, an increase of €0.1 million, or 0.3%, resulting from the increase in Adjusted EBITDA (€3.1 million) offset by higher income taxes and working capital requirements.

Net cash flow used in investing activities was €25.6 million in the year ended December 31, 2019 compared to €22.1 million in the year ended December 31, 2018, an increase of €3.5 million, or 15.7%. In 2019, in addition to capital expenditures, cash flow used in investing activities were impacted by the acquisition of Engimplan and a convertible loan we granted to FluidDa. For more information regarding this loan, see Note 3 to our consolidated financial statements.

Net cash flow from financing activities was €10.8 million in the year ended December 31, 2019 compared to €65.2 million in the year ended December 31, 2018, a decrease of €54.5 million, or 83.5 %. During 2018, the main cash flow from financing activity related to our follow-on public offering and BASF Antwerpen private placement in July 2018. During 2019, we drew an additional €25.0 million tranche under our finance contract with the European Investment Bank, and €4.0 million to finance capital expenditures from other credit institutions.

Comparison of Years Ended December 31, 2018 and 2017

Net cash flow from operating activities was €28.3 million in the year ended December 31, 2018 compared to €10.0 million in the year ended December 31, 2017, an increase of €18.4 million, or 184.6%, resulting from the increase in EBITDA (€9.4 million) and additional cash flow from working capital and taxes paid (€8.5 million).

Net cash flow used in investing activities was €22.1 million in the year ended December 31, 2018 compared to €59.2 million in the year ended December 31, 2017, a variance of €37.1 million, mainly explained by the business combination related to ACTech in 2017.

Net cash flow from financing activities was €65.2 million in the year ended December 31, 2018 compared to €38.0 million in the year ended December 31, 2017, an increase of €27.2 million. During 2018, the main cash flow from financing activity resulted from our follow-on public offering and BASF Antwerpen private placement in July 2018.

Investments in Property, Plant & Equipment and Intangible Assets

The table below describes our investments in property, plant & equipment and intangible assets for the years ended December 31, 2019, 2018 and 2017:

	For the year ended December 31,		
in 000€	2019	2018	2017
Purchase of property, plant and equipment	13,472	18,557	30,517
Purchase of intangible assets	2,193	2,344	4,467
Total	**15,665**	**20,901**	**34,984**

Indebtedness

As of December 31, 2019, we had loans and borrowings in the total amount of €127.9 million, with mainly fixed interest rates. These loans include secured bank loans used to finance the acquisition of ACTech, the construction of office and production facilities in Belgium and Poland, the acquisition of production equipment and installations, and research and development projects.

The following table sets forth our principal indebtedness:

in 000€	As of December 31 2019	2018	2017
K€35,000 EIB bank loan	35,000	10,000	—
K€28,000 acquisition bank loan	21,612	24,576	27,513
K€18,000 secured bank loans	17,429	17,739	17,575
K€12,300 bank loans ACTech	11,850	12,300	9,247
K€8,750 other facility loans	3,599	4,299	4,982
Bank investment loans - top 20 outstanding	22,132	23,801	21,441
Bank investment loans - other	4,429	3,808	2,289
Lease liabilities (2018 and 2017: Finance leases)	9,876	6,809	9,164
Institutional loan	824	1,492	1,105
Convertible bonds	1,000	1,000	1,000
Related party loan	187	214	241
Total loans and borrowings	**127,938**	**106,038**	**94,557**
Current	16,838	13,598	12,769
Non-Current	111,100	92,440	81,788

K€35,000 EIB bank loan

On December 20, 2017, we entered into a finance contract with the European Investment Bank, or EIB, to finance future research and development programs. The contract provides a credit of up to €35.0 million drawable in two tranches. As part of the first tranche, an amount of €10.0 million was drawn in July of 2018. The duration of the loan will be between six to eight years, and includes a two-year loan repayment grace period.

In July 2019, the second tranche of €25.0 million was drawn. Similar to the first tranche, the duration of the loan will be between six to eight years, and includes a two-year loan repayment grace period.

Loans under the contract are made at a fixed rate, based on the Euribor rate at the time of the borrowing, plus a variable margin. The applied rate for the first tranche is initially equal to 2.4%. The applied rate for the second tranche is initially equal to 2.72% and varies in function of certain EBITDA levels and debt ratios. The contract contains customary security, covenants and undertakings.

K€28,000 *Acquisition loan*

This bank loan was concluded in October 2017 to finance the acquisition of ACTech. The loan includes a portion of €18.0 million, repayable monthly over seven years, and a bullet portion of €10.0 million, payable at once in October 2024. The interest rate is fixed for the duration of the loan, and amounts to 1.1% on average for both portions. The bank loans are secured with a business pledge mandate, a share pledge on Materialise Germany GMBH, and debt covenants.

K€18,000 secured bank loans

The K€18,000 loan has been concluded in 2016 in two agreements to finance the construction of new facilities in Leuven (Belgium) and in Poland, both maturing in 2032. The agreement for the Belgian facility financing amounts to K€12,000 (drawn per end 2018: K€11,739; per end 2017 K€11,739), and with reimbursements only starting in December 2022. The agreement for the Polish facility financing amounts to K€6,000 (fully drawn per end of 2017), and with reimbursements only starting in June 2019. The average interest rate of both agreements amounts to 1.2%. The bank loan is secured with a mortgage mandate on the Belgian facility buildings.

K€12,300 *bank loans*

In March 2018, three bank loans originating from the acquired ACTech business were refinanced in their entirety for an aggregate amount of €9.3 million, with the maturity adjusted to May 2025 and the first repayments beginning in August 2020. The interest rate was fixed at approximately 1.6%, and pledges including a €4.7 million mortgage on ACTech's facilities and guaranteed by Materialise NV. In addition, a new investment credit of €3.0 million was obtained from Commerzbank in June 2018, repayable as from January 2019 and with a fixed interest rate of 1.5%.

K€8,750 - Other facility loans

Three facility loans were contracted in 2005, 2006 and 2012 for the construction of Leuven office and production facilities (€2.0 million, €0.3 million and €5.0 million respectively) and another loan for the Czech Republic offices in 2008 (€1.8 million). The aggregate balance of the four loans amounted to €4.3 million as of December 31, 2019. All loans have a repayment schedule of 15 years and interest rates are fixed between 4.3% and 5.4% for the four loans.

Bank investment loans

The 20 largest of these investment loans outstanding as of December 31, 2019 amount to a balance of €22.1 million. They were agreed in 2018, 2017 and prior years to finance various investments in machinery, printers, equipment, and software tools. The vast majority of the loans have a reimbursement period over seven years, and are at fixed interest rates with weighted average below 1%.

K€9,876 Lease liabilities included lease with related party

We have several lease obligations, mainly with financial institutions and related to the financing of buildings and various other items of plant and equipment such as 3D printers. As at December 31, 2019 the balance of these lease obligations amounts to K€9,876, and are mostly at fixed interest rates with weighted average below 2%. The subsidiary Engimplan is renting the office and production building from its non-controlling shareholders for an initial term of 10 years, with an extension option for an additional 10 years (assessed not to be reasonably certain to be exercised). The lease has been accounted for under IFRS 16 resulting in a lease liability at December 31, 2019 of K€617.

K€2,000 institutional loan

This loan was contracted with a governmental institution in Germany to finance the production operations of Materialise Germany for a maximum amount of K€2,000. The loan is repayable over a four year period, starting as of September 2017 with a fixed interest rate of 0.25% payable per quarter. As of December 31, 2019 K€2,000 has been drawn with an outstanding balance of K€824.

K€1,000 convertible bonds held by related party

On October 28, 2013, we issued 1,000 convertible bonds with a related party for a total amount of €1.0 million. The bonds have been fully subscribed by a member of our senior management.

The conditions of the convertible bonds are summarized as follows:

- Number of convertible bonds: 1,000
- Nominal value per bond: €1,000
- Contractual life: seven years
- Interest: 3.7% per year
- Conversion period: from January 1, 2017 until maturity
- Conversion price: €1.97 per share

The maximum number of ordinary shares that can be issued upon conversion is 508,904.

We have estimated the fair value of a similar liability however without any conversion option by reference to a number of quoted peers in Belgium. The fair value was estimated at €0.9 million. Upon initial recognition, an amount of €93,000 was recognized in consolidated reserves reflecting the fair value of the conversion option.

Related party loan

Ailanthus NV has granted us one other loan at fixed interest rate of 4.23% that matures in 2025. The purpose of the loan is to finance the purchase of a building in France. The amounts outstanding as of December 31, 2019 is €0.2 million (2018: €0.2 million; 2017: €0.2 million). The interest expense for the year ended December 31, 2019 is €8,645 (2018: €10,000; 2017: €11,000).

Material Unused Sources of Liquidity

Our cash and cash equivalents as of December 31, 2019, 2018 and 2017 were €128.9 million, €115.5 million and €43.2 million, respectively. We have no longer undrawn lines of credit at December 31, 2019.

Transfers from Subsidiaries

The amount of dividends payable by our subsidiaries to us is subject to, among other restrictions, general limitations imposed by the corporate laws, capital transfer restrictions and exchange control restrictions of the respective jurisdictions where those subsidiaries are organized and operate. For example, China has very specific approval regulations for all capital transfers to or from the country, certain capital transfers to and from Ukraine are subject to obtaining a specific permit and current legislation in Brazil permits the Brazilian government to impose temporary restrictions on remittances of foreign capital abroad in the event of a serious imbalance or an anticipated serious imbalance in Brazil's balance of payments. Dividends paid to us by certain of our subsidiaries may also be subject to withholding taxes in certain jurisdictions. Of our cash and cash equivalents held outside of Belgium as of December 31, 2019, 2018 and 2017, the amount of cash that would have been subject to withholding taxes if transferred to us by way of dividends and the amount of cash that could not have been transferred by law, or the transfer of which would have been subject to prior approval that was beyond our control, was in each case immaterial.

C. Research and Development, Patents and Licenses

For information regarding our research and development program, see "Item 4. Information on the Company—B. Business Overview—Research and Development."

D. Trend Information

The COVID-19 pandemic had no impact on our financial performance for the period from January 1, 2019 to December 31, 2019. However, its trajectory remains highly uncertain and we cannot predict the duration and severity of the outbreak and its containment measures.

As discussed in more detail in Note 27 to our audited consolidated financial statements, based on our current assessment of the COVID-19 pandemic, we have considered various hypothetical scenarios on how our business, results of operations and financial condition could be impacted during the year 2020. In these scenarios, we take the general view, but without any certainty as we are reviewing the situation constantly, that our business will be impacted very significantly in the second quarter of 2020, and will subsequently continue to be weak for the rest of the year, although our current assessment of the situation is that our business may gradually improve during the remainder of 2020. However, in the current situation, in view of the many uncertainties of this unprecedented crisis, we find it very hard to gain any visibility beyond the second quarter.

In our Materialise Software segment, we believe that an important part of the software sales of this segment are, at least temporarily, at risk. A significant portion of the sales of this segment comes from parties that either sell or use 3D printing systems. The weakness of the 3D printing industry in general is expected to weigh very negatively on 3D printing system sales and thus also on our software sales, definitely in the second quarter of 2020 with a possible extension into the second half of 2020.

In our Materialise Medical segment, we design, produce and sell customized implants, surgical guides and models as well as visualization and planning software to research institutes, universities, medical device companies and hospitals. A significant percentage of this segment's revenue stems, directly or indirectly, from elective surgeries, almost all of which are now being postponed due to the U.S. Centers for Disease Control and Prevention, or CDC, guidelines, which require hospitals to prioritize preparation and response to the pandemic. As a result, these revenues (and at least the timing thereof) become uncertain, which will result in a significant reduction of sales of this segment, definitely in the second quarter of 2020, and possibly in the next quarters as well, depending on how the pandemic evolves.

Our Materialise Manufacturing segment operates as part of the overall manufacturing sector in Europe, which includes subsectors such as automotive, aviation, machine parts and consumer products, all of which are heavily impacted by the coronavirus crisis. The European automotive market was particularly weak before the COVID-19 outbreak, and we now expect an even slower recovery than previously estimated. Other European industrial subsectors are not faring much better in this market and will likely face larger declines than previously expected. Order intake within this segment has been slowing down, which will significantly impact the segment's second quarter results and which may impact the results beyond the second quarter, as a function of how the crisis develops in general and how the industry as a whole, and our customers in particular, subsequently recover from the situation.

We also expect an increase of bad debt, a delay in trade payments, and that we will not be able to adjust and align all of our costs according to the expected decrease of revenue. We experienced the first negative effects of this crisis on our revenues in the first quarter of 2020. In these analyses, we considered a major negative impact in the second quarter, and only a gradual and partial recovery in the third and fourth quarter of this year. From these analyses, we conclude that (according to the currently most likely scenarios), the going concern principle should be maintained, and that the principle financial covenants of our credit facilities will not be violated. We believe that the expected situation does not impact the current valuation of our inventories, investments, intangible assets (including goodwill), long-lived assets, or our debt.

While we continue to monitor the situation regularly, we believe that eventually the 3D printing industry will recover and may even come out of this crisis stronger, as the crisis appears to be underscoring certain advantages of the 3D printing technology, in particular its flexibility in terms of part design, speed, production of smaller strategic batches and localization. Therefore, while we try to adjust our costs and capital spending in proportion to the short term reduction of our revenues, we currently take the view that these cost and spending reductions should, where possible, be as moderate and temporary as possible, since we believe that continued innovation during the current crisis may give us a competitive advantage going forward. This strategy involves significant risks, including risks in terms of its impact on our cash position, and as the crisis lasts longer, we may not be able to sustain this strategy and it might have negative implications for our long term competitive position.

Notwithstanding our current assessment of the potential impact of the COVID-19 pandemic on our business, financial condition and results of operations, we cannot predict with certainty the impacts, trends and uncertainties involving the pandemic's effects on economic activity, the 3D printing software and services markets, our sales, the availability and price of our products, and the extent to which our business may be materially and adversely affected. For more information regarding the risks of the COVID-19 pandemic, see "Item 3. Key Information—D. Risk Factors—Risks Relating to our Business." In addition, see "Special Note Regarding Forward-Looking Information" on page 1 of this annual report.

E. Off-Balance Sheet Arrangements

We do not have any off-balance sheet arrangements that have, or are reasonably likely to have, a current or future effect on our financial condition, changes in financial condition, revenues or expenses, results of operations, liquidity, capital expenditures or capital resources that is material to investors.

F. Tabular Disclosure of Contractual Obligations

The table below sets forth our contractual obligations as of December 31, 2019:

in 000€	Total	Less than 1 year	2-3 years	4-5 years	More than 5 years
Loans and borrowings	118,063	13,389	31,929	39,994	32,751
Lease Liabilities	9,876	3,450	4,743	998	685
Scheduled interest payments(1)	5,866	1,146	1,269	1,720	1,731
Purchase obligations	11,640	5,288	6,257	95	0
Total	**145,445**	**23,273**	**44,198**	**42,807**	**35,167**

(1) Scheduled interest payments comprises the interest payable on loans and borrowings and financial lease commitments. No interest is payable on the other contractual obligations in the above table.

In relation to our property, plant & equipment, we had committed expenditures of €0.7 million as of December 31, 2017, related to the purchase of land in Germany. In the course of 2018, this commitment was fulfilled and the land was purchased. As of the end of December 31, 2019, we had no significant purchase commitments related to property, plant & equipment.

G. Safe Harbor

See “Special Note Regarding Forward-Looking Information” on page 1 of this annual report.

ITEM 6. DIRECTORS, SENIOR MANAGEMENT AND EMPLOYEES

A. Directors and Senior Management

The following table sets forth certain information with respect to the current members of our board of directors and senior management:

Name	Age	Position
Directors:		
Wilfried Vancraen	58	Founder, Director & Chief Executive Officer
Peter Leys	55	Executive Chairman
A Tre C CVOA, represented by Johan De Lille	57	Director
Hilde Ingelaere	58	Director & Executive Vice President
Pol Ingelaere	84	Director
Jürgen Ingels	49	Director
Jos Vander Sloten	57	Director
Lieve Verplancke	60	Director
Bart Luyten	43	Director
Volker Hammes	56	Director
Senior Management and Executive Committee Members:		
Wilfried Vancraen	58	Founder, Director & Chief Executive Officer
Peter Leys	55	Executive Chairman
Hilde Ingelaere	58	Director & Executive Vice President
Seaquence BVBA, represented by Johan Pauwels	52	Executive Vice President
Bart Van der Schueren	53	Executive Vice President, Chief Technology Officer
Alfinco BVBA, represented by Johan Albrecht	56	Executive Vice President, Chief Financial Officer
Ioberan BVBA, represented by Stefaan Motte	43	Vice President, Materialise Software segment
De Vet Management bvba, represented by Brigitte de Vet-Veithen	49	Vice President, Materialise Medical segment
Level 5 BVBA, represented by Jurgen Laudus	41	Vice President, Materialise Manufacturing segment
Eduard Crits	61	Chief Information Officer
SoHo services, represented by Conny Hooghe	54	Vice President, Human Resources
Carla Van Steenbergen	44	Vice President, Chief Legal Officer

The term of the directorship of each member of our board of directors will expire at the 2020 annual general meeting of shareholders. The business address of the members of our board of directors is the same as our business address: Technologielaan 15, 3001 Leuven, Belgium. Our board of directors has determined that three members of our board of directors, Jürgen Ingels, Lieve Verplancke and A Tre C CVOA, represented by Johan De Lille, are independent under Belgian law and the NASDAQ Stock Market listing requirements.

The following is a brief summary of the business experience of the current members of our board of directors:

Wilfried Vancraen. Wilfried Vancraen has served as one of our directors and as our Chief Executive Officer since founding our company in July 1990. Mr. Vancraen previously worked as a research engineer and consultant at the Research Institute of the Belgian Metalworking Industry, where he was introduced to 3D printing. Passionate about this new technology and firm in his belief that it could help create a better and healthier world, he founded Materialise in July 1990. Mr. Vancraen holds several patents related to the technical and medical applications of 3D printing and remains committed to using the technology to make positive changes in people's lives. In recent years, Mr. Vancraen has been awarded the RTAM/SME Industry Achievement Award, the highest honor in the 3D printing industry, has been selected as the most influential person in additive manufacturing by industry professionals and TCT Magazine, and has been listed one of the five leading players in his sector by the Financial Times. He is also the recipient of a 2013 Visionaries! Award from the Museum of Art and Design in New York. Mr. Vancraen holds a Master of Science in Electro-Mechanical Engineering and a Master in Business Administration from KU Leuven. Wilfried Vancraen was chosen in the TCT Hall of Fame in 2017 for his contributions to the 3D printing industry. In 2018, he was chosen by the Additive Manufacturing Users Group (AMUG) as the Innovators Showcase and received the Industry Dino Award. In 2019, Mr. Vancraen was appointed as a faculty honorary professor at the Faculty of Engineering, KU Leuven on the recommendation of the Department of Mechanical Engineering because of his role as founder and CEO of our company.

Peter Leys. Peter Leys has served as one of our directors and as our Executive Chairman since 2013. Previously, from 1990 to 2013, Mr. Leys was at the Brussels office of Baker & McKenzie CVBA, where he focused on mergers and acquisitions, and capital markets. Mr. Leys lectures a contract negotiation course at the KU Leuven. Mr. Leys holds a Candidacy Degree in Philosophy from KU Leuven and Master of Law degrees from KU Leuven and the University of Georgia.

Johan De Lille. Johan De Lille has represented A Tre C CVOA as one of our directors since July 2006, and A Tre C CVOA has been an independent director of Materialise since 2006. Mr. De Lille started his professional career as an auditor at Arthur Andersen LLP in 1988. In 1994, he became Vice President & Group Controller of Ackermans & van Haaren NV, a Belgian public holding company. In 1999, he became Chief Financial Officer of Easdaq/Nasdaq Europe and took on the role of Chief Financial Officer of Option NV, a Belgian public technology company, in 2001. Mr. De Lille joined Delhaize Group, a Belgian public company, as Vice President & Controller in September 2002, and later became Chief Internal Auditor of the Delhaize Group in August 2006, and Chief Financial Officer of Delhaize Belgium in January 2009. Since 2013, Mr. De Lille has acted as Chief Financial & Information Officer of BMT Group, an industrial family owned holding company active in high-precision machining. Mr. De Lille serves as an independent director on the board of directors of Boma NV, a Belgian private company specializing in cleaning products. In 1988, Mr. De Lille was the award winner for the best final paper of the Department of Economics from KU Leuven. In 2010, he received the CFO Magazine Award for the Best Finance Team of the year for Working Capital in Belgium. Mr. De Lille holds a Master's degree in Economics, with a major in Econometrics and Mathematical Economics, from KU Leuven.

Hilde Ingelaere. Hilde Ingelaere co-founded Materialise in 1990, together with the company's Chief Executive Officer, Wilfried Vancraen, and has served as one of our directors since 1997. In her early years at Materialise, Ms. Ingelaere managed several staff departments including human resources, finance and legal. Today as the Executive Vice President of Materialise, she plays an important role in strategic negotiations with a focus on partnerships and applications in the medical domain. Prior to joining Materialise, Ms. Ingelaere conducted cardiovascular clinical research at Bristol-Myers Squibb from 1986 to 1989. She then worked as a business analyst with Plant Genetic Systems from 1989 to 1992. Ms. Ingelaere holds a Master's degree in Bioengineering from KU Leuven, where she focused on Biotechnology, and a Master's degree in Business Administration from KU Leuven.

Pol Ingelaere. Pol Ingelaere has served as one of our directors since 2011. Mr. Ingelaere has been involved for many years in education and the sciences, teaching physics, chemistry and biology to final grade college students in Belgium. In 1981 Mr. Ingelaere was appointed as an inspector for all science teachers in West Flanders, Belgium. Mr. Ingelaere has been an active member of a number of educational commissions. Mr. Ingelaere holds a Master's degree in Biology from the University of Ghent and an International Certificate in Human Ecology from the Free University of Brussels.

Jürgen Ingels. Jürgen Ingels has served as one of our independent directors since November 2013. Mr. Ingels is Founder and Managing Partner of SmartFin Capital, a growth stage private equity fund that was set up in December 2014. In October 2014, Mr. Ingels sold Clear2Pay NV/S.A., a global innovative payments software technology company he founded in 2000, to FIS Global. The clients of Clear2Pay include global and major regional financial institutions such as ING Group, Banco Santander, S.A., Crédit Agricole S.A., BNP Paribas, The U.S. Federal Reserve, Royal Bank of Scotland, The People's Bank of China (PBOC). Mr. Ingels started his career in private equity in 1997 at Dexia NV/S.A., where his role was focused on investing in technology companies. Mr. Ingels currently serves as a director on the board of directors for UnifiedPost NV, Guardsquare NV, Projective NV, Itineris NV, Itiviti AB, Willemen Groep, Ghelamco NV, WDP (Euronext), and Vavato. In 2015, Mr. Ingels co-founded The Glue, a provider of infrastructure solutions for financial institutions. In 2018, Mr. Ingels founded Scale-Ups.eu and organized Supernova, a four-day technology event in Antwerp with over 30.000 visitors. Mr. Ingels holds a Master's degree in Business Administration and a Master's degree in Political and Social Sciences from the University of Antwerp.

Jos Vander Sloten. Jos Vander Sloten has served as one of our directors since January 2007. Mr. Vander Sloten is a full professor at the Faculty of Engineering Science, KU Leuven and chaired the Division of Biomechanics for two terms from 2006 to 2014. He chaired the Leuven Medical Technology Centre (L-MTC), which he founded in 2008 until the end of his two terms in 2016. Mr. Vander Sloten teaches engineering mechanics, problem solving and engineering design, computer integrated surgery systems, and medical device design including regulatory affairs. From 2006 to 2012, he served as program director of the Master in Biomedical Engineering at KU Leuven. His research interests are computer applications in musculoskeletal biomechanics and computer integrated surgery, on which he authored more than 160 journal papers. Mr. Vander Sloten is a Founding Fellow of the European Alliance for Medical and Biological Engineering and Science, where he previously served as president in 2006, president-elect in 2005 and secretary-general from 2003 to 2004. In 2015, he was elected as a member of the International Academy for Medical and Biological Engineering. Mr. Vander Sloten holds a Master's degree in Mechanical Engineering and a PhD in Mechanical Engineering – Biomedical Engineering from KU Leuven. Since 2016, he is Vice-Dean for International Affairs at the Faculty of Engineering Science, KU Leuven.

Lieve Verplancke. Godelieve (Lieve) Verplancke has served as one of our independent directors since June 2015. Ms. Verplancke began her career in 1984 with The Beecham Group (now part of GlaxoSmithKline), and has since held key management positions with Merck & Co., as well as Bristol-Myers Squibb, where she served as Managing Director, leading their Belgian/GDL subsidiary, until 2012. Ms. Verplancke has also served as a board member for Brussels-based Europe Hospitals, the Imelda Hospital in Bonheiden, the Euronext fund, Quest for Growth, MdxHealth and the Stichting tegen Kanker. She is also the founder and managing director of Qaly@Beersel, an elderly care center in Belgium. In addition to being a medical doctor (MD – KU Leuven), Ms. Verplancke holds a postgraduate degree in Economics and a Master in Business Administration from the University of Antwerp. She has also completed courses at INSEAD, CEDEP, Columbia University and the Vlerick Business School, and is a certified Executive Coach (PCC).

Bart Luyten. Bart Luyten has served as one of our independent directors since June 2017 and also previously served as representative of one of our directors from 2012 to 2015. Mr. Luyten is Founder and Managing Partner of SmartFin Capital, a private equity fund investing in growth stage technology companies. Previously, Mr. Luyten was the Founder and Managing Director of Sniper Investments NV, a smart technologies venture capital fund that was liquidated in 2016. Mr. Luyten has experience as Investment Director of Partners At Venture, Managing Partner of Privast Capital Partners and General Partner of Nausicaa Ventures, all Belgian-based private equity and venture capital funds with a focus on technology investments. Mr. Luyten currently holds positions on the boards of directors of a number of European technology companies and serves on the advisory board of Boston Millennia Partners II, a U.S. based venture capital and private equity firm he was associated with earlier in his career. Mr. Luyten holds a Master of Science degree in Applied Economics from the University of Antwerp and a postgraduate Master degree in SME management from VIZO Brussels.

Volker Hammes. Volker Hammes, has served as one of our directors since November 2018. Mr. Hammes has served as a Managing Director of BASF New Business GmbH, a subsidiary of BASF SE, the German chemical conglomerate (FWB: BAS), since January 2016 and a Chairman of BASF 3D Printing Solutions GmbH, another subsidiary of BASF, since August 2017. Between 2012 and 2016, Mr. Hammes also served as director or officer of various BASF affiliates, including as Chief Executive Officer and Managing Director, Head of Business Center Turkey, Middle East and North Africa of BASF Turk Kimya San. Ltd. Sti. In addition, Mr. Hammes has served as a director on the board of directors of Essentium Inc., a provider of industrial 3D printing solutions, since December 2017. Mr. Hammes holds a Master of Science degree in Mechanical Engineering, Polymer Technology from RWTH Aachen.

Our board of directors has established an Executive Committee, within the meaning of article 524bis of the Belgian Companies Code. The following is a brief summary of the professional experience of the members of our Executive Committee, which was established effective as of January 1, 2017:

Johan Pauwels. Johan Pauwels has served as an Executive Vice President of our company since January 2011 and has been with our company since our founding. In 1990, Mr. Pauwels completed his Master's thesis on stereolithography on the very first 3D printing machine at Materialise. After graduating in 1991, Mr. Pauwels stayed on with our company, focusing on software development to support our 3D printing services. Throughout his career with our company, Mr. Pauwels has held several positions, including Software Sales Manager and Director of Sales, and is currently an Executive Vice President responsible for global sales organization and our sales offices around the world. Mr. Pauwels holds a Master's degree in Electro-Mechanical Engineering from KU Leuven.

Bart Van der Schueren. Bart Van der Schueren has served as an Executive Vice President of our company since January 2011 and as our Chief Technology Officer since 2016. Prior to joining Materialise, Mr. Van der Schueren was at KU Leuven as a liaison engineer for the newly founded Materialise and established the basic research activities for the company while also founding the research activities in 3D printing at the KU Leuven. Mr. Van der Schueren then went on to obtain a PhD in selective laser metal sintering. In 1995, Mr. Van der Schueren officially joined Materialise and ran the service bureau. Over the years, his dedication and expertise has grown the service bureau from a regional player to one of the most prominent additive manufacturing facilities in Europe. In 2011, Mr. Van der Schueren became an Executive Vice President of our company, responsible for the Materialise Manufacturing segment and focusing on production and engineering services. Since 2018, Mr. Van der Schueren is globally responsible for the research activities of Materialise. Mr. Van der Schueren holds a PhD in Selective Laser Metal Sintering and a Master's degree in Mechanical Engineering from KU Leuven.

Johan Albrecht. Johan Albrecht has represented Alfinco BVBA as our Chief Financial Officer since August 2015. Mr. Albrecht joined Materialise from BARC NV, a global central laboratory that supports the pharmaceutical and biotech industry in the development of new drugs, where he served as Chief Financial Officer between 1989 and 2015, with responsibility for its worldwide financial and business reporting and control systems. Mr. Albrecht was also a member of BARC NV's executive committee and a director in its subsidiaries in Belgium, the United States, China, Australia, Singapore and South Africa. After Cerba European Lab, a network of 200 laboratories, acquired BARC NV in 2007, Mr. Albrecht also joined Cerba European Lab's executive committee in 2011. Prior to joining BARC NV, Mr. Albrecht served in various financial capacities with Pizzaland Benelux (United Biscuits), Applied Data Research and Minit International. Mr. Albrecht holds a postgraduate degree in corporate finance from KU Leuven and a Bachelor of Science in Business Administration from HU Brussels University.

Stefaan Motte. Stefaan Motte serves as Vice President and General Manager of the Materialise Software segment, and as such is responsible for the general strategic management of that segment. Mr. Motte joined us in April 2010, with an initial focus on growing our cranio-maxillofacial business. From 2012 onwards, Mr. Motte's scope broadened to orthopaedic applications as he took up the role of Director of the Clinical Business Unit. From 2015 onwards, Mr. Motte assumed his current role leading the Software business. Mr. Motte has been a member of the Materialise Executive Committee since 2010. Prior to joining Materialise, Mr. Motte was a software architect and project manager with Koninklijke Philips NV from 2001 to 2006. From 2006 to 2010, Mr. Motte worked with NXP semiconductors as a competence center manager, and a member of the NXP Belgium management team. Mr. Motte holds a Master of Science degree in Mathematics from KU Leuven and a Master of Science degree in Applied Informatics from KU Leuven. In 2017 Mr. Motte was appointed Fellow of the Faculty of Science, KU Leuven.

Brigitte de Vet-Veithen. Brigitte de Vet-Veithen has represented De Vet Management bvba as Vice President Medical since June 2016. Mrs de Vet-Veithen has more than 20 years of experience in the Healthcare and Life Sciences Sector. She has worked in various management roles for Johnson & Johnson, ultimately serving as Vice President for the EMEA region of Cordis Neurovascular and General Manager of Cordis in Germany. Before joining Materialise she has held various leadership roles as representative of De Vet Management bvba including the role of Chief Executive Officer of Acertys group, a provider of medical devices, software, services and supplies to hospitals and medical professionals. Mrs de Vet-Veithen holds a Master of Business Administration with a Major in Engineering from HEC Liege and an MBA from INSEAD.

Jurgen Laudus. Jurgen Laudus serves as Vice-President of our Materialise Manufacturing segment. Mr. Laudus joined us in August 2001 as project manager and continued to our U.K. office to become Rapid Tooling manager in 2003. For two years, Mr. Laudus was responsible for both our Rapid Tooling sales support and production management. In 2005, Mr. Laudus returned to Belgium to become international production manager for our additive manufacturing services and later on sales manager, playing an active role in the growth of the additive manufacturing production activities of Materialise. Mr. Laudus holds a Master of Science degree in Engineering from the KU Leuven.

Eddy Crits. Eduard (Eddy) Crits has served as our Chief Information Officer since August 2018. For the past 30 years of his career, Mr. Crits held managerial and executive positions in ICT, Product Development, Operations and Engineering in global technological companies such as Agfa, IPTE and IBA. Mr. Crits holds a PhD degree in Physics from KU Leuven and an Executive MBA degree from the University of Antwerp.

Conny Hooghe. Conny Hooghe represented SoHo Services as our Global HR Director since September 2017. She holds a Master of Industrial Psychology from the University of Ghent. Previously she has held several human resources management positions within technological oriented or IT companies like Wolters Kluwer, Fujitsu Services and Atos Origin.

Carla Van Steenbergen. Carla Van Steenbergen has served as our in-house counsel since 2003, and her role has gradually evolved into our Chief Legal Officer. Ms. Van Steenbergen has served as our Compliance Officer since June 2014, and is a member of our Executive Committee in addition to being secretary to the board of directors. Ms. Van Steenbergen graduated from the law faculty of KU Leuven in 1999. After having worked for three years at Brussels' based law firm Marx Van Ranst Vermeersch & Partners, she temporarily moved to London to earn a LLM degree at King's College London. Upon her return to Belgium, she started working as in-house legal counsel for our company, a position which she holds to this day. Over the years, our legal department has expanded, changing Ms. Van Steenbergen's role from the sole company lawyer to that of a legal team manager.

Family Relationships

Wilfried Vancraen and Hilde Ingelaere are spouses. Pol Ingelaere is the father of Hilde Ingelaere. No other family relationship exists between any members of our board of directors or senior management.

B. Compensation

Compensation of Directors

Our Remuneration and Nomination Committee recommends the level of remuneration for directors. These recommendations are subject to approval by our board of directors and, subsequently, by our shareholders at the annual general meeting. During the year ended December 31, 2019, only the directorships of Mr. Vancraen, Mr. Leys, Ms. Ingelaere, Mr. De Lille, Mr. Vander Sloten, Mr. Ingels, Mr. Luyten, Ms. Verplancke and Mr. Hammes were remunerated. See "—Compensation of Senior Management and Executive Committee" below for more information about the remuneration of the directorships of Mr. Vancraen, Mr. Leys and Ms. Ingelaere. During the year ended December 31, 2019, Mr. De Lille, Mr. Vander Sloten, Mr. Ingels, Mr. Luyten, Ms. Verplancke and Mr. Hammes each received annual remuneration equal to €10,000. In addition, Mr. De Lille, Mr. Vander Sloten, Mr. Ingels, Mr. Luyten, Ms. Verplancke and Mr. Hammes each received a remuneration of €1,250 per physical board meeting that he or she attended and €625 for each board meeting held via conference call (lasting more than one hour) that he or she attended.

In addition, the Chairman of the Audit Committee and the Chairman of the Remuneration and Nomination Committee received annual remuneration of €7,500 and €2,500, respectively. Each independent member (including the Chairman) of the Audit Committee or the Remuneration and Nomination Committee received a remuneration of €1,250 for each physical committee meeting that he or she attended, and €625 for each committee meeting held via conference call (lasting more than one hour) and that he or she attended. The Remuneration and Nomination Committee benchmarks directors' compensation against peer companies to ensure that it is competitive. In addition, our board of directors sets and revises, from time to time, the rules and level of compensation for directors carrying out a special mandate or sitting on one or more of the board of directors committees and the rules for reimbursement of directors' business-related out-of-pocket expenses.

Compensation of Senior Management and Executive Committee

In 2019, our senior management received in the aggregate total gross compensation of €2.48 million, which included base salary, bonus payments, company car allowance and other benefits. This amount also includes the remuneration of the directorships of Mr. Vancraen, Mr. Leys and Ms. Ingelaere and the compensation for the members of the Executive Committee.

We have entered into services agreements (Contracts for Paid Office as a member of the Executive Committee) with each member of our Executive Committee. The terms of these agreements are substantially similar. These agreements generally provide for an annual base salary. In addition to the fixed remuneration components, under the terms of these agreements, members of our Executive Committee are entitled to certain additional benefits (including mobile phone and director and officer liability insurance) and reimbursement of necessary and reasonable expenses. These services agreements with members of our Executive Committee provide for payments and benefits (including upon termination of employment) that we believe are in line with customary market practice for similar companies who are operating in our industry.

C. Board Practices

Service Contracts

Except as described above under "—B. Compensation—Compensation of Senior Management and Executive Committee," we do not have service contracts with any member of our board of directors or Executive Committee.

Board of Directors Practices

Decisions are generally made by our board of directors as a whole. However, decisions on certain matters may be delegated to committees of our board of directors or to the Executive Committee to the extent permitted by law and our articles of association. The chairperson, or if he or she is prevented from doing so, the vice chairperson, chairs the meetings of our board of directors and determines the order in which the agenda items are discussed, the method and order of the voting, any adjournment of the discussion and passing of resolutions on individual agenda items after a due assessment of the circumstances.

Our board of directors transferred management powers to the Executive Committee, except for the general policy of the company and other powers which are reserved by Belgian company law to the board of directors. The Executive Committee is supervised by our board of directors. The following actions are comprised under general policy of our company and are thus excluded from the powers of the Executive Committee:

- mergers and acquisitions;
- transfer and waive of intellectual property rights to third parties;
- granting of exclusivity rights to third parties with an important impact on the freedom of a particular business segment;
- nomination and removal of members of the Executive Committee;
- opening of offices abroad and nomination and removal of managers thereof;
- conclusion of financial loans;
- sale and purchase of real estate; and
- cancellation of a particular product line.

Our board of directors entrusted the daily management of the company to Wilfried Vancraen, our Chief Executive Officer, in conformity with article 525 of the Belgian Companies Code.

Pursuant to our articles of association, our board of directors may form committees from among its members and charge them with the performance of specific tasks. The committees' tasks, authorizations and processes are determined by our board of directors. Where permissible by law and our articles of association, important powers of our board of directors may also be transferred to committees.

Audit Committee

The Audit Committee consists of three members: Johan De Lille (Chairman), Lieve Verplancke and Jürgen Ingels. Our board of directors has determined that Messrs. De Lille and Ingels and Ms. Verplancke are independent under Rule 10A-3 of the Exchange Act and the applicable rules of the NASDAQ Stock Market and that each of Messrs. De Lille and Ingels and Ms. Verplancke qualifies as an "audit committee financial expert" as defined under the Exchange Act.

Our Audit Committee assists our board of directors in overseeing the accuracy and integrity of our accounting and financial reporting processes and audits of our consolidated financial statements, the implementation and effectiveness of an internal control system and our compliance with legal and regulatory requirements, the independent auditors' qualifications and independence and the performance of the independent auditors.

The Audit Committee's duties and responsibilities to carry out its purposes include, among others:

- the review of our accounting processes;
- the review of the effectiveness of our internal systems of control, risk management and compliance;
- the consideration and recommendation of the nomination, compensation, retention and termination of the Company's statutory auditor for Belgian company law purposes and the Company's independent auditor for SEC purposes, the commissioning of the auditors to conduct audits, agreeing on additional services to be provided by the auditors under their respective engagements, the establishment of the scope and the main review points of the audit and oversight of the auditors' work (including resolution of disagreements with the auditors);

- the preparation of our board of directors' resolution on our consolidated financial statements;
- reviewing our interim consolidated financial statements that are made public or otherwise filed with any securities regulatory authority;
- discussing any flaws relating to our internal control systems, as reported by our board of directors to the audit committee;
- monitoring our bookkeeping and records; and
- the establishment of procedures for (i) the receipt, retention and treatment of complaints we receive regarding accounting, internal accounting controls or auditing matters and (ii) the confidential, anonymous submission by our employees of concerns regarding questionable accounting or auditing matters.

Our Audit Committee is entitled to review information on any point it wishes to verify, and is authorized to acquire such information from any of our employees. It is also authorized to obtain independent advice, including legal advice, if this is necessary for an inquiry into any matter under its responsibility. It is entitled to call on the resources that will be needed for this task. It is entitled to receive reports directly from the auditors, including reports with recommendations on how to improve our control processes.

Remuneration and Nomination Committee

Our Remuneration and Nomination Committee consists of three members: Wilfried Vancraen, Jozef Vander Sloten and Johan De Lille. Our board of directors has determined that Mr. De Lille is independent under the applicable rules of the NASDAQ Stock Market.

Our Remuneration and Nomination Committee assists our board of directors in its decisions relating to the remuneration policy and individual remuneration packages for our board of directors and Chief Executive Officer, the appointment of directors, the Chief Executive Officer and the other members of senior management.

The Remuneration and Nomination Committee's duties and responsibilities to carry out its purposes include, among others:

- identifying individuals qualified to become members of our board of directors, consistent with criteria approved by our board of directors;
- recommending to our board of directors the director nominees for each annual general meeting, taking into account any nomination rights that certain shareholders may have under our articles of association;
- recommending to our board of directors director nominees to fill vacancies;
- recommending to our board of directors qualified and experienced directors for service on the committees of the board of directors;
- recommending to our board of directors the compensation of the members of senior management;
- recommending to our board of directors any incentive compensation plans and equity-based plans, and awards thereunder, and profit-sharing plans for our employees;
- evaluating the performance of our Chief Executive Officer; and
- advising our board of directors on other compensation issues.

D. Employees

The table below sets out information about the number of FTEs and fully dedicated consultants, which consultants included individual professionals who are registered as private entrepreneurs in Ukraine and who work exclusively with our company. FTEs who are a part of one or more of our three core competencies are allocated to one of our segments and therefore included in our segment reporting.

	For the year ended December 31,		
	2019*	2018	2017
Total	2,177	2,009	1,862
Segments:			
Materialise Software	303	273	256
Materialise Medical	763	634	542
Materialise Manufacturing	775	783	775
Additional staff	336	319	289

* *Includes 104 Engimplan FTEs.*

We currently do not have a work council or trade union delegation. We have a health and safety committee entitled to certain information and consultation rights under Belgian law, at our Belgian headquarters. We consider our employee relations to be good and have never experienced a work stoppage.

E. Share Ownership

The following table sets forth information relating to beneficial ownership of our ordinary shares, as of April 24, 2020, for each member of our board of directors and senior management as of April 24, 2020:

	Ordinary Shares Beneficially Owned as of April 24, 2020	
Name of beneficial owner(1)	Number(2)	Percent(2)
Wilfried Vancraen(3)	33,098,964	62.2
Peter Leys(4)	654,668	1.2
A Tre C CVOA, represented by Johan De Lille(5)	—	—
Pol Ingelaere	—	*
Jürgen Ingels	—	*
Jos Vander Sloten	12,000*	
Lieve Verplancke	—	—
Hilde Ingelaere(3)	33,098,964	62.2
Bart Luyten	—	—
Volker Hammes	—	—
Johan Pauwels(6)	150,590	*
Bart Van der Schueren(7)	138,317	*
Johan Albrecht	—	—
Jurgen Laudus(8)	22,374	*
Carla Van Steenbergen(9)	13,590	*
Stefaan Motte(10)	1,515	*
Brigitte de Vet-Veithen	—	—
Conny Hooghe	—	—
Eddy Crits	—	—

* Less than 1%

(1) Except as otherwise indicated, the address for each of the persons named above is Technologielaan 15, 3001 Leuven, Belgium.

(2) Beneficial ownership is determined in accordance with the rules and regulations of the SEC. In computing the number of shares beneficially owned by a person and the percentage ownership of that person, we have included shares that the person has the right to acquire within 60 days of April 12, 2019, including through the exercise of any option, warrant or other right or the conversion of any other security. These shares, however, are not included in the computation of the percentage ownership of any other person. Except as otherwise indicated, we believe the persons named in this table have sole voting and investment power with respect to all ordinary shares shown as beneficially owned by them, subject to community property laws where applicable and to the information contained in the footnotes to this table.

(3) Consists of (i) 5,331,164 ordinary shares held by Mr. Vancraen, (ii) 277,500 ordinary shares held by Ms. Ingelaere, (iii) 15,000 ADSs jointly held by Mr. Vancraen and Ms. Ingelaere, (iv) 14,021,612 ordinary shares jointly held by Mr. Vancraen and Ms. Ingelaere through Idem, a civil partnership (*burgerlijke maatschap / société civile de droit commun*) that is controlled and managed by Mr. Vancraen and Ms. Ingelaere, (v) 13,428,688 ordinary shares held by Ailanthus NV, which is owned and controlled by Mr. Vancraen and Ms. Ingelaere, and (vi) 25,000 ADSs held by Ailanthus NV. Mr. Vancraen and Ms. Ingelaere may be deemed to share voting power and investment power over these shares, and ADSs. Does not include (i) 1,125 warrants issued and granted to Mr. Vancraen or 1,125 warrants issued and granted to Ms. Ingelaere under the 2013 Warrant Plan, that will be exercisable upon vesting for an aggregate of 4,500 ordinary shares and 4,500 ordinary shares, respectively, at €2.14 per share, which vests in thirds on a yearly basis beginning in October 2018 and that expire in 2023, (ii) 18,180 warrants issued and granted to Mr. Vancraen or 18,180 warrants issued and granted to Ms. Ingelaere under the 2014 Warrant Plan, which warrants are exercisable for 18,180 ordinary shares and 18,180 ordinary shares, respectively, at €8.81 per share, vest 25% on a yearly basis beginning in October 2018 and expire in 2024 or (iii) 15,000 warrants issued and granted to Mr. Vancraen or 15,000 warrants issued and granted to Ms. Ingelaere under the 2015 Warrant Plan, which warrants are exercisable for 15,000 ordinary shares and 15,000 ordinary shares, respectively, at €6.45 per share, vested or will vest 10% on September 2018, 20% on September 2019, 30% on September 2020 and 40% on September 2021, and expire in 2025.

(4) Consists of (i) 67,500 ADSs and (ii) 508,904 ordinary shares issuable upon conversion of 1,000 convertible bonds which have been issued to and subscribed by Mr. Leys and Ms. Kindt and which can be converted at a conversion price of €1.97 per share and mature in 2020. Does not include (i) 18,194 warrants issued and granted to Mr. Leys under the 2013 Warrant Plan, that will be exercisable upon vesting for an aggregate of 72,776 ordinary shares at €1.97 per share, which vests in thirds on a yearly basis beginning in October 2018, and that expire in 2023, or (ii) 15,000 warrants issued and granted to Mr. Leys under the 2015 Warrant Plan, which warrants are exercisable for 15,000 ordinary shares at €6.45 share, vested or will vest 10% on September 2018, 20% on September 2019, 30% on September 2020 and 40% on September 2021, and expire in 2025.

(5) The address for A Tre C CVOA is Timmermansstraat 32, 8340 Damme, Belgium.

(6) Consists of (i) 40,000 ordinary shares held jointly with Mr. Pauwels' spouse Kristine Van Muylder, (ii) 10,590 ADSs held jointly with Ms. Van Muylder. Mr. Pauwels and Ms. Van Muylder may be deemed to share voting power and investment power over these shares, and (iii) 100,000 ordinary shares jointly held by Mr. Pauwels and Ms. Van Muylder through Sorelle, a civil partnership (*burgerlijke maatschap / société civile de droit commun*) that is controlled and managed by Mr. Pauwels and Ms. Van Muylder. Does not include (i) 375 warrants issued and granted to Mr. Pauwels under the 2013 Warrant Plan, that will be exercisable upon vesting for an aggregate of 1,500 ordinary shares at €2.14 per share, which vests in thirds on a yearly basis beginning in October 2018, and that expire in 2023, (ii) 9,090 warrants issued and granted to Mr. Pauwels under the 2014 Warrant Plan, which warrants are exercisable for 9,090 ordinary shares at €8.81 per share, vest 25% on a yearly basis beginning in October 2018 and expire in 2024 or (iii) 15,000 warrants issued and granted to Mr. Pauwels under the 2015 Warrant Plan, which warrants are exercisable for 15,000 ordinary shares at €6.45 per share, vested or will vest 10% on September 2018, 20% on September 2019, 30% on September 2020 and 40% on September 2021, and expire in 2025.

(7) Consists of (i) 129,052 ordinary shares held by Mr. Van der Schueren and (ii) 9,265 ADSs held by Mr. Van der Scheuren. Does not include (i) 375 warrants issued and granted to Mr. Van der Schueren under the 2013 Warrant Plan, that will be exercisable upon vesting for an aggregate of 1,500 ordinary shares at €2.14 per share, which vests in thirds on a yearly basis beginning in October 2018, and that expire in 2023, (ii) 9,090 warrants issued and granted to Mr. Van der Schueren under the 2014 Warrant Plan, which warrants are exercisable for 9,090 ordinary shares at €8.81 per share, vest 25% on a yearly basis beginning in October 2018 and expire in 2024 or (iii) 10,500 warrants issued and granted to Mr. Van der Schueren under the 2015 Warrant Plan, which warrants are exercisable for 10,500 ordinary shares at €6.45 per share, vested or will vest 10% on September 2018, 20% on September 2019, 30% on September 2020 and 40% on September 2021, and expire in 2025.

(8) Consists of 22,374 ADSs held by Mr. Laudus. Does not include (i) 375 warrants issued and granted to Mr. Laudus under the 2013 Warrant Plan, that will be exercisable upon vesting for an aggregate of 1,500 ordinary shares at €2.14 per share, which vests in thirds on a yearly basis beginning in October 2018, and that expire in 2023, (ii) 9,090 warrants issued and granted to Mr. Laudus under the 2014 Warrant Plan, which warrants are exercisable for 9,090 ordinary shares at €8.81 per share, vest 25% on a yearly basis beginning in October 2018 and expire in 2024 or (iii) 15,000 warrants issued and granted to Mr. Laudus under the 2015 Warrant Plan, which warrants are exercisable for 4,000 ordinary shares at €6.45 per share, vested or will vest 10% on September 2018, 20% on September 2019, 30% on September 2020 and 40% on September 2021, and expire in 2025.

(9) Consists of (i) 27,764 ordinary shares held by Ms. Van Steenbergen and (ii) 1,500 ADSs held by Ms. Van Steenbergen. Does not include (i) 375 warrants issued and granted to Ms. Van Steenbergen under the 2013 Warrant Plan, that will be exercisable upon vesting for an aggregate of 1,500 ordinary shares at €2.14 per share, which vests in thirds on a yearly basis beginning in October 2018, and that expire in 2023, (ii) 9,090 warrants issued and granted to Ms. Van Steenbergen under the 2014 Warrant Plan, which warrants are exercisable for 9,090 ordinary shares at €8.81 per share, vest 25% on a yearly basis beginning in October 2018 and expire in 2024 or (iii) 15,000 warrants issued and granted to Ms. Van Steenbergen under the 2015 Warrant Plan, which warrants are exercisable for 4,000 ordinary shares at €6.45 per share, vested or will vest 10% on September 2018, 20% on September 2019, 30% on September 2020 and 40% on September 2021, and expire in 2025.

(10) Consists of (i) 1,500 ordinary shares held by Mr. Motte and (ii) 15 ADSs held by Mr. Motte. Does not include (i) 375 warrants issued and granted to Mr. Motte under the 2013 Warrant Plan that will be exercisable upon vesting for an aggregate of 1,500 ordinary shares at €2.14 per share, which vests in thirds on a yearly basis beginning in October 2018, and that expire in 2023, (ii) 9,090 warrants issued and granted to Mr. Motte under the 2014 Warrant Plan, which warrants are exercisable for 9,090 ordinary shares at €8.81 per share, vest 25% on a yearly basis beginning in October 2018 and expire in 2024 or (iii) 3,500 warrants issued and granted to Mr. Motte under the 2015 Warrant Plan, which warrants are exercisable for 3,500 ordinary shares at €6.45 per share, vested or will vest 10% on September 2018, 20% on September 2019, 30% on September 2020 and 40% on September 2021, and expire in 2025.

ITEM 7. MAJOR SHAREHOLDERS AND RELATED PARTY TRANSACTIONS

A. Major Shareholders

The following table sets forth information relating to beneficial ownership of our ordinary shares, as of April 24, 2020, for each person who is known by us to own beneficially 5% or more of our outstanding ordinary shares:

	Ordinary Shares Beneficially Owned as of April 24, 2020	
Name of Beneficial Owner(1)	Number(2)	Percent(2)
Wilfried Vancraen(3)	33,098,964	62.2
Hilde Ingelaere(3)	33,098,964	62.2
Nikko Asset Management Americas Inc.(4)	2,667,051	5.09
ARK Investment Management LLC(5)	2,834,406	5.41

(1) Except as otherwise indicated, the address for each of the persons named above is Technologielaan 15, 3001 Leuven, Belgium.

(2) Beneficial ownership is determined in accordance with the rules and regulations of the SEC. In computing the number of shares beneficially owned by a person and the percentage ownership of that person, we have included shares that the person has the right to acquire within 60 days of April 12, 2019, including through the exercise of any option, warrant or other right or the conversion of any other security. These shares, however, are not included in the computation of the percentage ownership of any other person. Except as otherwise indicated, we believe the persons named in this table have sole voting and investment power with respect to all ordinary shares shown as beneficially owned by them, subject to community property laws where applicable and to the information contained in the footnotes to this table.

(3) Consists of (i) 5,331,164 ordinary shares held by Mr. Vancraen, (ii) 277,500 ordinary shares held by Ms. Ingelaere, (iii) 15,000 ADSs jointly held by Mr. Vancraen and Ms. Ingelaere, (iv) 14,021,612 ordinary shares jointly held by Mr. Vancraen and Ms. Ingelaere through Idem, a civil partnership (*burgerlijke maatschap / société civile de droit commun*) that is controlled and managed by Mr. Vancraen and Ms. Ingelaere, (v) 13,428,688 ordinary shares held by Ailanthus NV, which is owned and controlled by Mr. Vancraen and Ms. Ingelaere, and (vi) 25,000 ADSs held by Ailanthus NV. Mr. Vancraen and Ms. Ingelaere may be deemed to share voting power and investment power over these shares and ADSs. Does not include (i) 1,125 warrants issued and granted to Mr. Vancraen or 1,125 warrants issued and granted to Ms. Ingelaere under the 2013 Warrant Plan, that will be exercisable upon vesting for an aggregate of 4,500 ordinary shares and 4,500 ordinary shares, respectively, at €2.14 per share, which vest in thirds on a yearly basis beginning in October 2018 and that expire in 2023, (ii) 18,180 warrants issued and granted to Mr. Vancraen or 18,180 warrants issued and granted to Ms. Ingelaere under the 2014 Warrant Plan, which warrants are exercisable for 18,180 ordinary shares and 18,180 ordinary shares, respectively, at €8.81 per share, vest 25% on a yearly basis beginning in October 2018 and expire in 2024 or (iii) 15,000 warrants issued and granted to Mr. Vancraen or 15,000 warrants issued and granted to Ms. Ingelaere under the 2015 Warrant Plan, which warrants are exercisable for 15,000 ordinary shares and 15,000 ordinary shares, respectively, at €6.45 per share, vested or will vest 10% on September 2018, 20% on September 2019, 30% on September 2020 and 40% on September 2021, and expire in 2025.

(4) Based on a Schedules 13G/A filed with the SEC on February 12, 2020 by Nikko Asset Management Americas Inc. (“NAMA”) and jointly by Sumitomo Mitsui Trust Holdings Inc. (“SMTH”) and Nikko Asset Management Co., Ltd. (“NAMC”). NAMA is an investment advisor and in the Schedule 13G/A filed by NAMA it is reported that NAMA has (a) shared voting with respect to 2,654,048 ADSs and (b) shared dispositive power with respect to 2,667,051 ADSs. SMTH and NAMC are parent holding companies of NAMA and are non-U.S. institutions. NAMC is an investment advisor and in the Schedule 13G/A jointly filed by SMTH and NAMC it is reported that SMTH and NAMC beneficially own, as parent holding companies of NAMA, 2,667,051 ADSs and have (a) shared voting with respect to 2,667,051 ADSs and (b) shared dispositive power with respect to 2,667,051 ADSs.

(5) Based on a Schedules 13G/A filed with the SEC on February 14, 2020 by ARK Investment Management LLC (“ARK”). ARK is an investment advisor and in the Schedule 13G/A filed by ARK it is reported that ARK has (a) sole voting power with respect to 2,545,931 ADSs; (b) shared voting with respect to 55,558 ADSs; and (c) shared dispositive power with respect to 2,834,406 ADSs.

None of our shareholders have different voting rights from other shareholders, except that as long as the Family Shareholders control, directly or indirectly, in the aggregate at least 20% of the voting rights attached to our ordinary shares, a majority of our directors must be appointed by our shareholders from a list of candidates proposed by the Family Shareholders. We are not aware of any arrangement that may, at a subsequent date, result in a change of control of our company.

As of December 31, 2019, there were 67 individual holders of record entered in our share register. The number of individual holders of record is based exclusively upon our share register and does not address whether a share or shares may be held by the holder of record on behalf of more than one person or institution who may be deemed to be the beneficial owner of a share or shares in our company. As of December 31, 2019, 66.9% of our outstanding ordinary shares were held in Belgium by 67 holders of record. As of December 31, 2019, assuming that all of our ordinary shares represented by ADSs are held by residents of the United States, approximately 33.1% of our outstanding ordinary shares were held in the United States by one holder of record, the Bank of New York Mellon, depositary of the ADSs. At such date, there were outstanding 17,583,315 ADSs, each representing one of our ordinary shares, and in the aggregate representing approximately 33.1% of our outstanding ordinary shares. The actual number of holders is greater than these numbers of record holders, and includes beneficial owners whose ADSs are held in street name by brokers and other nominees. This number of holders of record also does not include holder whose shares may be held in trust by other entities.

B. Related Party Transactions

Since January 1, 2019, there has not been, nor is there currently proposed, any material transaction or series of similar material transactions to which we were or are a party in which any of the members of our board of directors or senior management, holders of more than 10% of any class of our voting securities, or any member of the immediate family of any of the foregoing persons, had or will have a direct or indirect material interest, other than the compensation and shareholding arrangements we describe in "Item 6. Directors, Senior Management and Employees" and "—A. Major Shareholders," and the transactions we describe below.

Ailanthus NV

Ailanthus NV, a shareholder and director that is owned and controlled by Mr. Vancraen and Ms. Ingelaere, has previously provided several loans and financial leases to us for the purchase of machinery and a portion of our office and production buildings.

Ailanthus NV has granted us one loan at a fixed interest rate of 4.23% that matures in 2025. The purpose of the loan is to finance the purchase of a building in France. For additional information, see Note 15 to our audited consolidated financial statements.

We rent apartments on a regular basis from Ailanthus NV in order to host our employees from foreign subsidiaries who are visiting our headquarters in Leuven. The total amount paid to Ailanthus NV for rent in 2019 was €0.11 million.

Convertible Bonds Issuance

On October 28, 2013, we issued to Mr. Leys and his spouse 1,000 convertible bonds at an issuance price of €1,000 per bond. The bonds have a maturity of seven years, bear an annual interest rate of 3.7% and can be converted into ordinary shares at a conversion price of €1.97 per share.

Registration Rights Agreement

On September 15, 2016, we entered into a registration rights agreement with certain holders of our ordinary shares, warrants and convertible bonds, including certain of our directors, senior management and consultants, which we refer to as the Registration Rights Agreement. In accordance with the terms of the Registration Rights Agreement, we filed a shelf registration statement on Form F-3 to register up to 35,032,250 ordinary shares represented by 35,032,250 ADSs to be sold by the selling shareholders from time to time. These ordinary shares consist of ordinary shares previously issued to and ordinary shares issuable upon exercise of warrants or conversion of convertible bonds held by the selling shareholders, as well as ordinary shares underlying ADSs that were acquired by the selling shareholders on the NASDAQ Global Select Market.

C. Interests of Experts and Counsel

Not applicable.

ITEM 8. FINANCIAL INFORMATION

A. Consolidated Financial Statements and Other Information

See “Item 3.A. Key Information— A. Selected Financial Data” and “Item 18. Financial Statements.”

Legal or Arbitration Proceedings

From time to time, we may be subject to various claims or legal or arbitration proceedings that arise in the ordinary course of our business. We are currently involved in a legal proceeding with Dentsply Implants NV regarding the alleged wrongful termination of a supply agreement we entered into with Dentsply Implants NV in 2010. The court of first instance ruled in favor of Dentsply Implants NV that we have wrongfully terminated the relationship. We have appealed this decision before the court has pronounced itself on the monetary damages. The amount of damages which Dentsply Implants NV is claiming is €2.7 million. While we are confident that the first instance decision will be overruled, we believe that, in the event that the first instance decision would be confirmed, the amount of monetary damages that we would be exposed to will not have a material adverse effect on our business, financial conditions or results of operations.

We are currently not a party to any other legal or arbitration proceedings, which, in the opinion of our management, is likely to have or could reasonably possibly have a material adverse effect on our business, financial condition or results of operations. We have been made aware of patent infringement proceedings commenced in August 2019 in the U.S. District Court for the District of Delaware by Conformis Inc. against Zimmer Biomet, which may impact our knee guide business with Zimmer Biomet. We continue to monitor these proceedings.

Policy on Dividend Distribution

We have never declared or paid any cash dividends on our shares, and we have no present intention of declaring or paying any dividends in the foreseeable future. Any recommendation by our board of directors to pay dividends, subject to compliance with applicable law and any contractual provisions that restrict or limit our ability to pay dividends, including under agreements for indebtedness that we may incur, will depend on many factors, including our financial condition, results of operations, legal requirements, capital requirements, business prospects and other factors that our board of directors deems relevant.

All of the shares represented by the ADSs have the same dividend rights as all of our other outstanding shares. In general, distributions of dividends proposed by our board of directors require the approval of our shareholders at a shareholders’ meeting, although our board of directors may declare interim dividends without shareholder approval.

Furthermore, pursuant to Belgian law, the calculation of amounts available for distribution to shareholders, as dividends or otherwise, must be determined on the basis of our non-consolidated statutory Belgian GAAP financial statements. In addition, in accordance with Belgian law and our articles of association, we must allocate each year an amount of at least 5% of our annual net profit under our statutory non-consolidated accounts (prepared in accordance with Belgian GAAP) to a legal reserve until the reserve equals 10% of our share capital. As a consequence of these facts there can be no assurance as to whether dividends or other distributions will be paid out in the future or, if they are paid, their amount.

For information regarding the Belgian withholding tax applicable to dividends and related U.S. reimbursement procedures, see “Item 10. Additional Information—E. Taxation—Belgian Taxation.”

B. Significant Changes

None.

ITEM 9. THE OFFER AND LISTING

A. Offer and Listing Details

Price History

The ADSs, each representing one ordinary share, have been listed on the NASDAQ Global Select Market under the symbol “MTLS” since June 25, 2014. Prior to that date, there was no public trading market for ADSs or our ordinary shares.

B. Plan of Distribution

Not applicable.

C. Markets

The ADSs have been listed on the NASDAQ Global Select Market under the symbol “MTLS” since June 25, 2014.

D. Selling Shareholders

Not applicable.

E. Dilution

Not applicable.

F. Expenses of the Issue

Not applicable.

ITEM 10. ADDITIONAL INFORMATION

A. Share Capital

Not applicable.

B. Memorandum and Articles of Association

The information called for by this item has been reported previously in Exhibit 2.3 (Description of Securities) to Amendment No. 1 on Form 20-F/A to our Annual Report on Form 20-F for the year ended December 31, 2018, filed with the SEC on June 28, 2019, which exhibit is incorporated herein by reference, and is supplemented by the following additional information related to changes in our share capital:

The share capital of Materialise NV was increased following the exercise of warrants previously issued under our 2007 Warrant Plan on November 27, 2014, with €73,696 (including issuance premium) against the issuance of 75,200 new ordinary shares, and on November 20, 2015 with €96,040 (including issuance premium) against the issuance of 98,000 new ordinary shares. The 2007 Warrant Plan 2007 is now terminated. There are no outstanding warrants issued under this plan.

On March 5, 2015, the board of directors increased the share capital of Materialise NV by €578,917 (including issuance premium) against the issuance of 80,182 new ordinary shares, pursuant to the powers granted to it by the extraordinary general meeting of shareholders held on April 23, 2014.

On December 18, 2015, the board of directors adopted a new warrant plan, our 2015 Warrant Plan, and issued 1,400,000 warrants, which warrants are exercisable for 1,400,000 new ordinary shares, pursuant to the powers granted to it by the extraordinary general meeting of shareholders held on April 23, 2014. As of December 31, 2019, 352,000 of the warrants were granted.

On March 30, 2018, the board of directors increased the share capital of Materialise NV by €207,263.05 (including issuance premium) against the issuance of 102,856 new ordinary shares, pursuant to the powers granted to it by the extraordinary general meeting of shareholders held on April 23, 2014.

On July 18, 2018, the board of directors decided to increase the share capital of Materialise NV, which capital increase was confirmed on July 26 and July 27, 2018, by €33,361,847.73 (including issuance premium) and €4,993,171.73 (including issuance premium), respectively, against the issuance of 3,000,000 and 450,000 new ordinary shares, respectively, pursuant to the powers granted to it by the extraordinary general meeting of shareholders held on April 23, 2014.

On July 19, 2018, the board of directors increased the share capital of Materialise NV by €21,531,306.52 (including issuance premium) against the issuance of 1,953,125 new ordinary shares, pursuant to the powers granted to it by the extraordinary general meeting of shareholders held on April 23, 2014.

On December 28, 2018, the board of directors increased the share capital of Materialise NV following the exercise of warrants previously issued under the 2013 Warrant Plan and the 2014 Warrant Plan by €40,778.50 (including issuance premium) and €354,532.02 (including issuance premium), respectively, against the issuance of 19,100 and 40,242 new ordinary shares, respectively, pursuant to the powers granted to it by the extraordinary general meeting of shareholders held on April 23, 2014.

On November 28, 2019, the board of directors increased the share capital of Materialise NV following the exercise of warrants previously issued under the 2013 Warrant Plan and the 2014 Warrant Plan by €355,600.26 (including issuance premium) and €912,610.28 (including issuance premium), respectively, against the issuance of 178,164 and 103,588 new ordinary shares, respectively, pursuant to the powers granted to it by the extraordinary general meeting of shareholders held on June 4, 2019.

On April 7, 2020, the board of directors increased the share capital of Materialise NV following the exercise of warrants previously issued under the 2015 Warrant Plan by €140,287.5 (including issuance premium) against the issuance of 21,750 new ordinary shares, pursuant to the powers granted to it by the extraordinary general meeting of shareholders held on June 4, 2019.

C. Material Contracts

We have not entered into any material contracts in the prior two years other than in the ordinary course of business and other than those described elsewhere in this annual report, including under “—B. Memorandum and Articles of Association,” “Item 7. Major Shareholders and Related Party Transactions—B. Related Party Transactions.”

D. Exchange Controls

There are no Belgian exchange control regulations that impose limitations on our ability to make, or the amount of, cash payments to residents of the United States. See “Item 5. Operating and Financial Review and Prospects—B. Liquidity and Capital Resources—Transfers from Subsidiaries” for a discussion of various restrictions applicable to transfers of funds by our subsidiaries.

E. Taxation

Belgian Taxation

The following paragraphs are a summary of material Belgian tax consequences of the ownership of ADSs by an investor. The summary is based on laws, treaties and regulatory interpretations in effect in Belgium on the date of this document, all of which are subject to change, including changes that could have retroactive effect.

The summary only discusses Belgian tax aspects which are relevant to U.S. holders of ADSs, or Holders. This summary does not address Belgian tax aspects which are relevant to persons who are residents in Belgium or engaged in a trade or business in Belgium through a permanent establishment or a fixed base in Belgium. This summary does not purport to be a description of all of the tax consequences of the ownership of ADSs, and does not take into account the specific circumstances of any particular investor, some of which may be subject to special rules, or the tax laws of any country other than Belgium. This summary does not describe the tax treatment of investors that are subject to special rules, such as banks, insurance companies, collective investment undertakings, dealers in securities or currencies, persons that hold, or will hold, ADSs in a position in a straddle, share-repurchase transaction, conversion transactions, synthetic security or other integrated financial transactions. Investors should consult their own advisers regarding the tax consequences of an investment in ADSs in the light of their particular circumstances, including the effect of any state, local or other national laws.

In addition to the assumptions mentioned above, it is also assumed in this discussion that for purposes of the domestic Belgian tax legislation, the owners of ADSs will be treated as the owners of the ordinary shares represented by such ADSs. However, the assumption has not been confirmed or verified with the Belgian Tax Administration.

Dividend Withholding Tax

As a general rule, a withholding tax of 30% is levied on the gross amount of dividends paid on the ordinary shares represented by the ADSs, subject to such relief as may be available under applicable domestic or tax treaty provisions. Dividends subject to the dividend withholding tax include all benefits attributed to the ordinary shares represented by the ADSs, irrespective of their form. A reimbursement of fiscal capital made in accordance with the Belgian Code of Companies and Associations is partly considered to be a distribution of the existing taxed reserves (irrespective whether incorporated into the capital or not) and/or the tax-free reserves incorporated into the capital. The proportion is determined on the basis of the ratio between certain taxed reserves and tax-free reserves incorporated into the capital on the one hand and, on the other hand, the aggregate of such reserves and the fiscal capital. In principle, fiscal capital includes paid-up statutory share capital, and subject to certain conditions, the paid-up issue premiums and the cash amounts subscribed to at the time of the issue of profit sharing certificates.

In case of a redemption by us of own shares represented by ADSs, the redemption distribution (after deduction of the portion of fiscal capital represented by the redeemed shares) will be treated as a dividend which in certain circumstances may be subject to a withholding tax of 30%, subject to such relief as may be available under applicable domestic or tax treaty provisions. In case of a liquidation of our Company, any amounts distributed in excess of the fiscal capital will be subject to a 30% withholding tax, subject to such relief as may be available under applicable domestic or tax treaty provisions.

For non-resident individuals and companies, the dividend withholding tax will be the only tax on dividends in Belgium, unless the non-resident holds ADSs in connection with a business conducted in Belgium, through a fixed base in Belgium or a Belgian permanent establishment.

Relief of Belgian Dividend Withholding Tax

Under the Belgium-United States Tax Treaty, or the Treaty, there is a reduced Belgian withholding tax rate of 15% on dividends paid by us to a U.S. resident which beneficially owns the dividends and is entitled to claim the benefits of the Treaty under the limitation of benefits article included in the Treaty (which we refer to as a Qualifying Holder). If such Qualifying Holder is a company that owns directly at least 10% of our voting stock, the Belgian withholding tax rate is further reduced to 5%. No withholding tax is however applicable if the Qualifying Holder, is: (i) a company that is a resident of the United States that has owned directly ADSs representing at least 10% of our capital for a 12-month period ending on the date the dividend is declared, or (ii) a pension fund that is a resident of the United States, provided that such dividends are not derived from the carrying on of a business by the pension fund or through an associated enterprise.

Under the normal procedure, we or our paying agent must withhold the full Belgian withholding tax (without taking into account the Treaty rate). Qualifying Holders may make a claim for reimbursement for amounts withheld in excess of the rate defined by the Treaty. The reimbursement form (Form 276 Div-Aut.) may be obtained from the Centre Etrangers, Kruidtuinlaan 50, PO 3429, 1000 Brussels, Belgium or online on the website of the Belgian tax authorities. Qualifying Holders may also, subject to certain conditions, obtain the reduced Treaty rate at source. Qualifying Holders should deliver a duly completed Form 276 Div-Aut. no later than ten days after the date on which the dividend is paid. U.S. holders should consult their own tax advisors as to whether they qualify for reduction in withholding tax upon payment or attribution of dividends, and as to the procedural requirements for obtaining a reduced withholding tax upon the payment of dividends or for making claims for reimbursement.

Withholding tax is also not applicable, pursuant to Belgian domestic tax law, on dividends paid to certain U.S. pension funds provided that the U.S. pension fund (i) qualifies as a non-resident saver for Belgian withholding tax purposes (i.e., it has a separate legal personality and fiscal residence outside of Belgium), (ii) has a corporate purpose that consists solely in managing and investing funds collected in order to pay legal or complementary pensions, (iii) has activity that is limited to the investment of funds collected in the exercise of its statutory purpose, without any profit making activity and (iv) is exempt from income taxes in the United States. Furthermore, such pension fund may not contractually be obligated to redistribute the dividends to any beneficial owner of such dividends for whom it would manage the ADSs and subject to certain procedural formalities.

Under Belgian domestic tax law, a withholding tax exemption is available to dividends paid to a non-resident corporate shareholder (located in the EEA or in a country with which Belgium has entered in a double tax treaty including sufficient information exchange provisions) provided that (i) at the date of payment or attribution of the dividend it holds a participation in our company representing at least 10% of our share capital, (ii) this holding has been held in full ownership for an uninterrupted period of at least one year, (iii) this non-resident corporate shareholder is subject to a corporate income tax regime similar to Belgian corporate income tax regime without benefitting from a notably advantageous tax regime as compared to the ordinary income tax regime and (iv) its legal form is (similar to one of the legal forms) listed in the annex of the E.U. directive dated 23 July 1990 (90/435/EC) as amended by the directive of 22 December 2003 (2003/123/EC). This reduced withholding tax will apply provided that certain procedural formalities are complied with.

Finally, a withholding tax exemption is available, pursuant to Belgian domestic tax law, to dividends paid to a non-resident corporate shareholder (located in the EEA or in a country with which Belgium has entered in a double tax treaty including sufficient information exchange provisions) to the extent that at the date of payment or attribution of the dividend it holds a participation in our company representing less than 10%

of our share capital but the acquisition value of which is at least €2.5 million and provided that certain other conditions are met, i.e., that (i) this holding has been held in full ownership for an uninterrupted period of at least one year (ii) this non-resident corporate shareholder is subject to a corporate income tax regime similar to Belgian corporate income tax regime without benefitting from a notably advantageous tax regime as compared to the ordinary income tax regime, and (iii) its legal form is (similar to one of the legal forms) listed in the annex I, part A, of the E.U. directive dated 30 November 2011 (2011/96/EU) as amended by the directive of 8 July 2014 (2014/86/EU). This reduced withholding tax will apply only if and to the extent that the ordinary Belgian withholding tax cannot be credited or reimbursed to the non-resident corporate shareholder referred to below and subject to certain procedural formalities.

Capital Gains and Losses

Pursuant to the Treaty, capital gains and/or losses realized by a Qualifying Holder from the sale, exchange or other disposition of ADSs do not fall within the scope of application of Belgian domestic tax law.

Capital gains realized on ADSs by a corporate Holder which is not entitled to claim the benefits of the Treaty under the limitation of benefits article included in the Treaty are generally not subject to taxation in Belgium unless the corporate Holder is acting through a Belgian permanent establishment. Capital losses are not deductible.

Private individual Holders who are not entitled to claim the benefits of the Treaty under the limitation of benefits article included in the Treaty and which are holding ADSs as a private investment will, as a rule, not be subject to tax on any capital gains arising out of a disposal of ADSs. Losses will, as a rule, not be deductible in Belgium.

However, if the gain realized by such individual Holders on ADSs is deemed to be realized outside the scope of the normal management of such individual's private estate and the capital gain is obtained or received in Belgium, the gain will in principle be taxable at 33%. The Official Commentary to the ITC 1992 stipulates that occasional transactions on a stock exchange regarding ADSs should not be considered as transactions realized outside the scope of normal management of one's own private estate.

Capital gains realized by such individual Holders on the disposal of ADSs for consideration, outside the exercise of a professional activity, to a non-resident company (or a body constituted in a similar legal form), to a foreign state (or one of its political subdivisions or local authorities) or to a non-resident legal entity who is established outside the EEA, are in principle taxable at a rate of 16.5% if, at any time during the five years preceding the sale, such individual Holders has owned directly or indirectly, alone or with his/her spouse or with certain relatives, a substantial shareholding in us (that is, a shareholding of more than 25% of our shares).

Capital gains realized by a Holder upon the redemption of ADSs or upon our liquidation will generally be taxable as a dividend. See section "Dividend Withholding Tax."

Estate and Gift Tax

There is no Belgian estate tax on the transfer of ADSs upon the death of a Belgian non-resident.

Donations of ADSs made in Belgium may or may not be subject to gift tax in Belgium depending on the modalities under which the donation is carried out.

Belgian Tax on Stock Exchange Transactions

A tax on stock exchange transactions (*taxe sur les opérations de bourse/taks op de beursverrichtingen*) is generally levied on the purchase and the sale and on any other acquisition and transfer for consideration of existing ADSs on the secondary market carried out by a Belgian resident investor through a professional intermediary if (i) executed in Belgium through a professional intermediary, or (ii) deemed to be executed in Belgium, which is the case if the order is directly or indirectly made to a professional intermediary established outside of Belgium, either by private individuals having their usual residence in Belgium, or legal entities for the account of their seat or establishment in Belgium.

The applicable rate amounts to 0.35% of the consideration paid but with a cap of €1,600 per transaction and per party. The tax is due separately from each party to any such transaction, i.e., the seller (transferor) and the purchaser (transferee), both collected by the professional intermediary.

However, if the intermediary is established outside of Belgium, the tax will in principle be due by the ordering private individual or legal entity, unless that individual or entity can demonstrate that the tax has already been paid. Professional intermediaries established outside of Belgium can, subject to certain conditions and formalities, appoint a Belgian representative for tax purposes, which will liable for the tax on stock exchange transactions in respect of the transactions executed through the professional intermediary.

Belgian non-residents who purchase or otherwise acquire or transfer, for consideration, ADSs in Belgium for their own account through a professional intermediary may be exempt from the stock market tax if they deliver a sworn affidavit to the intermediary in Belgium confirming their non-resident status.

A tax on repurchase transactions (*taxe sur les reports/taks op de reportverrichtingen*) at the rate of 0.085%. will be due from each party to any such transaction entered into or carried out in Belgium by a Belgian resident investor in which a stockbroker acts for either party (with a maximum amount of €1,600 per transaction and per party).

No stock exchange tax, nor tax on repurchase transactions is payable by: (i) professional intermediaries described in Article 2, 9° and 10° of the Law of August 2, 2002 acting for their own account, (ii) insurance companies described in Article 2, §1 of the Law of 9 July 1975 acting for their own account, (iii) professional retirement institutions referred to in Article 2, 1° of the Law of October 27, 2006 relating to the control of professional retirement institutions acting for their own account, (iv) collective investment institutions acting for their own account, or (v) regulated real estate companies (for the stock exchange tax only).

No stock exchange tax, nor tax on repurchase transactions will thus be due by Holders on the subscription, purchase or sale of ADSs, if the Holders are acting for their own account. In order to benefit from this exemption, the Holders must file with the professional intermediary in Belgium a sworn affidavit evidencing that they are non-residents for Belgian tax purposes.

Belgian Tax on Securities Accounts

Pursuant to the law of February 7, 2018 introducing a tax on securities accounts, a tax of 0.15%. is levied on Belgian resident and non-resident individuals on their share in the average value of the qualifying financial instruments (including but not limited to shares, certificates thereof, notes and units of undertakings for collective investment) held on one or more securities accounts during a reference period of 12 consecutive months starting on October 1 and ending on September 30 of the subsequent year (which we refer to as Tax on Securities Accounts). The first reference period started on the day of entry into effect of the Law (i.e., March 10, 2018) and ended on September 30, 2018.

No Tax on Securities Accounts is due provided the holder's share in the average value of the qualifying financial instruments on those accounts amounts to less than €500,000. If, however, the holder's share in the average value of the qualifying financial instruments on those accounts amounts to €500,000 or more, the Tax on Securities Accounts will be due on the entire share of the holder in the average value of the qualifying financial instruments on those accounts (and, hence, not only on the part which exceeds the €500,000 threshold).

Qualifying financial instruments held by non-resident individuals only fall within the scope of the Tax on Securities Accounts provided they are held on securities accounts with a financial intermediary established or located in Belgium. Note that pursuant to certain double tax treaties, Belgium has no right to tax capital. Hence, to the extent the Tax on Securities Accounts is viewed as a tax on capital within the meaning of these double tax treaties, treaty protection may, subject to certain conditions, be claimed.

A financial intermediary is defined as (i) a credit institution or a stockbroking firm as defined by Article 1, §2 and §3 of the Law of 25 April 2014 on the status and supervision of credit institutions and investment companies and (ii) the investment companies as defined by Article 3, §1 of the Law of 25 October 2016 on access to the activity of investment services and on the legal status and supervision of portfolio management and investment advice companies, which are, pursuant to national law, admitted to hold financial instruments for the account of customers.

The Tax on Securities Accounts is in principle due by the financial intermediary established or located in Belgium if (i) the holder's share in the average value of the qualifying financial instruments held on one or more securities accounts with said intermediary amounts to €500,000 or more or (ii) the holder instructed the financial intermediary to levy the Tax on Securities Accounts due (e.g. in case such holder holds qualifying financial instruments on several securities accounts held with multiple intermediaries of which the average value does not amount to €500,000 or more, but of which the holder's share in the total average value of these accounts amounts to at least €500,000). Otherwise, the Tax on Securities Accounts would have to be declared and would be due by the holder itself unless the holder provides evidence that the Tax on Securities Accounts has already been withheld, declared and paid by an intermediary which is not established or located in Belgium. In that respect, intermediaries located or established outside of Belgium could appoint a Tax on the Securities Accounts representative in Belgium, subject to certain conditions and formalities (which we refer to as a Tax on the Securities Accounts Representative). Such a Tax on the Securities Accounts Representative will then be liable towards the Belgian Treasury for the Tax on the Securities Accounts due and for complying with certain reporting obligations in that respect.

Belgian resident individuals will have to report in their annual income tax return various securities accounts held with one or more financial intermediaries of which they are considered as a holder within the meaning of the Tax on Securities Accounts. Non-resident individuals have to report in their annual Belgian non-resident income tax return various securities accounts held with one or more financial intermediaries established or located in Belgium of which they are considered as a holder within the meaning of the Tax on Securities Accounts.

U.S. holders should consult their own tax advisors as to whether they are subject to the Tax on Securities Accounts.

On October 17, 2019 the Belgian Constitutional Court annulled the law introducing the Tax on Securities Accounts (and therefore also the tax itself), but maintained the legal consequences of the annulled provisions for the Tax on Securities Accounts due for reference periods ending on or before September 30, 2019. This annulment implies that the Tax on Securities Accounts is no longer due as of October 1, 2019.

Proposed Financial Transactions Tax

On February 14, 2013, the European Commission published a proposal for a Directive for a common financial transactions tax, or FTT, in Belgium, Germany, Greece, Spain, France, Italy, Austria, Portugal, Slovenia, Estonia and Slovakia, or collectively, the Participating Member States. On December 8, 2015, Estonia declared that it will no longer support the FTT.

The proposed FTT has a very broad scope and could, if introduced in its current form, apply to certain dealings in ADSs in certain circumstances. The FTT could apply in certain circumstances to persons both within and outside of the Participating Member States. Generally, it would apply to certain dealings in ADSs where at least one party is a financial institution, and at least one party is established in a Participating Member State.

A financial institution may be, or be deemed to be, "established" in a Participating Member State in a broad range of circumstances, including by transacting with a person established in a Participating Member State.

Currently, the proposed FTT remains subject to further negotiations between the Participating Member States (excluding Estonia). It may therefore be adjusted prior to any implementation, of which the timing and fate remains unclear. Moreover, additional E.U. Member States could decide to participate or drop out of the negotiations. Prospective Holders of ADSs are advised to seek their own professional advice in relation to the FTT.

U.S. Taxation

The following is a discussion of the material U.S. federal income tax considerations to U.S. holders (as defined below) of acquiring, holding and disposing of the ADSs. The following discussion applies only to U.S. holders that purchase ADSs, will hold ADSs as capital assets for U.S. federal income tax purposes (generally, assets held for investment) and that are not residents of, or ordinarily resident in, Belgium for tax purposes nor hold their ADSs as part of a permanent establishment in Belgium. The discussion also does not address any aspect of U.S. federal taxation other than U.S. federal income taxation. In particular, this summary does not address all tax considerations applicable to investors that own (directly or by attribution) 10% or more of our stock by vote or value, nor does this summary discuss all of the tax considerations that may be relevant to certain types of investors subject to special treatment under the U.S. federal income tax laws (such as financial institutions, insurance companies, real estate investment trusts, regulated investment companies, investors liable for the alternative minimum tax, certain U.S. expatriates, individual retirement accounts and other tax-deferred accounts, partnerships or other pass-through entities for U.S. federal income tax purposes, tax-exempt organizations, dealers in securities or currencies, securities traders that elect mark-to-market tax accounting, investors that will hold the ADSs as part of constructive sales, straddles, hedging, integrated or conversion transactions for U.S. federal income tax purposes or investors whose "functional currency" is not the U.S. dollar).

The following summary is based on the U.S. Internal Revenue Code of 1986, as amended, or the Code, U.S. Treasury Regulations thereunder, published rulings of the U.S. Internal Revenue Service, or the IRS, the income tax treaty between the United States and Belgium, or the U.S.-Belgium Treaty, and judicial and administrative interpretations thereof, in each case as available on the date of this annual report. Changes to any of the foregoing, or changes in how any of these authorities are interpreted, may affect the tax consequences set out below, possibly retroactively. No ruling will be sought from the IRS with respect to any statement or conclusion in this discussion, and there can be no assurance that the IRS will not challenge such statement or conclusion in the following discussion or, if challenged, a court will uphold such statement or conclusion.

For purposes of the following summary, a "U.S. holder" is a beneficial owner of ADSs that is for U.S. federal income tax purposes: (i) a citizen or individual resident of the United States, (ii) a corporation or other entity treated as a corporation for U.S. federal income tax purposes created or organized in or under the laws of the United States or any state thereof (including the District of Columbia), (iii) an estate, the income of which is subject to U.S. federal income taxation regardless of its source or (iv) a trust if (x) a court within the United States is able to exercise primary supervision over its administration and (y) one or more United States persons (as defined in the Code) have the authority to control all of the substantial decisions of such trust.

If a partnership (including any entity treated as a partnership for U.S. federal income tax purposes) holds ADSs, the U.S. federal income tax consequences to the partners of such partnership will depend on the activities of the partnership and the status of the partners. A partnership considering an investment in ADSs, and partners in such partnership, should consult their own tax advisers about the consequences of the investment.

We do not expect to be a passive foreign investment company, or a PFIC, and the discussion under "—Distributions by Us" and "—Proceeds from the Sale, Exchange or Retirement of the ADSs" below assumes we will not be a PFIC. See "—Passive Foreign Investment Company" discussion below.

Prospective purchasers of ADSs should consult their own tax advisers with respect to the U.S. federal, state, local and non-U.S. tax consequences to them in their particular circumstances of acquiring, holding, and disposing of, ADSs.

Ownership of ADSs in General

The discussion below is based, in part, on representations by the Depositary and assumes that each obligation under the deposit agreement and any related agreement will be performed in accordance with its terms.

For U.S. federal income tax purposes, an owner of ADSs generally will be treated as the owner of the ordinary shares represented by such ADSs. However, the U.S. Treasury has expressed concerns that parties to whom interests such as the ADSs are delivered in transactions similar to pre-release transactions may be taking actions that are inconsistent with the claiming of foreign tax credits for U.S. holders of ADSs. Accordingly, the analysis of the creditability of Belgian taxes could be affected by actions taken by parties to whom the ADSs are pre-released. No gain or loss will be recognized if you exchange ADSs for the ordinary shares represented by those ADSs. Your tax basis in such ordinary shares will be the same as your tax basis in such ADSs, and the holding period in such ordinary shares will include the holding period in such ADSs.

Distributions by Us

Subject to the application of the PFIC rules discussed below, the U.S. dollar value of distributions paid by us (including the amount of any taxes withheld) out of its earnings and profits, as determined under U.S. federal income tax principles, will be subject to tax as foreign source ordinary dividend income and will be includible in your gross income upon receipt by the Depositary. However, we do not maintain calculations of its earnings and profits in accordance with U.S. federal income tax accounting principles. U.S. holders should therefore assume that any distribution by us with respect to ordinary shares or ADSs will constitute ordinary dividend income. Subject to applicable limitations, so long as the ADSs are regularly traded on the NASDAQ Global Select Market, we expect that dividends paid by us will be classified as “qualified dividend income” generally subject to tax at lower rates than other items of ordinary income when received by individuals and other non-corporate U.S. holders. Dividends received on the ordinary shares or ADSs will not be eligible for the dividends received deduction allowed to corporations receiving dividends from U.S. corporations.

The U.S. dollar value of distributions paid by us will be calculated by reference to the exchange rate in effect on the date the dividend distribution is received by the Depositary, regardless of when the Depositary converts the payments into U.S. dollars. If the foreign currency is converted by the Depositary on a later date, a U.S. holder will be required to recognize foreign currency gain or loss in respect of the foreign currency based on the difference between the rate at which it is converted and the rate on the date the dividend was received by the Depositary.

Subject to certain limitations, Belgian withholding tax, if any, paid in connection with any distribution with respect to ordinary shares or ADSs may be claimed as a credit against your U.S. federal income tax liability if you elect not to take a deduction for any non-U.S. income taxes for that taxable year; otherwise, such Belgian withholding tax may be taken as a deduction. If you are eligible for benefits under the Treaty or are otherwise entitled to a refund for the taxes withheld, you will not be entitled to a foreign tax credit or deduction for the amount of any Belgian taxes withheld in excess of the maximum rate under the Treaty or for the taxes with respect to which you can obtain a refund from the Belgian taxing authorities. As the relevant rules are very complex, you should consult your own tax advisor concerning the availability and utilization of the foreign tax credit or deductions for non-U.S. taxes in your particular circumstances.

Proceeds from the Sale, Exchange or Retirement of the ADSs

Upon the sale, exchange or retirement of ADSs, a U.S. holder will generally recognize U.S. source capital gain or loss equal to the difference, if any, between the U.S. dollar amount realized on the sale, exchange or retirement and the U.S. holder’s tax basis in the ADSs (generally their cost in U.S. dollars). Any gain or loss generally will be long-term capital gain or loss if the ADSs have been held for more than a year. The deductibility of capital losses is subject to limitations.

Gain or loss you recognize on the sale, exchange or retirement of ADSs will generally be U.S. source. If any taxes are withheld from such amounts but are eligible to be refunded, you will not be entitled to a foreign tax credit or deduction with respect to such taxes. If there are amounts withheld that are not eligible to be refunded, you still may not be able to claim a foreign tax credit with respect to such amounts unless you have excess foreign source income of the correct type from other sources because foreign tax credits generally cannot be used against U.S. source income. As the relevant rules are very complex, you should consult your own tax advisor concerning the availability and utilization of the foreign tax credit or deductions for non-U.S. taxes in your particular circumstances.

Passive Foreign Investment Company

We believe that we were not a PFIC for the tax year ended December 31, 2019, and we do not expect to be classified as a PFIC for U.S. federal income tax purposes for the current tax year ending December 31, 2020, or for the foreseeable future. However, the application of the relevant rules to our businesses is not entirely clear and certain aspects of the relevant tests will be outside our control; therefore, no assurance can be given that we will not be a PFIC for any taxable year. If we are a PFIC at any time during the holding period of a U.S. holder, the U.S. holder would be subject to potentially materially greater amounts of tax and subject to additional U.S. tax form filing requirements. In addition, a non-corporate U.S. holder will not be eligible for qualified dividend income treatment on dividends received from us if we are treated as a PFIC for the taxable year in which the dividends are received or for the preceding taxable year.

A non-U.S. corporation is a PFIC in any taxable year in which, after taking into account certain look-through rules, either (i) at least 75% of its gross income is passive income or (ii) at least 50% of the average value (determined on a quarterly basis) of its assets is attributable to assets that produce or are held to produce passive income. Passive income generally includes dividends, interest, rents, royalties, gross income from certain commodities transactions, and capital gains. If a non-U.S. corporation owns at least 25% by value of the stock of another corporation, the foreign corporation is treated for purposes of the PFIC tests as owning its proportionate share of the assets of the other corporation, and as receiving directly its proportionate share of the other corporation's income. Although the determination of whether a non-U.S. corporation is a PFIC for a given taxable year is based on its income and assets for that taxable year, as determined under the PFIC rules, once a non-U.S. corporation is a PFIC for any taxable year, it generally remains a PFIC for any investors that owned interests in all or a portion of such taxable year even if it would not otherwise qualify as a PFIC in later taxable years. We do not undertake to monitor our PFIC status on an ongoing basis.

The Code imposes additional taxes on gains from the sale or other disposition of, and "excess distributions" with respect to, shares of a PFIC owned directly (or deemed to be owned directly or indirectly under certain attribution rules) by a U.S. holder. In general, an excess distribution is any distribution to the U.S. holder that is greater than 125% of the average annual distributions received by the U.S. holder (including return of capital distributions) during the three preceding taxable years or, if shorter, the U.S. holder's holding period for the ADSs. If we were a PFIC in any year in which a U.S. holder held the ADSs (i) the gain or excess distribution would be allocated ratably over the U.S. holder's holding period for the ADSs, (ii) the amount allocated to the taxable year in which the gain or excess distribution was realized and to any year before we became a PFIC would be taxable as ordinary income, (iii) the amount allocated to each other prior year would be subject to tax at the highest rate in effect for that year and (iv) the interest charge generally applicable to underpayments of tax would be imposed in respect of the tax allocated to each such year. For these purposes, a U.S. holder who uses the ADSs as collateral for a loan would be treated as having disposed of such ADSs.

Different rules apply to a U.S. holder that makes a valid mark-to-market election with respect to the ADSs. This election can be made if the ADSs are considered to be "marketable securities" for purposes of the PFIC rules. The ADSs should be marketable securities for these purposes to the extent they are "regularly traded" on the NASDAQ Global Select Market. Generally, shares are treated as "regularly traded" in any calendar year in which more than a de minimis quantity of the shares are traded on a qualified exchange on at least 15 days during each calendar quarter. Subject to certain limitations, a U.S. holder that makes a valid mark-to-market election with respect to the ADSs would be required to take into account the difference, if any, between the fair market value at the end of each taxable year and the fair market value at the end of the preceding taxable year (or the acquisition price in the first year the election is in effect) of those ADSs, as ordinary income or ordinary loss (but only to the extent of the net amount previously included as income by the U.S. holder as a result of the mark-to-market election). A U.S. holder's basis in the ADSs will be increased by the amount of any ordinary income inclusion and decreased by the amount of any ordinary loss taken into account under the mark-to-market rules. Gains from an actual sale or other disposition of the ADSs for which this election has been properly made would be treated as ordinary income, any losses incurred on a sale or other disposition of the ADSs would be treated as an ordinary loss to the extent of any net mark-to-market gains for prior years and any additional loss would be capital loss.

Even if a valid mark-to-market election is made with respect to the ADSs, there is a significant risk that indirect interests in any of our subsidiaries that are PFICs will not be covered by this election but will be subject to the excess distribution rules described above. Under these rules, distribution from, and dispositions of interests in, these subsidiaries, as well as certain other transactions, generally will be treated as a distribution or disposition subject to the discussion above regarding excess distributions.

Investors in certain PFICs are able to make an election to treat the PFIC as a "qualified electing fund," or QEF, which may mitigate the consequences of the rules described above. However, if we are classified as a PFIC, U.S. holders will not be able to make this election.

Prospective U.S. holders are urged to consult their own tax advisers about the consequences of holding the ADSs if we are considered a PFIC in any taxable year, including the availability of the mark-to-market election, and whether making the election would be advisable in their particular circumstances. In particular, U.S. holders should consider carefully the impact of a mark-to-market election with respect to their ADSs given that there is a significant risk that we will have subsidiaries that are classified as PFICs.

Medicare Tax

Certain U.S. holders who are individuals, estates and trusts will be required to pay an additional 3.8% tax on some or all of their "net investment income," which generally includes its dividend income and net gains from the disposition of the ADSs. U.S. holders should consult their own tax advisors regarding the applicability of this additional tax on their particular situation.

Information Reporting and Backup Withholding

Information returns may be filed with the IRS in connection with distributions on the ADSs and the proceeds from the sale or other disposition of the ADSs unless a U.S. holder establishes that it is exempt from the information reporting rules. A U.S. holder may be subject to backup withholding on these payments if it fails to provide its tax identification number to the paying agent and comply with certain certification procedures. The amount of any backup withholding from a payment to a U.S. holder will be allowed as a credit against its U.S. federal income tax liability and may entitle the U.S. holder to a refund, provided that the required information is timely furnished to the IRS.

Tax Return Disclosure Requirement

U.S. federal income tax law requires certain U.S. investors to disclose information relating to investments in securities of a non-U.S. issuer. Failure to comply with applicable disclosure requirements could result in the imposition of substantial penalties. U.S. holders should consult their own tax advisors regarding any disclosure obligations.

F. Dividends and Paying Agents

Not applicable.

G. Statement by Experts

Not applicable.

H. Documents on Display

We previously filed with the SEC our registration statement on Form F-1 (Registration No. 333-194982), as amended, and our registration statement on Form F-3 (Registration No. 333-213649), including the prospectuses contained therein, to register our ordinary shares. We have also filed with the SEC a related registration statement on F-6 (Registration No. 333-196734) to register the ADSs.

We are subject to the periodic reporting and other informational requirements of the Exchange Act as applicable to foreign private issuers. Our annual reports on Form 20-F are due within four months after each fiscal year end. We are not required to disclose certain other information that is required from U.S. domestic issuers. Also, as a foreign private issuer, we are exempt from the rules of the Exchange Act prescribing the furnishing of proxy statements to shareholders and our directors, senior management and principal shareholders are exempt from the reporting and short-swing profit recovery provisions contained in Section 16 of the Exchange Act.

Our SEC filings, including the registration statement, are available to you on the SEC’s website at http://www.sec.gov.

We have filed our amended and restated articles of association and all other deeds that are to be published in the annexes to the Belgian State Gazette with the clerk’s office of the Commercial Court of Leuven (Belgium), where they are available to the public. A copy of our amended and restated articles of association is also be publicly available as an exhibit to our registration statement on Form F-1 (registration No. 333-194982). In accordance with Belgian law, we must prepare audited annual statutory and consolidated financial statements. The audited annual statutory and consolidated financial statements and the reports of our board and statutory auditor relating thereto are filed with the Belgian National Bank, where they are available to the public.

I. Subsidiary Information

Not applicable.

ITEM 11. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

We are exposed to market risk from fluctuations in interest rates and foreign currency exchange rates which may adversely affect our results of operations and financial condition. We seek to minimize these risks through regular operating and financing activities.

Interest Rate Risk

Although we mainly have loans outstanding with a fixed interest rate, some of the loans have been contracted with variable interest rates. The most significant loans with variable interest rates have been secured by means of a variable to fixed interest rate swap. We therefore believe that we are not materially affected by changes in interest rates. For information with respect to the interest rate swaps, see Note 20 to our audited consolidated financial statements.

Foreign Exchange Rate Risk

We transact business globally and are subject to risks associated with fluctuating foreign exchange rates. The geographic areas outside of the Eurozone to which we sell our products and services are generally not considered to be highly inflationary. In the years ended December 31, 2019, 2018 and 2017, 29%, 30% and 31% of our revenue, respectively, were derived from sales in a currency different from the euro. Receivables denominated in a foreign currency are initially recorded at the exchange rate at the transaction date and subsequently re-measured in euro based on period-end exchange rates. Transaction gains and losses that arise from exchange rate fluctuations are charged to income. We primarily have exposure to the U.S. dollar, British pound, Japanese yen and Brazilian real as foreign currency.

During 2019, the impact of changes in foreign currency rates and term accounts held in U.S. dollars funded through the initial public offering proceeds was positive for an amount of €0.2 million. If the U.S. dollar (rate for €1) would have appreciated by 10%, the net result would have been €0.9 million higher, excluding the effect of the cash and term accounts held in U.S. dollars. If the U.S. dollar (rate for €1) would have depreciated by 10%, the net result would have been €0.8 million higher, excluding the effect of the cash and term accounts held in U.S. dollars.

To limit the exposure to foreign currency rate fluctuations on the British pound and Japanese yen, we have entered into currency rate swaps as of 2017.

Additionally, we are exposed to credit risk, liquidity risk and challenges related to capital management.

Credit Risk

Credit risk is the risk that third parties may not meet their contractual obligations resulting in a loss for us. We are exposed to credit risk from our operating activities and from our financing activities, which are mainly deposits with financial institutions. We limit this exposure by contracting with credit-worthy business partners or with financial institutions which meet high credit rating requirements. In addition, the portfolio of receivables is monitored on a continuous basis.

Customer credit risk is managed by each business unit subject to our established policy, procedures and controls relating to customer credit risk management. An impairment analysis is performed at each reporting date using a provision matrix to measure ECLs. The provision rates are based on days past due for groupings of various customer segments with similar loss patterns (i.e., by legal entity). The calculation reflects the probability-weighted outcome, the time value of money and reasonable and supportable information that is available at the reporting date about past events, current conditions and forecasts of future economic conditions. Generally, trade receivables are written-off if past due for more than one year and are not subject to enforcement activity. The maximum exposure to credit risk at the reporting date is the carrying value of each class of financial assets at amortized cost or fair value through Other Comprehensive Income, or OCI, as disclosed in Note 20 to our consolidated financial statements. We do not hold collateral as security.

We evaluate the concentration of risk with respect to trade receivables as low, as our customers are located in several jurisdictions and industries and operate in largely independent markets.

Liquidity Risk

The liquidity risk is that we may not have sufficient cash to meet our payment obligations. This risk is countered by day-by-day liquidity management at the corporate level. We have historically entered into financing and lease agreements with financial institutions to finance significant projects and certain working capital requirements. We no longer have undrawn lines of credit at December 31, 2019 (our undrawn lines of credit were €26.0 million and €4.5 million as of December 31, 2018 and 2017, respectively). These line of credit arrangements do not contain significant financial covenants.

On September 29, 2017, KBC Bank and Materialise agreed on a credit facility, mainly related to the financing of the ACTech acquisition, in which debt covenants were determined based on the ratio of our total net financial debt over EBITDA.

On December 20, 2017, EIB and Materialise entered into a finance contract to support our ongoing research and development programs for growth from 2017 to 2020. The contract provides a credit of up to €35.0 million drawable in two tranches. The first tranche could not exceed €25.0 million and could be drawn during the first year of the contract. We drew €10.0 million of this first tranche in the course of 2018 and €25.0 million in the second tranche in the course of 2019. The duration of the loan will be between six to eight years starting from the disbursement of the respective tranches, and includes a two-year loan reimbursement grace period. Loans under the contract will be made at a fixed rate, based on the Euribor rate at the time of the borrowing, plus a variable margin. The interest rate for the first tranche is equal to 2.40% and the interest rate for the second tranche is 2.72% and varies in function of certain EBITDA levels and debt ratios. The contract contains customary security, covenants and undertakings. As of December 31, 2019, €35.0 million was drawn in connection with this agreement.

Capital Management

The primary objective of our capital management strategy is to ensure we maintain healthy capital ratios to support our business and maximize shareholder value. Capital is defined as our shareholders' equity.

We consistently review our capital structure and make adjustments in light of changing economic conditions. We made no changes to our capital management objectives, policies or processes during the years ended December 31, 2019, 2018 and 2017.

ITEM 12. DESCRIPTION OF SECURITIES OTHER THAN EQUITY SECURITIES

A. Debt Securities

Not applicable.

B. Warrants and Rights

Not applicable.

C. Other Securities

Not applicable.

D. American Depositary Shares

Bank of New York Mellon serves as the depositary for the ADSs. Each ADS represents one ordinary share (or a right to receive one ordinary share) deposited with the principal Amsterdam office of ING Securities Services, Inc., as custodian for the depositary. Each ADS also represents any other securities, cash or other property which may be held by the depositary. The depositary's corporate trust office at which the ADSs are administered is located at 240 Greenwich Street, New York, New York 10286. The Bank of New York Mellon's principal executive office is located at 240 Greenwich Street, New York, New York 10286.

A deposit agreement among us, the depositary and the ADS holders sets out the ADS holder rights as well as the rights and obligations of the depositary. New York law governs the deposit agreement and the ADSs. A copy of the deposit agreement is incorporated by reference as an exhibit to this annual report on Form 20-F.

Pursuant to the terms of the deposit agreement, you, as an ADS holder, will be required to pay the following fees to the depositary:

Persons depositing or withdrawing ordinary shares or ADS holders must pay to the depositary:	**For:**
$5.00 (or less) per 100 ADSs (or portion of 100 ADSs)	Issuance of ADSs, including issuances resulting from a distribution of ordinary shares or rights or other property
	Cancellation of ADSs for the purpose of withdrawal, including if the deposit agreement terminates
$0.05 (or less) per ADS	Any cash distribution to you
A fee equivalent to the fee that would be payable if securities distributed to you had been ordinary shares and the shares had been deposited for issuance of ADSs	Distribution of securities distributed to holders of deposited securities which are distributed by the depositary to you
$0.05 (or less) per ADS per calendar year	Depositary services
Registration or transfer fees	Transfer and registration of ordinary shares on our share register to or from the name of the depositary or its agent when you deposit or withdraw shares
Expenses of the depositary	Cable, telex and facsimile transmissions (when expressly provided in the deposit agreement) converting foreign currency to U.S. dollars
Taxes and other governmental charges the depositary or the custodian has to pay on any ADS or ordinary shares underlying an ADS, such as share transfer taxes, stamp duty or withholding taxes	As necessary
Any charges incurred by the depositary or its agents for servicing the deposited securities	As necessary

The depositary collects its fees for delivery and surrender of ADSs directly from investors depositing ordinary shares or surrendering ADSs for the purpose of withdrawal or from intermediaries acting for them. The depositary collects fees for making distributions to investors by deducting those fees from the amounts distributed or by selling a portion of distributable property to pay the fees. The depositary may collect its annual fee for depositary services by deduction from cash distributions or by directly billing investors or by charging the book-entry system accounts of participants acting for them. The depositary may collect any of its fees by deduction from any cash distribution payable to ADS holders that are obligated to pay those fees. The depositary may generally refuse to provide fee-based services until its fees for those services are paid.

From time to time, the depositary may make payments to us to reimburse or share revenue from the fees collected from ADS holders, or waive fees and expenses for services provided, generally relating to costs and expenses arising out of establishment and maintenance of the ADS program. In performing its duties under the deposit agreement, the depositary may use brokers, dealers or other service providers that are affiliates of the depositary and that may earn or share fees or commissions.

PART II

ITEM 13. DEFAULTS, DIVIDEND ARREARAGES AND DELINQUENCIES

None.

ITEM 14. MATERIAL MODIFICATIONS TO THE RIGHTS OF SECURITY HOLDERS AND USE OF PROCEEDS

Material Modifications to the Rights of Security Holders

None.

Use of Proceeds

Our Registration Statement on Form F-1 (Registration No. 333-194982), relating to our underwritten initial public offering of ADSs, each representing one ordinary share with no nominal value per share, was declared effective by the SEC on June 24, 2014. On June 30, 2014, we consummated our initial public offering and sold 8,000,000 ADSs at a public offering price of $12.00 per ADS for an aggregate offering price of $96.0 million. We received net proceeds from our initial public offering of approximately $88.3 million, after deducting the underwriting discount of approximately $6.7 million and offering expenses of approximately $2.4 million, and reimbursement by the underwriters of certain offering expenses. On July 7, 2014, certain selling shareholders that participated in our initial public offering sold 1,200,000 ADSs at a public offering price of $12.00 per ADS pursuant to the underwriters' exercise in full of their over-allotment option for an aggregate offering price of $14.4 million. We did not receive any of the proceeds from the sale of ADSs by the selling shareholders. Piper Jaffray & Co. and Credit Suisse Securities (USA) LLC acted as joint book-running managers for the offering.

During the year ended December 31, 2019, the remaining net proceeds from our initial public offering were used and continue to be used as a buffer for our working capital, unfinanced capital expenditures, financing activities (including acquisitions, partnerships) and general corporate purposes.

ITEM 15. CONTROLS AND PROCEDURES

a) Disclosure Controls and Procedures

Our management, with the participation of our Chief Executive Officer and our Chief Financial Officer, evaluated the effectiveness of our disclosure controls and procedures as of December 31, 2019. The term "disclosure controls and procedures," as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act, means controls and other procedures of a company that are designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the SEC's rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is accumulated and communicated to the company's management, including its principal executive and principal financial officers, as appropriate to allow timely decisions regarding required disclosure. Management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving their objectives and management necessarily applies its judgment in evaluating the cost benefit relationship of possible controls and procedures. Based on this evaluation, management concluded as of December 31, 2019 that our disclosure controls and procedures were not effective due to the material weaknesses in our internal control over financial reporting, which are described below under "Management's Annual Report on Internal Control Over Financial Reporting."

b) Management's Annual Report on Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting as defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act. Our internal control over financial reporting is a process designed by, or under the supervision of, our Chief Executive Officer and Chief Financial Officer and effected by our management and other personnel to provide reasonable assurance regarding the reliability of our financial reporting and the preparation of our financial statements for external reporting purposes in accordance with IFRS. Internal control over financial reporting includes policies and procedures that pertain to the maintenance of records that in reasonable detail accurately and fairly reflect the transactions and dispositions of our assets; provide reasonable assurance that transactions are recorded as necessary to permit preparation of our financial statements in accordance with generally accepted accounting principles, and that our receipts and expenditures are being made only in accordance with the authorization of our board of directors and management; and provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of our assets that could have a material effect on our financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect all misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with our policies and procedures may deteriorate.

A material weakness is a deficiency, or combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of annual or interim financial statements will not be prevented or detected on a timely basis.

Management assessed the effectiveness of our internal control over financial reporting as of December 31, 2019 using the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission in the Internal Control-Integrated Framework, 2013 (the "COSO 2013 Framework"). Based on its assessment, our management, including our Chief Executive Officer and our Chief Financial Officer, has concluded that our internal control over financial reporting was not effective as of December 31, 2019 due to the material weaknesses in our internal control over financial reporting described below. Management did not assess the effectiveness of internal control over financial reporting of the Engimplan acquisition because of the timing of this acquisition which was completed on July 31, 2019. For additional information, see Note 4 to our audited consolidated financial statements. Engimplan constituted 5% and 10% of our total assets and net assets, respectively, as of December 31, 2019, and 1% and 14% of our revenues and net profit, respectively, for the year then ended.

We did not maintain an effective control environment to prevent or detect a potential material misstatement in our financial statements primarily as a result of the following factors:

- Our not appropriately remediating existing material weaknesses on a timely basis.
- Our not having certain policies, procedures and controls, related to our internal control framework implemented or operating effectively on a timely basis.

These deficiencies in the control environment resulted in the following material weaknesses:

- The controls over access to key financial systems were either not implemented or not operating effectively resulting in ineffective controls designed to validate the completeness and accuracy of underlying data and system reports used in controls over our financial reporting.
- We did not have appropriate controls designed to detect or prevent a material misstatement related to revenue recognition from non-standard contracts with customers and we did not have necessary controls to guarantee completeness of our sales contract database.

- We did not have an adequate process or appropriate controls in place to support an accurate financial reporting and consolidation process and a financial reporting of our financial results and disclosures in our Annual Report on Form 20-F.

Notwithstanding the identified material weaknesses and management's assessment that internal control over financial reporting was not effective as of December 31, 2019, management believes that the audited consolidated financial statements contained in this Annual Report on Form 20-F fairly present, in all material respects, our financial condition, results of operations and cash flows for the fiscal years presented in conformity with IFRS.

Remediation Plan

During the year ending December 31, 2020, we plan to continue to enhance our internal control over financial reporting in an effort to remediate the material weaknesses described in this Item 15 and to enhance our overall control environment. We are committed to ensuring that our internal control over financial reporting is designed and operating effectively. We are addressing all material weaknesses identified as follows.

In general, the executive committee has approved and implemented a key project plan that will (i), where possible and appropriate, clarify, simplify and/or complete the design of our control framework, (ii) help and support and, where appropriate, increase the discipline of the various control owners in the implementation of the controls for which they are responsible and (iii) specifically address the above material weaknesses. As part of this project plan, accountability for every control (including, but not limited to, those for which deficiencies have been identified) has been assigned to an executive committee member, to internal control coordinators and to the respective control owners. Workshops have been organized, and continue to be organized, with the control owners and coordinators to ascertain that they fully understand the design of their controls as well as the actions that they have to take (and the timing thereof) to properly execute the controls and sufficiently document such execution. The control coordinators and the accountable executive committee members will explain, in person, to the audit committee their action (including, where appropriate, remediation) plan during the second quarter of 2020. Meanwhile, management and internal audit personnel will continue to implement a structured approach to evaluate our internal controls and follow-up on action plans.

More particularly, as a result of this ongoing exercise, the following remediation actions are being taken:

- With regard to the material weakness in our control over access to key financial systems, we are addressing this situation by further improving the implementation of controls over privileged access rights with segregation of duties and, where possible, reactive monitoring of sessions.
- With regard to the material weakness identified in our revenue recognition, we are establishing and implementing an action plan to have a more structured approach to collect and review non-standard sales contracts.
- With regard to the material weakness identified in our financial reporting and consolidation we are establishing an action plan to re-design our analytical reviews and to re-design our control on documentation of material or complex transactions.

Also, as we are upgrading and reviewing our IT systems, particular attention will be given to the possibility to automate a larger portion of our controls.

Although we intend to complete the remediation process as promptly as possible, we cannot at this time estimate how long it will take to remediate these material weaknesses. In addition, we may discover additional material weaknesses that require additional time and resources to remediate and we may decide to take additional measures to address the material weaknesses or modify the remediation steps described above. Until these weaknesses are remediated, we plan to continue to perform additional analyses and other procedures to ensure that our consolidated financial statements are prepared in accordance with IFRS.

c) Changes in Internal Control over Financial Reporting

Other than as discussed above under "Management's Annual Report on Internal Control Over Financial Reporting," there were no changes in our internal control over financial reporting that occurred during the period covered by this report that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

d) Attestation Report of the Registered Public Accounting Firm

BDO Bedrijfsrevisoren CVBA ("BDO"), an independent registered public accounting firm, has issued an adverse report on the effectiveness of the company's internal control over financial reporting. See the report of BDO below:

Report of Independent Registered Public Accounting Firm

Shareholders and Board of Directors
Materialise NV
Leuven, Belgium

Opinion on Internal Control over Financial Reporting

We have audited Materialise NV's (the "Company's") internal control over financial reporting as of December 31, 2019, based on criteria established in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission (the "COSO criteria"). In our opinion, the Company did not maintain, in all material respects, effective internal control over financial reporting as of December 31, 2019, based on the COSO criteria.

We do not express an opinion or any other form of assurance on management's statements referring to any corrective actions taken by the Company after the date of management's assessment.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) ("PCAOB"), the consolidated statements of financial position of the Company as of December 31, 2019, 2018 and 2017, the related consolidated statements of income, statements of comprehensive income, changes in equity, and cash flows for each of the three years in the period ended December 31, 2019, and the related notes (collectively referred to as the consolidated financial statements") and our report dated April 30, 2020 expressed an unqualified opinion thereon.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying "Item 15, Management's Report on Internal Control over Financial Reporting". Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit of internal control over financial reporting in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audit also included performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

A material weakness is a deficiency, or a combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of the company's annual or interim financial statements will not be prevented or detected on a timely basis.

The following material weaknesses have been identified and described in management's assessment:

I. Control Environment

The Company did not maintain an effective control environment to prevent or detect a potential material misstatement in its financial statements primarily attributable to the following factors:

- Not appropriately remediating existing material weaknesses on a timely basis.
- Not having certain policies, procedures and controls, related to their internal control framework implemented or operating effectively on a timely basis.

These deficiencies in the control environment resulted in the following material weaknesses:

- The controls over access to key financial systems were either not implemented or not operating effectively resulting in ineffective controls designed to validate the completeness and accuracy of underlying data and system reports used in controls over the financial reporting.
- Not having appropriate controls designed to detect or prevent a material misstatement related to revenue recognition from non-standard contracts with customers and not having necessary controls to guarantee completeness of the sales contract database.
- Not having an adequate process or appropriate controls in place to support an accurate financial reporting and consolidation process and a financial reporting of the Company's financial results and disclosures on its Form 20-F.

These material weaknesses were considered in determining the nature, timing, and extent of audit tests applied in our audit of the 2019 financial statements, and this report does not affect our report dated April 30, 2020 on those consolidated financial statements.

As indicated in the accompanying "Item 15, Management's Annual Report on Internal Control over Financial Reporting", management's assessment of and conclusion on the effectiveness of internal control over financial reporting did not include the internal controls of Engimplan Engenharia De Implante Indústria E Comércio Ltda ("Engimplan"), which was acquired on August 6, 2019, and which is included in the consolidated statement of financial position of the Company as of December 31, 2019, and the related consolidated statements of income, comprehensive income, changes in equity, and cash flows from August 6, 2019 to December 31, 2019. Engimplan constituted 5% and 10% of total assets and net assets, respectively, as of December 31, 2019, and 1% and 14% of revenues and net profit, respectively, for the year then ended. Management did not assess the effectiveness of internal control over financial reporting of Engimplan because of the timing of the acquisition which was completed on August 6, 2019. Our audit of internal control over financial reporting of the Company also did not include an evaluation of the internal control over financial reporting of Engimplan.

Definition and Limitations of Internal Control over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ Veerle Catry

BDO Bedrijfsrevisoren CVBA

Represented by Veerle Catry

Zaventem, Belgium
April 30, 2020

ITEM 16A. AUDIT COMMITTEE FINANCIAL EXPERT

Our board of directors has determined that each of the members of our audit committee, Johan De Lille, Jürgen Ingels and Lieve Verplancke, is an “audit committee financial expert” as defined in Item 16A of Form 20-F under the Exchange Act and is independent under Rule 10A-3 under the Exchange Act.

ITEM 16B. CODE OF ETHICS

We have adopted a written code of conduct and ethics that outlines the principles of legal and ethical business conduct under which we do business. The code of conduct and ethics applies to all of our directors, senior management, consultants and other employees, including our Chief Executive Officer and Chief Financial Officer. We have posted this code of conduct and ethics on our website at www.materialise.com. This website address is included in this annual report as an inactive textual reference only, and the information and other content appearing on our website are not incorporated by reference into this annual report. We have not granted any waivers from any provision of our code of conduct and ethics since its adoption.

ITEM 16C. PRINCIPAL ACCOUNTANT FEES AND SERVICES

BDO Bedrijfsrevisoren CVBA was engaged as our independent registered public accounting firm in 2019 and 2018 in connection with our SEC reporting obligations, as well as our statutory auditor for Belgian company purposes. The following table sets forth by category of service the total fees for services provided by BDO Bedrijfsrevisoren CVBA and other BDO member firms to us during 2019 and 2018.

	For the year ended December 31	
in 000€	2019	2018
Audit Fees	1,220	1,121
Audit-Related Fees	35	17
Tax Fees	2	2
All Other Fees	—	—
Total	**1,257**	**1,140**

Audit Fees

Audit fees consist of the aggregate fees billed in connection with the audit of our annual consolidated and statutory financial statements and internal controls.

Audit-Related Fees

Audit-related fees are fees for services that are traditionally performed by the independent accountants and in the table above primarily related to the quarterly attestation reports for EIB and the consent of the independent accountants for referring to their audit opinion on the financial statements for RSPrint NV for the year 2017.

Tax Fees

For the fiscal year ended December 31, 2019 and 2018, these fees related to the Materialise entity in Malaysia.

All Other Fees

No other fees were paid to BDO Bedrijfsrevisoren CVBA or to other BDO member firms for the fiscal years ended December 31, 2019 and December 31, 2018.

Audit Committee Pre-Approval Policies and Procedures

The pre-approval of the Audit Committee or member thereof, to whom pre-approval authority has been delegated, is required for the engagement of our independent auditors to render audit or non-audit services. Audit Committee pre-approval of audit and non-audit services will not be required if the engagement for the services is entered into pursuant to pre-approval policies and procedures established by our audit committee regarding our engagement of the independent auditors, provided the policies and procedures are detailed as to the particular service, our audit committee is informed of each service provided and such policies and procedures do not include delegation of the Audit Committee's responsibilities under the Exchange Act to our management. Audit Committee pre-approval of non-audit services (other than review and attest services) also will not be required if such services fall within available exceptions established by the SEC.

All audit fees, audit related fees and tax fees for the fiscal years ended December 31, 2019 and 2018 were pre-approved under the pre-approval policies of the Audit Committee.

ITEM 16D. EXEMPTIONS FROM THE LISTING STANDARDS FOR AUDIT COMMITTEES

None.

ITEM 16E. PURCHASES OF EQUITY SECURITIES BY THE ISSUER AND AFFILIATED PURCHASERS

None.

ITEM 16F. CHANGE IN REGISTRANT'S CERTIFYING ACCOUNTANT

None.

ITEM 16G. CORPORATE GOVERNANCE

The Listing Rules of the NASDAQ Stock Market include certain accommodations in the corporate governance requirements that allow foreign private issuers, such as us, to follow "home country" corporate governance practices in lieu of the otherwise applicable corporate governance standards of the NASDAQ Stock Market. The application of such exceptions requires that we disclose each noncompliance with the NASDAQ Stock Market Listing Rules that we do not follow and describe the Belgian corporate governance practices we do follow in lieu of the relevant NASDAQ Stock Market corporate governance standard. We follow Belgian corporate governance practices in lieu of the corporate governance requirements of the NASDAQ Stock Market in respect of the following:

- **Quorum at Shareholder Meetings**. NASDAQ Stock Market Listing Rule 5620(c) requires that for any meeting of shareholders, the quorum must be no less than 33% or 1/3 of the outstanding ordinary shares. There is no quorum requirement under Belgian law for our shareholders' meetings, except as provided for by law in relation to decisions regarding certain matters.
- **Independent Director Majority on Board/Meetings**. NASDAQ Stock Market Listing Rules 5605(b)(1) and (2) require that a majority of the board of directors must be comprised of independent directors and that independent directors must have regularly scheduled meetings at which only independent directors are present. We are not required under Belgian law to have any independent directors on our board of directors. However, our articles of association provide that our board of directors must be comprised of at least seven and no more than 11 directors, of which at least three directors must be independent directors under Belgian law. We do not intend to require our independent directors to meet separately from the full board of directors on a regular basis or at all although the board of directors is supportive of its independent members voluntarily arranging to meet separately from the other members of our board of directors.
- **Director Nominations/Remuneration and Nomination Committee Composition**. NASDAQ Stock Market Listing Rule 5605(d)(2) requires that compensation of officers must be determined by, or recommended to, the board of directors for determination, either by a majority of the independent directors, or a compensation committee comprised solely of independent directors. NASDAQ Stock Market Listing Rule 5605(e) requires that director nominees be selected, or recommended for selection, either by a majority of the independent directors or a nominations committee comprised solely of independent directors. Under Belgian law, we are not subject to any such requirements. In particular, we are not required by Belgian law to set up any compensation or nominations committees within our board of directors, and are therefore not subject to any Belgian legal requirements as to the composition of such committees either. However, our articles of association provide that our board of directors may form committees from among its members. See "Item 6. Directors, Senior Management and Employees—C. Board Practices — Board of Directors Practices." Our board of directors has set up and appointed a Remuneration and Nomination Committee. Our Remuneration and Nomination Committee is currently comprised of three directors, one of whom is independent. In addition, as long as the Family Shareholders control, directly or indirectly, in the aggregate at least 20% of the voting rights attached to our ordinary shares, a majority of our directors must be appointed by our shareholders from a list of candidates proposed by the Family Shareholders.
- **Shareholder Approval of Equity Compensation Plans**. NASDAQ Stock Market Listing Rule 5635(c) requires shareholder approval prior to the issuance of securities in connection with equity-based compensation of officers, directors, employees or consultants. On December 18, 2015, our board of directors adopted a stock option plan, the 2015 Warrant Plan. Warrants under the 2015 Warrant Plan may be offered upon decision by our board of directors (or its proxy holder(s)) to employees, consultants and directors of our company and our subsidiaries. In lieu of the NASDAQ Stock Market Listing Rule 5635(c), we followed Belgian law regarding the issuance of shares or securities in connection with the remuneration of the directors and/or the employees of a Belgian company.

Under Belgian company law, a Belgian company may issue shares or grant rights to acquire shares pursuant to a resolution of the general meeting of shareholders or, within certain limits, pursuant to a resolution of the board of directors if so authorized by the shareholders' meeting (the so-called authorized capital). By resolution of our extraordinary shareholders' meeting of April 23, 2014, which entered into force on June 30, 2014, our shareholders authorized our board of directors, for a period of five years from August 18, 2014, to increase our share capital, in one or more transactions (including through the issuance of warrants), up to a maximum amount of €2,714,634.83 (of which €2,710,008.33 remained available prior to the issuance of the warrants under the 2015 Warrant Plan). On December 18, 2015, our board of directors decided, in connection with the adoption of the 2015 Warrant Plan, to increase the share capital with a maximum amount of €80,738 (excluding any issue premium), subject to the exercise of the warrants issued under the 2015 Warrant Plan.

Pursuant to Belgian company law and the authorization granted by the shareholders' meeting of April 23, 2014, our board of directors is also authorized to issue shares or grant rights to acquire shares in the framework of incentive plans, such as warrant plans or other plans, for the benefit of directors, consultants and members of personnel of our company and of our subsidiaries. As an exception to the foregoing, Belgian company law provides that warrants that are mainly reserved to one or more determined persons other than members of personnel cannot be issued by the board of directors under the authorized capital, but requires specific approval by the shareholders' meeting. However, given that the warrants under the 2015 Warrant Plan will not be mainly reserved to one or more determined persons other than members of personnel, these warrants do not fall within this exception and our board of directors was therefore authorized to issue such warrants without seeking any additional shareholder approval.

The 2015 Warrant Plan provides the terms and conditions governing the procedures for the granting of the warrants to employees, consultants and directors of our Company and of our subsidiaries. These terms and conditions include, among others, the determination of the exercise price and the vesting period. The granting of the warrants, and the determination of the applicable terms and conditions, is entrusted to our board of directors or to one or more proxy holders designated by our board of directors.

By resolution of our extraordinary shareholders' meeting of June 4, 2019, our shareholders authorized our board of directors, for a period of five years, to increase our share capital, in one or more transactions, with a maximum total amount equal to the then current share capital of our company, in accordance with the modalities as described in the special report of the Board of Directors prepared in accordance with Belgian company law.

ITEM 16H. MINE SAFETY DISCLOSURE

Not applicable.

PART III

ITEM 17. FINANCIAL STATEMENTS

Not applicable.

ITEM 18. FINANCIAL STATEMENTS

See our consolidated financial statements beginning on page F-1 of this annual report.

ITEM 19. EXHIBITS

1.1	Restated Articles of Association of Materialise NV (English translation)
2.1	Deposit Agreement, dated as of June 24, 2014, among Materialise NV and The Bank of New York Mellon (incorporated by reference to Exhibit 4.1 to the Company's Registration Statement on Form F-1 (File No. 333-194982))
2.2	Form of American Depositary Receipt (included in Exhibit 2.1)
	Certain instruments relating to long-term debt as to which the total amount of securities authorized thereunder does not exceed 10% of the total assets of Materialise NV and its subsidiaries on a consolidated basis have been omitted in accordance with Form 20-F. The Company hereby agrees to furnish a copy of any such instrument to the SEC upon request.
2.3	Description of Securities (incorporated by reference to Exhibit 2.3 to the Company's Amendment No. 1 on Form 20-F/A to the Company's Annual Report on Form 20-F for the year ended December 31, 2018)
4.1	2013 Warrant Plan (English translation) (incorporated by reference to Exhibit 10.2 to the Company's Registration Statement on Form F-1 (No. 333-194982))
4.2	2014 Warrant Plan (English translation) (incorporated by reference to Exhibit 10.3 to the Company's Registration Statement on Form F-1 (No. 333-194982))
4.3	Form of Warrant Agreement under 2014 Warrant Plan (English translation) (incorporated by reference to Exhibit 4.6 to the Company's Registration Statement on Form S-8 (No. 333-197236))
4.4	2015 Warrant Plan (English translation) (incorporated by reference to Exhibit 4.5 to the Company's Annual Report on Form 20-F for the year ended December 31, 2015)
4.5	Form of Warrant Agreement under 2015 Warrant Plan (English translation) (incorporated by reference to Exhibit 4.4 to the Company's Registration Statement on Form S-8 (File No. 333-212445))
4.6	Registration Rights Agreement, dated September 15, 2016, among Materialise NV and the Holders party thereto (incorporated by reference to Exhibit 4.8 to the Company's Registration Statement on Form F-3 (No. 333-213649))
4.7+	Share and Loan Purchase and Transfer Agreement, dated October 4, 2017, among Materialise GmbH, Materialise N.V. and the Sellers party thereto (incorporated by reference to Exhibit 4.9 to the Company's Annual Report on Form 20-F for the year ended December 31, 2017)
8.1	Subsidiaries of Materialise NV
12.1	Certification of Chief Executive Officer Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002
12.2	Certification of Chief Financial Officer Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002
13.1	Certification of Chief Executive Officer Pursuant to 18 U.S.C. Section 1350, as adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
13.2	Certification of Chief Financial Officer Pursuant to 18 U.S.C. Section 1350, as adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
23.1	Consent of BDO Bedrijfsrevisoren. CVBA, independent registered public accounting firm

101.INS	XBRL Instance Document
101.SCH	XBRL Taxonomy Extension Schema
101.CAL	XBRL Taxonomy Extension Calculation Linkbase
101.DEF	XBRL Taxonomy Extension Definition Linkbase
101.LAB	XBRL Taxonomy Extension Label Linkbase
101.PRE	XBRL Taxonomy Extension Presentation Linkbase

+ The registrant has omitted portions of the referenced exhibit pursuant to a request for confidential treatment under Rule 24b-2 promulgated under the Exchange Act.

Signatures

The registrant hereby certifies that it meets all of the requirements for filing on Form 20-F and that it has duly caused and authorized the undersigned to sign this annual report on its behalf.

MATERIALISE NV

By: /s/ Wilfried Vancraen
Name: Wilfried Vancraen
Title: Chief Executive Officer

Date: April 30, 2020

INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

Consolidated Financial Statements for the Years Ended December 31, 2019, 2018 and 2017

Report of Independent Registered Public Accounting Firm

Shareholders and Board of Directors
Materialise NV
Leuven, Belgium

Opinion on the Consolidated Financial Statements

We have audited the accompanying consolidated statements of financial position of Materialise NV (the "Company") and subsidiaries as of December 31, 2019, 2018 and 2017, the related consolidated income statements, statements of comprehensive income, changes in equity, and cash flows for each of the three years in the period ended December 31, 2019, and the related notes (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company and subsidiaries at December 31, 2019, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2019**,** in conformity with the International Financial Reporting Standards as issued by the International Accounting Standards Boards.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) ("PCAOB"), the Company's internal control over financial reporting as of December 31, 2019, based on criteria established in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission ("COSO") and our report dated April 30, 2020 expressed an adverse opinion thereon.

Adoption of New Accounting Standard

As discussed in Note 2 to the consolidated financial statements, effective on January 1, 2019, the Company changed its method of accounting for leases due to the adoption of IFRS 16, Leases.

Basis for Opinion

These consolidated financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's consolidated financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud.

Our audits included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ Veerle Catry

BDO Bedrijfsrevisoren CVBA
Represented by Veerle Catry

We have served as the Company's auditor since 2014.

Zaventem, Belgium
April 30, 2020

Consolidated income statements

in 000€, except per share data	Notes	For the year ended December 31, 2019	2018	2017
Revenue	22.1	196,679	184,721	142,573
Cost of sales	22.2	(86,972)	(82,299)	(62,952)
Gross profit		**109,707**	**102,422**	**79,621**
Research and development expenses	22.3	(23,348)	(22,416)	(19,959)
Sales and marketing expenses	22.4	(52,989)	(46,303)	(38,935)
General and administrative expenses	22.5	(31,786)	(32,310)	(24,876)
Net other operating income	22.6	5,432	3,771	4,541
Operating profit		**7,016**	**5,164**	**392**
Financial expenses	22.8	(3,682)	(4,864)	(4,728)
Financial income	22.9	1,377	3,627	3,210
Share in loss of joint venture	8	(392)	(475)	(469)
Profit (loss) before taxes		**4,319**	**3,452**	**(1,595)**
Income taxes	22.10	(2,595)	(425)	(522)
Net profit (loss) for the year		**1,724**	**3,027**	**(2,117)**
Net profit (loss) attributable to:				
The owners of the parent		1,646	3,027	(2,117)
Non-controlling interest		78	—	—
Earnings per share attributable to the owners of the parent				
Basic	23	0.03	0.06	(0.04)
Diluted	23	0.03	0.06	(0.04)

The accompanying notes form an integral part of these consolidated financial statements.

Consolidated statements of comprehensive income

in 000€	Notes	For the year ended December 31, 2019	2018	2017
Net profit (loss) for the year		**1,724**	**3,027**	**(2,117)**
Other comprehensive income (loss)				
Exchange differences on translation of foreign operations †		245	(47)	(691)
Other comprehensive income (loss), net of taxes		245	(47)	(691)
Total comprehensive income (loss) for the year, net of taxes		**1,969**	**2,980**	**(2,808)**
Total comprehensive income (loss) attributable to:				
The owners of the parent		2,102	2,980	(2,808)
Non-controlling interest		(133)	—	—

† May be reclassified subsequently to profit & loss

The accompanying notes form an integral part of these consolidated financial statements.

Consolidated statements of financial position

in 000€	Notes	As of December 31, 2019	2018	2017
Assets				
Non-current assets				
Goodwill	5	20,174	17,491	17,552
Intangible assets	6	27,395	26,326	28,600
Property, plant & equipment	7	90,331	92,537	87,065
Right-of-use assets	7	10,586	—	—
Investments in joint ventures	8	39	—	31
Deferred tax assets	22.10	192	315	304
Other non-current assets	10	9,391	7,237	3,667
Total non-current assets		**158,108**	**143,906**	**137,219**
Current assets				
Inventories and contracts in progress	9	12,696	9,986	11,027
Trade receivables	11	40,977	36,891	35,582
Other current assets	10	8,616	6,936	7,675
Cash and cash equivalents	12	128,897	115,506	43,175
Total current assets		**191,186**	**169,319**	**97,459**
Total assets		**349,294**	**313,225**	**234,678**

The accompanying notes form an integral part of these consolidated financial statements.

Consolidated statements of financial position

in 000€	Notes	As of December 31, 2019	2018	2017
Equity and liabilities				
Equity				
Share capital	13	3,066	3,050	2,729
Share premium	13	138,090	136,637	79,839
Consolidated reserves	13	(195)	(1,848)	(3,711)
Other comprehensive loss		(1,394)	(1,850)	(1,803)
Equity attributable to the owners of the parent		139,567	135,989	77,054
Non-controlling interest	13	3,107	—	—
Total equity		**142,675**	**135,989**	**77,054**
Non-current liabilities				
Loans & borrowings	15	104,673	92,440	81,788
Lease liabilities	15	6,427	—	—
Deferred tax liabilities	22.1	5,747	6,226	7,415
Deferred income	18	5,031	4,587	3,768
Other non-current liabilities	16	696	868	1,904
Total non-current liabilities		**122,574**	**104,121**	**94,875**
Current liabilities				
Loans & borrowings	15	13,389	13,598	12,769
Lease liabilities	15	3,449	—	—
Trade payables		18,517	18,667	15,670
Tax payables	17	3,363	2,313	2,023
Deferred income	18	27,641	23,195	18,791
Other current liabilities	19	17,686	15,342	13,496
Total current liabilities		**84,045**	**73,115**	**62,749**
Total equity and liabilities		**349,294**	**313,225**	**234,678**

The accompanying notes form an integral part of these consolidated financial statements.

Consolidated statements of changes in equity

in 000€	Notes	Attributable to the owners of the parent					Non-controlling interest	Total equity
		Share capital	Share premium	Consolidated reserves	Other compre-hensive loss	Total		
At January 1, 2019		**3,050**	**136,637**	**(1,848)**	**(1,850)**	**135,989**	**—**	**135,989**
Net profit for the year		—	—	1,646	—	1,646	78	1,724
Other comprehensive loss		—	—	—	456	456	(211)	245
Total comprehensive income (loss)		**—**	**—**	**1,646**	**456**	**2,102**	**(133)**	**1,969**
Capital increase through exercise of warrants	13	16	1,252	—	—	1,268	—	1,268
Acquisition Non-controlling interest Engimplan		—	—	—	—	—	3,240	3,240
Equity-settled share-based payment expense	14	—	201	7	—	208	—	208
At December 31, 2019		**3,066**	**138,090**	**(195)**	**(1,394)**	**139,567**	**3,107**	**142,675**

in 000€	Notes	Attributable to the owners of the parent					Non-controlling interest	Total equity
		Share capital	Share premium	Consolidated reserves	Other compre-hensive loss	Total		
At January 1, 2018		**2,729**	**79,839**	**(3,711)**	**(1,803)**	**77,054**	**—**	**77,054**
IFRS 15—impact on opening reserves (*)		—	—	(1,173)	—	(1,173)	—	(1,173)
Adjusted equity At January 1, 2018		**2,729**	**79,839**	**(4,884)**	**(1,803)**	**75,881**	**—**	**75,881**
Net profit for the year		—	—	3,027	—	3,027	—	3,027
Other comprehensive loss		—	—	—	(47)	**(47)**	—	(47)
Total comprehensive income (loss)		**—**	**—**	**3,027**	**(47)**	**2,980**	**—**	**2,980**
Capital increase in cash	12	312	59,575	—	—	**59,887**	—	59,887
Capital increase through exercise of warrants	12	9	593	—	—	602	—	602
Capital increase Rapidfit+		—	(4,003)	—	—	(4,003)	—	(4,003)
Equity-settled share-based payment expense	14	—	633	9	—	642	—	642
At December 31, 2018		**3,050**	**136,637**	**(1,848)**	**(1,850)**	**135,989**	**—**	**135,989**

in 000€	Notes	Attributable to the owners of the parent					Non-controlling interest	Total equity
		Share capital	Share premium	Consolidated reserves	Other compre-hensive income (loss)	Total		
At January 1, 2017		**2,729**	**79,019**	**(1,603)**	**(1,112)**	**79,033**	**—**	**79,033**
Net loss for the year		—	—	(2,117)	—	(2,117)	—	(2,117)
Other comprehensive loss		—	—	—	(691)	(691)	—	(691)
Total comprehensive income (loss)		**—**	**—**	**(2,117)**	**(691)**	**(2,808)**	**—**	**(2,808)**
Equity-settled share-based payment expense	14	—	820	9	—	829	—	829
At December 31, 2017		**2,729**	**79,839**	**(3,711)**	**(1,803)**	**77,054**	**—**	**77,054**

* The Goup initially adopted IFRS 15 using the cumulative effect method. Under this method, the comparative information is not restated.

The accompanying notes form an integral part of these consolidated financial statements.

Consolidated cash flow statements

in 000€	Notes	For the year ended December 31, 2019	2018	2017
Operating activities				
Net profit (loss) for the year		1,724	3,027	(2,117)
Non-cash and operational adjustments				
Depreciation of property, plant & equipment	7	14,339	12,223	8,754
Amortization of intangible assets	6	4,859	5,064	3,822
Share-based payment expense	14	302	1,075	1,033
Loss (gain) on disposal of property, plant & equipment	7	165	(83)	25
Movement in provisions		138	5	61
Movement in reserve for bad debt and slow moving inventory		121	1,293	502
Financial income	22.9	(1,377)	(581)	(381)
Financial expense	22.8	3,682	2,172	1,597
Impact of foreign currencies		(176)	(299)	302
Share in loss of joint venture (equity method)	8	392	475	469
Income taxes and deferred taxes	22.1	2,595	425	522
Fair value adjustment contingent consideration	4	—	(192)	—
Other		(245)	87	(22)
Working capital adjustment and income tax paid				
Decrease (increase) in trade receivables and other receivables		216	(3,156)	(4,973)
Decrease (increase) in inventories and contracts in progress		(745)	812	(417)
Increase in trade payables and other payables		4,196	7,341	2,343
Income tax paid		(2,139)	(1,368)	(1,569)
Interest received		355	—	—
Net cash flow from operating activities		**28,402**	**28,320**	**9,951**

The accompanying notes form an integral part of these consolidated financial statements.

Consolidated cash flow statements

in 000€	Notes	For the year ended December 31, 2019	2018	2017
Investing activities				
Purchase of property, plant & equipment	7	(13,472)	(18,270)	(27,733)
Purchase of intangible assets	6	(2,193)	(1,836)	(4,345)
Proceeds from the sale of property, plant, equipment and intangibles (net)		278	281	221
Acquisition of subsidiary (net of cash)	4	(6,331)	—	(27,173)
Investments in joint-ventures	8	(875)	—	(500)
Convertible loan granted	10	(2,743)	—	—
Other equity investments in non-listed entities	10	(281)	(2,671)	—
Interest received		—	363	281
Net cash flow used in investing activities		**(25,617)**	**(22,133)**	**(59,249)**
Financing activities				
Proceeds from loans & borrowings	15	29,000	32,554	54,319
Repayment of loans & borrowings	15	(12,126)	(18,820)	(11,904)
Repayment of leases	15	(5,283)	(3,102)	(2,947)
Capital increase in parent company	13	1,268	60,489	—
Direct attributable expense capital increase	13	—	(4,003)	—
Interest paid		(2,286)	(1,733)	(955)
Other financial income (expense), net		208	(150)	(472)
Net cash flow from financing activities		**10,781**	**65,235**	**38,041**
Net increase/(decrease) of cash and cash equivalents		**13,566**	**71,422**	**(11,257)**
Cash and cash equivalents at beginning of the year	12	115,506	43,175	55,912
Exchange rate differences on cash and cash equivalents		(175)	908	(1,480)
Cash and cash equivalents at end of the year	12	128,897	115,506	43,175

The accompanying notes form an integral part of these consolidated financial statements.

Notes to the consolidated financial statements

1 Corporate information

Materialise NV is a limited liability company with its registered office at Technologielaan 15, 3001 Leuven, Belgium. The consolidated financial statements comprise Materialise NV (the "Company" or "Parent") and its subsidiaries (collectively, the "Group"). See Note 28 for a list of subsidiaries of the Company.

The Group is a leading provider of additive manufacturing (AM) software and of sophisticated 3D printing services. The products and services of the Group are organized in the three segments: Materialise Medical, Materialise Software and Materialise Manufacturing. The Group sells its products in Europe, the Americas, Africa and Asia-Pacific.

The consolidated financial statements of the Group for the year ended December 31, 2019 were approved and authorized for issue on April 30, 2020 in accordance with a resolution of the Parent's Board of Directors.

2 Basis of preparation

The consolidated financial statements of the Group for the three years ended December 31, 2019, 2018 and 2017 were prepared in accordance with the International Financial Reporting Standards (IFRS) as issued by the International Accounting Standards Board (IASB) (collectively "IFRS") and with International Financial Reporting Standards (IFRS) as adopted by the European Union ("EU-IFRS").

These consolidated financial statements have been prepared on a historical cost basis, except for the assets and liabilities that have been acquired as part of a business combination, which have been initially recognized at fair value, and certain financial assets such as the non-listed equity instruments and the convertible loan receivable which are both included in the other non-current assets, the share appreciation rights, and the written put option of Rapidfit which are measured at fair value.

The financial statements are prepared on a going concern basis considering the COVID-19 impact as disclosed in Note 27.

The consolidated financial statements are presented in thousands of euros (K€ or thousands of €) and all "currency" values are rounded to the nearest thousand (€000), except when otherwise indicated.

The preparation of financial statements in compliance with adopted IFRS requires the use of certain critical accounting estimates. It also requires Group management to exercise judgment in applying the Group's accounting policies. The areas where significant judgment and estimates have been made in preparing the financial statements and their effect are disclosed in Note 3.

New standards, interpretations and amendments adopted by the Group

The Group has adopted the following new and revised standards and interpretations issued by the IASB and IFRIC that are relevant to its operations and effective for accounting periods beginning on January 1, 2019.

- *IFRIC 23 Uncertainty over income tax treatments*
- *IFRS 16 Leases*

Several other amendments and interpretations apply for the first time in 2019, but do not have an impact on the consolidated financial statements of the Group. The Group has not early adopted any standards, interpretations or amendments that have been issued but are not yet effective.

The application of the above relevant new standards and interpretations are explained below.

IFRIC 23 Uncertainty over income tax treatments

Uncertainty over income tax treatments has been applied as from January 1, 2019. The adoption of this new interpretation did not have an impact.

IFRS 16 Leases

The Company has applied IFRS 16 as from January 1, 2019 by using the modified retrospective approach, not restating comparatives for the 2018 reporting period. The reclassifications and the adjustments arising from the new leasing standard are recognized in the opening balance sheet on January 1, 2019.

On the adoption of IFRS 16, the Company recognized lease liabilities in relation to leases which had previously been classified as "operating leases" under the IAS 17 Leasing standard. These leases were measured at the present value of the remaining lease payments, using a discount rate based on the incremental borrowing rate as of January 1, 2019. The weighted average discount rate applied to the lease liabilities at January 1, 2019 was 2.99%.

The Company had leases classified as finance leases under IAS 17 for an amount of K€5,886 net book value for which the carrying amount has not been reassessed consistent with the transition requirements.

The table below shows the reconciliation of the IAS 17 operating lease commitments disclosed in the 2018 consolidated financial statements with the IFRS 16 lease liability at January 1, 2019:

(in 000€)	As at January 1, 2019
Non-cancellable operating lease commitments disclosed at December 31, 2018	5,442
Discounted using the company's incremental borrowing rate	(268)
Add: finance lease liabilities recognized at December 31, 2018	6,809
(Less) short-term/low-value leases recognized on a straight-line basis as an expense	(88)
Add/(Less) adjustments related to different treatment extension and termination options	(101)
Lease liability recognized as at January 1, 2019	11,794

The right-of-use assets for all assets were measured at the amount equal to the lease liability and relate to the following assets:

(in 000€)	As at December 31, 2019	As at January 1, 2019
Buildings	3,843	3,255
Vehicles	882	849
Other materials	301	880
Total right-of-use assets	**5,026**	**4,984**
Total lease liabilities	**5,026**	**4,984**

The impact on the consolidated statement of profit and loss for the year ended December 31, 2019 and the basic and diluted loss per share is not significant. There was no impact on the retained earnings as per January 1, 2019.

In applying IFRS 16 at January 1, 2019, the company has used the following practical expedients permitted by the standard:

- The use of a single discount rate to a portfolio of leases with similar characteristics;
- The accounting for operating leases with a remaining lease term of less than 12 months as at January 1, 2019 as short-term leases;
- The accounting for operating leases with a low value (less or equal to $5,000) as low-value leases; and
- The use of hindsight in determining the lease term where the contract contains options to extend or terminate the lease.

The other new standards and interpretations effective as of January 1, 2019 did not have any impact on the statement of financial position and the statement of profit and loss.

3 Summary of significant accounting policies

Basis for consolidation

The consolidated financial statements comprise the financial statements of the Group and its subsidiaries.

Entities are fully consolidated from the date of acquisition, which is the date when the Group obtains control, and continue to be consolidated until the date when such control ceases. The financial statements of the entities are prepared for the same reporting period as the parent company, using consistent accounting policies. All intra-Group balances, transactions, unrealized gains and losses resulting from intra-Group transactions and dividends are fully eliminated.

The Group attributes profit or loss and each component of other comprehensive income to the owners of the parent company and to the non-controlling interest based on present ownership interests, even if the results in the non-controlling interest have a negative balance.

A change in the ownership interest of a subsidiary, without a loss of control, is accounted for as an equity transaction. If the Group loses control over the subsidiary, it will derecognize the assets (including goodwill) and liabilities of the subsidiary, any non-controlling interest and the other components of equity related to the subsidiary. Any surplus or deficit arising from the loss of control is recognized in profit or loss. If the Group retains an interest in the previous subsidiary, then such interest is measured at fair value at the date the control is lost.

The proportion allocated to the parent and non-controlling interests in preparing the consolidated financial statements is determined based solely on present ownership interests.

In 2019, Engimplan entered into the consolidated scope – see note 28.

Non-controlling interests

The Group has the choice, on a transaction by transaction basis, to initially recognize any non-controlling interest in the acquiree which is a present ownership interest and entitles its holders to a proportionate share of the entity’s net assets in the event of liquidation at either acquisition date fair value or, at the present ownership instruments’ proportionate share in the recognized amounts of the acquiree’s identifiable net assets. Other components of non-controlling interest such as outstanding share options are generally measured at fair value. The Group has not elected to take the option to use fair value in acquisitions completed to date. Currently the only non-controlling interest resulting from business combinations coming from Engimplan.

Foreign currency translation

The Group’s consolidated financial statements are presented in euros, which is also the parent company’s functional currency. For each entity, the Group determines the functional currency, and items included in the financial statements of each entity are measured using the functional currency.

Financial statements of foreign subsidiaries

Foreign subsidiaries use the local currencies of the country where they operate. The statement of financial position is translated into euro at the closing rate on the reporting date and their income statement is translated at the average exchange rate at each month-end. Differences resulting from the translation of the financial statements of said subsidiaries are recognized in other comprehensive income as “exchange differences on translation of foreign operations”.

Foreign currency transactions

Transactions denominated in foreign currencies are translated into euro at the exchange rate at the end of the previous month-end. Monetary items in the statement of financial position are translated at the closing rate at each reporting date and the relevant translation adjustments are recognized in financial or operating result depending on its nature.

Business combinations and goodwill

Business combinations are accounted for using the acquisition method at the acquisition date, which is the date at which the Group obtains control over the entity. The cost of an acquisition is measured as the amount of the consideration transferred to the seller, measured at the acquisition date fair value, and the amount of any non-controlling interest in the acquiree.

The Group measures goodwill initially at cost at the acquisition date, being:

- the fair value of the consideration transferred to the seller, plus
- the amount of any non-controlling interest in the acquiree, plus
- if the business combination is achieved in stages, the fair value of the existing equity interest in the acquiree re-measured at the acquisition date, less
- the fair value of the net identifiable assets acquired and assumed liabilities

Goodwill is recognized as an intangible asset with any impairment in carrying value being charged to the consolidated income statement. Where the fair value of identifiable assets, liabilities and contingent liabilities exceed the fair value of consideration paid, the excess is credited in full to the consolidated income statement on acquisition date.

Acquisition costs incurred are expensed and included in general and administrative expenses.

Any contingent consideration to be transferred by the acquirer will be recognized at fair value at the acquisition date. Subsequent changes to the fair value of the contingent consideration, which is deemed to be an asset or liability, will be recognized either as a profit or loss or as a change to other comprehensive income. If the contingent consideration is classified as equity, it should not be re-measured until it is finally settled within equity.

Acquisition of non-controlling interests are accounted for as an equity transaction.

Investments in joint ventures

The Group carries investment in a joint venture (RS Print NV). The Group’s investments in its joint venture is accounted for using the equity method. Under the equity method, the investment in the joint venture was initially recognized at cost. The carrying amount of the investment is adjusted to recognize changes in the Group’s share of net assets of the joint venture since the acquisition date. Goodwill relating to the joint venture is included in the carrying amount of the investment and is not tested for impairment individually.

The income statement reflects the Group’s share of the results of operations of the joint venture. Any change in other comprehensive income of the joint venture is presented as part of the Group’s other comprehensive income. In addition, when there has been a change recognized directly in the equity of the joint venture, the Group recognizes its share of the change in the statement of changes in equity. Unrealized gains and losses resulting from transactions between the Group and the joint venture are eliminated to the extent of the interest in the joint venture.

After application of the equity method, the Group determines whether it is necessary to recognize an impairment loss on its investment in its joint venture. At each reporting date, the Group determines whether there is objective evidence that the investment in the joint venture is impaired. If there is such evidence, the Group calculates the amount of impairment as the difference between the recoverable amount of the Group’s interest in the joint venture (higher of value in use and fair value less costs to sell), and then recognizes the loss as ‘Share of profit or loss of joint ventures’ in the income statement.

Property, plant & equipment

Property, plant and equipment is stated at cost, net of accumulated depreciation and/or accumulated impairment losses, if any. Such cost includes borrowing costs directly attributable to construction projects if the asset necessarily takes a substantial period of time to get ready for its intended use, it is probable that they will result in future economic benefits to the group and the cost can be measured reliably. When significant parts of property, plant and equipment are required to be replaced at intervals, the Group recognizes such parts as individual assets with specific useful lives and depreciates them accordingly. Likewise, when a major inspection is performed, its cost is recognized in the carrying amount of the property, plant and equipment as a replacement if the recognition criteria are satisfied. All other repair and maintenance costs are recognized in the income statement as incurred.

Depreciation is calculated on a straight-line basis over the estimated useful lives of the assets as follows:

- Buildings: 20-30 years
- Machinery: 5-12 years
- IT assets: 3-5 years
- Fixtures & Furniture: 10-15 years
- Vehicles: 2-4 years
- Leasehold Building Improvements: 10 years

Land is not depreciated.

An item of property, plant and equipment and any significant part initially recognized is derecognized upon disposal or when no future economic benefits are expected from its use or disposal. Any gain or loss arising on derecognition of the asset (calculated as the difference between the net disposal proceeds and the carrying amount of the asset) is included in the income statement when the asset is derecognized.

The assets' residual values, useful lives and methods of depreciation are reviewed at each financial year-end and adjusted prospectively, if appropriate.

Right-of-use assets and related liabilities

Right-of-use assets:

The Company recognizes right-of-use assets at the commencement date of the lease (i.e., the date the underlying asset is available for use). Right-of-use assets are measured at cost, less any accumulated depreciation and impairment losses, and adjusted for any remeasurement of lease liabilities. The cost of right-of-use assets includes the amount of lease liabilities recognized, initial direct costs incurred, and lease payments made at or before the commencement date less any lease incentives received. Unless the Company is reasonably certain to obtain ownership of the leased asset at the end of the lease term, the recognized right-of-use assets are depreciated on a straight-line basis over the shorter of its estimated useful life and the lease term:

1. Property leased Assets: Lease terms up to 10 years or useful life of 10 - 15 years when reasonable certain ownership will be obtained at the end of the lease
2. Leased machines: Lease terms up to 10 years or useful life of 5 - 10 years when reasonable certain ownership will be obtained at the end of the lease
3. Leased vehicles: Lease terms up to 4 years or useful life of 4 years when reasonable certain ownership will be obtained at the end of the lease

Right-of-use assets are subject to impairment.

Lease liabilities:

At the commencement date of the lease, the Company recognizes lease liabilities measured at the present value of lease payments to be made over the lease term. The lease payments include fixed payments (including in substance fixed payments) less any lease incentives receivable, variable lease payments that depend on an index or a rate, and amounts expected to be paid under residual value guarantees. The lease payments also include the exercise price of a purchase option reasonably certain to be exercised by the Company and payments of penalties for terminating a lease, if the lease term reflects the Company exercising the option to terminate. The variable lease payments that do not depend on an index or a rate are recognized as expense in the period on which the event or condition that triggers the payment occurs. In calculating the present value of lease payments, the Company uses the incremental borrowing rate at the lease commencement date if the interest rate implicit in the lease is not readily determinable. After the commencement date, the amount of lease liabilities is increased to reflect the accretion of interest and reduced for the lease payments made. In addition, the carrying amount of lease liabilities is remeasured if there is a modification, a change in the lease term, a change in the in-substance fixed lease payments or a change in the assessment to purchase the underlying asset.

Short-term leases and leases of low-value assets:

The Company applies the short-term lease recognition exemption to its short-term leases of machinery and equipment (i.e., those leases that have a lease term of 12 months or less from the commencement date and do not contain a purchase option) however this exemption is not applied for property leases. It also applies the lease of low-value assets recognition exemption to leases of office equipment that are considered of low value (i.e., below k€5). Lease payments on short-term leases and low-value assets are recognized in the income statement when incurred.

Borrowing costs

Borrowing costs directly attributable to the acquisition, construction or production of a qualified asset that necessarily takes a substantial period of time to prepare for its intended use or sale are capitalized as part of the cost of the respective assets. All other borrowing costs are expensed in the period they occur. Borrowing costs consist of interest and other costs that an entity incurs in connection with the borrowing of funds.

Research and development

Research and development includes the costs incurred by activities related to the development of software solutions (new products, updates and enhancements), guides and other products.

Development activities involve the application of research findings or other knowledge to a plan or a design of new or substantially improved (software) products before the start of the commercial use.

Development expenditures on an individual project are recognized as an intangible asset when the Group can demonstrate:

- the technical feasibility of completing the intangible asset so that the asset will be available for use or sale;
- its intention to complete and its ability to use or sell the asset;
- how the asset will generate future economic benefits;
- the availability of resources to complete the asset; and
- the ability to measure reliably the expenditure during development.

The Group has determined that the conditions for recognizing internally generated intangible assets from proprietary software, guide and other product development activities are not met until shortly before the products are available for sale, unless either (i) the Group has strong evidence that the above criteria are met and a detailed business plan is available showing the asset will on a reasonable basis generate future economic benefits or (ii) the development is done based upon specific request of the customer, it is highly likely that the Group will be able to market the product also to other parties than the customer, the development is subject to an agreement and the substance of the agreement is that the customer reimburses the Group for a significant portion, but not all, of the development expenses incurred. As such, development expenditures not satisfying the above criteria and expenditures on the research phase of internal projects are recognized in the consolidated income statement as incurred. Internally generated intangible assets from proprietary software are amortized over their useful lives, starting from the moment they are ready for use/available for sale.

Following initial recognition of the development expenditure as an asset, the asset is carried at cost less any accumulated amortisation and accumulated impairment losses. Amortisation of the asset begins when development is complete and the asset is available for use. It is amortised over the period of expected future benefit, which is determined on a project-by-project basis. Amortisation is recorded in cost of sales. During the period of development, the asset is tested for impairment at least annually or whenever there is an indication of impairment.

Intangible assets other than goodwill and capitalized development expenditures

Intangible assets comprise acquired technology and customer portfolio, patents and licenses and technology and customers acquired in connection with business combinations. Those intangible assets are measured on initial recognition at cost, except for the acquired technology and customers arising from business combinations, which are measured initially at fair value. Following initial recognition, intangible assets other than goodwill are carried at cost less any accumulated amortization and accumulated impairment losses, if any.

The useful life of the intangible assets is as follows:

- Software: 3 years;
- Patents and licenses: 10 years;
- Acquired customers and Technology: 5-20 years;
- Order Backlog: Period over which orders will be completed.

The intangible assets with finite lives are amortized over their useful economic life and assessed for impairment whenever there is an indication that the intangible asset may be impaired. The amortization period and the amortization method for an intangible asset with a finite useful life are reviewed at least at the end of each reporting period. The amortization expense on intangible assets with finite lives acquired through business combination is recognized in the consolidated income statement in the line “net other operating income”.

Impairment of goodwill and other non-financial assets (excluding inventories and deferred tax assets)

Impairment tests on goodwill and other intangible assets with indefinite useful economic lives, assets under construction or capitalized development expenses which are not amortized yet, are undertaken annually at the financial year end. Other non-financial assets and goodwill are subject to impairment tests whenever events or changes in circumstances indicate that their carrying amount may not be recoverable. Where the carrying value of an asset exceeds its recoverable amount (i.e. the higher of value in use and fair value less costs to sell), the asset is written down accordingly.

Where it is not possible to estimate the recoverable amount of an individual asset, the impairment test is carried out on the smallest Group of assets to which it belongs for which there are separately identifiable cash flows: its cash generating units (CGUs). Goodwill is allocated on initial recognition to each of the Group’s CGUs that are expected to benefit from the synergies of the combination giving rise to the goodwill.

The Group bases its impairment calculation on detailed budgets and forecast calculations, which are prepared separately for each of the Group's CGUs to which the individual assets are allocated. These budgets and forecast calculations generally cover a period of five years. For longer periods, a long-term growth rate is calculated and applied to future cash flows projected after the fifth year.

Impairment charges are included in profit or loss, except, where applicable, to the extent they reverse gains previously recognized in other comprehensive income. An impairment loss recognized for goodwill is not reversed.

Where goodwill forms part of a cash-generating unit and part of the operation within that unit is disposed of, the goodwill associated with the operation disposed of is included in the carrying amount of the operation when determining the gain or loss on disposal of the operation. Goodwill disposed of in this circumstance is measured based on the relative values of the operation disposed of and the portion of the cash-generating unit retained.

Inventories and Contracts in progress

Inventories are valued at the lower of cost and net realizable value. Costs incurred in bringing each product to its present location and condition are accounted for as follows:

- Raw materials: purchase cost on a first in, first out basis; and
- Finished goods and work in progress: cost of direct materials and labor and a proportion of manufacturing overheads based on the normal operating capacity, but excluding borrowing costs.

Net realizable value is the estimated selling price in the ordinary course of business, less estimated costs of completion and the estimated costs necessary to make the sale.

A write-off of inventories is estimated based on an ageing or rotation analysis.

Work in progress relates to production of inventory for which a customer has not yet been secured, while contracts in progress are contract assets that relate to production for specific customers in performance of a signed contract. We refer also to the accounting policy on revenue recognition.

Financial assets

Financial assets are classified at initial recognition, and subsequently measured at amortised cost, fair value through other comprehensive income (OCI), and fair value through profit or loss.

The classification of financial assets at initial recognition depends on the financial asset's contractual cash flow characteristics and the Group's business model for managing them. With the exception of trade receivables that do not contain a significant financing component or for which the Group has applied the practical expedient, the Group initially measures a financial asset at its fair value plus transaction costs, in the case of a financial asset not at fair value through profit or loss or OCI. Trade receivables that do not contain a significant financing component or for which the Group has applied the practical expedient are measured at the transaction price.

For purposes of subsequent measurement, financial assets are classified in four categories:

- Financial assets at amortised cost;
- Financial assets at fair value through OCI with recycling of cumulative gains and losses (debt instruments);
- Financial assets designated at fair value through OCI with no recycling of cumulative gains and losses upon derecognition (equity instruments); and
- Financial assets at fair value through profit or loss.

Financial assets measured at amortized cost

This category is the most relevant to the Group. The Group measures financial assets at amortised cost if both of the following conditions are met:

- The financial asset is held within a business model with the objective to hold financial assets in order to collect contractual cash flows; and
- The contractual terms of the financial asset give rise on specified dates to cash flows that are solely payments of principal and interest on the principal amount outstanding.

Financial assets, trade and other receivables, cash and cash equivalents at amortised cost are subsequently measured using the effective interest rate (EIR) method and are subject to impairment. Gains and losses are recognised in profit or loss when the asset is derecognised, modified or impaired.

Financial assets at fair value through OCI with recycling of cumulative gains and losses (debt instruments)

The Group currently does not have financial assets at fair value through OCI with recycling of cumulative gains and losses.

Financial assets designated at fair value through OCI with no recycling of cumulative gains and losses upon derecognition (equity instruments)

The Group has irrevocably elected at initial recognition to classify the minority interest in the non-listed equity investment Essentium Inc, as disclosed in Note 10 and Note 20, as a financial asset designated at fair value through OCI as this measurement is most representative of the business model for this asset. Gain and losses on these financial assets are never recycled to profit and loss. Dividends are recognised as other operational income in the consolidated income statement when the right of payment has been established, except when the Group benefits from such proceeds as a recovery of part of the cost of the financial asset, in which case, such gains are recorded in OCI. Equity instruments designated at fair value through OCI are not subject to impairment assessment.

Financial assets measured at fair value through profit or loss

The Group does have the following financial assets classified as financial assets at fair value through profit or loss:

- a call option on non-controlling interests in RapidFit+ as disclosed in Note 13;
- derivatives,
- a convertible loan granted to a company as disclosed in Note 10;.

Those financial assets are carried in the statement of financial position at fair value with changes recognized in the income statement in the lines financial income/expense.

Derecognition

A financial asset is derecognized when:

- The rights to receive cash flows from the asset have expired, or
- The Group has transferred its rights to receive cash flows from the assets.

Impairment of financial assets

Further disclosures relating to impairment of financial assets are also provided in Note 3 Significant accounting judgments, estimates and assumptions.

The Group recognises an allowance for expected credit losses (ECLs) for all debt instruments not held at fair value through profit or loss.

For trade receivables and contract assets, the Group applies a simplified approach in calculating ECLs. A loss allowance is recognized at each reporting date based on lifetime ECLs. The Group established a provision matrix that is based on its historical loss experience, adjusted for forward-looking factors specific to the debtors and the economic environment.

For all other receivables, ECLs are based on the difference between the contractual cash flows due in accordance with the contract and all the cash flows that the Group expects to receive, discounted at an approximation of the original effective interest rate. The expected cash flows will include cash flows from the sale of collateral held or other credit enhancements that are integral to the contractual terms. ECLs are recognised in two stages. For credit exposures for which there has not been a significant increase in credit risk since initial recognition, ECLs are provided for credit losses that result from default events that are possible within the next 12-months (a 12-month ECL). For those credit exposures for which there has been a significant increase in credit risk since initial recognition, a loss allowance is required for credit losses expected over the remaining life of the exposure, irrespective of the timing of the default (a lifetime ECL).

Financial liabilities

All financial liabilities are recognised initially at fair value and, in the case of loans and borrowings and payables, net of directly attributable transaction costs.

The Group’s financial liabilities include trade and other payables, loans and borrowings including bank overdrafts and derivative financial instruments including written put options over non-controlling interests.

Financial liabilities at amortized cost

The trade and other payables, and loans and borrowings are classified as financial liabilities at amortized cost.

Those financial liabilities are measured at amortized cost using the effective interest rate method. Gains and losses are recognized in the income statement when the liabilities are derecognized as well as through the effective interest rate method amortization process.

Financial liabilities at fair value through profit and loss

The derivative financial instruments are classified as financial liabilities at fair value through profit and loss except for the written put options on non-controlling interests which is disclosed below.

Written put options on non-controlling interest

The Group recognizes a financial liability for the written put options on non-controlling interest. The written put options have a variable redemption price based on a formula as specified in the contract (see Note 13).

- The financial liability is initially recognized at fair value and the fair value is reclassified from non-controlling interest and, for any amount higher than the non-controlling interest, from consolidated reserves.
- The fair value is determined as the present value of the redemption amount.
- Any change in the fair value as a result of a change in the estimated redemption price is recognized directly in consolidated reserves. Any unwinding effect of the present value of the redemption price is recognized directly in profit and loss (financial cost).
- No share of profit is allocated to the non-controlling interest.
- Upon exercise of the written put option, the carrying value will be offset with the cash payment received. When the written put option is not exercised, the carrying value of the financial liability is derecognized against non-controlling interest with the difference going to consolidated reserves.

Compound financial instruments

The Group has issued convertible debt which is accounted for as a compound financial instrument. For those instruments, the Group determines the carrying amount of the liability component by measuring the fair value of a similar liability (including any embedded non-equity derivative features) that does not have an associated equity component. The carrying amount of the equity instrument is then determined by deducting the fair value of the financial liability from the fair value of the compound financial instrument as a whole.

Derecognition

A financial liability is derecognized when the obligation under the liability is discharged or cancelled or expires.

Offsetting

Financial assets and financial liabilities are offset and the net amount is reported in the consolidated statement of financial position if there is a currently enforceable legal right to offset the recognized amounts and there is an intention to settle on a net basis, or to realize the assets and settle the liabilities simultaneously.

Share capital

Financial instruments issued by the Group are classified as equity only to the extent that they do not meet the definition of a financial liability or financial asset. The Group’s ordinary shares are classified as equity instruments.

Provisions

Provisions are recognized when the Group has a present obligation (legal or constructive) as a result of a past event, it is probable that an outflow of resources embodying economic benefits will be required to settle the obligation and a reliable estimate can be made of the amount of the obligation.

Pensions benefits

The Group has a defined contribution obligation where the Group pays contributions based on salaries to an insurance company, in accordance with the laws and agreements in each country.

The Belgian defined contribution pension plans are by law with variable minimum returns based on the Belgian government bonds, with a minimum of 1.75% and a maximum of 3.75%, effective for contributions paid as from 2016. For contribution paid until 2015, the minimum guaranteed return is 3.25% on employer contributions and 3.75% on employee contributions.

These plans qualify as defined benefit plans. Contributions are recognized as expenses for the period in which employees perform the corresponding services. Outstanding payments at the end of the period are shown as other current liabilities.

Those plans are accounted for as a defined benefit plan however are considered not material.

Share based payments

Directors and employees (including senior executives) of the Group receive remuneration in the form of share-based payments, whereby employees render services as consideration for equity instruments (equity-settled transactions). The Group currently has only warrants and share-appreciation rights as share-based payments.

Equity-settled transactions

Equity-settled share-based payments to employees and others providing similar services are measured, indirectly, at the fair value of the equity instruments granted. The cost of equity-settled transactions is recognized, together with a corresponding increase in other capital reserves in equity,

over the period in which the performance and/or service conditions are fulfilled. The cumulative expense recognized for equity-settled transactions at each reporting date until the vesting date reflects the extent to which the vesting period has expired and the Group's best estimate of the number of equity instruments that will ultimately vest. The income statement expense or credit for a period represents the movement in cumulative expense recognized at the beginning and end of that period and is recognized as employee benefits expense.

The Group does currently only have equity-settled share-based payments that have service-based vesting conditions and no instruments with market vesting conditions.

No expense is recognized for awards that do not ultimately vest.

When the terms of an equity-settled award are modified, the minimum expense recognized is the expense as if the terms had not been modified, if the original terms of the award are met. An additional expense is recognized for any modification that increases the total fair value of the share-based payment transaction, or is otherwise beneficial to the employee as measured at the date of modification.

When an equity-settled award is cancelled, it is treated as if it vested on the date of cancellation, and any expense not yet recognized for the award is recognized immediately. This includes any award where non-vesting conditions within the control of either the entity or the employee are not met. However, if a new award is substituted for the cancelled award, and designated as a replacement award on the date that it is granted, the cancelled and new awards are treated as if they were a modification of the original award, as described in the previous paragraph.

Cash-settled transactions

The Group has cash-settled share-based payment transaction for certain employees in certain countries due to legal requirements (in the form of share-appreciation rights). The cost of cash-settled transactions is measured initially at fair value at the grant date. This fair value is expensed over the period until the vesting date with recognition of a corresponding liability. The liability is remeasured to fair value at each reporting date up to, and including the settlement date, with changes in fair value recognized in employee benefits expense.

Revenue from contracts with customers

The Group's revenue, which is presented net of sales taxes, is primarily generated by the sale of our software and 3D printed products and services. Software revenue is comprised of perpetual and periodic licenses, maintenance revenue and software development service fees. Perpetual license holders may opt to take an annual maintenance contract, which leads to annual fees. Periodic licenses entitle the customer to maintenance, support and product updates without additional charge. Revenue from prototypes and end products involving 3D printing technology is derived from our network of production centers and may include support and services such as pre-production collaboration prior to the actual production.

The Group sells its products and software through its direct sales force and through authorized distributors.

Software license revenue, maintenance and/or software development service fees may be bundled in one arrangement, or may be sold separately.

The Group recognizes revenue for goods including software based on the five-step model as a result of the application of IFRS 15 since January 1, 2018.

- Identify the contract(s) with a customer;
- Identify the performance obligations in the contract;
- Determine the transaction price;
- Allocate the transaction price to the performance obligations in the contract; and
- Recognize revenue when (or as) the entity satisfies a performance obligation.

Revenue from contracts with customers is recognized when control of the goods or services are transferred to the customer at an amount that reflects the consideration to which the Group is expected to be entitled in exchange from those goods and services.

If the consideration in a contract includes a variable amount, the Group estimates the amount of consideration to which it will be entitled in exchange for transferring the goods to the customer. The variable consideration is estimated at contract inception and constrained until it is highly probable that a significant revenue reversal in the amount of cumulative revenue recognised will not occur when the associated uncertainty with the variable consideration is subsequently resolved. Variable consideration is mainly related to quantities sold, volume (step-based) rebates and development time spend.

Prototypes and end products involving 3D printing technology

The Group recognizes revenue on the sale of goods to the customer or distributor at a point in time when control of the asset is transferred, generally upon shipment or delivery taking into account the shipment terms (usually Ex-works or FOB Time of Shipment Incoterms (International Commercial Terms)).

Perpetual licensed software

The sale and/or license of software products is deemed to have occurred at a point in time, i.e. when a customer either has taken possession of or has the ability to take immediate possession of the software and the software key.

Perpetual software licenses can include one year maintenance and support services as a separate performance obligation. The Company sells these maintenance services also on a stand-alone basis and is therefore capable of determining their stand-alone selling price. On this basis, the amount of the embedded maintenance is separated from the fee for the perpetual license and is recognized ratably over the period to which they relate.

Time-based licensed software

The time-based license agreements include the use of a software license for a fixed term and maintenance and support services during the same period. The Company does not sell time-based licenses without maintenance and support services and therefore revenues is satisfied over time for the entire arrangements and is recognized ratably over the term.

Maintenance and support services

Maintenance and support services are satisfied over time and as such, the Group recognizes this revenue ratably on a straight-line basis over the term that the maintenance service is provided. In general, maintenance services are not automatically renewed.

A maintenance and support contract may include a reinstatement for previous years when the customer did not have a maintenance and support contract previously. Revenue from reinstatements are recognized immediately when the maintenance and support services commence.

Software development services (SDS)

SDS include customized development of software components for customers. Revenue from SDS agreements when distinct from other performance obligations is satisfied over time. Revenue is then recognized either on time and material basis or on the stage of completion of each service contract and when the stage of completion can be measured reliably.

The Company determines the percentage-of-completion by comparing labor hours incurred to-date to the estimated total labor hours required to complete the project. The Company considers labor hours to be the most reliable available measure of progress on these projects. Adjustments to the Company's estimates of the time to completion are made when facts resulting in a change become known. When the estimate indicates that a loss will be incurred, such loss is recognized immediately.

Contracts with multiple performance obligations

The Group has entered into a number contracts with multiple performance obligations, such as when selling perpetual licenses that may include maintenance and support (included in price of perpetual licenses) and time-based licenses (that include embedded maintenance and support, both of which may be sold with software development services, training, and other product sales). In some cases, the Group delivers software development services bundled with the sale of the software.

The Group evaluates whether each performance obligation is distinct from each other, i.e. the customer can benefit from the good or service on its own, or with readily available resources. Certain development services significantly modify and/or enhance the software license and as such are not considered distinct and combined with the software license.

In those contracts, whether sold to end-customers or to collaboration partners, the Group uses either price list, historical pricing information or management's best estimate of selling prices (e.g. also using a cost-plus method) to determine the stand-alone selling price for each distinct performance obligation, including software and software-related services such as maintenance and support. In general, elements in such arrangements are also sold on a stand-alone basis and stand-alone selling prices are readily available.

Revenue is allocated to each distinct performance obligation ("PO") based on the relative percentage of the stand-alone selling price for each PO compared to the total of stand-alone selling prices for all PO over the total transaction price and is recognized when the revenue recognition criteria described above are met.

Contracts with collaboration partners in the medical segment also include multiple elements such as software, maintenance and support services, training, software development services, 3D printed products and royalties. Revenue from those contracts is determined and recognized consistent with other multiple element arrangements.

For certain contracts with collaboration partners, the Company also receives up-front fees, paid by customers for certain exclusivity rights granted only on previously acquired perpetual software licenses, which may be bundled with transfer of title, rights and ownership of certain software products and maintenance and support services. In case the up-front fees do not relate to already delivered good or services, the Group include the up-front fees in the total transaction price which is then allocated to all the distinct performance obligations. Other contracts with collaboration partners include prepaid fees to purchase a maximum number of "Plan Only" cases during a 12-month period. In this case, the prepaid fees are recognized over the period of 12 months based on the expected number of "Plan Only" cases that will be purchased.

Contract assets

A contract asset is the right to consideration in exchange for goods or services transferred to the customer. If the Group performs by transferring goods or services to a customer before the customer pays consideration or before payment is due, a contract asset is recognised for the earned consideration that is conditional. Contract assets are only contracts in progress that are disclosed with the line inventory and contracts in progress in the statement of financial position. We refer to our accounting policies regarding Inventories and Contracts in Progress

Contract liabilities

A contract liability is the obligation to transfer goods or services to a customer for which the Group has received consideration (or an amount of consideration is due) from the customer. If a customer pays consideration before the Group transfers goods or services to the customer, a contract liability is recognised when the payment is made or the payment is due (whichever is earlier). Contract liabilities are recognised as revenue when the Group performs under the contract. Contract liabilities are presented as deferred income in the statement of financial position.

Contract costs

The Group does not have significant costs to obtain contracts and those costs are expensed as incurred.

The Group may have costs incurred in fulfilling contracts that are accounted for as intangible assets. When those costs are not in scope of another standards, these costs are accounted for under contracts in progress (see contract assets). For certain contracts, the Group may have significant software development expenses that are not considered a “distinct performance obligation” which are accounted for as an intangible assets. The Group evaluates whether those costs meet the recognition criteria for an intangible assets and when criteria are not met, expenses those costs as incurred.

Government grants

Government grants are recognized when there is reasonable assurance that the grant will be received and all attached conditions will be complied with. When the grant relates to development costs or another expense, it is recognized as income over the grant period necessary to match the income on a systematic basis to the costs that it is intended to compensate. When the grant relates to the construction of buildings, it is recognized as income over the depreciation period of the related building.

Such grants have been received from the federal and regional governments and from the European Union in the forms of grants linked to certain of its research and development programs, reduced payroll taxes and the financing of the construction of an office building in Leuven (Belgium) and in Freiberg (Germany).

Where retention of a government grant related to assets or to income, is dependent on the Company satisfying certain criteria, it is initially recognized as deferred income. When the criteria for retention have been satisfied, the deferred income balance is released to other operating income in the consolidated income statement on a systematic basis over the periods in which the entity recognizes as expenses the related costs for which the grants are intended to compensate.

Any government grants recognized as income do not have any unfulfilled conditions or other contingencies attached to them, as otherwise we would not be recognizing income for such.

Other financial income and expenses

Other financial income and expenses include mainly foreign currency gains or losses on financial transactions and bank related expenses.

Taxes

Current income tax

Income tax assets and liabilities for the current period are measured at the amount expected to be recovered from or paid to the taxation authorities. The tax rates and tax laws used to compute the amount are those that are enacted or substantively enacted, at the reporting date.

Current income tax relating to items that are recognized directly in equity is recognized in equity and not in the income statement. Management periodically evaluates positions taken in the tax returns with respect to situations in which applicable tax regulations are subject to interpretation and establishes provisions where appropriate.

Deferred tax

Deferred tax is calculated using the liability method on temporary differences at the reporting date between the tax bases of assets and liabilities and their carrying amounts for financial reporting purposes.

Deferred tax liabilities are recognized for all taxable temporary differences. Deferred tax assets are recognized for all deductible temporary differences, carry forward of unused tax credits and unused tax losses, to the extent that it is probable that taxable profit will be available against which the deductible temporary differences, and the carry forward of unused tax credits and unused tax losses can be utilized.

The carrying amount of deferred tax assets is reviewed at each reporting date and reduced to the extent that it is no longer probable that sufficient taxable profit will be available to allow all or part of the deferred tax asset to be utilized. Unrecognized deferred tax assets are reassessed at each reporting date and are recognized to the extent that it has become probable that future taxable profits will allow the deferred tax asset to be recovered.

Deferred tax assets and liabilities are measured at the tax rates that are expected to apply in the year when the asset is realized or the liability is settled, based on tax rates (and tax laws) that have been enacted or substantively enacted at the reporting date.

Deferred tax assets and deferred tax liabilities are offset, if a legally enforceable right exists to set off current tax assets against current income tax liabilities and the deferred taxes relate to the same taxable entity and the same taxation authority.

Sales tax

Revenue, expenses and assets are recognized net of the amount of VAT, except:

- Where the sales tax incurred on a purchase of assets or services is not recoverable from the taxation authority, in which case the sales tax is recognized as part of the cost of acquisition of the asset or as part of the expense item as applicable; and
- Receivables and payables that are stated with the amount of sales tax included.

The net amount of sales tax recoverable from, or payable to, the taxation authority is included as part of receivables or payables in the statement of financial position.

New and revised standards not yet adopted

The standards, interpretations and amendments issued by the IASB and relevant for the Group, but not yet effective are not expected to have a material impact on the Group’s future consolidated financial statements:

- Amendments to IAS 1 and IAS 8 Definition of Material (applicable for annual periods beginning on or after January 1, 2020)
- Amendments to IAS 1 Presentation of Financial Statements: Classification of Liabilities as Current or Non-current (applicable for annual periods beginning on or after January 1, 2022)
- Amendments to IFRS 3 Business Combinations (applicable for annual periods beginning on or after January 1, 2020)
- Amendments to IFRS 9, IAS 39 and IFRS 7 Interest Rate Benchmark Reform (applicable for annual periods beginning on or after January 1, 2020)
- Amendments to references to the Conceptual Framework in IFRS standards (applicable for annual periods beginning on or after January 1, 2020)
- IFRS 17 Insurance Contracts (applicable for annual periods beginning on or after January 1, 2021)

Significant accounting judgments, estimates and assumptions

The preparation of the Group's consolidated financial statements requires management to make judgments, estimates and assumptions that affect the reported amounts of revenue, expenses, assets and liabilities, and the accompanying disclosures. Uncertainty about these assumptions and estimates could result in outcomes that require a material adjustment to the carrying amount of assets or liabilities for future periods.

On an ongoing basis, the Group evaluates its estimates, assumptions and judgments, including those related to revenue recognition, development expenses, share-based payment transactions, income taxes, impairment of goodwill, intangible assets and property, plant & equipment and business combinations, provisions for expected credit losses, convertible loans, useful lifes of certain assets and IFRS 16.

The Group based its assumptions and estimates on parameters available when the consolidated financial statements were prepared. Existing circumstances and assumptions about future developments, however, may change due to market changes or circumstances arising beyond the control of the Group. Such changes are reflected in the assumptions when they occur.

Revenue recognition

Our revenue recognition policies require management to make significant estimates. Management analyzes various factors, including a review of specific transactions, historical experience, creditworthiness of customers and current market and economic conditions. Changes in judgments based upon these factors could impact the timing and amount of revenue and cost recognized and thus affects our results of operations and financial condition. The significant estimates and judgments relate to:

- The assessment whether a performance obligation is distinct in a bundled sales transactions;
- Estimates of the variable considerations and the assessment of the revenue constraint limitation;
- Estimates of the stand-alone selling prices for each distinct performance obligation; and
- The stage of completion of our customized development of software components for customers when revenue is satisfied over time.

The Group is making significant judgments when performing the assessment of whether a performance obligation is distinct from the other performance obligations in a contract, i.e. whether the good or service has a benefit for the customer in its own or together with readily available resource and/or whether the good or service is highly interrelated or a significant input with another good or service delivered, or whether it significantly modifies or customizes another good or service. The relevant judgments include the following:

- Whether the software license is distinct from the 3D printed guides — in most cases with contracts with collabroration partners in the Materialise Medical segment, the software licenses is combined with the manufacturing of the 3D printed guides as the software license has no benefit for the customer without the manufacturing services. Note that the Group is implementing a new feature "Plan Only" which where the collaboration partners could benefit from the software license on its own.
- Whether the development services are distinct from other performance obligations — in most cases, those performance obligations are distinct however for one contract with a collaboration partner in the Materialise Medical segment, the software license is combined with the license and the 3D printed guides as one "distinct" performance obligation

For the stand-alone selling prices, the Group is using prices from price list or historical prices for similar transactions. However, in certain cases, such information is not immediately available and in such cases, the Group estimates the stand-alone selling price by using a cost-plus or another estimate. In addition, for certain performance obligations such as development services, stand-alone selling prices also require an estimate of the time to complete the development.

Certain contracts include estimates of variable considerations within the transaction price and assessing the revenue constraint, such as:

- Quantities/volume sold for fixed prices in relation to, but not limited to, manufacturing of 3D printed products, software licenses sold, maintenance renewals;
- Contractual prices may be different based on volume purchased during a certain period;
- FTE spend for development or other services billed on a time and material basis; and
- Volume rebates.

The method applied to estimate the variable consideration is dependent on the number of possible scenarios and the probability of each scenario. In case there are many possible scenarios with a wide range of probabilities (each less than 50%), the Group will use the expected value method while the most likely method is used when there is a scenario with a higher probability (more than 50%).

Variable consideration is not constrainted when, based on historical experience, high reliable business forecast and/or the timeframe of the estimates, the Group determines that there is a high probability that this will not result in a future revenue reversal.

We determine the stage of completion for development contracts satisfied over time by comparing labor hours incurred to-date to the estimated total labor hours required to complete the project. We consider labor hours to be the most reliable, available measure of progress on these projects. Adjustments to estimates to complete are made in the periods in which facts resulting in a change become known. When the estimate indicates that a loss will be incurred, such loss is recorded in the period identified. Significant judgments and estimates are involved in determining the percent complete of each contract. Different assumptions could yield materially different results.

Development expenses

Under IAS 38, internally generated intangible assets from the development phase are recognized if certain conditions are met. These conditions include the technical feasibility, intention to complete, the ability to use or sell the asset under development, and the demonstration of how the asset will generate probable future economic benefits. The cost of a recognized internally generated intangible asset comprises all directly attributable cost necessary to make the asset capable of being used as intended by management. In contrast, all expenditures arising from the research phase are expensed as incurred.

Determining whether internally generated intangible assets from development are to be recognized as intangible assets requires significant judgment, particularly in determining whether the activities are considered research activities or development activities, whether the product enhancement is substantial, whether the completion of the asset is technical feasible considering a company-specific approach, the probability of future economic benefits from the sale or use including an assessment whether FDA approval will be obtained.

The Group has determined that the conditions for recognizing internally generated intangible assets from proprietary software, guide and other product development activities are not met until shortly before the products are available for sale, unless either (i) the Group has strong evidence that the above criteria are met and a detailed business plan is available showing the asset will on a reasonable basis generate future economic benefits or (ii) the development is done based upon specific request of the customer, the Group has the intention to market the product also to other parties than the customer, the development is subject to an agreement and the substance of the agreement is that the customer reimburses the Group for a significant portion of the development expenses incurred. As such, development expenditures not satisfying the above criteria and expenditures on the research phase of internal projects are recognized in the consolidated income statement as incurred. This assessment is monitored by the Group on a regular basis.

We have determined that the criteria for internally generated intangible assets were met for two projects in 2018: (1) the software development of a new planner for hospitals within the cardiovascular field and (2) the process to obtain FDA and E.U. approval for a 3D printed tracheal splint within the Materialise Medical segment. The first development is finished and amortization has started in 2019. For the latter, we determined that there is a low risk that FDA approval will not be obtained although clinical trials have to be started and commercialization is not expected before 2022. This assessment was made by management based on several factors including the developed product itself, the exclusive patent rights obtained on the developed product, the successful application of the product on a number of patients as part of the emergency exception use obtained from the FDA and the continued discussions to speed up the trial duration and commercialization. The product is also expected to receive E.U. approval for commercialization by the end of 2020. The amount capitalized for the tracheal splint amounted to K€1,376 as of December 31, 2019 the amount capitalized for the software development of a new planner for hospitals amounted to K€461 as per December 31, 2019.

Share-based payment transactions

The Group measures the cost of equity-settled transactions with employees by reference to the fair value of the equity instruments at the date at which they are granted and measured the cost of cash-settled transactions by reference to the fair value of the equity instrument at the date of reporting. The Group has applied the Black-Scholes valuation model to estimate fair value. Using this model requires management to make assumptions with regards to volatility and expected life of the equity instruments. The assumptions used for estimating fair value for share-based payment transactions are disclosed in Note 14 and are estimated as follows:

- Volatility is estimated based on the average annualized volatility of the Group;
- Estimated life of the warrant is estimated to be until the first exercise period which is typically the month after their vesting;
- Fair value of the shares is determined based on the share price of the Group on Nasdaq at the date of issuance. For the grants prior to the initial public offering, the fair value of the shares was estimated based on a discounted cash flow model with 3-year cash flow projections and a multiple of EBITDA determined based on a number quoted peers in the 3D printing industry; and
- The dividend return is estimated by reference to the historical dividend payment of the Group. Currently, this is estimated to be zero as no dividends have been paid since inception.

Income taxes

Deferred tax assets are recognized for unused tax losses to the extent that it is probable that taxable profit will be available against which the losses can be utilized. Significant management judgment is required to determine the amount of deferred tax assets that can be recognized, based upon the likely timing and the level of future taxable profits together with future tax planning strategies.

As at December 31, 2019, the Group had K€37,440 (2018: K€25,285; 2017: K€11,948) of tax losses carry forward and other tax credits such as investment tax credits and notional interest deduction, of which K€25,172 related to Materialise NV (2018: K€15,592; 2017: K€4,581). These losses relate to the parent and subsidiaries that have a history of losses, in countries where these losses do not expire (except for the notional interest deduction 2019: K€0; 2018: K€0; 2017: K€315) and may not be used to offset taxable income elsewhere in the Group.

With respect to the unused tax losses of Materialise NV, no deferred tax assets have been recognized in 2019, 2018 and 2017, given that in view of the Belgian Patent Income Deduction and Innovation Income Deduction there is an uncertainty to which extent these tax losses will be used in future years. As from July 1, 2016, the new Innovation Income Deduction replaces the former Patent Income Deduction. Under the grandfathering rule the Patent Income Deduction system can still be applied until June 30, 2021. The Belgian Patent Income Deduction allows companies to deduct 80% of the qualifying gross patent income from the taxable basis. Under the Innovation Income Deduction system, companies can deduct up to 85% of their net innovation income from the taxable basis. Based on its analysis in 2019 the Company has assessed that no deferred tax asset should be accounted for with respect to its unused tax losses in Belgium.

With respect to the unused tax losses of the other entities, no deferred tax assets have been recognized in 2019 (2018: K€0; 2017: K€0). The Group has not recognized deferred tax assets on unused tax losses totaling K€10,737 in 2019 (2018: K€11,906; 2017: K€7,904) given that it is not probable that sufficient positive taxable base will be available in the foreseeable future against which these tax losses can be utilized.

If the Group was able to recognize all unrecognized deferred tax assets, net profit would have increased by K€6,855 in 2019 during which K€23,141 of tax losses were utilized. Further details on taxes are disclosed in Note 22.10.

Impairment of goodwill, intangible assets and property, plant & equipment and determination of the cash-generating-unit.

The Group has goodwill for a total amount of K€20,174 as at December 31, 2019 (2018: K€17,491; 2017: K€17,552) which has been subject to an impairment test. The goodwill is tested for impairment based on a discounted cash flow model with cash flows for the next five years derived from the budget and a residual value considering a perpetual growth rate. The value in use is sensitive to the discount rate used for the DCF model as well as the expected future cash-inflows and the growth rate used for extrapolation purposes.

Also, as part of the impairment analysis, the Group need to determine the different CGUs at the lowest non-aggregated level which include judgments about application of the criteria to determine the CGUs based on the facts and circumstances how the entities and business units within the CGU and within the Group operate and are monitored. The level of CGU may also have an impact on certain assumptions to make with regard to transfer pricing.

The key assumptions used to determine the value in use for the different CGUs are disclosed and further explained in Note 5.

The Group capitalized development expenses in 2019 for a total amount of K€1,328 which are not in the condition as intended by management and as such not amortized. Those development expenses have been subject to an impairment test based on a discounted cash flow model with cash flows derived from the latest business plan. The value in use is sensitive to the discount rate used for the DCF model as well as the expected commercialization date for the products and the expected future cash inflows after commercialization. We refer to the section on development expenses above for further explanations.

The Group is in progress of building or refurbishing a number of machines that allow to use recycled powder and reduce the scrap rate, which will bring significant benefits in the production for the Group. The project aims a completion date in 2020. The total carrying value of these assets under construction is K€1,804 as at December 31, 2019. Those assets under construction have been subject to an impairment test based on a discounted cash flow model using five years of projected cash flows. The present value is sensitive to the discount rate (10.0% applied) used for the DCF model, when the assets are in the state intended by management to use in the production as well as the expected future net cash inflows (revenue minus production costs). We refer to Note 7.

When events or changes in circumstances indicate that the carrying amount of the intangible assets and property, plant and equipment may not be recoverable, we estimate the value in use for the individual assets, or when not possible, at the level of CGUs to which the individual assets belong.

No impairment charges have been recorded during 2019 (2018: K€0; 2017: K€0).

Business combinations

We determine and allocate the purchase price of an acquired business to the assets acquired and liabilities assumed as of the business combination date. Business combinations are discussed further in Note 4. The purchase price allocation process requires us to use significant estimates and assumptions, including

- estimated fair value of the acquired intangible assets;
- estimated fair value of property, plant and equipment; and
- estimated fair value of the contingent consideration.

The contingent consideration as included in the financial statements is recorded at fair value at the date of acquisition and is reviewed on a regular basis. The fair value of the contingent consideration is based on risk-adjusted future cash flows of different scenarios discounted using appropriate interest rates. The structure of the possible scenarios and the probability assigned to each one of them is reassessed by management at every reporting period and requires judgement from management about the outcome and probability of the different scenarios as well as the evolution of the variables.

While we are using our best estimates and assumptions as part of the purchase price allocation process to accurately value assets acquired and liabilities assumed at the date of acquisition, our estimates and assumptions are inherently uncertain and subject to refinement. Examples of critical estimates in valuing certain of the intangible assets we have acquired or may acquire in the future include but are not limited to:

- future expected cash flows from customer contracts and relationships, software license sales and maintenance agreements;
- the fair value of the plant and equipment
- the fair value of the deferred revenue; and
- discount rates.

Provision for expected credit losses of trade receivables and contract assets

The Group uses a provision matrix to calculate ECLs for trade receivables and contract assets. The provision rates are based on days past due for groupings of various customer segments that have similar loss patterns (i.e., by legal entity).

The provision matrix is initially based on the Group's historical observed default rates. The Group will calibrate the matrix to adjust the historical credit loss experience with forward-looking information. For instance, if forecast economic conditions (i.e., gross domestic product) are expected to deteriorate over the next year which can lead to an increased number of defaults, the historical default rates are adjusted. At every reporting date, the historical observed default rates are updated and changes in the forward-looking estimates are analyzed.

The assessment of the correlation between historical observed default rates, forecast economic conditions and ECLs is a significant estimate. The amount of ECLs is sensitive to changes in circumstances and of forecast economic conditions. The Group's historical credit loss experience and forecast of economic conditions may also not be representative of customer's actual default in the future.

Convertible loan granted to Fluidda

The Group accounts for the convertible loan granted to Fluidda in January 2019, with a notional amount of K€2,500, at fair value. The carrying value of the convertible loan amounts to K€2,750 at December 31, 2019. Fluidda is a private start-up company which delivers CRO services for drug development and develops medical devices which require EMA/FDA approvals. Fluidda is currently loss-making. In determining the fair value, the Group consider different contractual parameters such as the repayment and conversion scenario's and dates. In addition, the Group needs to make significant estimates such as (i) the discount rate, (ii) the probabilities for each repayment and conversion scenario, (iii) the amount of a qualified capital increase that will determine the conversion factor and (iv) the timing for each repayment and conversion scenario. The convertible loan has a duration of 7 years with a 10% annual interest rate which are capitalized. The Group has applied a discount factor of 13.88% that is based on the estimated WACC of Fluidda reflecting the uncertainty in relation to the success of the company and the applied estimates by the Group.

At December 31, 2019, the Group determined that the fair value is not significantly different than its carrying value. Changes in the significant assumptions may lead to a significant increase/decrease in the fair value of the convertible loan. A increase/decrease in the applied discount rate by 2% would lead to a change in fair value by K€-267 / K€298.

Changes in useful life for certain assets

We review the useful life of our definite lived intangible assets and property, plant and equipment on an annual basis considering the current facts and circumstances available. This review has resulted in 2019 in a re-assessement of the useful life for certain specific assets in the categories buildings, fixtures, vehicles and machinery. We refer to Note 7 for the impact of the change in useful lifes during the year 2019.

Leases IFRS 16 – estimating the discount rate and probability of exercisting extension options/termination options and purchase options

The Group can not always determine the interest rate implicit in the lease contract and therefore, the Group has to estimate the incremental borrowing rate to measure certain lease liabilities such as buildings. The Group uses for buildings the property yield as reference to determine the incremental borrowing rate. For other assets, the Group generally uses the interest rate implicit in the lease contract or applies the incremental borrowing rate for a portfolio of similar assets. The incremental borrowing rate reflects what the Group "would have to pay", which requires estimation when no observable rates are available or when they need to be adjusted to reflect the terms and conditions of the lease.

In addition, certain lease contracts may have extension options, termination options in case of property leases and/or purchase options in case of leases. The Group estimates whether it is reasonable certain or not, whether those options will be exercised or not, which impact the lease term in case of extension options and termination options and the period over which the lease assets are depreciated in case of purchase options.

4 Business Combinations

Acquisitions in 2019

Engimplan

The Group executed a share purchase agreement dated August 6, 2019 and acquired 40% of the shares and voting interest of Engimplan Engenharia de Implante Indústria e Comércio Ltda (referred to as "Engimplan") for a total purchase consideration in cash of K€6,647.

As part of this transaction, the Group increased its shareholding in Engimplan to 75% with a capital increase of K€5,750 in cash in Engimplan.

The Brazilian-based company is specialist in manufacturing of orthopaedic and cranio-maxillofacial (CMF) implants and instruments. Engimplan will be part of the Medical segment.

The preliminary fair value of the identifiable assets and liabilities at the date of acquisition were:

in 000€	Carrying value at acquisition date	Fair value adjustments	Fair value at acquisition date
Assets			
Software	214	—	214
Customer relations	—	2,530	2,530
Trademarks	—	556	556
Other intangible assets	9	—	9
Property, plant & equipment	2,268	101	2,369
Right-of-use assets	633	—	633
Deferred tax assets	—	—	—
Other non-current financial assets	3	—	3
Inventory	2,084	96	2,180
Trade receivables	1,802	—	1,802
Other current assets	391	—	391
Cash from capital increase	5,750	—	5,750
Cash & cash equivalents	316	—	316
Total Assets	**13,470**	**3,283**	**16,753**
Liabilities			
Deferred tax liabilities	—	—	—
Deferred income	(83)	—	(83)
Loans & borrowings	(1,443)	—	(1,443)
Lease liabilities	(633)	—	(633)
Trade payables	(271)	—	(271)
Tax payables	(100)	—	(100)
Payroll related payables	(298)	—	(298)
Other liabilities	(914)	—	(914)
Total Liabilities	**(3,742)**	**—**	**(3,742)**
Total identified assets and liabilities	**9,728**	**3,283**	**13,011**
Goodwill	—	—	2,639
Non-controlling interest	—	—	(3,253)
Acquisition price	**—**	**—**	**12,397**

The cash flow from the business combination is as follows:

Cash & cash equivalents acquired	(316)
Cash from capital increase	(5,750)
Acquisition price in cash	12,397
Total cash flow	**6,331**

The preliminary fair value of the identifiable assets and liabilities are included in our consolidated financial statements per December 31, 2019. We have performed a preliminary fair value analysis of the Engimplan business combination, with corresponding adjustments to the intangible assets, property, plant and equipment and inventories. The full fair value exercise for plant, property & equipment is not yet finalised.

The accounting for the business combination resulted in fair values at date of acquisition of K€2,530 for customer relationships, K€556 for trademarks. Fair value analysis with respect to property, plant and equipment led to a preliminary fair value of K€2,369. A fair value adjustment was identified of K€96 for the inventory.

There are no contingent considerations payable.

The goodwill recognized is primarily attributable to the trained and knowledgable workforce and to the expected synergies that will be realized at level of manufacturing and existing customer base. The goodwill is not deductible for income tax purposes.

The total acquisition-related costs recognized as an expense in the general & administration costs are K€140.

The contribution of the acquired business to the revenue and net profit of the Group for the year ended December 31, 2019 were, respectively, K€2,437 and K€315. The pro forma revenue and the pro forma net profit of the acquired business would have been K€5,710 and K€(1,258), respectively, if the business would have been acquired on January 1, 2019.

Acquisitions in 2018

The Group has not completed any Business Combinations during the year 2018.

Acquisitions in 2017

ACTech

The Group has signed a share and purchase agreement on October 4, 2017 to acquire all of the shares and voting interest of ACTech Holding Gmbh, an entity incorporated in Germany, and its subsidiaries ACTech Gmbh and ACTech North America Inc. (together referred to as “ACTech Group”) for a total purchase consideration in cash of K€28,907 (net of indemnification asset).

The German-based ACTech Group is specialist in producing limited runs of highly complex cast metal parts in a short timeframe. ACTech Group will be part of the Manufacturing segment.

The fair value of the identifiable assets and liabilities at the date of acquisition were:

in 000€	Carrying value at acquisition date	Fair value adjustments	Fair value at acquisition date
Assets			
Technology	—	515	515
Customer relations	—	17,092	17,092
Other intangible assets	6,330	(5,345)	985
Property, plant & equipment	19,986	243	20,229
Deferred tax assets	503	(415)	88
Other non-current financial assets	56	—	56
Inventory	2,356	433	2,789
Trade receivables	5,176	—	5,176
Cash & cash equivalents	2,244	—	2,244
Other assets	542	—	542
Total Assets	**37,193**	**12,523**	**49,716**
Liabilities			
Deferred tax liabilities	(47)	(5,977)	(6,024)
Deferred income	(1,298)	1,298	—
Loans & borrowings	(11,308)	—	(11,308)
Trade payables	(777)	—	(777)
Tax payables	(3,664)	1,214	(2,450)
Other liabilities	(9,062)	—	(9,062)
Total Liabilities	**(26,156)**	**(3,465)**	**(29,621)**
Total identified assets and liabilities	**11,037**	**9,058**	**20,095**
Goodwill	—	—	8,812
Acquisition price	—	—	**28,907**

The cash flow from the business combination is as follows:

Cash & cash equivalents acquired	(2,244)
Acquisition price in cash including escrow	29,417
Total cash flow	**27,173**

The fair value of the identifiable assets and liabilities as included in our consolidated financial statements per December 31, 2017 were provisional as the final valuation had not been completed by the date these consolidated financial statements were approved for issue by the board of directors. As of October 4, 2018, we have completed the fair value analysis of the ACTech business combination, which corresponding adjustments to the intangible assets, property, plant and equipment, inventories and contracts in progress, other current assets, investment grants and tax payables. The fair value of the identified assets and liabilities were K€2,432 higher than the provisional value at date of acquisition, with a corresponding reduction in goodwill.

The accounting for the business combination resulted in fair values at date of acquisition of K€17,092 for customer relationships, K€515 for patented technology, K€826 for order backlog, and K€222 for tax contingencies subject to an indemnification asset. The fair value of the receivables is K€5,176 which equals the gross contractual amounts receivable. Fair value analysis with respect to property, plant and equipment led to a fair value of K€20,229. A fair value adjustment was identified of K€433 for the inventory. The deferred tax liabilities comprise the tax effect of the fair value adjustments for the above described items.

The purchase price paid at the acquisition date amounted to K€29,417. The share and purchase agreement foresees that the Sellers will indemnify the Group for certain tax payables and contingencies that may occur in the period between 2018 and 2021. An amount of K€3,788 has been paid in an escrow account which can be applied against the indemnification asset. The Group has estimated that the fair value of the indemnification asset is K€222 which has been applied against the acquisition price. The indemnification asset will be paid out of the escrow account when the related tax payables and contingencies are paid.

There are no contingent considerations payable.

The goodwill recognized is primarily attributable to the trained and knowledgable workforce and to the expected synergies that will be realized at level of software platforms, manufacturing and existing customer base. The goodwill is not deductible for income tax purposes.

The total acquisition-related costs recognized as an expense in the general & administration costs were K€609 in 2017.

The contribution of the acquired business to the revenue and net profit of the Group for the year ended December 31, 2017 were, respectively, K€9,965 and K€275. The pro forma revenue and the pro forma net profit of the acquired business would have been K€37,096 and K€2,060, respectively, if the business would have been acquired on January 1, 2017.

Changes in the measurement of the contingent consideration for previous acquisitions

Cenat

The Group has settled it contingent consideration in relation to the sale and purchase agreement of Cenat BVBA, signed on March 10, 2015, on January 21, 2019 for a total amount of K€450. No remeasurement gain or loss has been recorded during 2019 (2018: gain of K€192). No remeasurement has been recorded at December 31, 2017.

5 Goodwill

The goodwill has been allocated to the cash generating units ("CGU") as follows:

	As of December 31,		
in 000€	2019	2018	2017
CGU: MAT NV SAM BE	3,241	3,241	3,241
CGU: e-Prototypy	800	794	818
CGU: ACTech	8,812	8,812	8,812
CGU: OrthoView	4,683	4,467	4,504
CGU: MAT NV Manufacturing (Metal)	177	177	177
CGU: Engimplan	2,461	—	—
Total	**20,174**	**17,491**	**17,552**

The changes in the carrying value of the goodwill can be presented as follows for the years 2019, 2018 and 2017:

in 000€	Gross	Impairment	Total
At January 1, 2017	**8,964**	**(104)**	**8,860**
Additions	8,812	—	8,812
Impairment	—	—	—
Currency translation	(120)	—	(120)
At December 31, 2017	**17,656**	**(104)**	**17,552**
Additions	—	—	—
Currency translation	(61)	—	(61)
At December 31, 2018	**17,595**	**(104)**	**17,491**
Additions	2,639	—	2,639
Currency translation	44	—	44
At December 31, 2019	**20,278**	**(104)**	**20,174**

The goodwill of Orthoview (UK), e-Prototypy (PL) and Engimplan (BR) include respectively K€216, K€6 and K€-178 impact of currency translation in 2019.

The Group has performed an impairment test based on a discounted cash flow model with cash flows for the next five years derived from the budget and a residual value considering a perpetual growth rate. The MAT NV SAM BE and Cenat are included in the reportable segment "Materialise Software". The CGU ACTech, e-Prototypy (PL) and MAT NV Manufacturing (Metal) are included in the reportable segment "Materialise Manufacturing". The CGU Orthoview (UK) and Engimplan (BR) are included in the reportable segment "Materialise Medical".

CGU: MAT NV SAM (BE)

The goodwill allocated to the CGU MAT NV SAM (BE) relates to the goodwill from the acquisition of CENAT in 2015 and the goodwill related to the acquisition of Marcam in 2011 (DE-3D Printing Software).

The impairment test is based on the projected discounted cash flows resulting from the CGU MAT NV SAM BE, considering a period of five years. The main assumptions for goodwill impairment testing include a discount rate (based on WACC) of 10.96% and a perpetual growth rate of 5.00%. Other assumptions include the year-on-year growth rate of the revenue, gross margin and the operating costs which has been determined by management based on past experience. It was concluded that the value in use is higher than the carrying value of the cash generating unit of K€39,132 There are no reasonable changes in assumptions that would reduce the value in use below its carrying value of the cash generating unit.

CGU e-Prototypy

The goodwill relates to the acquisition of the Polish entity e-Prototypy . The impairment test on the CGU e-Prototypy is based on the projected discounted cash flows considering a period of five years. The main assumptions include a discount rate (based on WACC) of 14.52% and a perpetual growth rate of 2.00%. Other assumptions include the year-on-year growth rate of the revenue, gross margin and the operating costs which has been determined by management based on past experience and continued investments in capex in new 3D printing equipment. It was concluded that the value in use is significantly higher than the carrying value of the cash generating unit K€3,940. Based on the sensitivity analysis where discount rate would increase with 1%, the value in use would still be significantly higher than the carrying value of the cash generating units.

CGU Orthoview

The goodwill relates to the acquisition of Orthoview. The impairment test on the CGU Orthoview is based on the projected discounted cash flows considering a period of 5 years .The main assumptions include a discount rate (based on WACC) of 11.97% and a perpetual growth rate of 1.00%. Other assumptions include the year-on-year growth rate of the revenue, gross margin and the operating costs which have been determined by management based on past experience. It was concluded that the value in use is higher than the carrying value of the cash generating unit of K€9,269. Based on the sensitivity analysis where discount rate would increase with 1%, the value in use would still be higher than the carrying value of the cash generating unit. A perpetual growth of 0% still result in a value in use that is higher than the carrying value of the cash generating unit.

The Orthoview business is being integrated further in the existing software business within our Materialise Medical segment. Synergies that are expected from joined product lines are not taken into account in the current impairment review as management believes that Orthoview can still be considered a separate cash generating unit in 2019.

CGU ACTECH

The impairment test on the CGU ACTech is based on the projected discounted cash flows, considering a period of 5 years. The main assumptions include a discount rate (based on WACC) of 9.40% and a perpetual growth rate of 1.00%. Other assumptions include the year-on-year growth rate of the revenue, gross margin and the operating costs which have been determined by management based on past experience. It was concluded that the value in use is higher than the carrying value of the cash generating unit of K€26,284. Based on the sensitivity analysis where discount rate would increase with 1% or other reasonable changes in the 5-year projected cash flows (such as lower EBITDA) and perpetual growth rate, the value in use would be higher than the carrying value of the cash generating unit.

CGU ENGIMPLAN

The impairment test on the CGU Engimplan is based on the projected discounted cash flows, considering a period of 5 years. The main assumptions include a discount rate (based on WACC) of 17.05% and a perpetual growth rate of 3.00%. Other assumptions include the year-on-year growth rate of the revenue, gross margin and the operating costs which have been determined by local & new management based on past experience. It was concluded that the value in use is higher than the carrying value of the cash generating unit of K€15,710. Based on the sensitivity analysis where discount rate would increase with 1 % or other reasonable changes in the 5-year projected cash flows (such as lower EBITDA) and perpetual growth rate, the value in use would be higher than the carrying value of the cash generating unit.

6 Intangible assets

The changes in the carrying value of the intangible assets can be presented as follows for the years 2019, 2018 and 2017:

in 000€	Patents and licenses	Software	Acquired customers, technology and backlogs	Developed technology and software under construction	Total
Acquisition value					
At January 1, 2017	**3,788**	**3,769**	**7,596**	**—**	**15,153**
Additions	749	3,718	—	—	4,467
Acquisition of a subsidiary	115	242	18,433	—	18,790
Disposals	(159)	(143)	—	—	(302)
Transfer between accounts	—	(98)	—	—	(98)
Currency translation	—	(5)	(183)	—	(188)
Other	4	155	(251)	—	(92)
At December 31, 2017	**4,497**	**7,638**	**25,595**	**—**	**37,730**
Additions	554	807	32	951	2,344
Acquisition of a subsidiary	—	—	—	—	—
Disposals	(759)	(221)	—	—	(980)
Transfer between accounts	2	—	—	364	366
Currency translation	—	—	(48)	—	(48)
Other	—	17	—	—	17
At December 31, 2018	**4,294**	**8,241**	**25,579**	**1,315**	**39,429**
Additions	209	656	—	1,328	2,193
Acquisition of a subsidiary	38	214	3,048	9	3,309
Disposals	—	(45)	(32)	—	(77)
Transfer between accounts	(109)	1,601	—	(988)	504
Currency translation	1	(10)	86	20	97
Other	3	10	—	(32)	(19)
At December 31, 2019	**4,436**	**10,667**	**28,681**	**1,652**	**45,436**

in 000€	Patents and licenses	Software	Acquired customers, technology and backlogs	Developed technology and software under construction	Total
Amortization					
At January 1, 2017	**(2,042)**	**(1,251)**	**(2,095)**	**—**	**(5,388)**
Amortization charge for the year	(609)	(1,634)	(1,579)	—	(3,822)
Disposals	2	77	—	—	79
Transfer between accounts	—	98	—	—	98
Currency translation	—	4	45	—	49
Other	(117)	(279)	250	—	(146)
At December 31, 2017	**(2,766)**	**(2,985)**	**(3,379)**	**—**	**(9,130)**
Amortization charge for the year	(749)	(2,310)	(2,005)	—	(5,064)
Disposals	854	206	—	—	1,060
Transfer between accounts	—	—	—	—	—
Currency translation	—	1	22	—	23
Other	—	8	—	—	8
At December 31, 2018	**(2,661)**	**(5,080)**	**(5,362)**	**—**	**(13,103)**
Amortization charge for the year	(246)	(2,582)	(2,031)	—	(4,859)
Disposals	—	23	—	—	23
Transfer between accounts	109	(96)	—	—	13
Currency translation	—	(25)	(126)	—	(151)
Other	—	20	16	—	36
At December 31, 2019	**(2,798)**	**(7,740)**	**(7,503)**	**—**	**(18,041)**
Net carrying value					
At December, 31 2019	1,638	2,927	21,178	1,652	27,395
At December, 31 2018	1,633	3,161	20,217	1,315	26,326
At December 31, 2017	1,731	4,653	22,216	—	28,600
At January, 1 2017	1,746	2,518	5,501	—	9,765

Patent and licenses include only the direct attributable external costs incurred in registering the patent and obtaining the license. Software relates to purchased software for internal use only except for software development on certain application interfaces that were almost fully funded by a third party. Apart from the developed technology and software under construction that was capitalized per end of 2019 for the amount of K€1,652, no other software development was capitalized in 2019 (2018: K€1,315, 2017:€86). The remaining amortization period is 1.5 years for the main software purchases and 7.7 years for the main patents and licenses.

The ‘Acquired customers and technology’ have been recognized as part of the acquisition of Engimplan, ACTech, E-Prototypy, OrthoView, and Cenat (see Note 4). At December 31, 2019, the remaining amortization period for the acquired customers is 9.58 years for Engimplan, 17.75 years for ACTech, 4.75 years for OrthoView, fully amortized for E-Prototypy and 5.25 years for Cenat (2018: 18.75 years for ACTech, 5.75 years for OrthoView and 6.25 years for Cenat).

The developed technology and software relate to one project (Tracheal Splint Project) that meet the criteria for recognition as internally developed intangible asset (see also Note 3: significant accounting judgments, estimates and assumptions). This asset is still being developed and consequently is not amortized. The Group has performed an impairment analysis on this asset which resulted in no impairment. The key assumptions used are:

- Discount rate of 11.38%;
- Periods of cash flows: 6
- No perpetuity

The total amortization charge for 2019 is K€4,859 (2018: K€5,064; 2017: K€3,822). As from 2017 the amortization of intangible assets from business combinations is mainly included in the line net operating income of the consolidated income statement.

7 Property, plant & equipment

The changes in the carrying value of the property, plant & equipment can be presented as follows for the year 2019 and 2018:

in 000€	Land and buildings	Plant and equipment	Right-of-use assets	Construction in progress	Total
Acquisition value					
At January 1, 2018	**40,184**	**67,117**	**14,303**	**3,754**	**125,358**
Additions	3,079	9,476	792	5,210	18,557
Disposals	(99)	(1,882)	(17)	(387)	(2,385)
Transfers	2,728	2,953	(732)	(5,547)	(598)
Currency Translation	(119)	(25)	(19)	(26)	(189)
Other	4	(82)	—	(2)	(80)
At December 31, 2018	**45,777**	**77,557**	**14,327**	**3,002**	**140,663**
Impact of adoption of IFRS 16	—	—	4,984	—	4,984
Additions	302	7,363	3,429	5,807	16,901
Acquired from business combinations	61	2,291	633	17	3,002
Disposals	(37)	(6,091)	(753)	—	(6,881)
Transfers	(3,360)	7,077	117	(4,338)	(504)
Currency Translation	150	199	8	6	363
Other*	—	(73)	(1,099)	(80)	(1,252)
At December 31, 2019	**42,893**	**88,323**	**21,646**	**4,414**	**157,276**
Depreciation					
At January 1, 2018	**(4,504)**	**(27,166)**	**(6,623)**	**—**	**(38,293)**
Depreciation charge for the year	(1,560)	(8,010)	(2,346)	(307)	(12,223)
Disposals	26	2,102	6	—	2,134
Transfers	(18)	(253)	514	—	243
Currency Translation	(15)	(53)	8	—	(60)
Other	—	73	—	—	73
At December 31, 2018	**(6,071)**	**(33,307)**	**(8,441)**	**(307)**	**(48,126)**
Depreciation charge for the year	(1,199)	(9,082)	(4,058)	—	(14,339)
Disposals	36	5,704	359	—	6,099
Transfers	200	(1,551)	1,031	307	(13)
Currency Translation	(25)	(190)	(2)	—	(217)
Other	220	(34)	51	—	237
At December 31, 2019	**(6,839)**	**(38,460)**	**(11,060)**	**—**	**(56,359)**
Net book value					
At December 31, 2019	36,054	49,863	10,586	4,414	100,917
At December 31, 2018	39,706	44,250	5,886	2,695	92,537
At January 1, 2018	35,680	39,951	7,680	3,754	87,065

* "Other" includes modification of Right-of-use assets for an amount of K€(554) as disclosed in the Right-of-use assets table below.

The changes in the carrying value of the property, plant and equipment can be presented as follows for the year 2017:

in 000€	Land and buildings	Plant and equipment	Right-of-use assets	Construction in progress	Total
Acquisition value					
At January 1, 2017	**19,797**	**40,199**	**11,241**	**4,652**	**75,889**
Additions	377	10,560	2,246	17,334	30,517
Acquired from business combinations	9,362	10,318	136	414	20,230
Disposals	(31)	(1,046)	(39)	218	(898)
Transfers	11,527	7,439	(425)	(18,914)	(373)
Currency Translation	(185)	(118)	5	88	(210)
Other	(663)	(235)	1,139	(38)	203
At December 31, 2017	**40,184**	**67,117**	**14,303**	**3,754**	**125,358**
Depreciation					
At January 1, 2017	**(5,093)**	**(22,263)**	**(3,470)**	**—**	**(30,826)**
Depreciation charge for the year	(831)	(5,531)	(2,327)	—	(8,689)
Disposals	15	842	18	—	875
Transfers	521	(444)	296	—	373
Currency Translation	31	166	(1)	—	196
Other	853	64	(1,139)	—	(222)
At December 31, 2017	**(4,504)**	**(27,166)**	**(6,623)**	**—**	**(38,293)**
Net book value					
At December 31, 2017	35,680	39,951	7,680	3,754	87,065
At January 1, 2017	14,704	17,936	7,771	4,652	45,063

Certain prior year amounts have been reclassified to conform to the current year presentation with no impact on previously reported net loss, financial position or cash flows.

The investments in property, plant & equipment and right-of-use assets in 2019 amounted to K€16,901 (2018: K€18,557; 2017: K€30,517). They are mainly related to new machines and installations (K€7,757), land and buildings (K€4,865), IT equipment (K€1,268) and leased vehicles (K€1,118). The investments in 2018 related to new machines and installations in Belgium and Germany (K€10,747), land and buildings in Germany (K€2,491), IT equipment (K€1,781) and lease vehicles (K€792). The investments in 2017 related to the building constructions in Leuven and Poland (K€12,762), the investments into new machines and installations (acquired and leased – K€11,947) and the investment in motor vehicles (K€1,444).

The Group realized a net loss on disposal of property, plant and equipment of K€165 in 2019 (2018: a net loss of K€83; 2017: a net loss of K€25).

No impairment of property, plant and equipment was recorded.

The transfers in 2019 within property, plant and equipment are mainly related to

- the transfers from assets under construction towards plant and equipment of K€4,031, mainly the finalization of the cleanroom and self-constructed built machines;
- the gross up of the net amount of the PPA of ACTech of K€2,050;
- the transfer from Right-of-Use of assets to Plant and Equipment due to the exercise of purchase options at the end of the lease agreement for a net book value of K€362;
- a transfer from Plant and Equipment to Right-of-Use assets for leases with a net book value of K€1,510 which were incorrectly classified in prior year.

Assets under construction

Per end of 2019 the main assets under construction are related to our “Green Machine” project for an amount of K€1,870 located in Belgium and buildings located in Germany for an amount of K€1,464.

Changes in useful life for certain assets

The Group reviews the useful life for the intangible assets and property, plant and equipment on an annual basis considering the current facts and circumstances available. This review has resulted in 2019 in a re-assessment of the useful life for certain specific assets in the categories buildings, fixtures, vehicles and machinery. The impact of the change in useful life during the year 2019 resulted in a decrease of the depreciation charges by K€1,147 In 2020 and 2021 the depreciation charge will be less for respectively K€478 and K€276. The effect will be neutralized in 2028 for machines, in 2033 for fixtures and in 2048 for buildings.

The right of use assets can be presented as follows:

The carrying value of Right-of-Use assets at December 31, 2019 was K€10,586 (2018: K€5,886; 2017: K€7,680). Right-of-Use assets are mainly related to 3D printing machines with a carrying value of K€3,048 at December 31, 2019 (2018: K€4,608; 2017: K€6,613) and for which depreciation of K€1,045 was recorded in 2019 (2018: K€1,745; 2017: K€1,864). New leases in 2019 amount to K€4,062 of which K€1,119 relate to leased motor vehicles (2018: K€792; 2017: K€1,596).

in 000€	Buildings	Vehicles	Equipment	Total
Acquisition value				
At January 1, 2019 before adoption IFRS 16	935	2,542	10,850	14,327
Impact of adoption of IFRS 16	3,255	849	880	4,984
At January 1, 2019 after adoption IFRS 16	4,190	3,391	11,730	19,311
Additions	2,222	1,118	89	3,429
Acquired from business combinations	633	—	—	633
Modifications	(9)	(40)	(496)	(545)
Disposals	(550)	(147)	(56)	(753)
Currency Translation	4	—	4	8
Transfers	—	(47)	164	117
Other	(2)	—	(552)	(554)
At December 31, 2019	**6,488**	**4,275**	**10,883**	**21,646**
Depreciation				
At January 1, 2019	**(1,011)**	**(1,189)**	**(6,241)**	**(8,441)**
Depreciation charge for the year	(1,953)	(1,060)	(1,045)	(4,058)
Acquired from business combinations	—	—	—	—
Modifications	—	—	—	—
Disposals	257	147	56	460
Currency Translation	(1)	—	(1)	(2)
Transfers	—	41	990	1,031
Other	3	31	(84)	(50)
At December 31, 2019	**(2,705)**	**(2,030)**	**(6,325)**	**(11,060)**
Net book value				
At December 31, 2019	3,783	2,245	4,558	10,586
At January 1, 2019 before adoption IFRS 16	(76)	1,353	4,609	5,886
At January 1, 2019 after adoption IFRS 16	3,179	2,202	5,489	10,870

The following amounts related to leases are recognized in profit & loss

(in 000€)	2019
Depreciation expense	(4,058)
Interest expense on lease liabilities	(204)
Expenses related to short-term leases/ low-value assets/ variable lease payments	(725)

The Group has negotiated several contracts with extension and termination options because of common practice in the country or for the asset. Management has exercised significant judgments in determining whether these extension and termination options are reasonable certain to be exercised.

The potential future cash flows beyond the period following the exercise of the extension and termination option that are not included in the lease term are presented in the following table:

(in 000€)	2019
Potential cash flows for extension options that are not reasonably certain to be exercised:	843
Potential cash flows for termination options that are reasonably certain to be exercised	174

Pledges

Land and buildings (including buildings under construction) with a carrying amount of K€26,270 (2018: K€27,319; 2017: K€28,526) are subject to pledges to secure several of the Group's bank loans. In addition, pledges have been given on machines with a total carrying amount of K€2,884 (2018: K€3,533; 2017: K€13,340) (Note 24).

8 Investments in joint ventures

The Group has one investment in the joint venture RSPrint NV (Belgium).

The summarized financial information of RSPrint NV can be presented as follows:

in 000€	2019	2018	2017
Joint venture's statement of financial position			
Current assets	1,546	850	1,256
Non-current assets	93	114	212
Goodwill	—	—	—
Current liabilities	(1,114)	(756)	(692)
Non-current liabilities	(448)	(1,096)	(788)
Shareholders' deficit (surplus)	(77)	888	12
The joint venture income (loss)			
Revenue	1,736	1,186	817
Profit (loss)	(785)	(876)	(723)

Total current assets include cash and cash equivalents for a total amount of K€247 per December 31, 2019 (2018: K€175; 2017: K€128). Profit (loss) include total deprecations and amortization for a total amount of K€25 in 2019 (2018: K€30; 2017: K€50).

The movement of the carrying value of the joint venture is as follows:

	in 000€
Carrying value as of January 1, 2017	**—**
Additional investment	500
Transfer from receivables	—
Share in loss	(469)
Carrying value as of December 31, 2017	**31**
Additional investment	—
Transfer from receivables	444
Share in loss	(475)
Carrying value as of December 31, 2018	**—**
Additional investment	875
Transfer to receivables	(444)
Share in loss	(392)
Carrying value as of December 31, 2019	**39**

9 Inventories and contracts in progress

Inventories and contracts in progress include the following:

	As of December 31,		
in 000€	2019	2018	2017
Raw materials	7,400	5,616	4,970
Work in progress	2,805	2,151	3,377
Finished goods	1,996	1,390	1,414
Contracts in progress	495	829	1,266
Total inventories and contracts in progress	**12,696**	**9,986**	**11,027**

The amount of the inventory written-off as an expense is K€526 (2018: K€229; 2017: K€48). The expenses are booked in Cost of Sales.

The group has contracts in progress and advances from customers. The total costs incurred is K€366 and the profit recognized is K€129 as per December 31, 2019. Advances were received for the amount of K€22 with respect to contracts in progress per end of 2019 (2018: K€370; 2017: K€0).

10 Other assets

Other non-current assets

Other non-current assets include the following:

	As of December 31,		
in 000€	2019	2018	2017
Tax credits	3,015	3,006	2,446
Guarantees and deposits	415	405	362
Non-current receivable on joint venture	138	1,096	804
Non-listed equity investments	3,046	2,701	—
Convertible loan	2,750	—	—
Other	27	29	55
Total non-current assets	**9,391**	**7,237**	**3,667**

The non-current tax credits relate to tax credits that will be realized over more than one year.

The non-listed equity investments mainly consist of the investment in equity shares of the non-listed company Essentium Inc. The Group holds a non-controlling interest of 5% in this company. The increase is primarily to an additional investment in Essentium Inc at the same conditions as the initial investment. This investment was irrevocably designated at fair value through OCI as the Group considers these investments to be strategic in nature. We refer to Note 3 and Note 20.

The Group has granted a convertible loan to Fluidda in January 2019, with a notional amount of K€2,500. The converible loan is accounted for as a financial asset measured at fair value with changed in fair value through the income statement. The carrying value of the convertible loan amounts to K€2,750 at 31 December 2019. The convertible loan has a duration of 7 years with a 10% annual interest rate which is capitalized. We refer to Note 3 and Note 20.

Other current assets

Other current assets include the following:

	As of December 31,		
in 000€	2019	2018	2017
Deferred charges	2,632	2,046	2,021
Tax credits	695	185	219
Accrued income	486	958	524
Other tax receivables	3,127	2,286	2,910
Other non-trade receivables	1,676	1,461	2,001
Total current assets	**8,616**	**6,936**	**7,675**

The other tax receivables include Value Added Tax (VAT) receivables and corporate tax receivables. The non-trade receivables for the year ending December 31, 2019 include the indemnification asset for the amount of K€222 as referred to in Note 4. Business Combinations related to ACTech. Also please note that a receivable related to factoring was accounted for under the non-trade receivables in the year ending December 31, 2017 (K€646). In the year ending December 31, 2019 this receivable related to factoring has been recorded under the trade receivables for the amount of K€362 (2018: K€445).

11 Trade receivables

The trade receivables include the following:

	As of December 31,		
in 000€	2019	2018	2017
Trade receivables	42,509	38,764	36,572
Write off receivables	(1,532)	(1,873)	(990)
Total	**40,977**	**36,891**	**35,582**

Trade receivables are non-interest bearing and are generally on payment terms of 30 to 90 days.

As at December 31, 2019, trade receivables of an initial value of K€1,532 (2018: K€1,873; 2017: K€990) were impaired as part of the expected credit losses analysis. Impairment is accounted for under the other operating expenses. See below for changes in the impairment of receivables.

in 000€	
At January 1, 2017	**(511)**
Addition	(620)
Usage	12
Reversal	129
At December 31, 2017	**(990)**
At January 1, 2018	**(990)**
Addition	(1,284)
Usage	182
Reversal	219
At December 31, 2018	**(1,873)**
Addition	(141)
Usage	131
Reversal	351
At December 31, 2019	**(1,532)**

12 Cash and cash equivalents

Cash and cash equivalents include the following:

in 000€	As of December 31, 2019	2018	2017
Cash at bank	123,337	105,846	33,611
Cash equivalents	5,560	9,660	9,564
Total	**128,897**	**115,506**	**43,175**

Cash at banks earns interest at floating rates based on daily bank deposit rates. Short-term deposits are made for varying periods between one day and three months, depending on the immediate cash requirements of the Group, and earn interest at the respective short-term deposit rates.

In connection with the exercise of warrants payments have been received in 2018 from employees for a total amount of K€209, not converted into shares before year-end. In line with regulations the amount of K€209 was posted on a restricted bank account per December 31, 2018. There were no restrictions on cash at December 31, 2019 or 2017.

13 Equity

Share capital

The share capital of the parent company Materialise NV consists of 53,172,513 ordinary nominative shares at December 31, 2019 (2018: 52,890,761; 2017: 47,325,438) with no nominal but par value of €0.058 in 2019 (2018: €0.058; 2017: €0.058) for a total amount of K€3,066 at December 31, 2019 (2018: K€3,050; 2017: K€2,729).

in 000€, except share data	Total number of founder shares	Total number of ordinary shares	Total share-holders' capital	Total share-premium
Outstanding at January 1, 2017	**—**	**47,325,438**	**2,729**	**79,019**
Transfer share capital to share premium	—	—	—	—
Capital increase in cash - public offering	—	—	—	—
Expenses directly attributable to public offering	—	—	—	—
Capital increase via exercise of warrants	—	—	—	—
Equity settled share-based payments expense	—	—	—	820
Outstanding at January 1, 2018	**—**	**47,325,438**	**2,729**	**79,839**
Transfer share capital to share premium	—	—	—	—
Capital increase in cash - public offering	—	5,403,125	312	59,575
Expenses directly attributable to public offering	—	—	—	(4,003)
Capital increase via exercise of warrants	—	162,198	9	593
Equity settled share-based payments expense	—	—	—	633
Outstanding at January 1, 2019	**—**	**52,890,761**	**3,050**	**136,637**
Capital increase in cash - public offering and private placement	—	—	—	—
Expenses directly attributable to public offering	—	—	—	—
Capital increase via exercise of warrants	—	281,752	16	1,252
Equity settled share-based payments expense	—	—	—	201
Outstanding on December 31, 2019	**—**	**53,172,513**	**3,066**	**138,090**

The shareholders' capital increased by K€16 in 2019 as a result of the exercise of warrants outstanding and fully vested. The number of new shares issued was 281,752 at an average price of €4.5 per share, including share premium.

Share premium

In Belgium, the portion of the capital increase in excess of par value is typically allocated to share premium.

The carrying value of the share premium is K€138,090 at December 31, 2019 (2018: K€136,637; 2017: K€79,839). The change in 2019 is the result of:

- The capital increase via exercise of warrants of K€1,252; and
- the share-based payment expense of K€201.

The change in 2018 is the result of the share-based payment K€633, the capital increase via exercise of warrants of K€593 and the capital increase in cash-public offering and private placement of K€55,572. The change in 2017 is the result of the share-based payment expense of and K€820.

Reserves

The nature and purpose of the reserves is as follows:

	As of December 31,		
in 000€	2019	2018	2017
Legal reserve	279	279	279
(Accumulated deficit)	(474)	(2,127)	(3,990)
Reserves	**(195)**	**(1,848)**	**(3,711)**

Based on the statutory result and after final result allocation approved by the annual shareholders meeting the legal reserve is increased by reserving 5% of the yearly statutory profit until the legal reserve reaches at least 10% of the shareholders' capital. The legal reserve cannot be distributed to the shareholders.

The Group did not pay any dividend during 2019, 2018 and 2017.

Non-controlling interest

The non-controlling interest has been recognized for 25% held by third party in Engimplan for an amount of K€3,107 per end of 2019. In 2018 and 2017 there were no non-controlling interest. No non-controlling interest is recognized for the 17% held by a third party in RapidFit+ as the amount is presented as a financial liability.

RapidFit+

The Group has purchased a call option and written a put-option on the non-controlling interest in Rapidfit+. The call option is accounted for in accordance with IFRS 9 and has an exercise price which is calculated according to a specified contractual formula based on the following parameters: invested capital, multiple of EBITDA minus net financial debt. Based on our analysis the call option remains out of the money and as such the fair value is estimated at zero at December 31, 2019. The call option is exercisable between June 30, 2015 and June 27, 2020.

The written put option has been recognized as a financial liability and measured at the fair value of the redemption amount and amounts to K€875 at December 31, 2019 (2018: K€845; 2017 K€788). The undiscounted estimated redemption amount totals K€875 at December 31, 2019 (2018: K€875; 2017: K€875). The redemption price has an exercise price according to a specified contractual formula based on the following parameters: invested capital, multiple of EBITDA minus net financial debt. The initial recognition resulted in a reclassification of K€264 from non-controlling interest and K€64 from consolidated reserves. The parameter "invested capital" of the contractual formula has been adjusted in December 2014 to reflect the impact of the capital increase and the exercise period has been extended with one year. As a result, the estimated redemption amount of the written put option has increased by K€273 which has been recorded in diminution of the consolidated reserves. The written put option is exercisable between June 27, 2019 and June 27, 2021 and it is management's estimate that the put option will be exercised within 12 months. As such, the written put option is presented as an other current liability.

In addition, RapidFit+ has issued 10 dilution warrants to the non-controlling interest which are exercisable upon occurrence of certain specified events. The fair value of the dilution warrants is zero per end of 2019 (2018: zero; 2017: zero).

14 Share-based payment plans

Share-based payment plans of the parent

The changes of the year for the warrant plans are as follows:

	2019	2018	2017
Outstanding at January 1*	**1,318,049**	**1,458,360**	**1,681,000**
Granted	—	2,000	—
Forfeited / Cancelled	(42,952)	(69,104)	(119,784)
Exercised	(310,045)	(73,207)	(102,856)
Outstanding at December 31*	**965,052**	**1,318,049**	**1,458,360**
Exercisable at December 31	**296,859**	**252,793**	**—**

* The Group's share-based payment plans are all equity-settled except for the IPO warrants that have been granted to certain employees in certain countries due to legal requirements which are cash-settled. The outstanding amount includes number of stock appreciation rights ("SARs") issued under cash-settled share-based payment plans.

The number of outstanding warrants has been adjusted to reflect the 1-to-4 stock split decided in June 2014. The 2013 warrant plan gives a right to four shares for each warrant, whereas under all other warrant plans one warrant gives a right to one share. For presentation purposes the tables reflect the number of shares the warrants give right to across all plans.

Equity-settled share-based payment plans

The Group has several plans in place (2013 warrant plan, IPO warrant plan and 2015 warrant plan) which have similar terms except for the exercise price, except for the 2015 warrant plan.

2013 warrant plan

Each warrant gives the right to the holder to four ordinary shares of the parent Company. The warrants have a contractual term of ten years and vest for 25% in the fourth year; 25% in the fifth year; 25% in the sixth year; and 25% in the seventh year. Warrants are exercisable as from the month after they have vested and in the subsequent exercise periods. There are no cash settlement alternatives and the Group does not have a practice of cash settlement for these warrants. The warrants have a contractual term of ten years.

Under the 2013 warrant plan 301,096 warrants were effectively granted in October 2013 and 166,800 warrants were granted to certain employees and to certain members of our board of directors and senior management on November 28, 2013 with an exercise price ranging from €7.86 to €8.54.

The status of the 2013 warrant plan at December 31 is as follows:

	2019	2018	2017
Outstanding at January 1	**300,040**	**320,640**	**435,096**
Granted	—	—	—
Forfeited / Cancelled	(3,500)	(1,500)	(11,600)
Exercised	(178,164)	(19,100)	(102,856)
Outstanding at December 31	**118,376**	**300,040**	**320,640**
Exercisable at December 31	**15,300**	**89,892**	**—**

With respect to the warrants exercised in 2019, a total of 44,541 warrants representing 178,164 shares were exercised in the last quarter. The average share price during that quarter was $ 18.40. Since the 2013 warrant plan prescribes that each warrant gives right to four shares and our table above presents the impact on the number of shares, the actual remaining number of warrants as per December 31, 2019 equals 29,594.

IPO warrant plan

Each warrant gives the right to the holder to one ordinary share of the parent Company. The warrants have a contractual term of 10 years and vest for 25% in the fourth year; 25% in the fifth year; 25% in the sixth year and 25% in the seventh year. Warrants are exercisable as from the month after they have vested and in the subsequent exercise periods. There are no cash settlement alternatives and the Group does not have a practice of cash settlement for these warrants. The warrants have a contractual term of 10 years.

The Group granted 979,898 warrants in July 2014 and 36,151 warrants in November 2014 in the context of the initial public offering to the employees of the Group with an exercise price of €8.81 ("IPO warrant plan"). The Group granted an additional 18,180 warrants to employees in July 2015 under the IPO warrant plan.

The status of the IPO warrant plan at December 31 is as follows:

	2019	2018	2017
Outstanding at January 1	**589,052**	**671,503**	**727,599**
Granted	—	—	—
Forfeited / Cancelled	(20,252)	(42,209)	(56,096)
Exercised	(103,588)	(40,242)	—
Outstanding at December 31	**465,212**	**589,052**	**671,503**
Exercisable at December 31	**169,071**	**114,012**	**—**

With respect to the warrants exercised in 2019, a total of 103,588 warrants representing 103,588 shares were exercised in the last quarter. The average share price during that quarter was $ 18.40.

Warrant plan 2015

The board of directors decided on December 18, 2015 on a new plan ("2015 warrant plan") by which it can grant up to 1,400,000 warrants to employees. Each warrant gives the right to the holder to one ordinary share of the parent Company. The warrants vest for 10% on the second anniversary of the granting; 20% on the third anniversary of the granting; 30% on the fourth anniversary of the granting; and 40% on the fifth anniversary of the granting, unless otherwise decided by the board of directors or one or more of its representatives granted powers thereto. Warrants are exercisable only after they have vested and only during a period of (i) four weeks following the publication of the results of the parent Company of the second and fourth quarter, or (ii) if no quarterly results are published, during the month March and the month September of every year. There are no cash settlement alternatives and the Group does not have a practice of cash settlement for these warrants. The warrants have a term of ten years.

The Group granted 350,000 warrants in July 2016 to the employees of the Group with an exercise price of €6.45. The Group granted 2,000 warrants to an employee in May 2018 with an exercise price of €0.08.

The status of the 2015 warrant plan at December 31 is as follows:

	2019	2018	2017
Outstanding at January 1	**325,200**	**329,000**	**350,000**
Granted	—	2,000	—
Forfeited / Cancelled	(14,800)	(5,800)	(21,000)
Exercised	—	—	—
Outstanding at December 31	**310,400**	**325,200**	**329,000**
Exercisable at December 31	**96,500**	**32,700**	**—**

Fair value

The fair value of the warrants is estimated at the grant date using the Black-Scholes option pricing model, taking into account the terms and conditions upon which the warrants were granted.

The following table provides the input to the Black-Scholes model for the 2013 warrant plan, IPO warrant plan and 2015 warrant plan:

	2015 (Sept 16)	2015 (Nov)	IPO 2014 (Nov)	IPO 2014 (June)	2013 (Dec) *	2013 (Oct) *
Return dividend	0%	0%	0%	0%	0%	0%
Expected volatility	47%	47%	50%	46%	50%	53%
Risk-free interest rate	0.24%	1.17%	1.12%	1.70%	2.56%	2.43%
Expected life	4.30	5.50	5.50	5.50	5.50	5.50
Exercise price (in €)	6.45	8.81	8.81	8.81	8.54	7.86
Stock price (in €)	6.42	8.08	8.67	8.81	18.09	18.09
Fair value SAR (in €)	2.41	3.30	3.94	3.83	12.23	12.77

(*) Exercise price, stock price and fair value are not adjusted for the 1 to 4 stock-split completed in June 2014.

The above input for the Black-Scholes model have been determined based on the following:

- The dividend return is estimated by reference to the historical dividend payment of the Group. Currently, this is estimated to be zero as no dividend have been paid since inception;
- Expected volatility is estimated based on the average annualized volatility of the volatility of the Group's stock (until September 2016: of a number of quoted peers in the 3D printing industry and the volatility of the Group's stock);

- Risk-free interest rate is based on the interest rate applicable for the 10Y Belgian government bond at the grant date;
- Estimated life of the warrant is determined to be until the first exercise period which is typically the month after vesting; and
- Fair value of the shares is determined based on the share price of the Group on Nasdaq at the date of valuation. For the grants prior to the initial public offering, the fair value of the shares was estimated based on a discounted cash flow model with 3-year cash flow projections and a multiple of EBITDA determined based on a number of quoted peers in the 3D printing industry.

The expense arising from share-based payment transactions for the warrants plans mentioned above was K€401 (2018: K€640; 2017: K€819)

The weighted average remaining estimated life of the warrants outstanding as of December 31, 2019 is 5.20 years (2018: 5.95 years; 2017: 5.62 years). The weighted average fair value for the warrants outstanding at the end of 2019 was €4.48 (2018: €5.62; 2017: €5.60). The weighted average exercise price for the warrants outstanding at the end of 2019 was €7.88 (2018: €7.99; 2017: €8.05).

Cash-settled share-based payment plans

The Group has issued 215,688 SARs in July 2014 towards certain employees in certain countries due to legal requirements with similar terms and conditions as the IPO warrant plan except that the SAR will be settled in cash. The exercise price of the SAR is €8.81.

The status of this plan is as follows:

	2019	2018	2017
Outstanding at January 1	**103,757**	**137,217**	**168,305**
Granted	—	—	—
Forfeited / Cancelled	(4,400)	(19,595)	(31,088)
Exercised	(28,293)	(13,865)	—
Outstanding at December 31	**71,064**	**103,757**	**137,217**
Exercisable at December 31	**15,988**	**16,189**	**—**

The SAR plan grants the bearer the right to a cash payment equal to the difference between the exercise price and the stock price at the exercise date. This plan is considered a cash settled shared based payment and is as such recorded as liability (see Note 16).

The SAR's have a contractual term of ten years and vest for 25% in the fourth year; 25% in the fifth year; 25% in the sixth year and 25% in the seventh year. SAR's are exercisable as from the month after they have vested and in the subsequent exercise periods.

The fair value of the SAR is estimated at each reporting date using the Black-Scholes option pricing model, taking into account the terms and conditions upon which the warrants were granted.

The following table lists the input used for the Black-Scholes model:

	2019	2018	2017
Return dividend	0%	0%	0%
Expected volatility	49%	49%	49%
Risk-free interest rate	0.10%	0.77%	0.73%
Expected life	0.25	1.25	2.25
Exercise price (in €)	8.81	8.81	8.81
Stock price (in €)	16.32	17.49	10.61
Fair value SAR (in €)	7.52	9.09	3.85

The expense arising from share-based payment transactions for the SAR's plan was K€(11) in 2019 (2018: K€435; 2017: K€204). The carrying value of the liability at December 31, 2019 amounts to K€574 (2018: K€786; 2017: K€351). The total intrinsic value of the liability for warrants currently exercisable at December 31, 2019 amounts K€120 (2018: K€141; 2017: K€0).

Share-based payment plans of RapidFit+

The subsidiary RapidFit+ has issued a warrant plan on August 23, 2013 where a maximum of 300 warrants can be offered to management with an exercise price of €553.92. In January 2014, a total of 199 warrants were granted and accepted.

The changes for the year for the RapidFit+ warrant plan are as follows:

	2019	2018	2017
Outstanding at January 1	199	199	199
Granted	—	—	—
Forfeited / Cancelled	(13)	—	—
Exercised	—	—	—
Outstanding at December 31	**186**	**199**	**199**
Exercisable at December 31	**184**	**—**	**—**

The following table lists the input to the Black-Scholes model for the RapidFit+ warrant plan:

	2014
Return dividend	0%
Expected volatility	50%
Risk-free interest rate	2.29%
Expected life	5.5
Exercise price	553.9
Fair value option	262.7

The expense arising from share-based payment transactions for RapidFit+ warrant plan was K€2 in 2019 (2018: K€7; 2017: K€10)

15 Loans and borrowings

The loans and borrowings include the following:

in 000€	As of December 31 2019	2018	2017
K€35,000 EIB bank loan	35,000	10,000	—
K€28,000 acquisition bank loan	21,612	24,576	27,513
K€18,000 secured bank loans	17,429	17,739	17,575
K€12,300 bank loans ACTech	11,850	12,300	9,247
K€8,750 other facility loans	3,599	4,299	4,982
Bank investment loans—top 20 outstanding	22,132	23,801	21,441
Bank investment loans—other	4,429	3,808	2,289
Lease liabilities (2018 and 2017: Finance leases)	9,876	6,809	9,164
Institutional loan	824	1,492	1,105
Convertible bonds	1,000	1,000	1,000
Related party loan	187	214	241
Total loans and borrowings	**127,938**	**106,038**	**94,557**
Current	16,838	13,598	12,769
Non-Current	111,100	92,440	81,788

K€35,0000 EIB bank loan

On December 20, 2017 the Group entered into a finance contract with the European Investment Bank, or EIB, to finance future research and development programs. As part of a first tranche, an amount of K€10,000 was drawn in the course of 2018. The agreement foresees a first two-years period without loan reimbursements. Loans under the contract are made at a fixed rate, based on the Euribor rate at the time of the borrowing, plus a variable margin. The interest rate for this loan is 2.40%. The contract contains customary security, covenants and undertakings. A second tranche of K€25,000 was drawn in the course of 2019 with an interest rate of 2.72%.

K€28,000 Acquisition loan

This bank loan has been concluded in October 2017 to finance the acquisition of ACTech. The loan includes a portion of K€18,000 reimbursable monthly during seven years, and a bullet portion of K€10,000, reimbursable at once in October 2024. The interest rate is fixed for the duration of the loan, and amounts to 1.1% on average for both portions. The bank loans are secured with a business pledge mandate, a share pledge on Materialise Germany GMBH, and debt covenants.

K€18,000 secured bank loans

The K€18,000 loan has been concluded in 2016 in two agreements to finance the construction of new facilities in Leuven (Belgium) and in Poland, both maturing in 2032. The agreement for the Belgian facility financing amounts to K€12,000 (drawn per end 2018: K€11,739; per end 2017 K€11,739), and with reimbursements only starting in December 2022. The agreement for the Polish facility financing amounts to K€6,000 (fully drawn per end of 2017), and reimbursements have started in June 2019. The average interest rate of both agreements amounts to 1.2%. The bank loan is secured with a mortgage mandate on the Belgian facility buildings.

K€12,300 bank loans

In March 2018, three bank loans originating from the acquired ACTech Group were refinanced entirely for the amount of K€9,300, with adjusted maturity to May 2025 and first reimbursements in August 2020. The interest rate has been fixed at approximately 1.6%, and pledges including a K€4,650 mortgage on ACTech's facilities and a guarantee of Materialise NV. In addition, a new investment credit of K€3,000 was obtained in June 2018, repayable as from January 2019 and with a fixed interest rate of 1.5%.

K€8,750 - Other facility loans

Three facility loans were contracted in 2005, 2006 and 2012 for the construction of Leuven office and production facilities (K€2,000, K€300 and K€5,000, respectively) and another loan for the Czech Republic offices in 2008 (K€1,750). The balance of the four loans amounts to K€3,599 per December 31, 2019. All loans have a repayment schedule of 15 years and interest rates are fixed between 4.3% and 5.4% for the four loans.

Miscellaneous investment loans

The 20 largest of these loans outstanding as at December 31, 2019 amount to a balance of K€22,132. They have been agreed in 2019 and in the years before to finance various investments in machinery, printers, equipment, and software tools. The vast majority of the loans have a reimbursement period over seven years, and are at fixed interest rates with weighted average below 1%.

K€9,876 Lease liabilities included lease with related party

The Group has several lease obligations mainly with financial institutions and related to the financing of buildings and various other items of plant and equipment such as 3D printers. As at December 31, 2019 the balance of these lease agreements amounts to K€9,876, and are mostly at fixed interest rates with weighted average below 2%. The subsidiary Engimplan rents the office and production building from its non-controlling shareholders for a initial term of 10 years, with an extension option for an additional 10 years (assessed not to be reasonable certain to be exercised).. The lease has been accounted for under IFRS 16 resulting in a lease liability at December 31, 2019 of K€617.

K€2,000 institutional loan

This loan was contracted with a governmental institution in Germany to finance the production operations of Materialise Germany for a maximum amount of K€2,000. The loan is repayable over a four year period, starting as of September 2017 with a fixed interest rate of 0.25% payable per quarter. As at December 31, 2019 K€2,000 has been drawn with an outstanding balance of K€824.

K€1,000 convertible bond with related party

We issued, on October 28, 2013, 1,000 convertible bonds with a related party for a total amount of K€1,000. The bonds have been fully subscribed by a member of our senior management.

The conditions of the convertible bond can be summarized as follows:

- Number of convertible bonds: 1,000
- Nominal value per bond: €1,000
- Contractual life: 7 years
- Interest: 3.7% per year
- Conversion period: from January 1, 2017 until maturity
- Conversion price: €1.97 per share

The maximum number of ordinary shares that can be issued upon conversion is 508,904.

The Group has estimated the fair value of a similar liability however without any conversion option by reference to a number of quoted peers in Belgium. The fair value was estimated at K€907. Upon initial recognition, an amount of K€93 was recognized in consolidated reserves reflecting the fair value of the conversion option.

Related party loan

Ailanthus NV has granted us one other loan at fixed interest rate of 4.23% that matures in 2025. The purpose of the loan is to finance the purchase of a building in France. The amounts outstanding as of December 31, 2019 is K€187 (2018: K€214; 2017: K€241). The interest expense for the year ended December 31, 2019 is K€9 (2018:K€10; 2017: K€11).

Changes of liabilities for financing activities:

The following table presents the changes of the liabilities for financing activities:

	For the year ended December 31		
in 000€	2019	2018	2017
At January 1,	**106,038**	**94,557**	**33,806**
Proceeds from loans & borrowings	29,000	32,554	54,319
Repayment of loans & borrowings	(12,126)	(18,820)	(11,904)
New leases	8,326	792	2,906
Repayment of leases	(5,283)	(3,102)	(2,947)
Loans acquired from business combination	2,076	—	18,205
Net foreign exchange movements	(92)	57	172
At December 31,	**127,938**	**106,038**	**94,557**

16 Other non-current liabilities

The other non-current liabilities consist of the following:

in 000€	As of December 31, 2019	2018	2017
Written-put option RapidFit+	—	—	788
Contingent consideration	—	—	648
Provisions	122	82	109
Other	574	786	359
Total	**696**	**868**	**1,904**

We refer to Note 13 for a description of the written-put options RapidFit+.

With respect to the contingent consideration, related to the CENAT acquisition, we refer to Note 4 on business combinations. At December 31, 2018 only a consideration of K€450 remains, recorded under the other current liabilities (see Note 19). Per end of 2018 and 2017 the non-current part of the CENAT contingent consideration amounted to K€0 and K€648, respectively.

The other items in the above table include a liability of K€574 per December 31, 2019 related to the cash settled shared based payment plan as referred to in Note 14 (2018: K€786; 2017: K€351).

The impact of the accounting treatment of the Belgian contribution plans with a minimal guarantee is not material as only a limited number of people can benefit. No provisions have been recognized as of December 31, 2019, 2018 and 2017. As such, no further disclosures have been provided.

17 Tax payables

The tax payables amount to K€3,363 as per December 31, 2019 (2018: K€2,313; 2017: K€2,023) and is mainly related to the tax payables of the entities located in Germany. In Germany a tax unity was set-up in 2018 between Materialise Germany and ACTech.

18 Deferred income

Deferred income consists of the following:

	As of December 31		
in 000€	2019	2018	2017
Deferred maintenance & license	27,667	22,606	18,723
Deferred (project) fees	4,647	4,838	3,765
Deferred government grants	359	338	71
Total	**32,672**	**27,782**	**22,559**
current	27,641	23,195	18,791
non-current	5,031	4,587	3,768

The deferred maintenance and license consist of maintenance fees paid up-front which are deferred and amortized over the maintenance period. The deferred (project) fees consist of one-time and advance payments received which are deferred in accordance with the revenue accounting policies. The deferred government grants are recognized as income under “other operating income”.

We refer to Note 22.1.2 for more detail on the contract liabilities.

19 Other current liabilities

Other current liabilities include the following:

in 000€	As of December 31 2019	2018	2017
Payroll-related liabilities	10,281	10,111	9,274
Non-income tax payables	2,262	2,175	2,063
Accrued charges	1,080	789	769
Advances received	715	713	870
Other current liabilities	3,348	1,554	520
Total	**17,686**	**15,342**	**13,496**

The other current liabilities as per December 31, 2019 include an amount of K€0 (2018: K€450; 2017: K€257) payable in connection with the CENAT business combination (see also Note 4 and Note 16), and a payable for the amount of K€875 (2018: K€845; 2017: K€0) in connection with the written-put options RapidFit+ (see also Note 13 and Note 16), various accruals for K€1,110 and financial liabilities at fair value in respect of the foreign exchange hedges on GBP and JPY and interest rate swaps for K€478.

The non-income tax payables mainly relate to VAT payables and payroll taxes.

20 Fair value

Financial assets

The carrying value and fair value of the financial assets as of December 31, 2019, 2018 and 2017 can be presented as of:

in 000€	Carrying value			Fair value		
	2019	2018	2017	2019	2018	2017
Financial assets						
Debt instruments measured at amortized cost						
Trade receivables (current)	40,977	36,891	35,582	40,977	36,891	35,582
Other financial assets (non-current)	580	1,530	1,221	580	1,530	1,221
Other current non-trade receivables	1,676	1,461	2,001	1,676	1,461	2,001
Cash & cash equivalents	128,897	115,506	43,175	128,897	115,506	43,175
Total debt instruments	**172,130**	**155,388**	**81,979**	**172,130**	**155,388**	**81,979**
Financial assets at fair value through profit or loss						
Derivatives	9	117	218	9	117	218
Convertible loan	2,750	—	—	2,794	—	—
Total financial assets measured at fair value	2,759	117	218	2,803	117	218
Equity instruments designated at fair value through OCI						
Non-listed equity investments	3,046	2,701	—	3,047	2,701	—
Total Equity instruments designated at fair value through OCI	**3,046**	**2,701**	**—**	**3,047**	**2,701**	**—**

The fair value of the financial assets has been determined on the basis of the following methods and assumptions:

- The carrying value of the cash and cash equivalents and the current receivables approximate their fair value due to their short term character;
- The fair value of the derivatives has been determined based on a mark-to-market analysis prepared by the bank based on observable market inputs (level 2 inputs);
- Other current non-trade receivables are being evaluated on the basis of their credit risk and interest rate. Their fair value is not different from their carrying value on December 31, 2019, 2018 and 2017
- The non-listed equity investments, mainly representing the investment in Essentium Inc, are measured at fair value. As of December 31, 2019, management considers that currently the cost is an appropriate estimate of fair value (level 2 input) because a recent capital increase indicated that the market valuation of Essentium Inc. has not changed and because of the followings reasons:
  - Essentium Inc is a non-listed entity;
  - The Group only has an insignificant interest in Essentium Inc (5% of the shares);
  - The Group has no representatives in the Board of Directors of Essentium Inc; and
  - Insufficient more recent information is available to measure fair value;
- The convertible loan granted to Fluidda is measured at fair value. As of December 31, 2019, management considers that the fair value is close to the carrying value (level 3 input). In assessing the fair value, the Group has made significant estimates with regard to the discount rate, the probability of each repayment and conversion scenario and related timing, the amount of the qualified capital increase. Changes in the significant assumptions may lead to a significant increase/decrease in the fair value of the convertible loan. A increase/decrease in the applied discount rate by 2% would lead to a change in fair value by K€-267 / K€298.

Financial liabilities:

The carrying value and fair value of the financial liabilities as of December 31, 2019, 2018 and 2017 can be presented as follows:

in 000€	Carrying value			Fair value		
	2019	2018	2017	2019	2018	2017
Financial liabilities measured at amortized cost						
Loans & Borrowings including lease liabilities	127,939	106,037	94,557	128,930	105,026	95,351
Trade payables	18,517	18,667	15,670	18,517	18,667	15,670
Other liabilities excl. written put option on NCI	3,187	778	1,133	3,187	778	1,133
Total financial liabilities measured at amortized cost	**149,643**	**125,482**	**111,360**	**150,634**	**124,471**	**112,154**
Financial liabilities measured at fair value						
Contingent consideration	—	450	905	—	450	905
Cash settled share based payments	—	786	351	—	786	351
Written put option on NCI	875	845	788	875	845	788
Derivatives	478	194	8	478	194	8
Total financial liability measured at fair value	**1,353**	**2,275**	**2,052**	**1,353**	**2,275**	**2,052**
Total non-current	112,549	94,521	85,276	112,288	93,289	85,890
Total current	38,447	33,236	28,136	39,699	33,457	28,316

The fair value of the financial liabilities has been determined on the basis of the following methods and assumptions:

- The carrying value of current liabilities approximates their fair value due to the short term character of these instruments;
- Loans and borrowings are evaluated based on their interest rates and maturity date. Most interest bearing debts have fixed interest rates and their fair value is subject to changes in interest rates and individual creditworthiness. Their carrying value approximates their fair value;
- The fair value of the derivatives has been determined based on a markt-to-market analysis prepared by the bank based on observatable marketinputs (level 2 inputs);
- The fair value of the written put option on non-controlling interest has been determined based on the present value of the redemption amount (level 3 inputs);
- The fair value of the cash-settled sharebased payments has been determined based on a black-scholes model using inputs that are level 1 (stock-price and risk-free interest rate) as well as level 2 (e.g. volatility). We refer to Note 14.
- The fair value of the (contingent) consideration has been determined based on the latest long-term business plans of the Cenat business (level 3 inputs). Note that the consideration is no longer contingent as per end 2018.

Fair value hierarchy

The Group uses the following hierarchy for determining and disclosing the fair value of financial instruments by valuation technique:

- Level 1: quoted (unadjusted) prices in active markets for identical assets and liabilities;
- Level 2: other techniques for which all inputs which have a significant effect on the recorded fair value are observable, either directly or indirectly; and
- Level 3: techniques which use inputs that have a significant effect on the recorded fair value that are not based on observable market data.

The Group has the following financial instruments carried at fair value in the statement of financial position on December 31, 2019, 2018 and 2017: the derivatives related to interest rate and foreign currency swaps as included in the above tables, a call option and written put option on non-controlling interest, the (contingent) consideration for the acquisition of Cenat and the non-listed equity investments.

21 Segment information

For management purposes, the Group is organized into segments based on their products, services and industry and has the following three reportable segments:

- The Materialise Medical segment, which develops and delivers medical software solutions, medical devices and other related products and services;
- The Materialise Manufacturing segment, which delivers 3D printed products and related services; and
- The Materialise Software segment, which develops and delivers additive manufacturing software solutions and related services.

The measurement principles used by the Group in preparing this segment reporting are also the basis for segment performance assessment and are in conformity with IFRS. The Chief Executive Officer of the Group acts as the chief operating decision maker. As a performance indicator, the chief operating decision maker controls the performance by the Group’s revenue and adjusted EBITDA.

The following table summarizes the segment reporting for each of the reportable periods ending December 31. Corporate research and development, headquarters' function, financing and income taxes are managed on a Group basis and are not allocated to operating segments. As management's controlling instrument is mainly revenue-based, the reporting information does not include assets and liabilities by segment and is as such not available per segment.

in 000€	Materialise Software	Materialise Medical	Materialise Manufacturing	Total segments	Unallocated	Consolidated
For the year ended December 31, 2019						
Revenues	41,654	60,808	94,156	196,618	61	196,679
Segment Adjusted EBITDA	13,812	10,774	12,154	36,740	(10,084)	26,656
Segment Adjusted EBITDA %	33.2%	17.7%	12.9%	18.7%	—	13.6%
For the year ended December 31, 2018						
Revenues	37,374	52,252	94,956	184,582	139	184,721
Segment Adjusted EBITDA	11,536	10,252	10,785	32,573	(9,047)	23,526
Segment Adjusted EBITDA %	30.9%	19.6%	11.4%	17.6%	—	12.7%
For the year ended December 31, 2017						
Revenues	35,770	42,841	63,712	142,323	250	142,573
Segment Adjusted EBITDA	13,926	4,400	4,439	22,765	(8,155)	14,610
Segment Adjusted EBITDA %	38.9%	10.3%	7.0%	16.0%	—	10.2%

The segment Adjusted EBITDA is reconciled with the consolidated net profit (loss) for the year as follows:

in 000€	For the year ended December 31, 2019	2018	2017
Segment Adjusted EBITDA	**36,740**	**32,573**	**22,765**
Depreciation, amortization and impairment	(19,198)	(17,287)	(12,576)
Corporate research and development	(1,859)	(1,913)	(2,017)
Corporate headquarter costs	(11,077)	(10,358)	(9,690)
Other operating income (expense)	2,410	2,149	1,910
Operating profit	**7,016**	**5,164**	**392**
Financial expenses	(3,682)	(4,864)	(4,728)
Financial income	1,377	3,627	3,210
Income taxes	(2,595)	(425)	(522)
Share in loss of joint venture	(392)	(475)	(469)
Net (loss) profit	**1,724**	**3,027**	**(2,117)**

The Group has no customers with individual sales larger than 10% of the total revenue in 2019 (2018: none; 2017: none).

Entity-wide disclosures

The revenue by geographical areas is as follows.

in 000€	As of December 31, 2019	2018	2017
United States of America	56,235	42,217	32,926
Americas other than USA	3,395	1,700	2,194
Belgium	7,917	9,350	8,145
Germany	31,185	30,436	27,011
France	20,110	22,282	18,737
Switzerland	14,907	13,135	7,782
United Kingdom	13,804	11,946	10,911
Italy	6,707	4,392	4,224
Netherlands	5,825	7,382	7,986
Other Europe	17,329	21,455	3,144
Asia Pacific	19,265	20,426	19,513
Total	**196,679**	**184,721**	**142,573**

The total revenue realized in the country of domicile (Belgium) in 2019 amounts to K€7,917(2018: K€9,350; 2017: K€8,145).

The total non-current assets, other than financial instruments, deferred tax assets, by geographical area is as follows:

in 000€	As of December 31, 2019	2018	2017
United States of America (USA)	4,194	3,953	3,880
Americas other than USA	8,374	62	29
Belgium	49,426	48,873	46,573
Germany	57,918	56,096	56,410
Poland	15,506	16,206	15,441
Rest of Europe	10,410	10,125	10,140
Asia-Pacific	2,658	1,039	744
Total	**148,486**	**136,354**	**133,217**

The totals of the above table includes goodwill, intangible assets and property, plant & equipment and Right-of-Use Assets as disclosed in the consolidated statements of financial position.

22 Income and expenses

22.1 Revenue

22.1.1 Disaggregated revenue information

in 000€	For the year ended December 31, 2019 Materialise Software	Materialise Medical	Materialise Manufacturing	Total segments	Unallocated	Consolidated
Geographical markets						
United States of America (USA)	11,188	29,100	15,947	56,235	—	56,235
Americas other than USA	487	2,071	837	3,395	—	3,395
Europe (without Belgium) & Africa	18,767	21,356	69,744	109,867	—	109,867
Belgium	183	2,101	5,572	7,856	61	7,917
Asia Pacific	11,029	6,180	2,056	19,265	—	19,265
Total revenue from contracts with customers	41,654	60,808	94,156	196,618	61	196,679
Type of goods or service						
Software revenue (non-medical)	41,654	—	—	41,654	—	41,654
Software revenue (medical)	—	19,407	—	19,407	—	19,407
Medical devices and services	—	41,401	—	41,401	—	41,401
Manufacturing	—	—	94,156	94,156	—	94,156
Other	—	—	—	—	61	61
Total revenue from contracts with customers	41,654	60,808	94,156	196,618	61	196,679
Timing of revenue recognition						
Goods/Services transferred at a point in time	21,190	45,730	88,988	155,908	61	155,969
Goods/Services transferred over time	20,464	15,078	5,168	40,710	—	40,710
Total revenue from contracts with customers	41,654	60,808	94,156	196,618	61	196,679

in 000€	For the year ended December 31, 2018					
	Materialise Software	Materialise Medical	Materialise Manufacturing	Total segments	Unallocated	Consolidated
Geographical markets						
United States of America (USA)	8,804	23,940	9,439	42,183	34	42,217
Americas other than USA	193	1,404	101	1,698	2	1,700
Europe (without Belgium) & Africa	17,026	19,073	74,852	110,951	77	111,028
Belgium	155	1,824	7,364	9,343	7	9,350
Asia Pacific	11,196	6,011	3,200	20,407	19	20,426
Total revenue from contracts with customers	37,374	52,252	94,956	184,582	139	184,721
Type of goods or service						
Software revenue (non-medical)	37,374	—	—	37,374	—	37,374
Software revenue (medical)	—	17,045	—	17,045	—	17,045
Medical devices and services	—	35,207	—	35,207	—	35,207
Complex metal parts production (ACTech)	—	—	43,438	43,438	—	43,438
Other	—	—	—	—	139	139
Total revenue from contracts with customers	37,374	52,252	94,956	184,582	139	184,721
Timing of revenue recognition						
Goods/Services transferred at a point in time	20,326	39,682	90,614	150,622	139	150,761
Goods/Services transferred over time	17,048	12,570	4,342	33,960	—	33,960
Total revenue from contracts with customers	37,374	52,252	94,956	184,582	139	184,721

The revenue per type of good or service including the previous years is as follows:

in 000€	For the year ended December 31		
	2019	2018	2017
Software revenue (non-medical)	41,654	37,374	35,770
Software revenue (medical)	19,407	17,045	15,619
Medical devices and services	41,401	35,207	27,222
Manufacturing	94,156	94,956	63,712
Other	61	139	250
Total	**196,679**	**184,721**	**142,573**

22.1.2 Contract balances

The following table provides information about receivables, contracts in progress (contract assets) and deferred income (contract liabilities) from contracts with customers.

in 000€	As of December 31,	
	2019	2018
Trade receivables, included in 'trade and other receivables'	42,509	38,764
Contract assets / contracts in progress	495	829
Contract liabilities / deferred income	32,314	27,444
Total	**75,318**	**67,037**

We refer to note 18 for a detail of the deferred income. Note 18 include split of the deferred income in current and non-current. Non-current deferred income, representing mainly maintenance contracts with terms more than one year and certain contracts with up-front fees which are allocated to performance obligations that will be satisfied over more than one year, may be recognized as revenue between one to three years. Total revenue recognized during 2019 that was included in the contract liability at the beginning of the year amounts to K€27,444. There is no revenue recognized during 2019 from performance obligations that were satisfied in the previous years.

The relation between the timing of satisfaction of the performance obligations and the timing of billing resulting in contract assets and liabilities is as follows:

- Maintenance services: maintenance services are typically billed at the beginning of the maintenance period resulting in deferred income that is recognized on a straightline basis over the maintenance period.

- Software licenses: certain software licenses may have been billed prior to the delivery of the software key resulting in a deferred income balance.
- Certain agreements in the medical segment include up-front fees such as step-in fees or milestone payments which are billed at inception of the contract but which are allocated to performance obligations which are satisfied at a later time in the contract term or which have not been recognized considering the revenue contraint (i.e. may have to be credited when customer achieves certain volume targets). In addition, certain contracts include prepaid fees for volume “Plan Only” purchases for which the purchased services are only delivered during a one year period. Those fees result in deferred income which are recognized as revenue when services/products are delivered and revenue is not constrainted.
- Certain development services are satisfied while the services can only billed at certain pre-defined points in time or when the services are fully satisfied resulting in contracts in progress / contract assets.

22.2 Cost of sales

Cost of sales include the following selected information:

in 000€	For the year ended December 31 2019	2018	2017
Purchase of goods and services	(37,870)	(39,114)	(34,480)
Amortization and depreciation	(10,837)	(9,910)	(7,560)
Payroll expenses	(37,715)	(33,036)	(20,806)
Other expenses	(550)	(239)	(106)
Total	**(86,972)**	**(82,299)**	**(62,952)**

22.3 Research and development expenses

Research and development expenses include the following selected information:

in 000€	For the year ended December 31 2019	2018	2017
Purchase of goods and services	(2,583)	(3,590)	(3,140)
Amortization and depreciation	(1,483)	(830)	(686)
Payroll expenses	(19,219)	(17,935)	(16,054)
Other	(63)	(61)	(79)
Total	**(23,348)**	**(22,416)**	**(19,959)**

22.4 Sales and marketing expenses

Sales and marketing expenses include the following selected information:

in 000€	For the year ended December 31 2019	2018	2017
Purchase of goods and services	(9,228)	(9,775)	(8,035)
Amortization and depreciation	(1,346)	(725)	(505)
Payroll expenses	(42,055)	(35,585)	(30,175)
Other	(360)	(218)	(220)
Total	**(52,989)**	**(46,303)**	**(38,935)**

22.5 General and administrative expenses

General and administrative expenses include the following selected information:

in 000€	For the year ended December 31 2019	2018	2017
Purchase of goods and services	(9,856)	(9,892)	(7,053)
Amortization and depreciation	(3,630)	(3,828)	(2,761)
Payroll expenses	(18,078)	(18,442)	(14,858)
Other	(222)	(148)	(204)
Total	**(31,786)**	**(32,310)**	**(24,876)**

22.6 Net other operating income

The net other operating income can be detailed as follows:

in 000€	For the year ended December 31 2019	2018	2017
Government grants	5,263	4,658	4,342
Amortization intangibles purchase price allocation	(2,013)	(1,994)	(1,064)
Allowance for doubtful debtors	210	(1,065)	(454)
Capitalized expenses (asset construction)	166	16	123
Net foreign currency exchange gains / (losses)	—	246	(235)
Tax Credits	665	706	899
Fair value adjustment Cenat liability	—	192	—
Personnel related income	37	168	—
Other	1,104	844	930
Total	**5,432**	**3,771**	**4,541**

The Company has received government grants from the Belgian federal and regional governments and from the European Community in the forms of grants linked to certain of its research and development programs and reduced payroll taxes.

22.7 Payroll expenses

The following table shows the breakdown of payroll expenses for 2019, 2018 and 2017:

in 000€	For the year ended December 31 2019	2018	2017
Short-term employee benefits	(87,775)	(76,023)	(60,195)
Social security expenses	(15,647)	(14,139)	(11,200)
Expenses defined contribution plans	(1,033)	(936)	(926)
Other employee expenses	(12,612)	(13,900)	(9,572)
Total	**(117,067)**	**(104,998)**	**(81,893)**
Total registered employees at the end of the period	2,177	2,009	1,862

22.8 Financial expenses

Financial expenses includes the following selected information:

in 000€	For the year ended December 31 2019	2018	2017
Interest expense	(2,146)	(1,747)	(1,026)
Foreign currency losses	(832)	(2,748)	(3,131)
Other financial expenses	(704)	(369)	(571)
Total	**(3,682)**	**(4,864)**	**(4,728)**

22.9 Financial income

Financial income includes the following selected information:

in 000€	For the year ended December 31 2019	2018	2017
Foreign currency exchange gains	955	3,047	2,830
Amortization discount interest free loans	—	—	6
Other finance income	422	580	374
Total	**1,377**	**3,627**	**3,210**

22.10 Income taxes and deferred taxes

Current income tax

The following table shows the breakdown of the tax expense for 2019, 2018 and 2017:

in 000€	As of December 31, 2019	2018	2017
Estimated tax liability for the year	(2,926)	(1,216)	(1,530)
Tax adjustments to the previous year	—	—	412
Deferred income taxes	331	791	596
Total income taxes for the period	**(2,595)**	**(425)**	**(522)**

The current tax expense is equal to the amount of income tax owed to the tax authorities for the year, under the applicable tax laws and rates in effect in the various countries. The estimated tax liability is mainly due in Germany.

Deferred tax

Deferred tax is presented in the statement of financial position under non-current assets and non-current liabilities, as applicable. The following table shows the breakdown of the deferred tax assets, deferred tax liability and the deferred tax expense for 2019, 2018 and 2017:

in 000€	Asset/(liability) 2019	2018	2017	Income/(expense) 2019	2018	2017
Tax losses, notional interest deduction and other tax benefits	—	26	—	—	—	—
Amortization development assets and other intangible assets	38	224	304	—	—	—
Depreciation property, plant & equipment	70	30	—	—	—	—
Other items	84	35	—	—	—	—
Total deferred tax assets	**192**	**315**	**304**	**(124)**	**11**	**(32)**
Property, plant & equipment	(403)	(694)	(698)	—	**—**	**—**
Intangible assets	(4,937)	(5,370)	(6,656)	—	—	—
Investment grants	(301)	(312)	—	—	**—**	**—**
Inventory valuation	(89)	141	—	—	**—**	**—**
Other items	(17)	9	(61)	—	—	—
Total deferred tax liabilities	**(5,747)**	**(6,226)**	**(7,415)**	**455**	**780**	**628**
Total deferred tax income (loss)	**—**	**—**	**—**	**331**	**791**	**596**

The Group has unused tax losses, tax credits and notional interest deduction available in an amount of K€37,440 for 2019 (2018: K€25,285; 2017: K€11,948) of which K€25,172 for 2019 (2018: K€15,592; 2017: K€4,581) relating to Materialise NV. As at December 31, 2019 no unused notional interest deduction remains (2018: K€0; 2017: K€315), the amount remaing from previous periods has expired.

With respect to the unused tax losses of Materialise NV, no deferred tax assets have been recognized given that in view of the Belgian Patent Income Deduction and Innovation Income Deduction there is an uncertainty to which extent these tax losses will be used in future years. As from July 1, 2016, the new Innovation Income Deduction replaces the former Patent Income Deduction. Under the grandfathering rule the Patent Income Deduction system can still be applied until June 30, 2021. The Belgian Patent Income Deduction allows companies to deduct 80% of the qualifying gross patent income from the taxable basis. Under the Innovation Income Deduction system, companies can deduct up to 85% of their net innovation income from the taxable basis. Based on its analysis, in 2019 the Company has assessed that no deferred tax asset should be accounted for with respect to its unused tax losses in Belgium.

With respect to the net tax losses of the other entities in the Group no deferred taxes have been recognized in 2019 (2018: K€26; 2017: K€0). The deferred tax liability of K€5,747 in the year ending December 31, 2019 mainly relates to the intangibles that have been recognized as part of the purchase price allocation (ACTech).

Relationship between Tax Expense and Accounting Profit

	For the year ended December 31		
in 000€	2019	2018	2017
Profit (loss) before taxes	4,319	3,452	(1,595)
Income tax at statutory rate of 29.58% (2017: 33.99%)	(1,278)	(1,021)	542
Effect of different local tax rate	63	166	433
Tax adjustments to the previous period	(367)	80	412
Non-deductible expenses	(554)	(1,141)	(818)
Capitalized initial public offering transaction costs	—	—	—
Research and development tax credits & patent income deduction	179	337	44
Notional interest deduction Belgium	—	—	—
Non recognition of deferred tax asset	(1,579)	(546)	(1,505)
Recognition of deferred tax assets on previous years tax losses	119	653	—
Non-taxable income	925	606	556
Use of previous years tax losses and tax credits for which no deferred tax assets was recognized	—	—	12
Taxes on other basis	—	280	(117)
Other	(103)	161	(81)
Income tax expense as reported in the consolidated income statement	**(2,595)**	**(425)**	**(522)**

23 Earnings per share

Basic earnings per share amounts are calculated by dividing the net profit (loss) for the year attributable to ordinary equity holders of the parent company by the weighted average number of ordinary shares outstanding during the year.

Diluted earnings per share amounts are calculated by dividing the net profit (loss) attributable to ordinary equity holder of the parent company by the weighted average number of ordinary shares outstanding during the year plus the weighted average number of ordinary shares that would be issued on conversion of all warrants.

The net profit (loss) for the year used for the basic and diluted earnings per share are reconciled as follows:

	For the year ended December 31		
in 000€	2019	2018	2017
Net profit attributable to ordinary equity holders of the parent for basic earnings	**1,646**	**3,027**	**(2,117)**
Interest on convertible bonds	50	50	—
Net profit attributable to ordinary equity holders of the parent adjusted for the effect of dilution	**1,696**	**3,077**	**(2,117)**

The convertible bond and the warrants are dilutive as per December 31, 2019 and 2018 but are anti-dilutive as per December 31, 2017. We refer to Notes 14 and 15 for information on the number of instruments that could potentially be dilutive but which were not considered in the calculation above.

The following reflects the share data used in the basic and diluted earnings per share computations:

in 000	For the year ended December 31 2019	2018	2017
Weighted average number of ordinary shares for basic earnings per share	**52,915**	**49,806**	**47,325**
Effect of dilution:			
Share options	563	382	—
Convertible loan	509	509	—
Weighted average number of ordinary shares adjusted for effect of dilution	**53,987**	**50,697**	**47,325**

The earnings per share are as follows:

	For the year ended December 31 2019	2018	2017
Earnings per share attributable to the owners of the parent			
Basic	0.03	0.06	(0.04)
Diluted	0.03	0.06	(0.04)

24 Commitments and contingent liabilities

Operating lease commitments

The Group has operating lease commitments mainly related to cars and equipment as follows:

in 000€	As of December 31, 2019	2018	2017
Within one year	28	2,053	1,721
Between one and three years	49	2,302	1,504
Between four and five years	—	785	406
More than five years	—	302	77
Total	**77**	**5,442**	**3,708**

The total lease payments recognized in the consolidated income statement are K€725 in 2019 (2018: K€2,956; 2017: K€2,909).

Finance lease commitments (only valid for 2017 and 2018)

The Group has finance leases for the building and various other items of plant and equipment. Future minimum lease payments under finance lease with the present value of the net minimum lease payments are as follows:

in 000€	December 31, 2019 Minimum lease payments	Present value of payments	December 31, 2018 Minimum lease payments	Present value of payments	December 31, 2017 Minimum lease payments	Present value of payments
Within one year	—	—	2,876	2,829	3,179	3,034
Between two and three years	—	—	3,398	3,236	5,017	4,643
Between four and five years	—	—	655	604	1,361	1,269
More than five years	—	—	149	140	285	218
Total	**—**	**—**	**7,078**	**6,809**	**9,842**	**9,164**
Less finance charges	—	—	(269)	—	(678)	—
Present value of minimum lease payments	—	—	6,809	6,809	9,164	9,164

Mortgages and pledges

The Group has several loans secured by a mortgage on the building. The carrying value of related property, plant & equipment (including buildings under construction) is K€29,154 (2018: K€30,853; 2017: K€28,526). The total outstanding mortgages and pledges are K€77,849 in 2019 (2018: K€124,428; 2017: K€85,186).

Included in the above, the Group also has pledges on the business goodwill ("fonds de commerce") of the Company for a total amount of K€36,992 in 2019 (2018: K€70,300; 2017: K€29,000) and pledges on other fixed assets for a total amount of K€3,301 (2018: K€21,142; 2017: K€6,383).

Other commitments

The Group has outstanding non-cancellable contracts with a future commitment of K€11,640 at December 31, 2019 (2018: K€6,383; 2017: K€7,638), mainly related to purchase commitment for raw materials. For property, plant & equipment, we have no committed expenditures as per December 31, 2019 (2018: K€0; 2017: K€672).

Contingent liabilities

The Group is currently involved in a legal proceeding with Dentsply Implants NV regarding the alleged wrongful termination of a supply agreement between the Company and Dentsply Implants NV entered into in 2010. The court of first instance ruled in favor of Dentsply Implants NV, that we have wrongfully terminated the relationship. We have appealed this decision before the court has pronounced itself on the monetary damages. The amount of damages which Dentsply Implants NV is claiming is K€2,700. While we are confident that the first instance decision will be overruled, we believe that, in the event that the first instance decision would be confirmed, the amount of monetary damages that we would be exposed to will not have a material impact on our business, financial conditions or result of operations. We are currently not a party to, and we are not aware of any threat of, any other legal proceedings, which, in the opinion of our management, is likely to have or could reasonably possibly have a material adverse effect on our business, financial condition or results of operations. As a result management concluded that no provision is required.

25 Risks

The Group is mainly exposed to liquidity risk, interest rate risk and credit risk.

Foreign exchange risk

The Group transacts business globally and is subject to risks associated with fluctuating foreign exchange rates. The geographic areas outside of the Eurozone to which it sells its products and services are generally not considered to be highly inflationary. In the years ended December 31, 2019, 2018 and 2017, 29%, 30% and 31% of our revenue, respectively, was derived from sales in a currency different from the euro. Receivables denominated in a foreign currency are initially recorded at the exchange rate at the transaction date and subsequently remeasured in euro based on period-end exchange rates. Transaction gains and losses that arise from exchange rate fluctuations are charged to income.

The Group has primarily exposure to the USD, GBP, BRL and JPY as foreign currency.

During 2019 the impact of changes in foreign currency rates on the cash and term accounts held in USD funded through the initial public offering proceeds was positive for an amount of K€553.

If the USD (rate for 1 EUR) would have appreciated by 10%, the net result would have been K€895 higher, excluding the effect of the cash and term accounts held in USD. If the USD (rate for 1 EUR) would have depreciated by 10%, the net result would have been K€780 lower, excluding the effect of the cash and term accounts held in USD.

To limit the exposure to foreign currency rate fluctuations on GBP and JPY, the Group has entered into currency rate swaps as of 2017. We refer to note 20.

Liquidity risk

The liquidity risk is that the Group may not have sufficient cash to meet its payment obligations. This risk is countered by day-by-day liquidity management at the corporate level. The Group has historically entered into financing and lease agreements with financial institutions to finance significant projects and certain working capital requirements. The Group has no longer undrawn lines of credit at December 31, 2019 (2018: K€26,040; 2017: K€4,473).

On September 29, 2017 KBC Bank and Materialise agreed on a credit facility, mainly related to the financing of the ACTech acquisition, in which debt covenants were determined based on the ratio of the Group's total net financial debt over EBITDA.

On December 20, 2017, the European Investment Bank (EIB) and Materialise entered into a finance contract to support Materialise's ongoing research and development programs for growth from 2017 to 2020. The contract provides a credit of up to €35.0 million drawable in two tranches. The first tranche could not exceed €25.0 million and could be drawn during the first year of the contract. The Group actually has drawn €10.0 million of this first tranche in the course of 2018. The second tranche of €25.0 million was drawn in July 2019. The duration of the loan will be between six to eight years starting from the disbursement of the respective tranches, and includes a two-year loan reimbursement grace period. Loans under the contract will be made at a fixed rate, based on the Euribor rate at the time of the borrowing, plus a variable margin. The interest rate for the first tranch is initially equal to 2.4% . The interest rate for the second tranch is initially 2.72% and varies in function of certain EBITDA levels and debt ratios. The contract contains customary security, covenants and undertakings.

The range of contracted obligations are as follows:

in 000€	Less than 1 year	2 to 3 years	4-5 years	More than 5 years	Total
At December 31, 2019					
Loan & borrowings	14,300	33,034	41,672	34,447	123,453
Lease liabilities	3,685	4,907	1,040	720	10,352
Trade payables	18,517	—	—	—	18,517
Other current liabilities and advances received	4,063	—	—	—	4,063
Total	**40,565**	**37,941**	**42,712**	**35,167**	**156,385**

	Less than 1 year	2 to 3 years	4-5 years	More than 5 years	Total
At December 31, 2018					
Loan & borrowings	14,491	42,100	33,636	23,870	114,097
Trade payables	18,667	—	—	—	18,667
Other current liabilities	2,267	—	—	—	2,267
Total	**35,425**	**42,100**	**33,636**	**23,870**	**135,031**

	Less than 1 year	2 to 3 years	4-5 years	More than 5 years	Total
At December 31, 2017					
Loan & borrowings	14,331	37,933	22,286	32,699	107,249
Trade payables	15,670	—	—	—	15,670
Other current liabilities	1,390	—	—	—	1,390
Total	**31,391**	**37,933**	**22,286**	**32,699**	**124,309**

Interest rate risk

Although the Group mainly has loans outstanding with a fixed interest rate, some of the loans have been contracted with variable interest rates. The most significant loans with variable interest rates have been secured by means of a variable to fixed interest rate swap. We therefore believe that the Group is not subject to immediate changes in interest rates. With respect to the interest rate swaps, we refer to note 20.

Credit risk

Credit risk is the risk that third parties may not meet their contractual obligations resulting in a loss for the Group. The Group is exposed to credit risk from its operating activities (primarily trade receivables) and from its financing activities, which are mainly deposits with financial institutions. The Group limits this exposure by contracting with credit-worthy business partners or with financial institutions which meet high credit rating requirements. In addition, the portfolio of receivables is monitored on a continuous basis.

Trade receivables and contracts in progress

Customer credit risk is managed by each business unit subject to the Group’s established policy, procedures and controls relating to customer credit risk management.

An impairment analysis is performed at each reporting date per company and using a provision matrix per company to measure expected credit losses. The provision rates are based on days past due for groupings of various customer segments with similar loss patterns (i.e., by legal entity).

The calculation reflects the probability-weighted outcome, the time value of money and reasonable and supportable information that is available at the reporting date about past events, current conditions and forecasts of future economic conditions. Generally, trade receivables are written-off if past due for more than one year and are not subject to enforcement activity. The maximum exposure to credit risk at the reporting date is the carrying value of each class of financial assets at amortized cost or fair value through OCI as disclosed in Note 20. The Group does not hold collateral as security.

The Group evaluates the concentration of risk with respect to trade receivables as low, as its customers are located in several jurisdictions and industries and operate in largely independent markets.

Set out below is the information about the credit risk exposure on the Group's trade receivables using a provision matrix:

in 000€	Total	Non-due	Less than 30 days	31-60 days	61-90 days	91-180 days	More than 181 days
December 31, 2019	40,977	31,528	4,924	2,094	733	981	717
December 31, 2018	36,891	26,208	5,395	1,479	931	1,512	1,366
December 31, 2017	35,582	21,630	6,920	1,765	1,526	1,614	2,127

Capital management

The primary objective of the Group's shareholders' capital management strategy is to ensure it maintains healthy capital ratios to support its business and maximize shareholder value. Capital is defined as the Group shareholder's equity.

The Group consistently reviews its capital structure and makes adjustments in light of changing economic conditions. The Group made no changes to its capital management objectives, policies or processes during the years ended December 31, 2019, 2018 and 2017.

26 Related party transactions

The compensation of key management personnel of the Group is as follows:

in 000€	For the year ended December 31 2019	2018	2017
Short-term employee benefits	2,394	2,334	2,190
Post-employment benefits	85	80	80
Total	**2,479**	**2,414**	**2,270**
Warrants granted	—	—	—
Warrants outstanding	359,266	557,935	573,980

The amounts disclosed in the table are the amounts recognized as an expense during the reporting period related to key management personnel (senior management and executive committee members). In the year ending December 31, 2019 the compensation to key management by means of share based payments amounts to K€214.

The following table provides the total amount of transactions that have been entered into with related parties for the relevant financial year:

in 000€	Sale of goods to	Purchases from	Depreciation	Interest expense	Right-of-Use Assets	Receivables	Lease liabilities	Other liabilities
Non-executive directors of the group								
2019	—	128	—	37	—	—	—	1,053
2018	—	123	—	51	—	—	—	1,038
2017	—	96	—	50	—	—	—	965
Shareholders of the group								
2019	—	113	—	9	—	—	—	131
2018	—	123	—	10	—	—	—	261
2017	—	172	—	11	—	—	—	371
Joint ventures								
2019	1,431	—	—	—	—	1,279	—	—
2018	1,156	241	—	—	—	1,281	—	22
2017	714	23	—	—	—	804	—	28
Non-controlling interests								
2019	—	—	26	9	617	—	652	—
2018	—	—	—	—	—	—	—	—
2017	—	—	—	—	—	—	—	—

Related party – Ailanthus NV

Ailanthus is a shareholder and director of the group. The Group rent apartments on a regular basis from Ailanthus NV in order to host our employees from foreign subsidiaries who are visiting our headquarters in Leuven. The total amount paid to Ailanthus NV for rent in 2019 was K€113 (2018: K€123; 2017: K€172).

Related party – shareholders of Engimplan (non-controlling interest)

The subsidiary Engimplan rents the office and production building from its non-controlling shareholders for a initial term of 10 years, with an extension option for an additional 10 years (assessed not to be reasonable certain to be exercised). The monthly lease payment amount to K€7. The lease has been accounted for under IFRS 16 resulting in a lease liability at December 31, 2019 of K€617.

Related party – Convertible debt

The Group has issued on October 28, 2013 1,000 convertible bonds for a total amount of K€1,000. The bonds have been fully subscribed by a member of our senior management. We refer to Note 15 for more details.

Joint ventures

The receivable for the amount of K€1,279 is accounted for under the other non-current assets and trade receivables and relates to the services and goods delivered to the joint venture RSPRINT. In the course of 2018 the Group also purchased a 3D printer from RSPRINT for the amount of K€200.

27 Events subsequent to the statement of financial position date

Impact of coronavirus

The outbreak of a novel coronavirus, was first identified in December 2019 in Wuhan, China, and has since spread globally. In response to the pandemic, governments worldwide have closed business, restricted travel and implemented emergency quarantines, and businesses and individuals have reduced travel, cancelled meetings and events and implemented of work-from-home policies, which have caused significant disruption to the global economy and normal business operations. The coronavirus public health crisis is expected to have broader macroeconomic implications, including a decrease in or halt to economic growth, the effects of which could be long lasting.

In an effort to protect the health and safety of employees, we, and many of our customers, partners, suppliers and other counterparties, currently require that employees work from home and restrict travel as much as possible, which affects, amongst other things, their ability to attend industry events and to engage in commercial visits. In the event we or our customers, partners, suppliers and other counterparties maintain or expand these restrictions, we may suffer disruptions to business operations including the closure of manufacturing facilities, warehouses and logistics supply chains worldwide. Furthermore, the coronavirus and the responses thereto could have a range of other effects on us. For example, the implementation of business continuity plans in a fast-moving public health emergency could have an adverse effect on our internal controls (potentially giving rise to significant deficiencies or material weaknesses) and increase our vulnerability to information technology and other systems disruptions.

As of April 30, 2020, we are unable to predict the duration and severity of the spread of the coronavirus and the political and economic responses thereto and as a result, we are unable to assess with certainty its impact on our business and operations, results of operations, financial condition, cash flows and liquidity. The coronavirus and related responses are developing rapidly, making their impact highly uncertain, and are subject to many factors beyond our control, such as the speed of contagion, the implementation of effective preventative and containment measures, the development of effective medical solutions, the timing and scope of governmental restrictions on public gatherings, mobility and other activities, financial and other market reactions, and reactions and responses of the public. While we expect we will suffer adverse effects, the more severe the outbreak is and the longer it lasts, the effects on us and our business will be more materially adverse.

Based on our current assessment of the COVID-19 pandemic, we have considered various hypothetical scenarios on how our business, results of operations, and financial condition could be impacted during the year 2020. In these scenarios we take the general view, but without any certainty as we are reviewing the situation constantly, that our business will be impacted very significantly in the second quarter of 2020, and will subsequently continue to be weak for the rest of the year, although that our current assessment of the situation is that our business may gradually improve during the remainder of 2020. However, in the current situation, in view of the many uncertainties of this unprecedented crisis, we find it very hard to gain any visibility beyond the second quarter.

The Materialise software segment, represented 24% of the total sales exiting 2019 and had an Adjusted EBITDA margin of 33.2% in 2019. We believe that an important part of the software sales of our Materialise software segment are, at least temporarily, at risk. A significant portion of the sales of this segment comes from parties that either sell or use 3D printing systems. The weakness of the 3D printing industry in general is expected to weigh very negatively on 3D printing system sales and thus also on our software sales, definitely in the second quarter of 2020 with a possible extension into the second half of 2020.

The Materialise medical segment, which represented 34% of the total sales exiting 2019 and had an Adjusted EBITDA margin of 17.7% in 2019, designs, produces and sells customized implants, surgical guides and models as well as visualization and planning software to research institutes, universities, medical device companies and hospitals. A significant percentage of this segment’s revenue stems, directly or indirectly, from elective surgeries, almost all of which are now being postponed due to the U.S. Centers for Disease Control and Prevention, or CDC, guidelines, which require hospitals to prioritize preparation for and response to the pandemic. As a result, these revenues (and at least the timing thereof) become uncertain, which will result in a significant reduction of sales of our Materialise medical segment, definitely in the second quarter of 2020, and possibly in the next quarters as well, depending on how the pandemic evolves.

The remaining 42% of the total sales exiting 2019 comes from the Materialise manufacturing segment, which operates as part of the overall manufacturing sector in Europe, which includes subsectors such as automotive, aviation, machine parts and consumer products, all of which are heavily impacted by the coronavirus crisis. The European automotive market was particularly weak before the COVID-19 outbreak, and we now expect an even slower recovery than previously estimated. Other European industrial subsectors are not faring much better in this market and will likely face larger declines than previously expected. Order intake within the Materialise manufacturing segment has been slowing down, which will significantly impact the segment’s second quarter results and which may impact the results beyond this quarter, as a function of how the crisis develops in general and how the industry as a whole, and our customers in particular, subsequently recover from the situation.

We also expect an increase of bad debt, delay in trade payments, and that we will not be able to adjust and align all of our costs according to the expected decrease of revenue. We experienced the first negative effects of this crisis on our revenues in the first quarter of 2020. In these analyses, we considered a major negative impact in the second quarter, and only a gradual and partial recovery in the third and fourth quarter of this year. From these analyses, we conclude that (according to the currently most likely scenarios), the going concern principle should be maintained, and that the principle covenants of our credit facilities (at EIB and KBC), 'minimum cash' and 'Net Debt / Adjusted EBITDA', will not be violated. We believe that the expected situation does not impact the current valuation of our inventories, investments, intangible assets (including goodwill), long-lived assets, or our debt.

While we continue to monitor the situation regularly, we believe that eventually the 3D printing industry will recover and may even come out of this crisis stronger, as the crisis appears to be underscoring certain advantages of the 3D printing technology, in particular its flexibility in terms of part design, speed, production of smaller strategic batches and localization. Therefore, while we try to adjust our costs and capital spending in proportion to the short term reduction of our revenues, we currently take the view that these cost and spending reductions should, where possible, be as moderate and temporary as possible, since we believe that continued innovation during the current crisis may give us a competitive advantage going forward. This strategy involves significant risks, including risks in terms of its impact on our cash position, and as the crisis lasts longer, we may not be able to sustain this strategy and it might have negative implications for our long term competitive position.

Warrant exercises

In connection with the exercise of 21,750 warrants, representing 21,750 shares, from the 2015 warrant plan in the course of March 2020, the share capital was raised for the amount of K€1 and the share premium was raised for the amount of K€140 by deed before the notary on April 16, 2020 (we refer to Note 14 for further information about the share based payment plans). As per April 16, 2020 the funds received in connection with the exercise of the warrants (K€140) were accounted for on a restricted bank account classified under the Cash and Cash Equivalents.

There are no other significant events subsequent to the statement of financial position date that would require adjustments or disclosures to the financial statements.

28 Overview of consolidated entities

Name	Country of incorporation	% equity interest 2019	2018	2017
Materialise NV	Belgium	100%	100%	100%
Materialise France SAS	France	100%	100%	100%
Materialise GmbH	Germany	100%	100%	100%
Materialise Japan K.K.	Japan	100%	100%	100%
Materialise Czech Republic SRO	Czech Republic	100%	100%	100%
Materialise USA, LLC	United States	99%	99%	99%
Materialise UK Limited	United Kingdom	100%	100%	100%
OBL SAS	France	100%	100%	100%
Materialise Austria GmbH	Austria	100%	100%	100%
Materialise Malaysia SDN. Bhd.	Malaysia	100%	100%	100%
Materialise Ukraine LLC	Ukraine	100%	100%	100%
RapidFit NV	Belgium	83%	83%	83%
Meridian Technique Limited	United Kingdom	100%	100%	100%
OrthoView Holdings Limited	United Kingdom	100%	100%	100%
Meridian (Corporate Trustee) Limited (liquidated)	United Kingdom	—	—	100%
OrthoView Limited (liquidated)	United Kingdom	—	—	100%
Materialise SA	Poland	100%	100%	100%
Materialise Colombia SAS	Colombia	100%	100%	100%
RSPRINT powered by Materialise NV (joint venture)	Belgium	50%	50%	50%
Materialise Shanghai Co.Ltd	China	100%	100%	100%
Engimplan Engenharia de Implante Industria & Comércio Ltda	Brazil	75%	—	—
Engimplan Holding Ltda	Brazil	100%	—	—
Materialise Australia PTY Ltd	Australia	100%	100%	100%
Materialise S.R.L.	Italy	100%	100%	100%
ACTech GmbH	Germany	100%	100%	100%
ACTech Holding GmbH	Germany	100%	100%	100%
ACTech, Inc	United States	100%	100%	100%

The entities Materialise GmbH, Gilching, Germany, ACTech Holding GmbH, Freiberg / Saxony, Germany and ACTech GmbH, Freiberg / Saxony, Germany, have taken advantage of the exemption regulations of § 264 (3) HGB (German Commercial Code) for the financial year ending December 31, 2019.

29 Non-GAAP Measures

EBITDA and Adjusted EBITDA is used in the Note 21 Segments as one of the basis of the Segments performance measurement. We calculate EBITDA as net profit plus income taxes, financial expenses (less financial income), depreciation and amortization, and share in loss of joint venture. We calculate Adjusted EBITDA by adding non-recurring initial public offering related expenses, non-cash share-based compensation expenses and acquisition-related expenses of business combinations to EBITDA.

RESTATED ARTICLES OF ASSOCIATION

on 16 April 2020

1. Name - duration - registered office - object

ARTICLE 1: Name.

The company has the legal form of a public limited company and is named **"MATERIALISE"**.

It is a company which makes or has made a public offering.

ARTICLE 2: Duration.

The company is established for an indefinite period, starting on 28 June 1990.

Except in the case of legal dissolution, the company may only be dissolved by the extraordinary general meeting, taking the requirements for amendments to the articles of association into account.

ARTICLE 3: Registered office.

The company's registered office is established in 3001 Heverlee, Technologielaan 15.

The registered office may be transferred within the Dutch language area or to the Brussels language area of Belgium without any amendment to the articles of association, following a decision by the Board of Directors. Such decision shall be published.

Furthermore, the Board of Directors shall be authorized to record the amendment to the Articles of Association resulting from the transfer of the registered office by notarial deed.

ARTICLE 4: Object.

The company's object is as follows: the research, development and commercialization of additive manufacturing and related technologies and all related service, engineering and holding activities. All these activities should be interpreted in the broadest sense.

The company acts for its own account, on consignment, on commission, as an intermediary or as an agent.

The company also has the following additional object:

- the purchase, sale, exchange, construction, renovation, commercialization, furnishing, exploitation, letting, sub-letting, management, maintenance, parcelling, horizontal division and placement under compulsory co-ownership, leasing, prospection and promotion in any form of all immovable property or immovable property rights.
- Investing in, subscribing to, taking over, placing, purchasing, selling and trading all securities issued by Belgian or foreign companies, whether or not in the form of commercial companies, administrative offices, institutions and associations, as well as managing these investments and participations;
- providing advice, management and any other services to all affiliated companies or companies in which the company has a participating interest, in its capacity as director, liquidator or otherwise, as well as running or exercising control over these companies.

It may, either in cash or in kind, by means of a merger, subscription, participation, financial intervention or in any other way, acquire an interest in all existing companies or companies to be incorporated, whether in Belgium or abroad, with an identical or similar object or an object related to its own, or which is likely to promote the realization of its object.

In general, the company may perform all acts of a civil and commercial, movable, immovable, industrial nature which are directly or indirectly, whether in whole or in part, related to its object.

2. Capital

ARTICLE 5: Capital and shares

The registered capital amounts to three million sixty-seven thousand seven hundred and seventy-two cents (3,067,700.72 EUR), represented by fifty-three million one hundred ninety-four thousand two hundred and sixty-three (53,194,263) shares, without designation of nominal value, each representing an equal share in the capital.

The capital has been subscribed to and paid up in full and unconditionally.

ARTICLE 6: Authorized capital

a) By decision of the general meeting of shareholders of 23 April 2014, which will enter into force on the day of publication of the decision in the Annexes to the Belgian Official Gazette, the Board of Directors was granted the authority to increase the share capital in one or more rounds up to a maximum total amount equal to the amount of the share capital after the confirmation of the realization of the "First Capital Increase", as referred to in the second decision of the general meeting of shareholders held on 23 April 2014 (the "**First Capital Increase"**).

The Board of Directors may only exercise the powers granted to it for a period of five (5) years from the publication of this authorization in the Annexes to the Belgian Official Gazette.

This authorization may be renewed in accordance with the applicable legal conditions.

On 5 March 2015, the Board of Directors of the company decided to increase the company's registered capital within the framework of the authorized capital, by an amount of four thousand six hundred and twenty-six euros and fifty cents (4,626.50 EUR), thereby increasing the available amount of the authorized capital to two million seven hundred and ten thousand eight euros and thirty-three cents (2,710,008.33 EUR).

On 18 December 2015, the Board of Directors of the company also decided to increase the capital within the framework of the authorized capital, under the suspensive condition of full or partial exercise of the previously issued one million four hundred thousand (1,400,000) "Warrants 2015", and determined that the authorized capital may not be used for an amount of eighty thousand seven hundred and thirty-eight euros (80,738 EUR), i.e. the maximum amount of the aforementioned capital increase (excluding the issue premium) as long as the capital increase resulting from the exercise of the aforementioned warrants has not been confirmed and/or the period within which they can be exercised has not expired.

On 18 July 2018, the Board of Directors of the company decided to increase the company's registered capital within the framework of the authorized capital, which on 26 July 2018 was fixed at an amount for the capital increase of one hundred and seventy-three thousand and nine euros and nineteen cents (173,009.19 EUR), which resulted in an increase in the available amount of the authorized capital to two million four hundred and fifty-six thousand two hundred and sixty-thirds euros and fourteen cents (2,456,261.14 EUR).

On 19 July 2018, the Board of Directors of the company decided to increase the company's registered capital within the framework of the authorized capital for an amount of one hundred and twelve thousand six hundred and thirty-six euros twenty cents (EUR 112,636.20), which resulted in an increase in the available amount of the authorized capital to two million three hundred and forty-three thousand six hundred and twenty-four euros and ninety-four cents (2,343,624.94 EUR).

On 18 July 2018, the Board of Directors of the company decided to increase the company's registered capital within the framework of the authorized capital, which on 27 July 2018 was fixed at an amount for the capital increase of twenty-five thousand nine hundred and fifty-three euros and thirty-eight cents (25,951.38 EUR), which resulted in an increase in the available amount of the authorized capital to two million three hundred and seventy-seven thousand six hundred and seventy-three euros and fifty-six cents (2,317,673.56 EUR).

b) The capital increases decided upon pursuant to this authorization may take place in accordance with the conditions to be determined by the Board of Directors, including:

- by means of contributions in cash or in kind within the limits permitted by the Belgian Company Code,
- through a conversion of reserves and share premiums,
- with or without the issue of new securities,
- through the issue of shares, with or without voting rights,
- through the issue of convertible bonds, whether subordinated or not,
- through the issue of warrants (free of charge or at a certain issue price),
- through the issue of bonds to which warrants or other securities are attached,
- through the issue of other securities, such as shares under a stock option plan.

c) In accordance with article 606 of the Belgian Company Code, the Board of Directors is not allowed to use its authority for capital increases (i) by means of contributions in kind exclusively by a 10% shareholder, (ii) issuance below fractional value, (iii) issuance of warrants mainly intended for one or more specific persons, other than employees.

d) In the event of a public takeover bid for securities issued by the company, the Board of Directors shall also have a specific authorization to increase the capital in any form whatsoever, including a capital increase in which the shareholders' preferential subscription right is restricted or suspended, under the conditions provided for in article 607 of the Belgian Company Code.

This authorization is granted for a period of three (3) years, starting from the extraordinary general meeting of shareholders held on 23 April 2014.

This authorization may be renewed for the same period by a decision of the general meeting made in accordance with the rules set for the amendment of the articles of association.

The capital increases decided upon in the context of this authorization shall be imputed to the remaining part of the authorized capital as referred to in paragraph (a).

e) Any issue premiums payable upon subscription to a capital increase within the framework of the authorized capital shall be credited by the Board of Directors to an unavailable "Issue premiums" account, which shall serve as a guarantee for third parties to the same extent as the authorized capital and which, except for the possibility to convert this reserve into capital, may only be disposed of by a decision of the general meeting of shareholders deliberating in accordance with the rules which apply for amendments to the articles of association.

f) The Board of Directors shall also be authorized to restrict or cancel the preferential subscription right in the interest of the company. It may do this for the benefit of one or more specific persons, even if they are not employees of the company or its subsidiaries, provided that, including upon the issue of warrants, compliance with the relevant legal provisions is ensured. It may also decide, as appropriate, to give priority to the existing shareholders during the allocation of new shares.

g) The Board of Directors has the power, with the possibility of subrogation, to amend the articles of association of the company in order to align them with decisions on capital increases within the framework of the authorized capital.

ARTICLE 7: Capital increase - preferential subscription right.

a) Subject to the possibility of a capital increase within the framework of authorized capital by decision of the Board of Directors, an increase in the share capital can only be decided upon by an extraordinary general meeting before a notary public, in accordance with the provisions of the Belgian Company Code.

b) For each capital increase by means of a contribution in cash, the shareholders shall have a preferential subscription right in accordance with Article 592 et seq. of the Belgian Company Code and the new shares, convertible bonds and warrants shall first be offered to the shareholders in proportion to the part of the capital represented by their shares.

The period during which the preferential subscription right may be exercised shall be determined by the general meeting of shareholders or, as applicable, by the Board of Directors, and may not be less than fifteen days from the date on which the subscription is opened.

The Board of Directors may decide that the total or partial non-use by the shareholders of their preferential subscription rights shall increase the proportional share of the shareholders who have already exercised their preferential subscription rights; it shall also decide on the subscription procedure. The Board of Directors shall also have the right, upon such terms as it shall determine, to conclude all agreements to ensure the subscription to all or part of the shares to be issued.

If a share is encumbered with a usufruct, the preferential subscription right shall belong to the usufructuary, unless otherwise agreed. The newly acquired shares, convertible bonds and warrants shall be fully owned by him, subject to a possible fee paid to the bare owner for exercising the preferential subscription right.

In the case of pledged shares, the preferential subscription right shall exclusively belong to the owner-pledger.

In the interest of the company and with due observance of the relevant legal requirements, the general meeting of shareholders and, within the framework of the authorized capital, the Board of Directors, may restrict or cancel the preferential subscription right.

c) The general meeting of shareholders, or the Board of Directors within the authorized capital, as appropriate, may decide to increase the capital in favour of its employees, subject to the provisions of Article 609 of the Belgian Company Code.

d) In the event that a capital increase includes any contribution in kind, an auditor or statutory auditor shall draw up a report in addition to a special report of the Board of Directors, and the provisions of Article 602 of the Belgian Company Code shall continue to apply. This contribution must be paid up in full immediately.

e) A capital increase can also be realized through the conversion of reserves. The extraordinary general meeting may grant the Board of Directors the power to increase the capital within the limits of the authorized capital through the conversion of reserves.

f) If the new shares are issued with an issue premium, it must be paid up in full upon subscription of the shares.

ARTICLE 8: Capital reduction

A decision to reduce the capital can be made in accordance with the relevant legal provisions.

3. Shares and other securities

ARTICLE 9: Nature of the securities

The shares and other securities of the company are and will always remain registered shares. They shall bear a serial number.

A register is kept at the registered office of the company for each class of registered securities, either in original physical form or in electronic form in accordance with the applicable legislation. The ownership of registered securities is determined by an entry in the register. If so requested, certificates of these subscriptions shall be issued to the holders of the securities.

ARTICLE 10: Unpaid or partially paid shares—obligation to pay up

The obligation to pay up a share is unconditional and indivisible.

If shares which have not been paid up in full are jointly owned by several persons, each one of them shall be liable for the payment of the entire amount of the duly called payments due.

Additional contributions or full payment are requested by the Board of Directors at a time to be determined by the Board of Directors. The shareholders are notified by a letter sent by registered post, which shall mention the bank account to which payment must be made by wire transfer or deposit, with the exclusion of all other methods of payment. The shareholder shall be deemed in default when the time limit specified in the notice has expired and interest shall be payable to the company at the statutory rate fixed at that time, plus two percentage points.

As long as the called payments due for a share have not been made in accordance with this provision, the exercise of the rights related thereto shall be suspended.

Early payments on shares may not be made without the prior consent of the Board of Directors.

ARTICLE 11: Indivisibility of shares

The securities are indivisible vis-à-vis the company.

If a security belongs to several owners, or if several persons are entitled to a security, they may exercise the rights attached to such securities only through a joint representative.

The company may suspend the exercise of the rights attached to it until a single person has been appointed as the owner of the security vis-à-vis the company or as their joint representative.

All convocation notices, notifications and other notices served by the company to the different persons entitled to a single security shall be validly and exclusively given, as the case may be, either to the person designated as the owner vis-à-vis the company or to the designated joint representative.

ARTICLE 12: Successors

The rights and obligations shall remain attached to a security, regardless of its ownership.

The heirs, creditors or other successors of the shareholder may not interfere with the management of the company, nor cause any seals to be affixed to the goods and valuables of the company, nor claim the liquidation of the company and the distribution of its equity.

They shall act in compliance with the company's financial statements for exercising their rights and shall observe the decisions of the general meeting.

ARTICLE 13: Bonds, warrants and other financial instruments granting rights to shares

The company may issue mortgage or other bonds by decision of the Board of Directors, which will determine the terms of the issue.

The issue of convertible bonds or bonds redeemable in shares, warrants or other financial instruments which will eventually entitle the holder to shares may be decided upon by the general meeting of shareholders or by the Board of Directors within the framework of the authorized capital.

The holders of bonds or warrants have the right to attend the general meeting of shareholders, but only in an advisory capacity.

3. Acquisition and disposal of own securities

ARTICLE 14: Acquisition and disposal of own securities

a) By decision of the general meeting of shareholders of 23 April 2014, the Board of Directors was authorized, in accordance with article 620 et seq. of the Belgian Company Code and within the limits specified in this article, to acquire its own shares at a price per share that may not be lower than 80%, and not higher than 120% of the average closing prices of the American Depository Shares representing the shares of the company during a period of 30 calendar days prior to either the date of purchase or the date of announcement thereof.

This authorization shall also apply to the acquisition of the company's shares by one of its directly controlled subsidiaries, as referred to in and within the limits of article 627 of the Belgian Company Code.

Any offer to acquire the company's shares must be made to all shareholders under the same conditions, in accordance with Article 620, 1st paragraph, 5th section of the Belgian Company Code.

This authorization shall be valid for a period of five years from the date of the First Capital Increase.

This authorization may be extended by a decision of the general meeting and in accordance with the provisions of the Belgian Company Code.

b) By decision of the general meeting of shareholders of 23 April 2014, the Board of Directors was also authorized to dispose of the company's own shares at a price determined by the Board of Directors.

This authorization is not limited in time.

This authorization also applies to the disposal of the company's shares by one of its direct subsidiaries in accordance with Article 627 of the Belgian Company Code.

c) Lastly, by decision of the general meeting of shareholders of 23 April 2014, the Board of Directors was authorized, without further decision by the general meeting of shareholders and in accordance with the provisions of the Belgian Company Code, to acquire or dispose of the company's shares, when such acquisition or disposal is necessary to prevent serious imminent harm to the company.

This authorization is granted for a period of three years, starting from the publication of this authorization in the Annexes to the Belgian Official Gazette. This authorization may be extended for periods of three years by a decision of the general meeting and in accordance with the provisions of the Belgian Company Code.

4. Management and representation

ARTICLE 15: Appointment—Dismissal—Vacancy—Publication

a) The Board of Directors of the company shall consist of at least seven (7) and no more than eleven (11) directors, and at least three (3) directors must be independent directors (within the meaning of Article 526ter of the Belgian Company Code).

b) As long as all the voting rights attached to the shares controlled by each of the Family Shareholders, whether directly or indirectly and jointly or otherwise, represent 20% or more of all voting rights attached to all outstanding shares of the company, a maximum of six (6) directors shall, upon the simple request of a Family Shareholder, only be appointed on the nomination of a majority of all Family Shareholders who directly or indirectly control at least 3% of the voting rights attached to the shares of the company on the date of the appointment. The number of candidates on the nomination list of the Family Shareholders must be higher than the number of vacancies to be filled which are subject to the nomination right. If a director appointed on the nomination of the Family Shareholders resigns or is dismissed, his vacancy may only be filled by a candidate nominated by the majority of the other directors appointed on the nomination of the Family Shareholders, if any.

For the purposes of this Article, "**Family Shareholders**" shall include the following persons: Wilfried Vancraen, Hilde Ingelaere and their relatives in the first degree in descending line.

c) When a legal entity is appointed as a director, it must appoint a permanent representative among its shareholders, managers, directors, members of the management committee or employees, who will be charged with the execution of the assignment in the name of and on behalf of the legal entity-director.

d) The directors are appointed by the general meeting of shareholders.

In any case, the duration of their assignment may not exceed the maximum legal term of six (6) years.

Their assignment shall end when the general meeting of shareholders or the meeting of the Board of Directors deciding on their replacement is closed.

The directors can be dismissed by the general meeting of shareholders at all times.

Retiring directors are eligible for reappointment.

e) When a director's office becomes vacant, the remaining directors have the right to fill the vacancy in a provisional manner, under the conditions provided for by law and in

compliance with the abovementioned nomination scheme. The subsequent general meeting of shareholders shall then decide on the definitive appointment. The newly appointed director shall complete the term of the person he replaces.

f) The Chairman of the Board of Directors will be elected by the Board of Directors.

g) The appointment of the members of the board and the termination of their office shall be published by submitting an extract from the decision at the Registrar's Office of the Commercial Court in the company file, and a copy thereof for publication in the Annexes to the Belgian Official Gazette. These documents shall in any event specify whether the persons representing the company each bind the company individually, jointly or as a body.

ARTICLE 16: Convocation of the Board of Directors

a) the Board of Directors shall be convened by its chairman as often as required in the interest of the company, and shall meet within fourteen days following a request to that effect from two directors or from the managing director.

If the Chairman has not convened the Board of Directors within the abovementioned period of fourteen days following the request of the directors or of the managing director to convene the Board of Directors, the requesting directors or the requesting managing director may validly convene the Board of Directors

b) The convocation notices shall state the place, date, time and agenda of the meeting and shall be sent by letter, fax or other written, possibly electronic, means at least two (2) working days before the meeting.

c) Each general meeting shall be held at the registered office of the company or in any other location in Belgium, as specified in the convocation notice.

d) The regularity of the convocation cannot be disputed if all directors are present or validly represented.

ARTICLE 17: Meeting of the Board of Directors

a) The Board is presided by the Chairman or, in his absence, by the Vice-Chairman (if one has been appointed) or by the oldest of the directors present at the meeting.

b) The Board of Directors may only validly deliberate and decide if at least a majority of its members are present or represented at the meeting.

c) Directors who are unable to be present in person at the meeting may participate in the deliberations and vote through telecommunication tools such as telephone or videoconference, on the condition that all participants in the meeting can communicate directly with all other participants. The persons who participate in a meeting by such technical means shall be considered to be present in person at this meeting.

d) Each director may grant a proxy to another director to represent him at a specific meeting. Such a proxy must be given in the form of a power of attorney bearing the signature of the director, which may be a digital signature as defined in article 1322, 2nd paragraph of the Belgian Civil Code, and which must be notified to the Board of Directors by simple letter, fax or any other means of written, possibly electronic, communication. A director may represent several colleagues of the Board of Directors.

e) Decisions are made by a simple majority of the votes.

f) Minutes are kept of the decisions made by the Board of Directors. They are signed by the Chairman and, in his absence, by the director chairing the meeting and at least a majority of the board members present at the meeting.

Copies and extracts shall be signed by two directors or by one managing director.

g) In exceptional cases, in the event of urgency that requires a decision in the interest of the company, decisions of the Board of Directors can be made by unanimous written consent of the directors. This is not possible for the adoption of the financial statements and the use of the authorized capital.

ARTICLE 18: Salary

Without prejudice to the reimbursement of their expenses, the directors may be granted a fixed remuneration, the amount of which shall be determined each year by the general meeting and shall be at the charge of the general budget of the company. In addition, the general meeting may grant them a profit-related directors' fee from the available profit for the financial year.

ARTICLE 19: Conflicts of interest

a) If a director has a direct or indirect financial interest which conflicts with a decision or transaction within the authority of the Board of Directors, the requirements of Article 523 of the Belgian Company Code must be observed by the relevant director, as well as by the Board of Directors in its deliberations and decision-making.

b) If several directors have such an interest, and applicable law forbids them to participate in the deliberation or vote on the relevant topic, the remaining directors shall have the authority to make a valid decision, even if half of the directors are no longer present or represented in this circumstance.

ARTICLE 20: Internal governance—Restrictions—Delegation of powers

a) The Board of Directors is authorized to take any action which is required or useful to pursue the company's object, with the exception of the activities assigned exclusively to the general meeting by law.

b) Without prejudice to the obligations arising from collegial management, in particular with respect to consultation and supervision, the directors may distribute the management tasks among themselves. Such division of tasks shall not be enforceable against third parties.

c) The Board of Directors may establish a management committee, whose members may be chosen among the directors or otherwise.

It shall define the powers of this committee, organize its operation and determine the remuneration of its members, which will be at the charge of the general budget.

d) The Board of Directors may establish one or more advisory committees under its responsibility. The Board of Directors shall define their composition, tasks and functioning. The members of such committees are appointed by the Board of Directors, which shall also determine the conditions of their appointment, dismissal, remuneration and the duration of their mandate.

d) The Board of Directors may delegate day-to-day administration of the company to:

- the management committee, if one is established;
- one or more members of the Board of Directors, who shall be referred to as the managing director(s)

ARTICLE 21: External powers of representation

a) The Board of Directors shall represent the company as a body in and out of court. It shall act through the majority of its members.

Notwithstanding the general representation powers of the Board of Directors as a body, the company shall also be represented in and out of court by two directors acting jointly, of which at least one director is appointed from the list of candidates nominated by the Family Shareholders.

b) With respect to the powers granted to the management committee, the company shall be validly represented in and out of court by two members of the management committee acting jointly.

c) The company shall also be represented in day-to-day administration, both in and out of court:

- either by one or more representatives entrusted with day-to-day administration, acting individually or jointly in accordance with the delegation decision of the Board of Directors;
- or in the manner determined by the Board of Directors, when the management committee has been entrusted with day-to-day administration.

ARTICLE 22: Special powers of attorney

The Board of Directors or the directors representing the company may appoint attorneys-in-fact of the company. Only special and limited powers of attorney for a specific legal act or a series of specific legal acts shall be permitted. The proxy holders shall bind the company within the limits of the authority granted to them, without prejudice to the responsibility of the directors in the event of excess of power of attorney.

ARTICLE 23: Responsibility of the directors

The directors are not personally bound by the commitments of the company. The directors shall be responsible vis-à-vis the company and vis-à-vis third parties for any shortcomings in their management, in accordance with the applicable provisions of the Belgian Company Code.

5. Supervision

ARTICLE 24: Appointment—authority and remuneration of the auditor

If necessary, one or more auditors shall be appointed to audit the company. They are appointed by the general meeting for a renewable term of three years. Under penalty of damages, they may only be dismissed for legal cause during their mandate by the general meeting.

If there is no obligation for the company to appoint an auditor, each shareholder shall individually have the investigation and audit powers of an auditor.

The remuneration of the auditor shall consist of a fixed amount, which is determined by the general meeting at the start of their mandate, without prejudice to Article 134 of the Belgian Company Code. It may be amended only by agreement of the Parties. Apart from this remuneration, the auditor may not receive any benefit, in whatever form, from the company.

6. General meeting

ARTICLE 25: Ordinary, special and extraordinary general meetings

a) The ordinary general meeting of shareholders, which is referred to as the annual meeting, shall be convened each year on the first Tuesday of the month of June at 10 am. If this day is a public holiday, the meeting will be held on the subsequent working day (excluding Saturdays) at the same time.

b) A special general meeting may be convened at all times to deliberate and decide on any matter which is within its competence and which does not involve any amendment to the Articles of Association.

c) An extraordinary general meeting may also be convened at all times to deliberate and decide on any amendment to the Articles of Association, in the presence of a notary.

d) The general meetings shall be held at the registered office of the company or in any other location, as specified in the convocation notice.

ARTICLE 26: Convocation

a) The Board of Directors and any possible auditor may convene both an ordinary general meeting (annual meeting) and a special or extraordinary general meeting. They must convene the annual meeting on the date determined by the articles of association. The Board of Directors and any auditor shall be obliged to convene a special or extraordinary meeting if one or more shareholders who individually or jointly represent one fifth of the share capital so request.

Such a request must be sent by registered letter to the registered office of the company; it must state the agenda items on which the general meeting has to deliberate and decide.

The notice convening the general meeting to be held must be given within three weeks of the request.

Other items may be added to the agenda items specified by the shareholders in the notice convening the meeting.

b) The notices convening the general meetings shall state the agenda and shall be communicated at least fifteen (15) days in advance, to the holders of shares, bonds and warrants, the holders of registered certificates issued with the cooperation of the company, the directors and any auditor(s), in a letter sent by registered post or by any other means of communication, on the condition, in the latter case, that the addressees have agreed individually, expressly and in writing to receive the notice by an alternative means of communication.

Convocation notices are deemed to be given as soon as they are sent.

c) The agenda must contain the items to be discussed and the proposals for resolutions.

d) Any person may waive this notice and shall in any case be considered as having been invited correctly if he attends the meeting or is represented there.

ARTICLE 27: Admission to general meetings—representation

a) The right to attend the general meetings and to exercise the voting right is determined by the registration of the ownership of the shares in the name of the shareholder on the third (3rd) business day prior to the date of the scheduled meeting by their registration in the company's shareholders' register.

The board of directors may make participation in the general meetings dependent on a requirement of notification by the shareholder to the company, or to the person appointed for this purpose by the company, on a date to be determined by the board of directors before the

date of the scheduled meeting, that he intends to attend the meeting, stating the number of shares the shareholder wishes to participate with, in which case this notification must be made as defined in the convocation notice.
b) Any shareholder who has voting rights may either attend the meeting in person or be represented by a proxy, who may or may not be a shareholder.

The power of attorney must be given in writing in the manner specified in the convocation notice.

The company has to receive the power of attorney no later than on the date determined by the Board of Directors as stated in the convocation notice.

c) Before attending the meeting, the shareholders or their proxy holders must sign the attendance list, stating (i) the identity of the shareholder, (ii) if applicable, the identity of the proxy holder, and (iii) the number of shares they represent.

d) The holders of profit-sharing certificates, non-voting shares, bonds, warrants, or other securities issued by the company may attend the general meeting of shareholders insofar as the law grants them this right and, as applicable, the right to participate in the vote. If they wish to attend, they shall be bound by the same formalities of admission, access, form and notification for proxies as those imposed on the shareholders.

ARTICLE 28: Chairman—Committee

Each general meeting is presided by the chairman of the Board of Directors or, in his absence, by the vice-chairman (if one has been appointed) or by the oldest member of the Board of Directors.

The chairman shall appoint a secretary and vote counter, who does not have to be a shareholder. Both roles may be performed by one person. The chairman, secretary and vote counter shall together constitute the Committee.

The chairman may form the Committee before opening the session and this Committee may verify the powers of the participants before the opening of the session.

ARTICLE 29: Procedure of the meeting

a) The deliberation and voting shall take place under the supervision of the chairman. The directors and any auditor(s) shall answer questions raised by the shareholders during the meeting or in writing in relation to their annual report or the agenda items, insofar as the communication of data or facts is not likely to be detrimental to the company's business interests or to the confidentiality to which the company or its directors are bound.

As soon as the convocation notice has been published, the shareholders may ask the abovementioned questions in writing, provided that these shareholders meet the conditions to be admitted to the meeting and that they have submitted their questions to the company at the latest on the third (3rd) business day prior to the date of the scheduled meeting as specified in the convocation notice.

b) During the session, the Board of Directors has the right to postpone each general shareholders' meeting by three weeks. This adjournment shall not affect the other decisions that have been made, unless the general meeting decides otherwise. At the next meeting, the items on the agenda of the first meeting at which no final decision was made, will be discussed.

c) The general meeting may not validly deliberate or decide on items which at are not included in the announced agenda or are not implicitly included therein. Items not included in

the agenda may only be discussed at a meeting at which all shareholders are present or represented and on the condition that the decision is made unanimously. The required consent will be assumed if no objection is recorded in the minutes of the meeting.

ARTICLE 30: Voting rights

a) Every voting share is entitled to one vote.

b) If one or more shares belong to several persons or to a legal person with a collegiate body of representation, the exercise of the rights attached thereto vis-à-vis the company may be exercised only by a single person designated for this purpose by all the persons entitled thereto in writing. Until this person is appointed, all rights attached to the shares shall remain suspended.

c) If a share is encumbered with a usufruct, the exercise of the voting right attached to that share shall be exercised by the usufructuary, unless otherwise agreed.

d) The voting rights attached to shares pledged as a security shall be exercised by the owner-pledger.

ARTICLE 31: Decision-making process

a) The ordinary and extraordinary general meetings may validly deliberate and decide regardless of the number of shares present or represented. Decisions shall be made by a simple majority of votes. Abstentions or blank votes and invalid votes are ignored in the calculation of the majority. In the case of a tie, the proposal is rejected.

b) The extraordinary general meeting must be held before a notary public, who will draw up an authentic report. The general meeting may only validly deliberate and decide on an amendment to the articles of association if the persons participating in the meeting represent at least half of the share capital. If the abovementioned quorum is not reached, a new meeting must be convened in accordance with article 558 of the Belgian Company Code; the second meeting may validly deliberate and decide, regardless of the part of the capital present or represented.

Any amendment to the articles of association shall only be adopted if it has received three quarters of the votes attached to the shares present or represented. For the calculation of the required majority, the votes of abstainers, blank votes and invalid votes shall be counted as votes against.

c) Minutes shall be drawn up for each general meeting, and the attendance list and any reports and proxies shall be attached thereto.

The minutes of the general meeting of shareholders are signed by the members of the Committee and by the shareholders requesting them.

Copies and extracts shall be signed by two directors or by one managing director.

d) The shareholders can make all decisions that fall within the competence of the general meeting by unanimous vote and in writing, with the exception of decisions that must be executed by an authentic deed. The holders of bonds, warrants or certificates as defined in Article 537 of the Belgian Company Code may take note of these decisions.

7. Inventory—financial statements—reserve—appropriation of profits.

ARTICLE 32: Financial year—financial statements—annual report

a) The financial year of the company shall commence on one January and end on thirty one December of the same calendar year.

At the end of each financial year, the accounts and records are closed and the Board of Directors draws up the inventory and the financial statements, in accordance with the relevant legal requirements.

The directors also draw up an annual report, if applicable, in which they justify their policies.

b) Fifteen days before the ordinary general meeting, which shall meet within six months of the end of the financial year, the shareholders may examine the annual accounts and other documents mentioned in the Belgian Company Code at the company's registered office.

c) Following approval of the financial statements, the general meeting shall decide by separate vote on granting discharge to the directors and auditors.

ARTICLE 33: Appropriation of profits—Reserve

The positive balance of the profit and loss account shall constitute the profits of the company.

Of these profits, at least one twentieth is deducted in advance to constitute the legal reserve until it amounts to one tenth of the share capital.

The general meeting shall decide freely on the further allocation of the balance of the profits by simple majority vote on a proposal from the Board of Directors.

In accordance with Article 615 of the Belgian Company Code, the general meeting of shareholders may decide to allocate all or part of this balance to the redemption of the capital by redeeming the shares drawn by lot at par.

No distribution may be made if, as of the closing date of the previous financial year, the net assets of the company, as reported in the financial statements, have fallen or would fall as a result of the distribution below the highest amount of the paid-up capital or the called capital, plus any reserves which may not be distributed based on a legal provision or on the Articles of Association, and Article 617 of the Company Code must be applied in this case.

ARTICLE 34: Payment of dividends—interim dividends

a) The Board of Directors shall determine the place, time and manner in which dividends are paid.

b) The Board of Directors has the authority to pay interim dividends on the profits of the financial year. Such a payment may be made only on the basis of the profit of the current financial year, after deducting, as appropriate, the loss carried forward or after adding the profit carried forward, without deduction from the reserves constituted and taking into account the reserves which have to be constituted pursuant to any legal or statutory provision. The provisions of Article 618 of the Belgian Company Code shall continue to apply.

8. Dissolution—liquidation

ARTICLE 35: Dissolution

The voluntary dissolution of the company may only be decided upon by an extraordinary general meeting of shareholders, in compliance with the relevant legal requirements.

After its dissolution, the company shall continue to exist as a legal entity until the closure of its liquidation.

ARTICLE 36: Appointment and powers of the liquidators

a) If no liquidators have been appointed, the directors who are in office at the time of the dissolution shall be the liquidators, by operation of the law.

b) If a legal person is appointed as a liquidator, the natural person representing the liquidator in the liquidation must be specified in the appointment decision. Any change to this appointment must be published in the Annex to the Belgian Official Gazette.

c) The liquidators shall not assume their office before the Commercial Court has confirmed their appointment following the decision of the general meeting, in accordance with the provisions of the Belgian Company Code.

d) The general meeting of the dissolved company may appoint and dismiss one or more liquidators at any time and by a simple majority vote. It shall decide whether the liquidators, if there are several, shall represent the company alone, jointly or as a body.

ARTICLE 37: Powers of the liquidators

a) The liquidators are authorized to carry out all the transactions referred to in articles 186, 187 and 188 of the Belgian Company Code without requiring prior authorization from the general meeting, unless the general meeting decides otherwise by simple majority vote.

b) In the seventh and thirteenth month after the start of the liquidation, the liquidators shall submit a detailed statement of the status of the liquidation, drawn up at the end of the sixth and twelfth month of the first year of liquidation, to the registrar's office of the commercial court, in accordance with the provisions of the Belgian Company Code. As from the second year of liquidation, the detailed statement must be submitted only once every year.

c) Each year, the liquidators shall submit the results of the liquidation to the company's annual general meeting, stating the reasons why the liquidation could not be completed. They will also prepare the financial statements every year.

d) The financial statements shall be published in accordance with the relevant legal provisions.

ARTICLE 38: Liquidation method

After payment of all debts, charges and costs of the liquidation or after consignment of the necessary funds, the liquidators shall distribute the net assets in cash or in securities among the shareholders in proportion to the number of shares they own.

9. General provision

ARTICLE 39: Election of domicile:

The directors, auditors and liquidators whose domicile is unknown shall be deemed to have elected their domicile at the registered office of the company, where all summons, writs and notices relating to the affairs of the company may be served.

ARTICLE 40: Applicable law

The provisions of the Belgian Company Code and other provisions of Belgian law shall apply to any matters which are not expressly specified in these articles of association, or to the legal provisions from which these articles of association do not include a valid derogation.

Certified as a true restated text of the articles of association.

EXHIBIT 8.1

SUBSIDIARIES OF MATERIALISE NV

Name	Jurisdiction of Incorporation
Materialise France SAS	France
Materialise GmbH	Germany
Materialise Japan K.K.	Japan
Materialise SRO	The Czech Republic
Materialise USA, LLC	United States
Materialise UK Limited	United Kingdom
OBL SAS	France
Materialise Austria GmbH	Austria
Materialise SDN. Bhd.	Malaysia
Materialise Ukraine LLC	Ukraine
RapidFit NV	Belgium
Materialise SA	Poland
Meridian Technique Limited	United Kingdom
OrthoView Holdings Limited	United Kingdom
Materialise Colombia SAS	Colombia
RSPRINT powered by Materialise NV	Belgium
Materialise Shanghai Co. Ltd.	China
Materialise Australia PTY Ltd	Australia
Materialise S.R.L.	Italy
ACTech Holding GmbH	Germany
ACTech GmbH	Germany
ACTech North America Inc.	United States
Engimplan Engenharia de Implante Industria E Comércio Ltda.	Brazil
Engimplan Holding Ltda.	Brazil

EXHIBIT 12.1

CERTIFICATION

I, Wilfried Vancraen, certify that:

1. I have reviewed this annual report on Form 20-F of MATERIALISE NV (the "company");

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the company as of, and for, the periods presented in this report;

4. The company's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the company and have:

   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the company, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   (c) Evaluated the effectiveness of the company's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (d) Disclosed in this report any change in the company's internal control over financial reporting that occurred during the period covered by the annual report that has materially affected, or is reasonably likely to materially affect, the company's internal control over financial reporting; and

5. The company's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the company's auditors and the audit committee of the company's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the company's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the company's internal control over financial reporting.

Date: April 30, 2020

By: /s/ Wilfried Vancraen
Wilfried Vancraen
Chief Executive Officer

EXHIBIT 12.2

CERTIFICATION

I, Johan Albrecht, certify that:

1. I have reviewed this annual report on Form 20-F of MATERIALISE NV (the "company");

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the company as of, and for, the periods presented in this report;

4. The company's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the company and have:

   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the company, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   (c) Evaluated the effectiveness of the company's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (d) Disclosed in this report any change in the company's internal control over financial reporting that occurred during the period covered by the annual report that has materially affected, or is reasonably likely to materially affect, the company's internal control over financial reporting; and

5. The company's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the company's auditors and the audit committee of the company's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the company's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the company's internal control over financial reporting.

Date: April 30, 2020

By: /s/ Johan Albrecht
Johan Albrecht
Alfinco BVBA
Chief Financial Officer

EXHIBIT 13.1

CERTIFICATION PURSUANT TO 18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE U.S. SARBANES-OXLEY ACT OF 2002

In connection with the Annual Report of MATERIALISE NV (the "Company") on Form 20-F for the fiscal year ended December 31, 2019, as filed with the U.S. Securities and Exchange Commission on the date hereof (the "Report"), I, Wilfried Vancraen, certify, pursuant to 18 U.S.C. section 1350, as adopted pursuant to section 906 of the U.S. Sarbanes-Oxley Act of 2002, that to the best of my knowledge:

(i) the Report fully complies with the requirements of section 13(a) or 15(d) of the U.S. Securities Exchange Act of 1934, as amended; and

(ii) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: April 30, 2020

By: /s/ Wilfried Vancraen
Wilfried Vancraen
Chief Executive Officer

EXHIBIT 13.2

CERTIFICATION PURSUANT TO 18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE U.S. SARBANES-OXLEY ACT OF 2002

In connection with the Annual Report of MATERIALISE NV (the "Company") on Form 20-F for the fiscal year ended December 31, 2019, as filed with the U.S. Securities and Exchange Commission on the date hereof (the "Report"), I, Johan Albrecht, certify, pursuant to 18 U.S.C. section 1350, as adopted pursuant to section 906 of the U.S. Sarbanes-Oxley Act of 2002, that to the best of my knowledge:

(i) the Report fully complies with the requirements of section 13(a) or 15(d) of the U.S. Securities Exchange Act of 1934, as amended; and

(ii) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: April 30, 2020

By: /s/ Johan Albrecht
Johan Albrecht
Alfinco BVBA
Chief Financial Officer

EXHIBIT 23.1

Consent of Independent Registered Public Accounting Firm

Materialise NV
Leuven, Belgium

We hereby consent to the incorporation by reference in the Registration Statements on Form S-8 (No. 333-197236 and No. 333-212445) and Form F-3 (No. 333-213649 and No. 333-226006) of Materialise NV, of our reports dated April 30, 2020, relating to the consolidated financial statements, and the effectiveness of Materialise NV's internal control over financial reporting, which appear in this Annual Report on Form 20-F. Our report on the effectiveness of internal control over financial reporting expresses an adverse opinion on the effectiveness of the Company's internal control over financial reporting as of December 31, 2019.

BDO Bedrijfsrevisoren CVBA
On behalf of it,

/s/ Veerle Catry
Veerle Catry

Zaventem, Belgium
April 30, 2020