

UNITED STATES SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

Form 10-K

(Mark One)

[X] ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the fiscal year ended December 31, 2018

OR

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

For the transition period from to

Commission file number 001-13595

Mettler-Toledo International Inc.

(Exact name of registrant as specified in its charter)

Delaware (State or other jurisdiction of incorporation or organization)

13-3668641 (I.R.S. Employer Identification No.)

1900 Polaris Parkway Columbus, OH 43240 and Im Langacher 44 CH 8606 Greifensee, Switzerland (Address of principal executive offices) (Zip Code) 1-614-438-4511 and +41-44-944-22-11 (Registrant's telephone number, including area code)

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

Table with 2 columns: Title of Each Class, Name of Each Exchange on Which Registered. Row 1: Common Stock, \$0.01 par value; New York Stock Exchange

Securities registered pursuant to Section 12(g) of the Act: NONE

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

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes [] No [X]

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 [X] 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 [X] No []

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§ 229.405 of this chapter) is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. Yes [] No [X]

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer", "accelerated filer", "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer [X] Accelerated filer [] Non-accelerated filer [] Smaller reporting company [] Emerging growth company []

If an emerging growth company, 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. []

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act). Yes [] No [X]

As of February 1, 2019 there were 24,795,237 shares of the registrant's Common Stock, \$0.01 par value per share, outstanding. The aggregate market value of the shares of Common Stock held by non-affiliates of the registrant on June 30, 2018 (based on the closing price for the Common Stock on the New York Stock Exchange as of the last business day of the registrant's most recently completed second fiscal quarter, June 30, 2018) was approximately \$14.6 billion. For purposes of this computation, shares held by affiliates and by directors of the registrant have been excluded. Such exclusion of shares held by directors is not intended, nor shall it be deemed, to be an admission that such persons are affiliates of the registrant.

Documents Incorporated by Reference

Table with 2 columns: Document, Part of Form 10-K Into Which Incorporated. Row 1: Certain Sections of the Proxy Statement for 2019 Annual Meeting of Shareholders; Part III

METTLER-TOLEDO INTERNATIONAL INC.
ANNUAL REPORT ON FORM 10-K
FOR THE FISCAL YEAR ENDED DECEMBER 31, 2018

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FORWARD-LOOKING STATEMENTS DISCLAIMER

You should not rely on forward-looking statements to predict our actual results. Our actual results or performance may be materially different than reflected in forward-looking statements because of various risks and uncertainties. You can identify forward-looking statements by terminology such as “may,” “will,” “could,” “would,” “should,” “expect,” “plan,” “anticipate,” “intend,” “believe,” “estimate,” “predict,” “potential,” or “continue.”

We make forward-looking statements about future events or our future financial performance, including earnings and sales growth, earnings per share, strategic plans and contingency plans, growth opportunities or economic downturns, our ability to respond to changes in market conditions, planned research and development efforts and product introductions, adequacy of facilities, access to and the costs of raw materials, shipping and supplier costs, gross margins, customer demand, our competitive position, pricing, capital expenditures, cash flow, tax-related matters, the impact of foreign currencies, compliance with laws, and effects of acquisitions.

Our forward-looking statements may not be accurate or complete, and we do not intend to update or revise them in light of actual results. New risks also periodically arise. Please consider the risks and factors that could cause our results to differ materially from what is described in our forward-looking statements. See in particular “Factors Affecting Our Future Operating Results” and “Management’s Discussion and Analysis of Financial Condition and Results of Operations.”

PART I

Item 1. *Business*

We are a leading global supplier of precision instruments and services. We have strong leadership positions in all of our businesses and believe we hold global number-one market positions in most of them. We are recognized as an innovation leader and our solutions are critical in key research and development, quality control, and manufacturing processes for customers in a wide range of industries including life sciences, food, and chemicals. Our sales and service network is one of the most extensive in the industry. Our products are sold in more than 140 countries and we have a direct presence in approximately 40 countries. With proven growth strategies and a focus on execution, we have achieved a long term track record of strong financial performance.

Our business is geographically diversified, with net sales in 2018 derived 31% from Europe, 38% from North and South America, and 31% from Asia and other countries. Our customer base is also diversified by industry and by individual customer.

Mettler-Toledo International Inc. was incorporated as a Delaware corporation in 1991 and became a publicly traded company with its initial public offering in 1997.

Business Segments

We have five reportable segments: U.S. Operations, Swiss Operations, Western European Operations, Chinese Operations, and Other. See Note 17 to the audited consolidated financial statements and Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations under "Results of Operations by Reportable Segment" for detailed results by segment and geographic region.

We manufacture a wide variety of precision instruments and provide value-added services to our customers. Our principal products and services are described below. We also describe our customers and distribution, sales and service, research and development, manufacturing, and certain other matters. These descriptions apply to substantially all of our products and related reportable segments.

Laboratory Instruments

We make a wide variety of precision laboratory instruments for sample preparation, synthesis, analytical bench top, and material characterization. Our portfolio includes laboratory balances, liquid pipetting solutions, automated laboratory reactors including real-time analytics, titrators, pH meters and sensors, physical value analyzers (including density and refractometry instruments), thermal analysis systems, and other analytical instruments, such as UV/VIS spectrophotometers, and moisture analyzers. Our laboratory instruments have leading-edge embedded software and we also offer LabX, our PC-based laboratory software platform, to manage and analyze data generated from our instruments. The laboratory instruments and related service business accounted for approximately 51% of our net sales in 2018, 50% in 2017, and 49% in 2016.

Laboratory Balances

Our laboratory balances have weighing ranges from one ten-millionth of a gram up to 64 kilograms. To respond to a wide range of customer needs and value/price points, we market our balances in a range of product tiers offering different levels of functionality. We also provide filter weighing and powder and liquid dosing automated systems. Based on the same weighing technology platform, we manufacture mass comparators, which are used by weights and measures officials as well as National Measurement Institute laboratories to ensure the accuracy of reference weights. Laboratory balances are primarily used in the pharmaceutical, biotechnology, testing labs, food, chemical, cosmetics, academia, and other industries.

Pipettes

Pipettes are used in life science research laboratories for dispensing small volumes of liquids. We operate our pipette business with the Rainin and Biotix brand names. We develop, manufacture, and distribute advanced pipettes, including single- and multi-channel manual and electronic pipettes. We also develop and produce high-value consumables such as pipette tips and tubes. We maintain service centers in the key markets where customers periodically send their pipettes for certified recalibrations. These service centers, combined with our advanced asset management solutions, provide our customers with innovative solutions to maintain their instruments and meet regulatory compliance. Our principal end markets are pharmaceutical, biotech, and academia.

Analytical Instruments

Titration systems measure the chemical composition of samples and are used in environmental and research laboratories as well as in quality control labs in the pharmaceutical, testing labs, food and beverage, and other industries. Our high-end titrators are multi-tasking models, which can perform two determinations simultaneously on multiple vessels. Our offering includes robotics to automate routine work in quality control applications.

Thermal analysis systems measure material properties as a function of temperature, such as weight, dimension, energy flow, and viscoelastic properties. Thermal analysis systems are used in nearly every industry, but primarily in the plastics and polymer industries, academia, and increasingly in the pharmaceutical industry.

pH meters measure acidity in laboratory samples. We also sell density and refractometry instruments, which measure chemical concentrations in solutions. In addition, we manufacture and sell moisture analyzers, which precisely determine the moisture content of a sample by utilizing the loss on drying method, and UV/VIS spectrophotometers that optimize spectroscopic workflows.

Laboratory Software

LabX, our PC-based laboratory software platform, manages and analyzes data generated by our balances, titrators, pH meters, physical value analyzers, and other analytical instruments like UV/VIS spectrophotometers. LabX provides full network capability; assists with workflow automation; has efficient, intuitive protocols; and enables customers to collect and archive data in compliance with the U.S. Food and Drug Administration's traceability and data integrity requirements for electronically stored data (also known as 21 CFR Part 11).

Automated Chemistry Solutions

Our automated chemistry solutions focus on selected applications in the chemical and drug discovery process. Our automated lab reactors and in situ analysis systems are considered integral to the process development and scale-up activities of our customers. Our on-line measurement technologies, based on infrared and laser light scattering, enable customers to monitor chemical reactions and crystallization processes in real time in the lab and plant. In situ samples allow overnight sampling and testing. Additionally, we provide industry-leading embedded software solutions that enable our customers to manage, optimize, and improve experiments as well as production scale-up. We believe that our portfolio of integrated technologies can bring significant efficiencies to the development process, enabling our customers to bring new chemicals and drugs to market faster.

Process Analytics

Our process analytics business provides instruments for the in-line measurement of liquid and gas parameters used primarily in the production process of pharmaceutical, biotech, beverage, microelectronics, chemical, and refining companies, as well as power plants. Close to half of our process

analytics sales are to the pharmaceutical and biotech markets, where our customers need fast and secure scale-up and production that meet the validation processes required for GMP (Good Manufacturing Processes) and other regulatory standards like the USP (US Pharmacopoeia) regulations for ultrapure water quality. We are a leading solution provider for liquid analytical measurement to control and optimize production processes. Our solutions include sensor and analyzer technology for measuring pH, dissolved oxygen, carbon dioxide, conductivity, turbidity, ozone, total organic carbons, bioburden, sodium, and silica, as well as laser analyzers for gas measurement. Intelligent sensor diagnostics capabilities enable improved asset management solutions for our customers to reduce process downtime and maintenance costs. Our instruments offer leading multi-parameter capabilities and plant-wide control system integration, which are key for integrated measurement of multiple parameters to secure production quality and efficiency. With a worldwide network of specialists, we support customers in critical process applications, compliance, and systems integration questions.

Industrial Instruments

We manufacture numerous industrial weighing instruments and related terminals and offer dedicated software solutions for the pharmaceutical, chemical, food, discrete manufacturing, and other industries. In addition, we manufacture metal detection, x-ray, and other end-of-line product inspection systems used in production and packaging. We supply automatic identification and data capture solutions, which integrate in-motion weighing, dimensioning, and identification technologies for transport, shipping, and logistics customers. We also offer heavy industrial scales and related software. The industrial instruments and related service business accounted for approximately 41% of our net sales in 2018 and 42% in 2017 and 2016.

Industrial Weighing Instruments

We offer a comprehensive line of industrial scales and weighing devices, such as bench scales, floor scales, and weigh modules for weighing loads from a few grams to several thousand kilograms in applications ranging from measuring materials in chemical production to quality completeness control in discrete manufacturing to weighing packages at the end of the line. Our products are used in a wide range of industrial applications, such as counting, formulating and mixing ingredients, and quality control.

Industrial Terminals

Our industrial scale terminals collect data and integrate it into manufacturing processes, helping to automate them. Our terminals allow users to remotely download formulation recipes or access setup data and can minimize downtime through predictive rather than reactive maintenance.

Transportation and Logistics

We supply automatic dimensional measurement and data capture solutions, which integrate in-motion weighing, dimensioning, and identification technologies. With these solutions, customers can measure the weight and cubic volume of packages for appropriate billing, load management, and quality control. Our solutions also integrate into customers' information systems.

Vehicle Scale Systems

Our primary heavy industrial products are scales for weighing trucks or railcars (i.e., weighing bulk goods as they enter or leave a factory or at a toll station). Heavy industrial scales are capable of measuring weights up to 500 tons and permit accurate weighing under extreme environmental conditions. We also offer advanced computer software that can be used with our heavy industrial scales to facilitate a broad range of customer solutions and provides a complete system for managing vehicle transaction processing.

Industrial Software

We offer software that can be used with our industrial instruments. Examples include FreeWeigh.Net, statistical quality control software; FormWeigh.Net, our formulation/batching software; and DataBridge, which supports the operation of vehicle scales. FreeWeigh.Net and FormWeigh.Net provide full network capability and enable customers to collect and archive data in compliance with U.S. Food and Drug Administration's requirements, 21 CFR Part 11.

Product Inspection

Increasing safety and consumer protection requirements are driving the need for more sophisticated end-of-line product inspection systems (e.g., for use in food processing and packaging, pharmaceutical, packaged consumer goods, and other industries). We are a leading global provider of metal detectors, x-ray and camera-based imaging equipment, checkweighers, and track-and-trace solutions that are used in these industries. Metal detectors are most commonly used to detect fine particles of metal that may be contained in raw materials or may be generated by the manufacturing process itself. X-ray inspection is used to detect metallic contamination in applications unsuited to metal detectors and many types of non-metallic contamination, such as glass, calcified bone, stones, and pits. Our x-ray systems are also used for mass control and for determining and controlling the fat content in meat. Our camera-based vision inspection solutions provide in-line inspection of package quality, labels, and content, which are needs for food and beverage, consumer goods, and pharmaceutical companies. Vision inspection systems with associated specialist software enable our pharmaceutical customers to implement traceability and serialization tracking, as required by regulation. Checkweighers are used to control the filled weight of packaged goods such as food, pharmaceuticals, and cosmetics. All of our technologies are integrated with material handling systems to ensure the correct presentation of the customer's product to the device and the secure rejection of non-conforming product, and are frequently designed to comply with stringent hygiene standards. Our technologies may also be used together as components of integrated packaging lines. ProdX Inspect is our quality and productivity control software for helping customers comply with regulations and optimize process efficiency, either as a stand-alone solution or through integration with the customer's manufacturing and enterprise systems.

Retail Weighing Solutions

Supermarkets, hypermarkets, and other food retail businesses make use of multiple weighing and food labeling solutions for handling fresh goods (such as meats, vegetables, fruits, or cheeses). We offer networked scales and software, which can integrate backroom, counter, self-service, and checkout functions and can incorporate fresh goods item data into a supermarket's overall food item and inventory management system. The scale screen display allows for in-store marketing and can help encourage consumers in the store to make more purchase decisions at the point of sale. In addition, we offer stand-alone scales for basic counter weighing and pricing, price finding, and printing. The customer benefits of our retail solutions are in the areas of enterprise-wide article and price management, merchandising, and regulatory compliance. In North America and select other markets, our offering also includes automated packaging and labeling solutions for the meat backroom, which are fully integrated with the scales in the store. The retail business accounted for approximately 8% of our net sales in 2018, 8% in 2017, and 9% in 2016.

Customers and Distribution

Our principal customers include companies in the following key end markets: the life science industry (pharmaceutical and biotech companies, as well as independent research organizations); food and beverage producers; chemical, specialty chemicals, and cosmetics companies; food retailers; the

transportation and logistics industry; the metals industry; the electronics industry; and the academic community.

Our products are sold through a variety of distribution channels. Generally, more technically sophisticated products are sold through our direct sales force, while less complicated products are sold through indirect channels. Our sales through direct channels exceed our sales through indirect channels. A significant portion of our sales in the Americas is generated through indirect channels, including sales of our Ohaus-branded products. Ohaus-branded products target markets, such as the educational market, in which customers are interested in lower cost, a more limited set of features, and less comprehensive support and service.

We have a diversified customer base, with no single end-customer accounting for more than 1% of 2018 net sales.

Sales and Service

Market Organizations

We maintain geographically focused market organizations around the world that are responsible for all aspects of our sales and service. The market organizations are customer-focused, with an emphasis on building and maintaining value-added relationships with customers in our target market segments. Each market organization has the ability to leverage best practices from other units while maintaining the flexibility to adapt its marketing and service efforts to account for different cultural and economic conditions. Market organizations also work closely with our producing organizations (described below) by providing feedback on manufacturing and product development initiatives, new product and application ideas, and information about key market segments.

We have one of the largest and broadest global sales and service organizations among precision instrument manufacturers we compete against. At December 31, 2018, our sales and service group consisted of approximately 7,900 employees in sales, marketing and customer service (including related administration), and post-sales technical service, located in approximately 40 countries. This field organization has the capability to provide service and support to our customers and distributors in major markets across the globe. This is important because our customers increasingly seek to do business with a consistent global approach.

Service

Our service business continues to be successful with a focus on providing uptime and calibration services, as well as further expansion of our offerings to provide value-added services for a range of market needs, including regulatory compliance, performance enhancements, application expertise and training, and remote services. We have a unique offering to our pharmaceutical customers in promoting the use of our instruments in compliance with FDA and other international regulations, and we can provide these services to most customers' locations around the world. Our global service network is also an important factor in our ability to expand in emerging markets. We estimate that we have the largest installed base of weighing instruments in the world. Service (representing service contracts, on demand services, and replacement parts) accounted for approximately 22% of our net sales in 2018, 2017, and 2016.

Beyond revenue opportunities, we believe service is a key part of our solution offering and helps significantly in customer retention. The close relationships and frequent contact with our large customer base allow us to be the trusted advisor of our customers, which provides us with high-quality sales opportunities as well as innovative product and application ideas.

Research and Development and Manufacturing

Producing Organizations

Our research, product development, and manufacturing efforts are organized into a number of producing organizations. Our focused producing organizations help reduce product development time and costs, improve customer focus, and maintain technological leadership. The producing organizations work together to share ideas and best practices, and there is a close interface and coordinated customer interaction among marketing organizations and producing organizations.

Research and Development

We continue to invest in product innovation to provide technologically advanced products to our customers for existing and new applications. Over the last three years, we have invested \$389 million in research and development (\$141.1 million in 2018, \$128.3 million in 2017, and \$119.2 million in 2016), which is approximately 5% of net sales for each year. Our research and development efforts fall into two categories:

- technology advancements, which generate new products or features and increase the value of our products. These advancements may be in the form of enhanced or new functionality, new applications for our technologies, more accurate or reliable measurement, additional software capability, or automation through robotics or other means.
- cost reductions, which reduce the manufacturing cost of our products through better overall design and/or improve the ease of serviceability.

We devote a substantial proportion of our research and development budget to software development. This includes software to process the signals captured by the sensors of our instruments, application-specific software, and software that connects our solutions into customers' existing IT systems. We closely integrate research and development with marketing, manufacturing, and product engineering. We have approximately 1,300 employees in research and development and product engineering in countries around the globe.

Manufacturing

We are a worldwide manufacturer, with facilities principally located in China, Switzerland, the United States, Germany, the United Kingdom, and Mexico. We emphasize product quality in our manufacturing operations, and most of our products require very strict tolerances and exact specifications. We use an extensive quality control system that is integrated into each step of the manufacturing process. All major manufacturing facilities have achieved ISO 9001 certification. We believe that our manufacturing capacity is sufficient to meet our present and currently anticipated demand. We expect to make net investments in a new manufacturing facility of approximately \$15 million over the next two years.

We generally manufacture critical components, which are components that contain proprietary technology. When outside manufacturing is more efficient, we contract with other manufacturers for certain nonproprietary components. We use a wide range of suppliers. We believe our supply arrangements are adequate and that there are no material constraints on the sources and availability of materials. From time to time, we may rely on a single supplier for all of our requirements of a particular component. Supply arrangements for electronic components are generally made globally.

Backlog; Seasonality

Our manufacturing turnaround time is generally short, which permits us to manufacture orders to fill for most of our products. Backlog is generally a function of requested customer delivery dates and is typically no longer than one to two months.

Our business has historically experienced a slight amount of seasonal variation, particularly the high-end laboratory instruments business. Traditionally, sales in the first quarter are slightly lower than, and sales in the fourth quarter are slightly higher than, sales in the second and third quarters. Fourth quarter sales have historically generated approximately 28% to 30% of our net sales. This trend has a somewhat greater effect on income from operations than on net sales because fixed costs are generally incurred evenly across all quarters.

Employees

Our total global workforce was 16,000, including 14,200 employees and 1,800 temporary personnel, as of December 31, 2018, and includes approximately 6,000 in Europe, 4,700 in North and South America, and 5,300 in Asia and other countries.

We believe our employee relations are good, and we have not suffered any material employee work stoppage or strike during the last five years. Labor unions do not represent a substantial number of our employees. Approximately 600 employees in Germany and France are represented by unions.

Sustainability

Sustainability touches all aspects of our business, from designing and producing our products, to selling and delivering them to our customers, to handling them at the end of their lifecycle. Sustainability helps guide us to make the right decisions for our customers, employees, suppliers, shareholders, and the communities in which we operate our business. We want to manage our business sustainably to position the Company for long-term growth. Our GreenMT program is designed to help save energy and resources. We do this in four key areas: (1) developing products using our Design for Environment criteria that allow us and our customers to reduce energy usage, material, and product waste, (2) implementing energy efficiency projects to reduce energy usage at our sites, (3) managing our sales and service fleets to reduce our fuel consumption, and (4) reducing the environmental impact of our resource consumption, especially in processes related to cooling and packaging. Our goal is to reduce our carbon footprint by the end of 2025 by 30% (relative CO₂ emissions per net sales compared with 2010) and at the same time realize financial benefits.

Blue Ocean Program

“Blue Ocean” refers to our program to establish a global operating model with standardized, automated, and integrated processes and high levels of global data transparency. It encompasses an enterprise architecture, with a global, single-instance ERP system. Within our IT systems, we are moving toward integrated, homogeneous applications and common data structures. We will also largely standardize our key business processes. The implementation of the systems and processes has been proceeding on a staggered basis over a multi-year period with the initial go-live rollout having occurred in 2010. We have implemented the Blue Ocean program in our Swiss, Chinese, U.K., Benelux, German, and certain U.S. and Southeast Asia operations. We estimate that we have more than 80% of the program completed as measured in users. We will continue to implement the program in additional locations over the coming years.

Intellectual Property

We hold over 5,000 patents and trademarks (including pending applications), primarily in the United States, Switzerland, the European Union, Germany, the United Kingdom, Italy, France, Japan, China, South Korea, Brazil, and India. Our products generally incorporate a wide variety of technological innovations, some of which are protected by patents of various durations. Products are generally not protected as a whole by individual patents, and as a result, no one patent or group of related patents is material to our business. We have numerous trademarks, including the Mettler-Toledo name and logo, which are material to our business. We regularly protect against infringement of our intellectual property.

Regulation

Our products are subject to various regulatory standards and approvals by weights and measures regulatory authorities. All of our electrical components are subject to electrical safety standards. We believe that we are in compliance in all material respects with applicable regulations.

Approvals are required to ensure our instruments do not impermissibly influence other instruments and are themselves not affected by other instruments. In addition, some of our products are used in “legal for trade” applications, in which prices based on weight are calculated and for which specific weights and measures approvals are required. Although there are a large number of regulatory agencies across our markets, there is an increasing trend toward harmonization of standards, and weights and measures regulation is harmonized across the European Union.

Our products may also be subject to special requirements depending on the end-user and market. For example, laboratory customers are typically subject to Good Laboratory Practices (GLP), industrial customers to Good Manufacturing Practices (GMP), pharmaceutical customers to U.S. Food and Drug Administration (FDA) regulations, and customers in food processing industries may be subject to Hazard Analysis and Critical Control Point (HACCP) regulations. Products used in hazardous environments may also be subject to special requirements.

Environmental Matters

We are subject to environmental laws and regulations in the jurisdictions in which we operate. We own or lease a number of properties and manufacturing facilities around the world. Like many of our competitors, we have incurred, and will continue to incur, capital and operating expenditures and other costs in complying with such laws and regulations.

We are currently involved in, or have potential liability with respect to, the remediation of past contamination in certain of our facilities. A former subsidiary of Mettler-Toledo, LLC known as Hi-Speed Checkweigher Co., Inc. was one of two private parties ordered by the New Jersey Department of Environmental Protection, in an administrative consent order signed on June 13, 1988, to investigate and remediate certain ground water contamination at a property in Landing, New Jersey. After the other party under this order failed to fulfill its obligations, Hi-Speed became solely responsible for compliance with the order. Residual ground water contamination at this site is now within a Classification Exception Area which the Department of Environmental Protection has approved and within which the Company oversees monitoring of the decay of contaminants of concern. A concurrent Well Restriction Area also exists for the site. The Department of Environmental Protection does not view these vehicles as remedial measures, but rather as “institutional controls” that must be adequately maintained and periodically evaluated. We estimate that the costs of compliance associated with the site over the next several years will approximate a total of \$0.4 million.

In addition, certain of our present and former facilities have or had been in operation for many decades and, over such time, some of these facilities may have used substances or generated and disposed of wastes that are or may be considered hazardous. It is possible that these sites, as well as disposal sites owned by third parties to which we have sent wastes, may in the future be identified and become the subject of remediation. Although we believe that we are in substantial compliance with applicable environmental requirements and, to date, we have not incurred material expenditures in connection with environmental matters, it is possible that we could become subject to additional environmental liabilities in the future that could have a material adverse effect on our financial condition, results of operations, or cash flows.

Competition

Our markets are highly competitive. Many of the markets in which we compete are fragmented both geographically and by application, particularly the industrial and food retailing markets. As a result, we face numerous regional or specialized competitors, many of which are well established in their markets. For example, some of our competitors are divisions of larger companies with potentially greater financial and other resources than our own. In addition, some of our competitors are domiciled in emerging markets and may have a lower cost structure than ours. We are confronted with new competitors in emerging markets which, although relatively small in size today, could become larger companies in their home markets. Given the sometimes significant growth rates of these emerging markets, and in light of their cost advantage over developed markets, emerging market competitors could become more significant global competitors. Taken together, the competitive forces present in our markets can impair our operating margins in certain product lines and geographic markets.

We expect our competitors to continue to improve the design and performance of their products and to introduce new products with competitive prices. Although we believe that we have technological and other competitive advantages over many of our competitors, we may not be able to realize and maintain these advantages. These advantages include our worldwide market leadership positions; our global brand and reputation; our track record of technological innovation; our comprehensive, high-quality solution offering; our global sales and service offering; our large installed base of weighing instruments; and the diversification of our revenue base by geographic region, product range, and customer. To remain competitive, we must continue to invest in research and development, sales and marketing, and customer service and support. We cannot be sure that we will have sufficient resources to continue to make these investments or that we will be successful in identifying, developing, and maintaining any competitive advantages.

We believe the principal competitive factors in developed markets for purchasing decisions are the product itself, application support, service support, and price. In emerging markets, where there is greater demand for less sophisticated products, price is a more important factor than in developed markets. Competition in the U.S. laboratory market is also influenced by the presence of large distributors that sell not only our products but those of our competitors as well.

Company Website and Information

You can find our website on the Internet at www.mt.com. The website contains information about us and our operations. The information contained on our website is not included in, or incorporated by reference into, this annual report on Form 10-K. You can view and download free of charge copies of each of our filings with the SEC on Form 10-K, Form 10-Q, Form 8-K, and Schedule 14A and all amendments to those reports by accessing www.mt.com, clicking on *About Us*, *Investor Relations*, and then clicking on *SEC Filings*. The SEC maintains a website at <http://www.sec.gov> that contains reports, proxy and information statements, and other information regarding issuers that file electronically with the SEC.

Our website also contains copies of the following documents that you can download free of charge:

- Corporate Governance Guidelines
- Audit Committee Charter
- Compensation Committee Charter
- Nominating and Corporate Governance Committee Charter
- Code of Conduct
- Equal Employment Opportunity Policy
- Business Partner Code of Conduct
- Ethical, Social, and Quality Standards
- Sustainability Report

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- Environmental Policy
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- Conflict Mineral Report
- Statement on Slavery, Human Trafficking, and Transparency in the Supply Chain

You can also obtain in print, free of charge, any of the above documents and any of our reports on Form 10-K, Form 10-Q, Form 8-K, and Schedule 14A and all amendments to those reports by sending a written request to our Investor Relations Department:

Investor Relations
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Item 1A. Risk Factors

Factors Affecting Our Future Operating Results

We are subject to certain risks associated with our international operations and have a significant concentration of business in China.

We conduct business in many countries, including emerging markets in Asia, Latin America, and Eastern Europe, and these operations represent a significant portion of our sales and earnings. For example, our Chinese operations accounted for 18% of sales to external customers, approximately 30% of our global production, and 37% of total segment profit during 2018. In addition to the currency risks discussed below, international operations pose other substantial risks and problems for us, including the following:

- local tariffs and trade barriers;
- countries may revise or alter their respective legal and regulatory requirements;
- difficulties in staffing and managing local operations and/or mandatory salary increases;
- credit risks arising from financial difficulties facing local customers and distributors;
- difficulties in protecting intellectual property;
- nationalization of private enterprises which may result in the confiscation of assets, as we hold significant assets around the world in the form of property, plant, and equipment, inventory, and accounts receivable, as well as \$145 million of cash at December 31, 2018 in our Chinese subsidiaries;
- restrictions on investments and/or limitations regarding foreign ownership;
- adverse tax consequences, including tax disputes, imposition or increase of withholding and other taxes on remittances and other payments by subsidiaries;
- other uncertain local economic, political, and social conditions, including hyper-inflationary conditions or periods of low or no productivity growth; and
- credit tightening or reduction in credit availability for local customers.

We must also comply with regulations regarding the conversion and repatriation of funds earned in local currencies. For example, we need government approval to convert earnings from our operations in China into other currencies and to repatriate these funds. If we cannot comply with these or other applicable regulations, we may face increased difficulties in using cash generated in China.

We are required to comply with various import, export control, and economic sanctions laws, which may affect our transactions with certain customers, business partners, and other persons, including in certain cases dealings with or between our employees and subsidiaries. In certain circumstances, export control and economic sanctions regulations may prohibit the export of certain products, services, and technologies, and in other circumstances, we may be required to obtain an export license before exporting a controlled item. We follow all relevant laws and continue to do business in Russia. Sanctions imposed on business in Russia may affect the economy and our business in Russia. In addition, failure to comply with any of these regulations could result in civil and criminal, monetary and non-monetary penalties, disruptions to our business, limitations on our ability to import and export products and services, and damage to our reputation.

Growth in emerging markets, especially China, can be volatile and change quickly. While we experienced strong growth in China in 2018, we have also experienced sales declines in recent years and we may see volatility in the future. There is also currently economic uncertainty, including the potential impact of international trade/tariff disputes.

We sell primarily to companies in developed countries. An economic downturn in these countries could hurt our operating results.

Most of our business is derived from companies in developed countries. Economic uncertainty in many parts of the world, including international trade disputes and sovereign debt levels in the European Union and the United States, are situations that we are monitoring closely. If developed countries were to experience slow growth or recession, we could see the following effects:

- a drop in demand for our products;
- companies being unable to finance their businesses;
- difficulty in obtaining materials and supplies;
- potential devaluation and/or impairment of assets;
- difficulty in collecting accounts receivables;
- an increase in accounts receivable write-offs; and
- greater foreign exchange rate volatility affecting our profitability and cash flow.

Economic downturns or recessions adversely affect our operating results because our customers often decrease or delay capital expenditures. Customers may also purchase lower-cost products made by competitors and not resume purchasing our products even after economic conditions improve. These conditions would reduce our revenues and profitability.

In addition, a potential financial crisis on financial institutions globally would likely have an adverse effect on the global capital markets and our business.

Currency fluctuations affect our operating profits.

Our earnings are affected by changing exchange rates. We are most sensitive to changes in the exchange rates between the Swiss franc, euro, and U.S. dollar. We have more Swiss franc expenses than we do Swiss franc sales because we develop and manufacture products in Switzerland that we sell globally and have a number of corporate functions located in Switzerland. When the Swiss franc strengthens against our other trading currencies, particularly the U.S. dollar and euro, our earnings go down. We also have significantly more sales in the euro than we do expenses. When the euro weakens against the U.S. dollar and Swiss franc, our earnings also go down. We estimate a 1% strengthening of the Swiss franc against the euro would reduce our earnings before tax by approximately \$1.6 million to \$1.8 million annually.

We also conduct business throughout the world, including Asia Pacific, the United Kingdom, Eastern Europe, Latin America, and Canada. Fluctuations in these currency exchange rates against the U.S. dollar can also affect our operating results. The most significant of these currency exposures is the Chinese renminbi. The impact on our earnings before tax of the Chinese renminbi weakening 1% against the U.S. dollar is a reduction of approximately \$1.5 million to \$1.7 million annually.

In addition to the effects of exchange rate movements on operating profits, our debt levels can fluctuate due to changes in exchange rates, particularly between the U.S. dollar, the Swiss franc, and euro. Based on our outstanding debt at December 31, 2018, we estimate that a 10% weakening of the U.S. dollar against the currencies in which our debt is denominated would result in an increase of approximately \$30.1 million in the reported U.S. dollar value of our debt.

Concerns regarding the Eurozone debt levels and market perception related to the instability of the euro could affect our operating profits.

We conduct business in many countries that use the euro as their currency (the Eurozone). Concerns persist regarding the debt burden of certain Eurozone countries and their ability to meet future financial obligations. In addition, concerns in recent years have existed regarding the overall stability of the euro and the suitability of the euro as a single currency given the diverse economic and political circumstances in individual Eurozone countries.

These concerns could lead to the re-introduction of individual currencies in one or more Eurozone countries or, in more extreme circumstances, the possible dissolution of the euro currency entirely. Should the euro dissolve entirely, the legal and contractual consequences for holders of euro-denominated obligations would be determined by laws in effect at such time. These potential developments, or market perceptions concerning these and related issues, could adversely affect the value of our euro-denominated assets and obligations. In addition, concerns over the effect of this financial crisis on financial institutions in Europe and globally could have an adverse effect on the global capital markets and, more specifically, on the ability of our Company, our customers, suppliers, and lenders to finance their respective businesses, to access liquidity at acceptable financing costs, if at all, on the availability of supplies and materials, and on the demand for our products.

We are vulnerable to system failures and data loss risks, which could harm our business.

We rely on our technology infrastructure to interact with suppliers, sell our products and services, support our customers, fulfill orders, and bill, collect, and make payments. Our systems are vulnerable to damage or interruption from natural disasters, power loss, telecommunication failures, malicious employees or employee negligence, computer viruses, and other events. When we upgrade or change systems, we may suffer interruptions in service, loss of data, or reduced functionality. A significant number of our systems are not redundant, and our disaster recovery planning is not sufficient for every eventuality. Despite any precautions we may take, such problems could result in interruptions in our services, fraudulent or negligent loss of assets, or unauthorized disclosure of confidential information, which could harm our reputation and financial condition. Our business interruption insurance may not be sufficient to compensate us for losses that may result from interruptions in our services or data loss as a result of system failures.

Customers may use our products and/or software to generate or manage confidential information. Though we take steps to ensure our products and/or software are secure, it is possible customers could lose confidential information stored on our products. If a customer alleges system failures in our products and/or software cause or contribute to a loss, we could face harm to our reputation and financial condition and legal liability.

We also are in the process of implementing a program to globalize our business processes and information technology systems that includes the implementation of a Company-wide enterprise resource planning system. This has been proceeding on a staggered basis over several years with the initial go-live rollout having occurred in 2010. We have implemented the program in our Swiss, Chinese, U.K., Benelux, German, and certain U.S. and Southeast Asia operations. We estimate that we have more than 80% of the program implemented, as measured in users. If the implementation is flawed, we could suffer interruptions in operations and customer-facing activities that could harm our reputation and financial condition or cause us to lose data, experience reduced functionality, or have delays in reporting financial information. It may take us longer to implement the program than we have planned, and the project may cost us more than we have estimated, either of which would negatively impact our ability to generate cost savings or other efficiencies. In addition, the implementation will increase our reliance on a single

information technology system, which would have greater consequences should we experience a system disruption.

Our business and financial performance may be adversely affected by a cybersecurity attack.

As described in the above section, we rely on our technology infrastructure to interact with suppliers, sell our products and services, fulfill orders, support our customers, and bill, collect and make payments. Our system and processes may be susceptible to damage or interruption from cybersecurity incidents, such as terrorist or hacker attacks, the introduction of malicious computer viruses, ransomware, falsification of banking and other information, insider risk, or other security breaches. If there is a cybersecurity incident, we may suffer interruptions in service, loss of assets or data, or reduced functionality. Many of our systems are not redundant, and our disaster recovery planning is not sufficient for every eventuality a cybersecurity incident could cause. Security breaches of our systems which allow inappropriate access to or inadvertent transfer of information and misappropriation or unauthorized disclosure of confidential information belonging to us or to our employees, customers, or suppliers could result in our suffering significant financial and reputational damage.

Customer may use our products and/or software to generate or manage critical information. Though we take steps to ensure our products and/or software are secure, it is possible that a cyber attack could result in the loss or compromise of critical information. If a customer alleges that a cyber attack causes or contributes to a loss or compromise of critical information, we could face harm to our reputation and financial condition.

While we attempt to mitigate cybersecurity risks by employing a number of proactive measures, including employee training and awareness, technical security controls, enhanced data protection, and maintenance of backup and protective systems, our systems remain potentially vulnerable to cybersecurity threats, any of which could have a material adverse effect on our business. We believe our mitigation measures reduce, but cannot eliminate, the risk of a cybersecurity incident. Despite any precautions we may take, a cybersecurity incident could harm our reputation and financial condition and cause us to incur legal liability and increased costs to respond to such events. Our cyber liability insurance may not be sufficient to compensate us for losses that may result from interruptions in our services or asset or data loss as a result of cybersecurity incidents.

We operate in highly competitive markets, and it may be difficult for us to preserve operating margins, gain market share, and maintain a technological advantage.

Our markets are highly competitive. Many are fragmented both geographically and by application, particularly the industrial and food retailing markets. As a result, we face numerous regional or specialized competitors, many of which are well established in their markets. In addition, some of our competitors are divisions of larger companies with potentially greater financial and other resources than our own. There has also been an increase in the consolidation of precision instrument companies in recent years. Any consolidation within our market could result in competitors becoming larger and having greater financial and other resources than our own. Some of our competitors are domiciled or operate in emerging markets and may have a lower cost structure than ours. We are confronted with new competitors in emerging markets which, although relatively small in size today, could become larger companies in their home markets. Given the sometimes significant growth rates of these emerging markets, and in light of their cost advantage over developed markets, emerging market competitors could become more significant global competitors. Taken together, the competitive forces present in our markets could harm our operating margins. We expect our competitors to continue to improve the design and performance of their products and to introduce new products with competitive prices. Although we believe that our products and services have advantages over our competitors, we may not be able to realize and maintain these advantages.

Our ability to manufacture and deliver products and services may be disrupted.

We have key manufacturing facilities located in China, Europe, and the United States. Many of our products are developed and manufactured at single locations, with limited alternate facilities. In addition, a large portion of our products and spare parts are distributed through regional logistics centers, in which certain logistics activities are outsourced to third parties. If we experience any significant disruption in these facilities for any reason, such as strikes or other labor unrest, power interruptions, cyber attacks, fire, earthquakes, hurricanes, or other events beyond our control, we may be unable to satisfy customer demand for our products or services and lose sales. It may be expensive to resolve these issues, even though some of these risks are covered by insurance policies. More importantly, customers may switch to competitors and may not return to us even if we resolve the interruption.

Our business would suffer if we were unable to obtain supplies of material.

We purchase most of our raw materials, components, and supplies from multiple suppliers. Some items are purchased from a limited or single source of supply, however, and disruption of these sources could affect our ability to manufacture products. Even where multiple sources of materials and components are available, the quality of the alternative materials, regulatory and contractual requirements to qualify materials for use in manufacturing, and the time required to establish new relationships with reliable suppliers could result in manufacturing delays and possible loss of sales. If we are unable to obtain materials or components for an extended time, this could damage our customer relationships and harm our financial condition or results of operations.

Our product development efforts may not produce commercially viable products in a timely manner.

If we do not introduce new products and enhancements, our products could become technologically obsolete over time, which would harm our operating results. To remain competitive, we must continue to make significant investments in research and development, sales and marketing, and customer service and support. We cannot be sure that we will have sufficient resources to continue to make these investments. In developing new products, we may be required to make substantial investments before we can determine their commercial viability. As a result, we may not be successful in developing new products and we may never realize the benefits of our research and development activities.

A prolonged downturn or additional consolidation in the pharmaceutical, food and beverage, and chemical industries could adversely affect our operating results. A reduction in the capital resources or government funding of our customers could reduce our sales.

Our products are used extensively in the pharmaceutical, food and beverage, and chemical industries. Consolidation in these industries hurt our sales in prior years. In recent years, there has been an increase in consolidation within these industries. A prolonged economic downturn or additional consolidation in any of these industries could adversely affect our operating results. In addition, the capital spending policies of our customers in these and other industries are based on a variety of factors we cannot control, including the resources available for purchasing equipment, the spending priorities among various types of equipment, and policies regarding capital expenditures. Any decrease or delay in capital spending by our customers would cause our revenues to decline and could harm our profitability. A decline in government funding of research or education could reduce some customers' ability to purchase our products.

Unanticipated changes in our tax rates or additional income tax liabilities could impact our profitability.

We are subject to income taxes in the United States and various other jurisdictions, and our domestic and international tax liabilities are subject to allocation of expenses among different jurisdictions. Our

effective tax rates and tax obligations could be adversely affected by changes in tax laws or rates, changes in the mix of earnings by jurisdiction, changes in the valuation of deferred tax assets and liabilities, and material adjustments from tax audits.

In particular, the carrying value of deferred tax assets, which are predominantly in the U.S., is dependent upon our ability to generate future taxable income in the U.S. In addition, the amount of income taxes we pay is subject to ongoing audits in various jurisdictions, and a material assessment by a governing tax authority could affect our profitability.

Our tax expense and tax obligations could increase as a result of a changing application of tax law.

Governments are facing greater pressure on public finances, which could lead to their more aggressively applying existing tax laws and regulations. Governments also periodically change tax laws and regulations. Any changes in corporate income tax rates or regulations, on repatriation of dividends, earnings or capital, or on transfer pricing, as well as changes in the interpretation of existing tax laws and regulations in the jurisdictions in which we operate, could adversely affect our cash flow and increase our overall tax burden, which would negatively affect our profitability.

We face risks related to sales through distributors and other third parties that we do not control, which could harm our business.

We sell some products through third parties, including distributors and value-added resellers. This exposes us to various risks, including competitive pressure, concentration of sales volumes, credit risks, and compliance risks. We may rely on one or a few key distributors for a product or market, and the loss of these distributors could reduce our revenue and net earnings. Distributors may also face financial difficulties, including bankruptcy, which could harm our collection of accounts receivables. Violations of the FCPA or similar anti-bribery laws by distributors or other third-party intermediaries could materially impact our business. Risks related to our use of distributors may reduce sales, increase expenses, and weaken our competitive position.

A terrorism attack, other geopolitical crisis, or widespread outbreak of an illness or other health issue could negatively affect our business, making it more difficult and expensive to meet our obligations to our customers, and could result in reduced demand from our customers.

Our global operations are susceptible to global events, including acts or threats of war or terrorism, international conflicts, political instability, and natural disasters. Also, in past years a number of countries have experienced outbreaks of the H1N1 influenza (swine flu) or, in the Asia Pacific region, outbreaks of SARS and/or avian influenza (bird flu), and more recently, Ebola outbreaks in parts of Africa. Despite the implementation of certain precautions, we are susceptible to such outbreaks. As a result of such events, businesses can be shut down and individuals can become ill, quarantined, or otherwise unable to work. These events, particularly in North America, Europe, China, or other locations significant to our operations, could adversely affect general commercial activity, which could have a material adverse effect on our financial condition, results of operations, business, or prospects. If our operations are curtailed, we may need to seek alternate sources of supply for services and staff and these alternate sources may be more expensive. Alternate sources may not be available or may result in delays in shipments to our customers, each of which would affect our results of operations. In addition, a curtailment of our product design operations could result in delays in the development of new products. Further, if our customers' businesses are similarly affected, they might delay or reduce purchases from us, which could adversely affect our results of operations.

If we cannot protect our intellectual property rights, or if we infringe or misappropriate the proprietary rights of others, our operating results could be harmed.

Our success depends on our ability to obtain, maintain, and enforce patents on our technology, maintain our trademarks, and protect our trade secrets. Our patents may not provide complete protection or may expire, and competitors may develop similar products that are not covered by our patents. Our patents may also be challenged by third parties and invalidated or narrowed. We may experience a decline in sales and/or profitability if any of these things occur. Competitors sometimes seek to take advantage of our trademarks or brands in ways that may create customer confusion or weaken our brand. Improper use or disclosure of our trade secrets may still occur.

We may be sued for infringing on the intellectual property rights of others. The cost of any litigation could affect our profitability regardless of the outcome, and management attention could be diverted. If we are unsuccessful in such litigation, we may have to pay damages, stop the infringing activity, and/or obtain a license. If we fail to obtain a required license, we may be unable to sell some of our products, which could result in a decline in our revenues.

Departures of key employees could impair our operations.

Key employees could leave the Company. If any key employees stopped working for us, our operations could be harmed. Important R&D personnel may leave and join competitors, which could substantially delay or hinder ongoing development projects. We have no key man life insurance policies with respect to any of our senior executives.

We may be adversely affected by environmental laws and regulations.

We are subject to various environmental laws and regulations and incur expenditures in complying with environmental laws and regulations. We are currently involved in, or have potential liability with respect to, the remediation of past contamination in various facilities. In addition, some of our facilities are or have been in operation for many decades and may have used substances or generated and disposed of wastes that are hazardous or may be considered hazardous in the future. These sites and disposal sites owned by others to which we sent waste may in the future be identified as contaminated and require remediation. Accordingly, it is possible that we could become subject to additional environmental liabilities in the future that may harm our results of operations or financial condition.

We may be adversely affected by regulations and market expectations related to sourcing and our supply chain, including conflict minerals.

The SEC has adopted disclosures and reporting requirements for companies whose products contain certain minerals and their derivatives, namely tin, tantalum, tungsten, or gold, known as conflict minerals. Companies must report annually whether or not such minerals originate from the Democratic Republic of Congo (DRC) and adjoining countries and in some cases perform extensive due diligence on their supply chains for such minerals. These requirements could adversely affect the sourcing, availability, and pricing of materials used in the manufacturing of our products. In addition, we have incurred additional costs to comply with the disclosure requirements, including cost related to determining the source of any of the relevant minerals used in our products. Since our supply chain is complex, the due diligence procedures that we have implemented may not enable us to ascertain with sufficient certainty the origins for these minerals or determine that these minerals are DRC conflict free, which may harm our reputation. We may also face difficulties in satisfying customers who may require that our products be certified as DRC conflict free, which could harm our relationships with these customers and/or lead to a loss of revenue. These requirements also could have the effect of limiting the pool of suppliers from which we source these minerals, and we may be unable to obtain conflict-free minerals at prices similar to the past, which could increase our costs and adversely affect our manufacturing operations and our profitability.

Future laws, regulations, or customers may make additional demands on supply chain transparency. These demands can include more transparency into the activities of our suppliers with regard to human rights and sustainable sourcing. We have significant protections in place to ensure we partner with responsible suppliers, but increased demands may cause us to incur increased supply chain costs. If we can't satisfy customers' demands, we may lose business, and if we can't meet new regulatory requirements, we may have to alter our sourcing at increased expense.

We may be adversely affected by failure to comply with regulations of governmental agencies or by the adoption of new regulations. Changes in United States trade policy, including the imposition of tariffs and the resulting consequences, as well as other changes in political policy in the United States, China, the U.K., and certain European countries, may also impact global trade or create uncertainty impacting our business.

Our products are subject to regulation by governmental agencies. These regulations govern a wide variety of activities relating to our products, including design and development, product safety, labeling, manufacturing, promotion, sales, and distribution. We also operate a global business and are subject to various laws and regulations in the many markets we do business, including those relating to competition, employment and labor practices, international trade, and corruption. If we fail to comply with these regulations, or if new regulations are adopted that substantially change existing practice or impose new burdens, we may have to recall products and cease their manufacture and distribution. In addition, we could be subject to investigation costs, reputational harm, fines, criminal prosecution, and other damages that could impact our profitability.

Changes in political policy in the United States, China, the U.K., and certain European countries may impact global trade or create uncertainty. The United States government has announced its intent to adopt a new approach to trade policy and in certain cases to renegotiate, or possibly terminate, certain existing trade agreements. The United States government has also initiated tariffs on certain foreign goods, particularly those produced in China, and has raised the possibility of imposing further tariff increases or expanding the scope of the tariffs. As a result, certain foreign governments, including the Chinese government, have imposed retaliatory tariffs on goods that their countries import from the United States.

These actions may restrict our access to lower-cost countries or otherwise create uncertainty in global markets and make it more difficult or costly for us to import our products into certain countries. The adoption and expansion of trade restrictions or other government action related to tariffs or trade agreements or policies could also lead to an economic downturn and/or could create unfavorable fluctuations in currency exchange rates (see above description "currency fluctuations affect our operating profits"). In times of uncertainty, some customers delay investments or defer normal replacement cycles, which could have an adverse impact on our sales. The adoption and expansion of trade restrictions or other governmental action related to tariffs or trade agreements or policies have the potential to adversely impact our business and financial performance.

In June 2016, voters in the U.K. approved an advisory referendum to withdraw from the European Union, commonly referred to as "Brexit". The timing of the proposed exit is currently scheduled for March 2019, with a transition period running through December 2020. Brexit has created political and economic uncertainty that may have a negative impact on U.K., European and global economic conditions, international trade flows, and foreign currency translation. At this time, we cannot predict the potential impact of Brexit on our business. However, Brexit could adversely effect our operating results and financial condition.

We may face risks associated with future acquisitions.

We may pursue acquisitions of complementary product lines, technologies, or businesses. Acquisitions involve numerous risks, including difficulties in integrating the acquired operations, technologies, and products; diversion of management's attention from other business concerns; and potential departures of key employees of the acquired company. If we successfully identify acquisitions in the future, completing such acquisitions may result in new issuances of our stock that may be dilutive to current owners, increases in our debt and contingent liabilities, and additional amortization expense related to intangible assets. Any of these acquisition-related risks could have a material adverse effect on our profitability.

Larger companies have identified life sciences and instruments as businesses they will consider entering, which could change the competitive dynamics of these markets. In addition, we may not be able to identify, successfully complete, or integrate potential acquisitions in the future. Even if we can do so, we cannot be sure that these acquisitions will have a positive impact on our business or operating results. We are also required to estimate the fair value of certain assets acquired or liabilities assumed. Such fair values may be based on valuation models which are subject to inherent uncertainties and our judgments regarding certain assumptions.

We may experience impairments of goodwill or other intangible assets.

As of December 31, 2018, our consolidated balance sheet included goodwill of \$534.8 million and other intangible assets of \$217.3 million.

Our business acquisitions typically result in goodwill and other intangible assets, which affect the amount of future period amortization expense and possible impairment expense. We make estimates and assumptions in valuing such intangible assets that affect our consolidated financial statements.

In accordance with U.S. GAAP, our goodwill and indefinite-lived intangible assets are not amortized, but are evaluated for impairment annually in the fourth quarter, or more frequently if events or changes in circumstances indicate that an asset might be impaired. The evaluation may be based on valuation models that estimate fair value. In preparing the valuation models, we consider a number of factors, including operating results, business plans, economic conditions, future cash flows, and transactions and market data. There are inherent uncertainties related to these factors and our judgment in applying them to the impairment analyses. The significant estimates and assumptions within our fair value models include sales growth, controllable cost growth, perpetual growth, effective tax rates, and discount rates. Our assessments to date have indicated that there has been no impairment of these assets.

Should any of these estimates or assumptions change, or should we incur lower-than-expected operating performance or cash flows, including from a prolonged economic slowdown, we may experience a triggering event that requires a new fair value assessment for our reporting units, possibly prior to the required annual assessment. These types of events and resulting analysis could result in impairment charges for goodwill and other indefinite-lived intangible assets if the fair value estimate declines below the carrying value.

Our amortization expense related to intangible assets with finite lives may materially change should our estimates of their useful lives change.

We have debt and we may incur substantially more debt, which could affect our ability to meet our debt obligations and may otherwise restrict our activities.

We have debt and we may incur substantial additional debt in the future. As of December 31, 2018, we had total indebtedness of approximately \$856.6 million, net of cash of \$178.1 million. Our debt instruments allow us to incur substantial additional indebtedness.

The existence and magnitude of our debt could have important consequences. For example, it could make it more difficult for us to satisfy our obligations under our debt instruments; require us to dedicate a substantial portion of our cash flow to payments on our indebtedness, which would reduce the amount of cash flow available to fund working capital, capital expenditures, product development, and other corporate requirements; increase our vulnerability to general adverse economic and industry conditions, including changes in raw material costs; limit our ability to respond to business opportunities; limit our ability to borrow additional funds, which may be necessary; and subject us to financial and other restrictive covenants, which, if we fail to comply with these covenants and our failure is not waived or cured, could result in an event of default under our debt instruments.

The agreements governing our debt impose restrictions on our business.

The note purchase agreements governing our notes and the agreements governing our credit facility contain covenants imposing various restrictions on our business. These restrictions may affect our ability to operate our business and may limit our ability to take advantage of potential business opportunities. The restrictions these covenants place on us include limitations on our ability to incur liens and consolidate, merge, sell, or lease all or substantially all of our assets. Our credit facility and the note purchase agreements governing our senior notes also require us to meet certain financial ratios.

Our ability to comply with these agreements may be affected by events beyond our control, including economic, financial, and industry conditions. The breach of any covenants or restrictions could result in a default under the note purchase agreements governing the senior notes and/or under our credit facility. An event of default under the agreements governing our debt would permit holders of our debt to declare all amounts owed to them under such agreements to be immediately due and payable. Acceleration of our other indebtedness may cause us to be unable to make interest payments on the senior notes and repay the principal amount of the senior notes.

The lenders under our credit agreement may be unable to meet their funding commitments, reducing the amount of our borrowing capacity.

We have a revolving credit facility outstanding under which the Company and certain of its subsidiaries may borrow up to \$1.1 billion. Our credit facility is provided by a group of 15 financial institutions, which individually have between 1% and 11% of the total funding commitment. At December 31, 2018, we had borrowings of \$493.2 million outstanding under our credit facility. Our ability to borrow further funds under our credit facility is subject to the various lenders' financial condition and ability to make funds available. Even though the financial institutions are contractually obligated to lend funds, if one or more of the lenders encounters financial difficulties or goes bankrupt, such lenders may be unable to meet their obligations. This could result in us being unable to borrow the full \$1.1 billion amount available.

We make forward-looking statements, and actual events or results may differ materially from these statements because assumptions we have made prove incorrect due to market conditions in our industries or other factors.

We provide forward-looking statements both in our filings with the SEC and orally in connection with our quarterly earnings calls, including guidance on anticipated earnings per share. You should not rely on forward-looking statements to predict our actual results. Our actual results or performance may be materially different than reflected in forward-looking statements because of various risks and uncertainties.

Our forward-looking statements may not be accurate or complete, and we do not intend to update or revise them in light of actual results. New risks also periodically arise. Please consider the risks and factors that could cause our results to differ materially from what is described in our forward-looking

statements. See in particular “Factors Affecting Our Future Operating Results” and “Management’s Discussion and Analysis of Financial Condition and Results of Operations.”

In providing guidance on our future earnings, we evaluate our budgets, strategic plans, and other factors relating to our business. We make assumptions about external factors, including the following:

- the outlook for our end markets and the global economy;
- the impact of external factors on our competition;
- the financial position of our customers and their willingness to pay for our products and services;
- the estimated costs of purchasing materials;
- developments in personnel costs;
- our estimated income tax expense; and
- rates for currency exchange, particularly between the Swiss franc and the euro.

Some of these assumptions may prove to be incorrect over time. For example, although no single end-customer accounts for more than 1% of our revenues, if a number of our customers experienced significant deteriorations in their financial positions concurrently, it could have an impact on our results of operations.

Some of our key internal assumptions include the following:

- our ability to implement our business strategy;
- our ability to implement price increases as forecasted;
- the effectiveness of our sales and marketing programs such as our Spinnaker and market penetration, and Field Turbo initiatives;
- the effectiveness of our programs to improve our service business, including growth, globalization, and productivity initiatives;
- our ability to develop and deliver innovative products and services;
- the continued growth of our sales in emerging markets; and
- the effectiveness of productivity and cost saving initiatives.

These internal assumptions may also prove to be incorrect over time. For example, with respect to our ability to realize our planned price increases without disturbing our customer base in core markets, in certain markets, such as emerging markets, price tends to be a more significant factor in customers’ decisions to purchase our products and services. Furthermore, we can have no assurance that our cost reduction programs will generate adequate cost savings. Additionally, it may become necessary to take additional restructuring actions resulting in additional restructuring costs.

We believe our current assumptions are reasonable and prudent for planning purposes. However, should any of these assumptions prove to be incorrect, or should we incur lower-than-expected operating performance or cash flows, we may experience results different than our projections.

Our ability to generate and repatriate cash depends in part on factors beyond our control.

Our ability to make payments on our debt and to fund our share repurchase program, planned capital expenditures, and research and development efforts depends on our ability to generate and repatriate cash in the future. This is subject to factors beyond our control, including general economic, financial, competitive, legislative, regulatory, governmental, and other factors described in this section.

We cannot ensure that our business will generate sufficient cash flows from operations or that future borrowings will be available to us under our credit facility in an amount sufficient to enable us to pay our debt or to fund our other liquidity needs. We may need to refinance all or a portion of our indebtedness on or before maturity. We cannot ensure that we will be able to refinance any of our debt, including our credit facility and the senior notes, on commercially reasonable terms or at all.

Our ability to fund our share repurchase program is also dependent on our ability to repatriate our international cash flows. Changes in governmental cash repatriation policies, restrictions, or tax laws could impair our ability to continue our share repurchase program.

Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

Our principal executive offices are located in Columbus, Ohio and Greifensee, Switzerland. The following table lists our principal facilities, indicating the location and whether the facility is owned or leased. The properties listed below serve primarily as manufacturing facilities or shared service centers and also typically have a certain amount of space for service, sales and marketing, and administrative activities. The facilities in Giessen, Germany and Viroflay, France are used primarily for sales and marketing. We believe our facilities are adequate for our current and reasonably anticipated future needs.

Location	Owned/Leased	Business Segment
Europe:		
Greifensee/Nänikon, Switzerland	Owned	Swiss Operations
Urdorf, Switzerland	Owned	Swiss Operations
Manchester, England	Leased	Western European Operations
Royston, United Kingdom	Owned	Western European Operations
Salford, United Kingdom	Leased	Western European Operations
Viroflay, France (two facilities)	Owned; Leased	Western European Operations
Albstadt, Germany	Owned	Western European Operations
Giessen, (Hesse) Germany	Owned	Western European Operations
Giesen, (Lower Saxony) Germany	Owned	Western European Operations
Warsaw, Poland	Leased	Other Operations
Americas:		
Columbus, Ohio	Leased	U.S. Operations
Worthington, Ohio (two facilities)	Owned	U.S. Operations
Oakland, California	Owned	U.S. Operations
Billerica, Massachusetts	Owned	U.S. Operations
Tampa, Florida	Owned	U.S. Operations
Tijuana, Mexico	Leased	U.S. Operations
Thorofare, New Jersey	Owned	U.S. Operations
Other:		
Shanghai, China (two facilities)	Buildings Owned; Land Leased	Chinese Operations
Changzhou, China (two facilities)	Buildings Owned; Land Leased	Chinese Operations
ChengDu, China	Buildings Owned; Land Leased	Chinese Operations
Mumbai, India (three facilities)	Leased	Other Operations

Item 3. *Legal Proceedings*

We are not currently involved in any legal proceeding that we believe could have a material adverse effect upon our financial condition, results of operations, or cash flows. See the disclosure in Item 1 above under “Environmental Matters.”

Executive Officers of the Registrant

See Part III, Item 10 of this annual report for information about our executive officers.

PART II

Item 5. *Market for Registrant's Common Equity, Related Stockholder Matters, and Issuer Purchases of Equity Securities*

Market Information for Common Stock

Our common stock is traded on the New York Stock Exchange under the symbol "MTD."

Holder

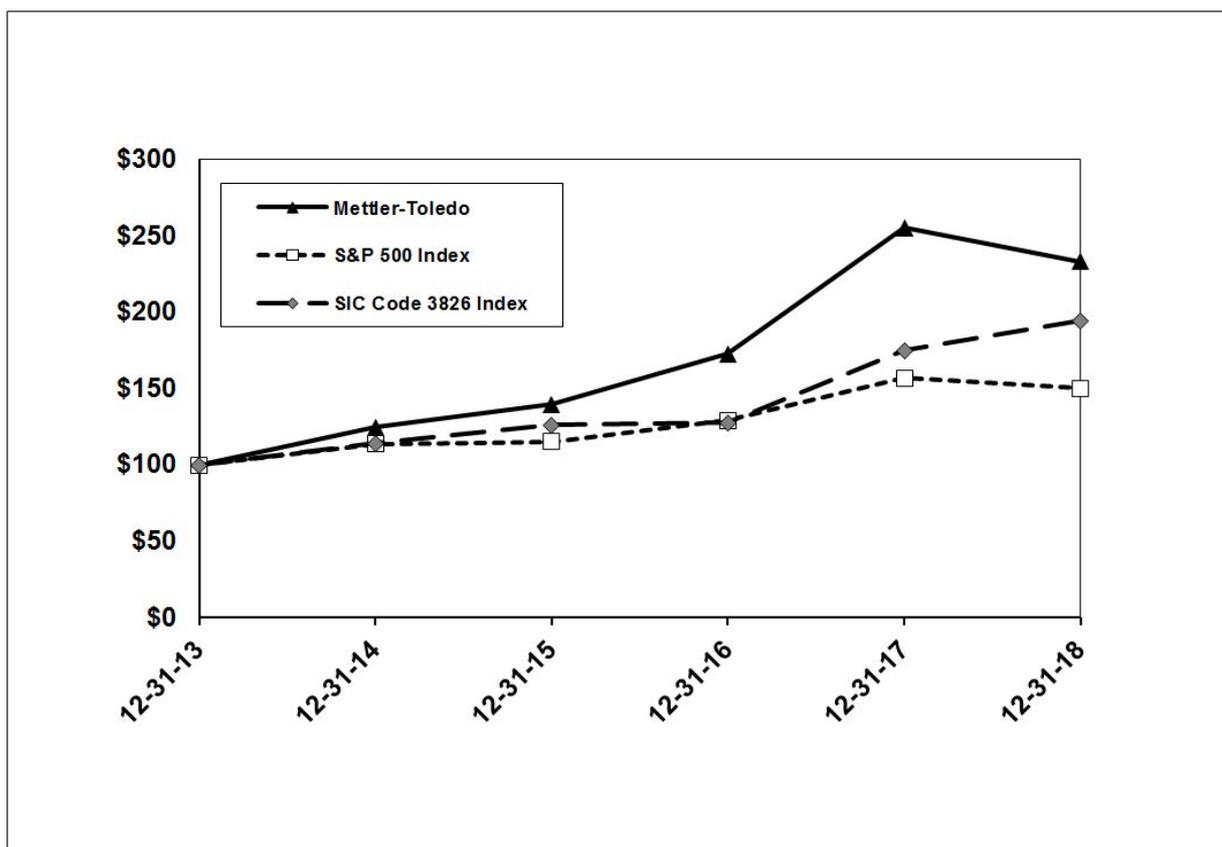
At February 1, 2019, there were 49 holders of record of common stock and 24,795,237 shares of common stock outstanding. We estimate we have approximately 90,609 beneficial owners of common stock.

Dividend Policy

Historically, we have not paid dividends on our common stock. However, we will evaluate this policy on a periodic basis taking into account our results of operations, financial condition, capital requirements, including potential acquisitions, our share repurchase program, the taxation of dividends to our shareholders, and other factors deemed relevant by our Board of Directors.

Share Performance Graph

The following graph compares the cumulative total returns (assuming reinvestment of dividends) on \$100 invested on December 31, 2013 through December 31, 2018 in our common stock, the Standard & Poor’s 500 Composite Stock Index (S&P 500 Index), and the SIC Code 3826 Index — Laboratory Analytical Instruments.



Comparison of Cumulative Total Return Among Mettler-Toledo International Inc., the S&P 500 Index, and SIC Code 3826 Index — Laboratory Analytical Instruments

	12/31/13	12/31/14	12/31/15	12/31/16	12/31/17	12/31/18
Mettler-Toledo	\$100	\$125	\$140	\$173	\$255	\$233
S&P 500 Index	\$100	\$114	\$115	\$129	\$157	\$150
SIC Code 3826 Index	\$100	\$114	\$126	\$128	\$175	\$194

Purchases of Equity Securities by the Issuer and Affiliated Purchasers*Issuer Purchases of Equity Securities*

Period	Total Number of Shares Purchased	Average Price Paid per Share	Total Number of Shares Purchased as Part of Publicly Announced Program	Approximate Dollar Value (in thousands) of Shares that may yet be Purchased under the Program
October 1 to October 31, 2018	71,514	\$ 571.57	71,514	\$ 186,296
November 1 to November 30, 2018	69,849	585.17	69,849	2,145,421
December 1 to December 31, 2018	62,907	588.12	62,907	2,108,423
Total	204,270	\$ 581.32	204,270	\$ 2,108,423

In November 2018, the Company's Board of Directors authorized an additional \$2.0 billion to the share repurchase program which has \$2.1 billion of remaining availability as of December 31, 2018. The share repurchases are expected to be funded from cash generated from operating activities, borrowings, and cash balances. Repurchases will be made through open market transactions, and the amount and timing of purchases will depend on business and market conditions, the stock price, trading restrictions, the level of acquisition activity, and other factors.

We have purchased 27.5 million common shares since the inception of the program in 2004 through December 31, 2018, at a total cost of \$4.4 billion. During the years ended December 31, 2018 and 2017, we spent \$475 million and \$400 million on the repurchase of 802,809 shares and 749,254 shares at an average price per share of \$591.65 and \$533.84, respectively. We reissued 183,379 shares and 270,413 shares held in treasury for the exercise of stock options and restricted stock units during 2018 and 2017, respectively.

Item 6. Selected Financial Data

The selected historical financial information set forth below as of and for the years then ended December 31 is derived from our audited consolidated financial statements. The financial information presented below, in thousands except share data, was prepared in accordance with accounting principles generally accepted in the United States of America (“U.S. GAAP”).

	2018	2017	2016	2015	2014
Statement of Operations Data:					
Net sales	\$ 2,935,586	\$ 2,725,053	\$ 2,508,257	\$ 2,395,447	\$ 2,485,983
Cost of sales ^(a)	1,251,208	1,149,302	1,070,525	1,040,510	1,123,780
Gross profit	1,684,378	1,575,751	1,437,732	1,354,937	1,362,203
Research and development ^(a)	141,071	128,308	119,196	118,557	122,688
Selling, general, and administrative ^(a)	812,802	794,861	745,358	717,022	747,597
Amortization	47,524	42,671	36,052	30,951	29,185
Interest expense	34,511	32,785	28,026	27,451	24,537
Restructuring charges ^(b)	18,420	12,772	6,235	11,148	5,915
Other charges (income), net ^{(a)(c)}	(21,808)	(9,868)	(1,328)	(13,616)	(12,723)
Earnings before taxes	651,858	574,222	504,193	463,424	445,004
Provision for taxes ^(d)	139,247	198,250	119,823	110,604	106,763
Net earnings	<u>\$ 512,611</u>	<u>\$ 375,972</u>	<u>\$ 384,370</u>	<u>\$ 352,820</u>	<u>\$ 338,241</u>
Basic earnings per common share:					
Net earnings	\$ 20.33	\$ 14.62	\$ 14.49	\$ 12.75	\$ 11.71
Weighted average number of common shares	25,215,674	25,713,575	26,517,768	27,680,918	28,890,771
Diluted earnings per common share:					
Net earnings	\$ 19.88	\$ 14.24	\$ 14.22	\$ 12.48	\$ 11.44
Weighted average number of common and common equivalent shares	25,781,324	26,393,783	27,023,905	28,269,615	29,571,308
Balance Sheet Data:					
Cash and cash equivalents	\$ 178,110	\$ 148,687	\$ 158,674	\$ 98,887	\$ 85,263
Working capital ^(e)	182,987	188,040	169,569	152,721	172,380
Total assets	2,618,847	2,549,805	2,166,777	1,959,335	1,973,532
Long-term debt ^(e)	985,021	960,170	875,056	575,138	334,134
Other non-current liabilities ^(f)	260,511	301,452	204,957	194,552	218,108
Shareholders' equity ^(g)	590,063	547,280	434,943	580,457	719,595

(a) In accordance with the new accounting rules that went into effect on January 1, 2018, we reclassified a net pension benefit of \$6.2 million, \$4.0 million, \$9.8 million, \$12.7 million, and \$15.0 million into other charges (income) from other income statement categories for the years ended December 31, 2018, 2017, 2016, 2015, and 2014, respectively, to be consistent with 2018 presentation.

(b) Restructuring charges primarily relate to our global cost reduction programs. See Note 15 and Note 18 to the audited consolidated financial statements.

(c) Other charges (income), net includes (gains) losses from foreign currency transactions and hedging activities, interest income, and other items. Other charges (income), net for 2018 includes a one-time gain of \$18.7 million associated with the settlement of the Biotix acquisition contingent consideration, as well as a one-time legal charge of \$3 million. Other charges (income), net includes \$1.7 million and \$1.1 million of acquisition costs for 2017 and 2016, respectively. Other charges (income), net for 2017 also includes a one-time gain of \$3.4 million relating to the sale of a facility in Switzerland in connection with our initiative to consolidate certain Swiss operations into a new facility, while 2016 includes a one-time non-cash pension settlement charge of \$8.2 million related to a lump sum offering to former employees of our U.S. pension plan.

- (d) Provision for taxes for 2018 and 2017 includes charges of \$3.6 million and \$72 million, respectively, for the implementation of the Tax Cuts and Jobs Act. Of this aggregate amount, \$62 million is expected to be paid over a period of up to eight years beginning in 2018. See Note 14 to the audited consolidated financial statements.
- (e) Working capital represents total current assets net of cash, less total current liabilities net of short-term borrowings and current maturities of long-term debt.
- (f) Other non-current liabilities consist of pension and other post-retirement liabilities, the long-term taxes payable of \$45 million and \$48 million as of December 31, 2018 and 2017 related to the Tax Cuts and Jobs Act, plus certain other non-current liabilities. See Note 13 to the audited consolidated financial statements for pension and other post-retirement disclosures.
- (g) No dividends were paid during the five-year period ended December 31, 2018.

Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations

The following discussion and analysis of our financial condition and results of operations should be read together with our audited consolidated financial statements.

Changes in local currencies exclude the effect of currency exchange rate fluctuations. Local currency amounts are determined by translating current and previous year consolidated financial information at an index utilizing historical currency exchange rates. We believe local currency information provides a helpful assessment of business performance and a useful measure of results between periods. We do not, nor do we suggest that investors should, consider such non-GAAP financial measures in isolation from, or as a substitute for, financial information prepared in accordance with GAAP. We present non-GAAP financial measures in reporting our financial results to provide investors with an additional analytical tool to evaluate our operating results.

We also include in the discussion below disclosures of immaterial qualitative factors that are not quantified. Although the impact of such factors is not considered material, we believe these disclosures can be useful in evaluating our operating results.

Overview

We operate a global business with sales that are diversified by geographic region, product range, and customer. We hold leading positions worldwide in many of our markets and attribute this leadership to several factors, including the strength of our brand name and reputation, our comprehensive offering of innovative instruments and solutions, and the breadth and quality of our global sales and service network.

Net sales in U.S. dollars increased 8% in 2018 and 9% in 2017. Excluding the effect of currency exchange rate fluctuations, or in local currencies, net sales increased 6% in 2018 and 8% in 2017. Net sales growth in local currencies during 2018 reflected strong execution of our growth initiatives and favorable global market conditions. We expect to continue to benefit from our strong global leadership positions, diversified customer base, innovative product offering, investment in emerging markets, significant installed base, and the impact of our global sales and marketing programs. Examples of these programs include identifying and investing in growth and market penetration opportunities, more effectively pricing our products and services, increasing our sales force effectiveness through improved guidance, and continuing to optimize our lead generation and lead nurturing processes. However, economic conditions can also change quickly, particularly in emerging markets, and it is uncertain that favorable market conditions will continue. We also remain cautious as economic uncertainties exist in certain regions of the world, especially the potential impact of international trade/tariff disputes.

With respect to our end-user markets, we experienced increased results during 2018 versus the prior year in our laboratory-related markets, such as pharmaceutical and biotech customers, as well as the laboratories of chemical companies and food and beverage companies. Demand from these markets was

favorable during 2018. The local currency increase in net sales of our laboratory-related products during 2018 was driven by strong growth in most product categories.

Our industrial markets experienced favorable market conditions in China with strong growth despite challenging prior period comparisons. Emerging market economies have historically been an important source of growth based upon the expansion of their domestic economies, as well as increased exports as companies have moved production to low-cost countries. However, our core industrial-related products are especially sensitive to changes in economic growth. We also expect our industrial markets to continue to benefit from our customers' focus on brand protection and food safety within our product inspection end-market.

Our food retailing sales increased during 2018 with strong project activity in the Americas. Traditionally the spending levels in this sector have experienced more volatility than our other customer sectors due to the timing of customer project activity and new regulations.

In 2019, we expect to continue to pursue the overall business growth strategies which we have followed in recent years:

Gaining Market Share. Our global sales and marketing initiative, “Spinnaker,” continues to be an important growth strategy. For example, over the past few years, we have added field sales and service resources to pursue under-penetrated market opportunities and will look to continue to make investments to front-end resources in 2019. We also aim to gain market share by implementing sophisticated sales and marketing programs, leveraging our extensive customer databases, and leveraging our product offering to larger customers through key account management. While this initiative is broad-based, efforts to improve these processes include leveraging big data analytics to identify, prioritize, and pursue growth opportunities, the implementation of more effective pricing and value-based selling strategies and processes, improved sales force guidance, training and effectiveness, cross-selling, increased segment marketing, and leads generation and nurturing activities. Our comprehensive service offerings, and our initiatives to globalize and harmonize these offerings, help us further penetrate developed markets. We estimate that we have the largest installed base of weighing instruments in the world, and we continue to leverage big data analytics and invest in sales and marketing activities aimed at increasing the proportion of our installed base that is under service contract, or selling new products that replace old products in our installed base. In addition to traditional repair and maintenance, our service offerings continue to expand into value-added services for a range of market needs, including regulatory compliance.

Expanding Emerging Markets. Emerging markets, comprising Asia (excluding Japan), Eastern Europe, Latin America, the Middle East, and Africa, account for approximately 35% of our total net sales. We have a two-pronged strategy in emerging markets: first, to capitalize on long-term growth opportunities in these markets, and second, to leverage our low-cost manufacturing operations in China. We have approximately a 30-year track record in China, and our sales in Asia have grown more than 14% on a compound annual growth basis in local currencies since 1999. Over the years, we have also broadened our product offering to the Asian markets. India has also been a source of emerging market sales growth in past years due to increased life science research activities. Overall, market conditions in emerging markets were favorable during 2018. We experienced a 10% increase in emerging market local currency sales during 2018 versus the prior year, which included 13% local currency sales growth in China. Within China, we continue to redeploy resources and sales and marketing efforts to the faster-growing segments of pharma, food safety, chemical, and environment. We believe the long-term growth of these segments will be favorably impacted by the Chinese government's emphasis on science, high-value industries, and product quality. We expect our laboratory and product inspection businesses will particularly benefit from these segments. We also continue to invest and add sales and marketing resources to pursue growth in under-penetrated emerging markets. However, emerging market sales can

be volatile. While Chinese market conditions are currently favorable, there is uncertainty, including the potential impact of international trade disputes. The Chinese economy has historically been volatile and market conditions may change unfavorably due to various factors.

Extending Our Technology Lead. We continue to focus on product innovation. In the last three years, we spent approximately 5% of net sales on research and development. We seek to accelerate product replacement cycles, as well as improve our product offerings and their capabilities with additional integrated technologies and software which also supports our pricing differentiation. In addition, we aim to create value for our customers by having an intimate knowledge of their processes via our significant installed product base.

Expanding Our Margins. We continue to strive to improve our margins by more effectively pricing our products and services and optimizing our cost structure. For example, sophisticated data analytic tools provide us new insights to further refine our price strategies and processes. We also focus on reallocating resources and better aligning our cost structure to support our investments in market penetration initiatives, higher-growth areas, and opportunities for margin improvement. We have also initiated various cost reduction programs over the past few years. As previously mentioned, shifting production to China has also been an important component of our cost savings initiatives. We have also implemented global procurement and supply chain management programs over the last several years aimed at lowering supply costs, and have further increased our focus on these programs during the past two years with the global launch of our SternDrive initiative. SternDrive is our global program for continuous improvement efforts within our supply chain, manufacturing, and back-office operations. Blue Ocean is also an important enabler of our various margin expansion initiatives. Our move to standardized business processes, systems, and data structures throughout our global organization provides greater data transparency and faster access to real-time data. Our cost leadership and productivity initiatives are also focused on continuously improving our invested capital efficiency, such as reducing our working capital levels and ensuring appropriate returns on our expenditures.

Pursuing Strategic Acquisitions. We seek to pursue "bolt-on" acquisitions that may leverage our global sales and service network, respected brand, extensive distribution channels, and technological leadership. We have identified life sciences, product inspection, and process analytics as three key areas for acquisitions. For example, during 2017, we acquired the shares of Biotix, Inc., a U.S.-based manufacturer and distributor of plastic consumables associated with pipettes, including tips, tubes, and reagent reservoirs used in the life sciences market, for an initial cash payment of \$105 million plus additional cash consideration of \$10 million that will be paid in the first quarter of 2019.

Results of Operations — Consolidated

Net sales

Net sales were \$2.9 billion for the year ended December 31, 2018, compared to \$2.7 billion in 2017 and \$2.5 billion in 2016. This represents an increase of 8% in 2018 and 9% in 2017 in U.S. dollars and an increase of 6% and 8% in local currencies, respectively. The Biotix and Troemner acquisitions contributed approximately 1% to local currency sales in 2018 and 2017. Global market conditions were favorable during 2018, and we continue to benefit from the execution of our global sales and marketing programs, our innovative product portfolio, and investments in our field resources. However, we remain cautious as market conditions are subject to change and economic uncertainties exist, particularly concerning international trade/tariff disputes.

In 2018, our net sales by geographic destination increased in U.S. dollars 5% in the Americas, 7% in Europe, and 12% in Asia/Rest of World. In local currencies, our net sales by geographic destination increased in 2018 by 5% in the Americas, 4% in Europe, and 10% in Asia/Rest of World. The Biotix and

Troemner acquisitions contributed approximately 1% and 2% to net sales in the Americas during 2018 and 2017, respectively. A discussion of sales by operating segment is included below.

As described in Note 3 to our audited consolidated financial statements, our net sales comprise product sales of precision instruments and related services. Service revenues are primarily derived from repair and other services, including regulatory compliance qualification, calibration, certification, preventative maintenance, and spare parts.

Net sales of products increased 8% in U.S. dollars and 6% in local currencies during 2018 and increased 9% in both U.S. dollars and in local currencies in 2017. The Biotix and Troemner acquisitions contributed approximately 1% and 2% to our net sales of products during 2018 and 2017, respectively. Service revenue (including spare parts) increased 8% in U.S. dollars and 6% in local currencies in 2018 and increased 7% in both U.S. dollars and in local currencies in 2017.

Net sales of our laboratory products and services, which represented approximately 51% of our total net sales in 2018, increased 11% in U.S. dollars and 9% in local currencies during 2018. The local currency increase in net sales of our laboratory products during 2018 includes strong growth in most product categories, especially process analytics, pipettes, and automated chemistry. The Biotix acquisition also contributed approximately 2% to our net sales growth of laboratory-related products and services.

Net sales of our industrial products and services, which represented approximately 41% of our total net sales in 2018, increased 5% in U.S. dollars and 3% in local currencies during 2018. The local currency increase in net sales of our industrial products includes growth in core-industrial, offset in part by a slight decline in product inspection.

Net sales of our food retailing products and services, which represented approximately 8% of our total net sales in 2018, increased 5% in U.S. dollars and 3% in local currencies during 2018. Food retailing experienced strong project activity in the Americas, while net sales in Europe declined in 2018 related to reduced customer activity.

Gross profit

Gross profit as a percentage of net sales was 57.4% for 2018, compared to 57.8% for 2017 and 57.3% for 2016.

Gross profit as a percentage of net sales for products was 60.3% for 2018, compared to 61.1% for 2017 and 60.9% for 2016. Gross profit as a percentage of net sales for services (including spare parts) was 47.0% for 2018, compared to 46.1% for 2017 and 44.6% for 2016.

The decrease in gross profit as a percentage of net sales for 2018 was primarily due to initial costs associated with a new manufacturing facility and product introductions, tariff costs, and unfavorable business mix, offset in part by favorable price realization.

In 2018, the U.S. government enacted tariffs on certain products imported from China. The tariffs became effective at various points during 2018. We estimate the associated annualized cost increase is approximately \$25 million (assuming a 25% tariff rate). We continue to evaluate and implement various actions to mitigate the effect of these tariffs.

Research and development and selling, general, and administrative expenses

Research and development expenses as a percentage of net sales were 4.8% for 2018, 4.7% for 2017, and 4.8% for 2016. Research and development expenses in U.S. dollars increased 11% in 2018 and 8% in 2017, and in local currencies increased 9% in 2018 and 8% in 2017, relating to increased project activity.

Selling, general, and administrative expenses as a percentage of net sales were 27.7% for 2018, compared to 28.9% for 2017 and 29.2% for 2016. Selling, general, and administrative expenses increased 2% in U.S. dollars and 1% in local currencies in 2018 and increased 8% in both U.S. dollars and local currencies in 2017. The increase during 2018 includes investments in our field sales organization and growth initiatives, offset in part by benefits from our cost savings initiatives and lower variable cash incentives.

Amortization expense

Amortization expense was \$47.5 million in 2018, compared to \$42.7 million and \$36.1 million in 2017 and 2016, respectively. The increase in amortization expense is primarily related to our investments in information technology, including the Company's Blue Ocean program, as well as the Biotix acquisition.

Restructuring charges

During the past few years, we initiated various cost reduction measures. For the year ended December 31, 2018, we have incurred \$18.4 million of restructuring expenses which primarily comprise employee-related costs. See Note 15 and Note 18 to our audited consolidated financial statements for a summary of restructuring activity during 2018.

Other charges (income), net

Other charges (income), net consisted of net income of \$21.8 million, \$9.9 million and \$1.3 million in 2018, 2017 and 2016, respectively. Other charges (income), net includes non-service pension costs (benefits), net (gains) losses from foreign currency transactions and hedging activities, interest income, and other items. Non-service pension benefits were \$6.2 million, \$4.0 million and \$9.8 million in 2018, 2017 and 2016, respectively. Other charges (income), net in 2018 also includes a one-time gain of \$18.7 million associated with the settlement of the Biotix acquisition contingent consideration, as well as a one time legal charge of \$3 million. Other charges (income), net includes \$1.7 million and \$1.1 million of acquisition costs during 2017 and 2016, respectively. Other charges (income), net for 2017 also includes a one-time gain of \$3.4 million relating to the sale of a facility in Switzerland in connection with our initiative to consolidate certain Swiss operations into a new facility, while 2016 includes a one-time non-cash pension settlement charge of \$8.2 million related to a lump sum offering to former employees of our U.S. pension plan.

Interest expense and taxes

Interest expense was \$34.5 million for 2018, compared to \$32.8 million for 2017 and \$28.0 million for 2016.

Our reported tax rate was 21.4% during 2018, compared to 34.5% and 23.8% in 2017 and 2016, respectively. The 2018 and 2017 reported tax rates include charges of \$3.6 million and \$72 million, respectively, associated with the Tax Cuts and Jobs Act described below.

On December 22, 2017, the Tax Cuts and Jobs Act ("the Act") significantly revised U.S. corporate income tax law. The Act includes, among other things, a reduction in the U.S. federal corporate income tax rate from 35% to 21% effective for taxable years beginning after December 31, 2017, and the implementation of a modified territorial tax system that includes a one-time transition tax on deemed repatriated earnings of foreign subsidiaries ("Transition Tax") that is payable over a period of up to eight years. The tax effects of the Act are reflected in Note 14 to our consolidated financial statements.

In connection with the Act, we recorded charges of \$3.6 million and \$72 million during 2018 and 2017, respectively. These amounts include an aggregate cash charge of \$62 million for un-repatriated foreign earnings which is expected to be paid over a period of up to eight years beginning in 2018, and a non-cash charge of \$13 million related to certain deferred tax and other non-cash items.

Our accounting for the above items is based upon reasonable estimates of the tax effects of the Act; however, our estimates may change upon additional interpretive guidance from regulatory authorities.

Results of Operations — by Operating Segment

The following is a discussion of the financial results of our operating segments. We currently have five reportable segments: U.S. Operations, Swiss Operations, Western European Operations, Chinese Operations, and Other. A more detailed description of these segments is outlined in Note 17 to our audited consolidated financial statements.

U.S. Operations (amounts in thousands)

	2018	2017	2016	Increase (Decrease) in % 2018 vs. 2017	Increase (Decrease) in % 2017 vs. 2016
Net sales	\$ 1,112,256	\$ 1,043,942	\$ 958,542	7%	9%
Net sales to external customers	\$ 1,007,798	\$ 944,825	\$ 867,962	7%	9%
Segment profit	\$ 161,615	\$ 177,705	\$ 161,539	(9)%	10%

The increase in both total net sales and net sales to external customers of 7% in 2018 reflects particularly strong results in our laboratory products, as well as strong food retailing project activity. These results were offset in part by a decrease in product inspection which had strong growth in 2017. Net sales to external customers in our U.S. Operations during 2018 also benefited approximately 3% from the Biotix acquisition.

Segment profit decreased \$16.1 million in our U.S. Operations segment during 2018, compared to an increase of \$16.2 million during 2017, primarily due to initial costs associated with a new manufacturing facility and new product introductions, continued investments in our field and service organization, and increased tariff costs, offset in part by benefits from our margin expansion initiatives.

Swiss Operations (amounts in thousands)

	2018	2017	2016	Increase (Decrease) in % ⁽¹⁾ 2018 vs. 2017	Increase (Decrease) in % ⁽¹⁾ 2017 vs. 2016
Net sales	\$ 762,593	\$ 697,008	\$ 655,657	9%	6%
Net sales to external customers	\$ 134,064	\$ 133,925	\$ 130,674	0%	2%
Segment profit	\$ 202,027	\$ 174,447	\$ 163,663	16%	7%

(1) Represents U.S. dollar growth for net sales and segment profit.

Total net sales in U.S. dollars increased 9% in 2018 and 6% in 2017, and in local currencies increased 9% in 2018 and 6% in 2017. Net sales to external customers in U.S. dollars and local currencies

were flat in 2018, compared to an increase of 2% in U.S dollars and local currencies in 2017. Net sales to external customers includes growth in industrial-related products, offset by a decline in food retailing.

Segment profit increased \$27.6 million in our Swiss Operations segment during 2018, compared to an increase of \$10.8 million during 2017. Segment profit includes the impact of increased inter-segment sales volume, our margin expansion initiatives, and favorable currency translation, offset in part by higher research and development activity.

Western European Operations (amounts in thousands)

	2018	2017	2016	Increase (Decrease) in % ⁽¹⁾ 2018 vs. 2017	Increase (Decrease) in % ⁽¹⁾ 2017 vs. 2016
Net sales	\$ 895,783	\$ 844,596	\$ 817,059	6%	3%
Net sales to external customers	\$ 718,788	\$ 673,776	\$ 640,558	7%	5%
Segment profit	\$ 122,574	\$ 123,841	\$ 129,001	(1)%	(4)%

(1) Represents U.S. dollar growth for net sales and segment profit.

Total net sales in U.S. dollars increased 6% in 2018 and 3% in 2017, and in local currencies increased 2% in both 2018 and 2017. Net sales to external customers in U.S. dollars increased 7% in 2018 and 5% in 2017, and in local currencies increased 3% in both 2018 and 2017. The increase in local currency net sales to external customers during 2018 includes growth in most product categories, offset in part by a decline in food retailing related to reduced project activity.

Segment profit decreased \$1.3 million in our Western European Operations segment during 2018, compared to a decrease of \$5.2 million in 2017. The decrease in segment profit for 2018 includes higher research and development activity, an inter-segment product transfer, and roll-in costs associated with our Blue Ocean program, offset by benefits from our margin expansion initiatives and favorable currency translation.

Chinese Operations (amounts in thousands)

	2018	2017	2016	Increase (Decrease) in % ⁽¹⁾ 2018 vs. 2017	Increase (Decrease) in % ⁽¹⁾ 2017 vs. 2016
Net sales	\$ 767,561	\$ 685,499	\$ 606,307	12%	13%
Net sales to external customers	\$ 525,109	\$ 452,617	\$ 386,541	16%	17%
Segment profit	\$ 270,668	\$ 231,860	\$ 187,924	17%	23%

(1) Represents U.S. dollar growth for net sales and segment profit.

Total net sales in U.S. dollars increased 12% in 2018 and 13% in 2017, and in local currencies increased 10% in 2018 and 15% in 2017. Net sales by origin to external customers in U.S. dollars increased 16% in 2018 and 17% in 2017, and in local currencies increased 14% in 2018 and 19% in 2017. The increase in net sales to external customers during 2018 reflects strong growth in most product categories, especially laboratory products. While Chinese market conditions are currently favorable, there is uncertainty, including the potential impact of international trade/tariff disputes. The Chinese economy has historically been volatile and market conditions may change unfavorably due to various factors.

Segment profit increased \$38.8 million in our Chinese Operations segment during 2018, compared to an increase of \$43.9 million in 2017. The increase in segment profit during 2018 includes increased net sales volume and benefits from our margin expansion and cost savings initiatives, offset in part by incremental investments in sales and marketing.

Other (amounts in thousands)

	2018	2017	2016	Increase (Decrease) in % ⁽¹⁾ 2018 vs. 2017	Increase (Decrease) in % ⁽¹⁾ 2017 vs. 2016
Net sales	\$ 556,370	\$ 527,844	\$ 490,231	5%	8%
Net sales to external customers	\$ 549,827	\$ 519,910	\$ 482,522	6%	8%
Segment profit	\$ 78,317	\$ 72,681	\$ 64,146	8%	13%

(1) Represents U.S. dollar growth for net sales and segment profit.

Other includes reporting units in Southeast Asia, Latin America, Eastern Europe, and other countries. Total net sales and net sales to external customers in U.S. dollars increased 5% in 2018 and 8% in 2017, and in local currencies increased 5% and 6% in 2018 and 2017, respectively. Local currency sales growth during 2018 reflects strong growth in laboratory and core-industrial products.

Segment profit increased \$5.6 million in our Other segment during 2018, compared to an increase of \$8.5 million during 2017. The increase in segment profit during 2018 is primarily due to our increased sales volume, benefits from our margin expansion initiatives, and favorable foreign currency translation, offset in part by increased sales and service investments.

Liquidity and Capital Resources

Liquidity is our ability to generate sufficient cash flows from operating activities to meet our obligations and commitments. In addition, liquidity includes the ability to obtain appropriate financing. Currently, our financing requirements are primarily driven by working capital requirements, capital expenditures, share repurchases, and acquisitions. Global market conditions can be uncertain, and our ability to generate cash flows could be reduced by a deterioration in global markets.

Cash provided by operating activities totaled \$565.0 million in 2018, compared to \$516.3 million in 2017 and \$460.8 million in 2016. The increase in 2018 is primarily related to higher net earnings, offset in part by higher cash incentive payments, the timing of tax payments, and a Transition Tax payment of \$4.2 million (see below).

Capital expenditures are made primarily for investments in information systems and technology, machinery, equipment, and the purchase and expansion of facilities. Our capital expenditures totaled \$142.7 million in 2018, \$127.4 million in 2017, and \$124.0 million in 2016. The increase is primarily related to investments in manufacturing facilities and information technology. We expect to make net investments in a new manufacturing facility of approximately \$15 million over the next two years.

Cash flows used in financing activities during 2018 included share repurchases. As further described below, in accordance with our share repurchase plan, we repurchased 802,809 shares and 749,254 shares in the amount of \$475 million and \$400 million during 2018 and 2017, respectively.

We continue to explore potential acquisitions. In connection with any acquisition, we may incur additional indebtedness. As further described in Note 4 of our Consolidated Financial Statements, in the third quarter of 2017, we acquired all of the shares of Biotix, Inc., a U.S.-based manufacturer and distributor of plastic consumables associated with pipettes, including tips, tubes, and reagent reservoirs used in the life sciences market, for an initial cash payment of \$105 million plus additional cash consideration of \$10 million that will be paid in the first quarter of 2019. We also recorded a one-time gain of \$18.7 million during 2018 related to the settlement of the Biotix acquisition contingent consideration.

In 2018 and 2017, we also incurred additional acquisition payments totaling \$5.5 million and \$2.1 million, respectively.

As previously described, we recorded charges of \$3.6 million and \$72 million in 2018 and 2017, respectively, for the estimated income tax effects of the Transition Tax associated with the Tax Cuts and Jobs Act of which \$62 million is expected to be paid over a period of up to eight years. We also plan to continue to repatriate earnings from China, Switzerland, Germany, the United Kingdom, and certain other countries in future years and expect the only additional cost associated with the repatriation of such foreign earnings will be withholding taxes. All other undistributed earnings are considered to be permanently reinvested. We believe the ongoing tax impact associated with repatriating our undistributed foreign earnings will not have a material effect on our liquidity.

Senior Notes

As further described in Note 10 of our Consolidated Financial Statements, we have the following Senior Notes.

In 2012, we issued and sold \$50 million of 3.67% Senior Notes due December 17, 2022 in a private placement. The 3.67% Senior Notes are senior unsecured obligations of the Company. Interest is payable semi-annually in June and December.

In 2013, we issued and sold \$50 million of 4.10% Senior Notes due September 19, 2023 in a private placement. The 4.10% Senior Notes are senior unsecured obligations of the Company. Interest on the 4.10% Senior Notes is payable semi-annually in March and September of each year.

In 2014, we entered into an agreement to issue and sell \$250 million of ten-year Senior Notes in a private placement. We issued \$125 million with a fixed interest rate of 3.84% ("3.84% Senior Notes") in September 2014 and issued \$125 million with a fixed interest rate of 4.24% ("4.24% Senior Notes") in June 2015. The Senior Notes are senior unsecured obligations of the Company. Interest on the 3.84% Senior Notes is payable semi-annually in March and September each year. Interest on the 4.24% Senior Notes is payable semi-annually in June and December each year.

In 2015, we issued in a private placement Euro 125 million fifteen-year Senior Notes with a fixed interest rate of 1.47% ("1.47% Euro Senior Notes"). The Euro Senior Notes are senior unsecured obligations of the Company. We have designated the 1.47% Euro Senior Notes as a hedge of a portion of our net investment in a euro-denominated foreign subsidiary to reduce foreign currency translation risk associated with this net investment. Changes in the carrying value of this debt resulting from fluctuations in the euro to U.S. dollar exchange rate are recorded as foreign currency translation adjustments within other comprehensive income (loss). We recorded in other comprehensive income (loss) related to this net investment hedge an unrealized gain of \$6.7 million and an unrealized loss of \$18.2 million for the years ended December 31, 2018 and 2017, respectively.

Credit Agreement

In 2018, we entered into an amended \$1.1 billion Credit Agreement (the "Credit Agreement"), which amended our \$800 million Amended and Restated Credit Agreement (the "Prior Credit Agreement"). The Credit Agreement is provided by a group of financial institutions (similar to our Prior Credit Agreement) and has a maturity date of June 15, 2023. It is a revolving credit facility and is not subject to any scheduled principal payments prior to maturity. The obligations under the Credit Agreement are unsecured.

Borrowings under the Credit Agreement bear interest at current market rates plus a margin based on our consolidated leverage ratio, which was, as of December 31, 2018, set at LIBOR plus 87.5 basis points. We must also pay facility fees that are tied to our leverage ratio. As of December 31, 2018, approximately \$600.7 million was available under the facility.

Other Local Arrangements

In April 2018, two of our non-U.S. pension plans issued loans totaling \$39.6 million (Swiss franc 38 million) to a wholly owned subsidiary of the Company. The loans have the same terms and conditions which include an interest rate of Swiss franc LIBOR plus 87.5 basis points, a maturity date of April 2019 and a one year mutual renewal term and, as such, are classified as short-term debt on our consolidated balance sheet. The proceeds were used to repay outstanding amounts on the Company's credit facility.

Our short-term borrowings and long-term debt consisted of the following at December 31, 2018:

	U.S. Dollar	Other Principal Trading Currencies	Total
3.67% \$50 million Senior Notes due December 17, 2022	\$ 50,000	\$ —	\$ 50,000
4.10% \$50 million Senior Notes due September 19, 2023	50,000	—	50,000
3.84% \$125 million Senior Notes due September 19, 2024	125,000	—	125,000
4.24% \$125 million Senior Notes due June 25, 2025	125,000	—	125,000
1.47% EUR 125 million Senior Notes due June 17, 2030	—	143,053	143,053
Senior notes debt issuance costs, net	(906)	(328)	(1,234)
Total Senior Notes	349,094	142,725	491,819
\$1.1 billion Credit Agreement, interest at LIBOR plus 87.5 basis points ⁽¹⁾	414,444	78,758	493,202
Other local arrangements	654	49,016	49,670
Total debt	764,192	270,499	1,034,691
Less: current portion	(654)	(49,016)	(49,670)
Total long-term debt	\$ 763,538	\$ 221,483	\$ 985,021

(1) See Note 6 for additional disclosures on the financial instruments associated with the Credit Agreement.

Changes in exchange rates between the currencies in which we generate cash flow and the currencies in which our borrowings are denominated affect our liquidity. In addition, because we borrow in a variety of currencies, our debt balances fluctuate due to changes in exchange rates. Further, we do not have any downgrade triggers relating to ratings from rating agencies that would accelerate the maturity dates of our debt.

We currently believe that cash flows from operating activities, together with liquidity available under our Credit Agreement and local working capital facilities, will be sufficient to fund currently anticipated working capital needs and capital spending requirements for at least the foreseeable future.

Contractual Obligations

The following summarizes certain of our contractual obligations at December 31, 2018 and the effect such obligations are expected to have on our liquidity and cash flows in future periods. We do not have significant outstanding letters of credit or other financial commitments.

	Payments Due by Period				
	Total	Less than 1 Year	1-3 Years	3-5 Years	After 5 Years
Short- and long-term debt	\$ 1,035,926	\$ 49,670	\$ —	\$ 593,203	\$ 393,053
Interest on debt	173,728	30,679	64,131	53,920	24,998
Non-cancelable operating leases	95,241	32,113	40,757	17,290	5,081
Pension and post-retirement funding ⁽¹⁾	25,804	25,804	—	—	—
Purchase obligations	64,150	46,438	10,783	6,929	—
Biotix contingent consideration	10,000	10,000	—	—	—
Total⁽¹⁾	\$ 1,404,849	\$ 194,704	\$ 115,671	\$ 671,342	\$ 423,132

(1) In addition to the above table, we also have liabilities for pension and post-retirement funding and income taxes (and transition tax liabilities of \$49 million). However, we cannot determine the timing or the amounts for income taxes or the timing and amounts beyond 2019 for pension and post-retirement funding.

We have purchase commitments for materials, supplies, services, and fixed assets in the normal course of business. Due to the proprietary nature of many of our materials and processes, certain supply contracts contain penalty provisions. We do not expect potential payments under these provisions to materially affect our results of operations or financial condition. This conclusion is based upon reasonably likely outcomes derived by reference to historical experience and current business plans.

Share Repurchase Program

In November 2018, the Company's Board of Directors authorized an additional \$2.0 billion to the share repurchase program which has \$2.1 billion of remaining availability as of December 31, 2018. The share repurchases are expected to be funded from cash generated from operating activities, borrowings, and cash balances. Repurchases will be made through open market transactions, and the amount and timing of purchases will depend on business and market conditions, the stock price, trading restrictions, the level of acquisition activity, and other factors.

We have purchased 27.5 million common shares since the inception of the program in 2004 through December 31, 2018, at a total cost of \$4.4 billion. During the years ended December 31, 2018 and 2017, we spent \$475 million and \$400 million on the repurchase of 802,809 shares and 749,254 shares at an average price per share of \$591.65 and \$533.84, respectively. We reissued 183,379 shares and 270,413 shares held in treasury for the exercise of stock options and restricted stock units during 2018 and 2017, respectively.

Off-Balance Sheet Arrangements

Currently, we have no 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.

Effect of Currency on Results of Operations

Our earnings are affected by changing exchange rates. We are most sensitive to changes in the exchange rates between the Swiss franc, euro, and U.S. dollar. We have more Swiss franc expenses than we do Swiss franc sales because we develop and manufacture products in Switzerland that we sell globally and have a number of corporate functions located in Switzerland. When the Swiss franc

strengthens against our other trading currencies, particularly the U.S. dollar and euro, our earnings go down. We also have significantly more sales in the euro than we do expenses. When the euro weakens against the U.S. dollar and Swiss franc, our earnings also go down. We estimate a 1% strengthening of the Swiss franc against the euro would reduce our earnings before tax by approximately \$1.6 million to \$1.8 million annually.

We also conduct business throughout the world, including Asia Pacific, the United Kingdom, Eastern Europe, Latin America, and Canada. Fluctuations in these currency exchange rates against the U.S. dollar can also affect our operating results. The most significant of these currency exposures is the Chinese renminbi. The impact on our earnings before tax of the Chinese renminbi weakening 1% against the U.S. dollar is a reduction of approximately \$1.5 million to \$1.7 million annually.

In addition to the effects of exchange rate movements on operating profits, our debt levels can fluctuate due to changes in exchange rates, particularly between the U.S. dollar, the Swiss franc, and euro. Based on our outstanding debt at December 31, 2018, we estimate that a 10% weakening of the U.S. dollar against the currencies in which our debt is denominated would result in an increase of approximately \$30.1 million in the reported U.S. dollar value of our debt.

Taxes

We are subject to taxation in many jurisdictions throughout the world. Our effective tax rate and tax liability will be affected by a number of factors, such as changes in law, the amount of taxable income in particular jurisdictions, the tax rates in such jurisdictions, tax treaties between jurisdictions, the extent to which we transfer funds between jurisdictions, and earnings repatriations between jurisdictions. Generally, the tax liability for each taxpayer within the group is determined either (i) on a non-consolidated/non-combined basis or (ii) on a consolidated/combined basis only with other eligible entities subject to tax in the same jurisdiction, in either case without regard to the taxable losses of non-consolidated/non-combined affiliated legal entities.

Environmental Matters

We are subject to environmental laws and regulations in the jurisdictions in which we operate. We own or lease a number of properties and manufacturing facilities around the world. Like many of our competitors, we have incurred, and will continue to incur, capital and operating expenditures and other costs in complying with such laws and regulations.

We are currently involved in, or have potential liability with respect to, the remediation of past contamination in certain of our facilities. A former subsidiary of Mettler-Toledo, LLC known as Hi-Speed Checkweigher Co., Inc. was one of two private parties ordered by the New Jersey Department of Environmental Protection, in an administrative consent order signed on June 13, 1988, to investigate and remediate certain ground water contamination at a property in Landing, New Jersey. After the other party under this order failed to fulfill its obligations, Hi-Speed became solely responsible for compliance with the order. Residual ground water contamination at this site is now within a Classification Exception Area which the Department of Environmental Protection has approved and within which the Company oversees monitoring of the decay of contaminants of concern. A concurrent Well Restriction Area also exists for the site. The Department of Environmental Protection does not view these vehicles as remedial measures, but rather as “institutional controls” that must be adequately maintained and periodically evaluated. We estimate that the costs of compliance associated with the site over the next several years will approximate a total of \$0.4 million.

In addition, certain of our present and former facilities have or had been in operation for many decades and, over such time, some of these facilities may have used substances or generated and disposed

of wastes which are or may be considered hazardous. It is possible that these sites, as well as disposal sites owned by third parties to which we have sent wastes, may in the future be identified and become the subject of remediation. Although we believe that we are in substantial compliance with applicable environmental requirements and, to date, we have not incurred material expenditures in connection with environmental matters, it is possible that we could become subject to additional environmental liabilities in the future that could have a material adverse effect on our financial condition, results of operations, or cash flows.

Inflation

Inflation can affect the costs of goods and services that we use, including raw materials to manufacture our products. The competitive environment in which we operate limits somewhat our ability to recover higher costs through increased selling prices.

Moreover, there may be differences in inflation rates between countries in which we incur the major portion of our costs and other countries in which we sell products, which may limit our ability to recover increased costs. We remain committed to operations in China, Eastern Europe, India, and Brazil, which have experienced inflationary conditions. To date, inflationary conditions have not had a material effect on our operating results. However, as our presence in China, Eastern Europe, India, and Brazil increases, these inflationary conditions could have a greater impact on our operating results.

Quantitative and Qualitative Disclosures about Market Risk

We have only limited involvement with derivative financial instruments and do not use them for trading purposes.

We have entered into certain interest rate swap agreements. These contracts are more fully described in Note 6 to our audited consolidated financial statements. The fair value of these contracts was a net asset of \$0.5 million at December 31, 2018. Based on our agreements outstanding at December 31, 2018, a 100-basis-point increase in interest rates would result in an increase in the net aggregate market value of these instruments of \$4.0 million. Conversely, a 100-basis-point decrease in interest rates would result in a \$4.1 million decrease in the net aggregate market value of these instruments at December 31, 2018. Any change in fair value would not affect our consolidated statement of operations unless such agreements and the debt they hedge were prematurely settled.

We also entered into a cross currency swap in 2017. The fair value of this contract was a net asset of \$1.1 million at December 31, 2018. Based on our agreements outstanding at December 31, 2018, a 100-basis-point increase in interest rates and foreign currency exchange rates would result in an increase in the net aggregate market value of these instruments of \$1.5 million. Conversely, a 100-basis-point decrease in interest rates and foreign currency exchange rates would result in a \$1.5 million decrease in the net aggregate market value of these instruments at December 31, 2018. Any change in fair value would not affect our consolidated statement of operations unless such agreements and the debt they hedge were prematurely settled.

Critical Accounting Policies

Management's discussion and analysis of our financial condition and results of operations is based upon our audited consolidated financial statements, which have been prepared in accordance with U.S. GAAP. The preparation of these consolidated financial statements requires us to make estimates and judgments that affect the reported amounts of assets, liabilities, revenues, expenses, and related disclosure of contingent assets and liabilities. On an ongoing basis, we evaluate our estimates, including those related to pensions and other post-retirement benefits, trade accounts receivable, inventories, intangible assets, income taxes, and revenue. We base our estimates on historical experience and on various other

assumptions that are believed to be reasonable under the circumstances. The results of which form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions or conditions.

We believe the following critical accounting policies affect our more significant judgments and estimates used in the preparation of our audited consolidated financial statements. For a detailed discussion on the application of these and other accounting policies, see Note 2 to our audited consolidated financial statements.

Employee benefit plans

The net periodic pension cost for 2018 and projected benefit obligation as of December 31, 2018 were \$4.2 million and \$130.2 million, respectively, for our U.S. pension plan. The net periodic cost for 2018 and projected benefit obligation as of December 31, 2018 were \$7.7 million and \$864.1 million, respectively, for our international pension plans. The net periodic post-retirement benefit for 2018 and expected post-retirement benefit obligation as of December 31, 2018 for our U.S. post-retirement medical benefit plan were \$1.6 million and \$2.2 million, respectively.

Pension and post-retirement benefit plan expense and obligations are developed from assumptions utilized in actuarial valuations. The most significant of these assumptions include the discount rate and expected return on plan assets. In accordance with U.S. GAAP, actual results that differ from the assumptions are accumulated and deferred over future periods. While management believes the assumptions used are appropriate, differences in actual experience or changes in assumptions may affect our plan obligations and future expense.

The expected rates of return on the various defined benefit pension plans' assets are based on the asset allocation of each plan and the long-term projected return of those assets, which represent a diversified mix of U.S. and international corporate equities and government and corporate debt securities. In 2002, we froze our U.S. defined benefit pension plan and discontinued our retiree medical program for certain current and all future employees. Consequently, no significant future service costs will be incurred on these plans. For 2018, the weighted average return on assets assumption was 6.5% for the U.S. plan and 3.8% for the international plans. A change in the rate of return of 1% would impact annual benefit plan expense by approximately \$6.8 million after tax.

The discount rates for defined benefit and post-retirement plans are set by benchmarking against high-quality corporate bonds. For 2018, the weighted average discount rate assumption was 4.1% for the U.S. plan and 1.2% for the international plans, representing a weighted average of local rates in countries where such plans exist. A change in the discount rate of 1% would impact annual benefit plan expense by approximately \$7.0 million after tax.

Equity-based compensation

We also have an equity incentive plan that provides for the grant of stock options, restricted stock units, and other equity-based awards which are accounted for and recognized in the consolidated statement of operations based on the grant-date fair value of the award. This methodology yields an estimate of fair value based in part on a number of management estimates, the most significant of which include future volatility and estimated option lives. Changes in these assumptions could significantly impact the estimated fair value of stock options.

Trade accounts receivable

As of December 31, 2018, trade accounts receivable were \$535.5 million, net of a \$15.5 million allowance for doubtful accounts.

Trade accounts receivable are recorded at the invoiced amount and do not bear interest. The allowance for doubtful accounts represents our best estimate of probable credit losses in our existing trade accounts receivable. We determine the allowance based upon a review of both specific accounts for collection and the age of the accounts receivable portfolio.

Inventories

As of December 31, 2018, inventories were \$268.8 million.

We record our inventory at the lower of cost or net realizable value. Cost, which includes direct materials, labor, and overhead, is generally determined using the first in, first out (FIFO) method. The estimated net realizable value is based on assumptions for future demand and related pricing. Adjustments to the cost basis of our inventory are made for excess and obsolete items based on usage, orders, and technological obsolescence. If actual market conditions are less favorable than those projected by management, reductions in the value of inventory may be required.

Goodwill and other intangible assets

As of December 31, 2018, our consolidated balance sheet included goodwill of \$534.8 million and other intangible assets of \$217.3 million.

Our business acquisitions typically result in goodwill and other intangible assets, which affect the amount of future period amortization expense and possible impairment expense. The determination of the value of such intangible assets requires management to make estimates and assumptions that affect our consolidated financial statements.

In accordance with U.S. GAAP, our goodwill and indefinite-lived intangible assets are not amortized, but are evaluated for impairment annually in the fourth quarter, or more frequently if events or changes in circumstances indicate that an asset might be impaired. The annual evaluations of goodwill and indefinite-lived intangible assets are generally based on an assessment of qualitative factors to determine whether it is more likely than not that the fair value of the asset is less than its carrying amount.

If we are unable to conclude whether the goodwill asset is not impaired after considering the totality of events and circumstances during our qualitative assessment, we perform the first step of the two-step impairment test by estimating the fair value of the goodwill asset and comparing the fair value to the carrying amount of the goodwill asset. If the carrying amount of the goodwill asset exceeds its fair value, then we perform the second step of the impairment test to measure the amount of the impairment loss, if any.

If we are unable to conclude whether the indefinite-lived intangible asset is not impaired after considering the totality of events and circumstances, we perform an impairment test to measure the amount of the impairment loss, if any.

Both the qualitative and quantitative evaluations consider operating results, business plans, economic conditions and market data, among other factors. There are inherent uncertainties related to these factors and our judgment in applying them to the impairment analyses. Our assessments to date have indicated that there has been no impairment of these assets.

Should any of these estimates or assumptions change, or should we incur lower than expected operating performance or cash flows, including from a prolonged economic slowdown, we may

experience a triggering event that requires a new fair value assessment for our reporting units, possibly prior to the required annual assessment. These types of events and resulting analysis could result in impairment charges for goodwill and other indefinite-lived intangible assets if the fair value estimate declines below the carrying value.

Our amortization expense related to intangible assets with finite lives may materially change should our estimates of their useful lives change.

Income taxes

Income tax expense, deferred tax assets and liabilities, and reserves for unrecognized tax benefits reflect management's assessment of estimated future taxes to be paid on items in the consolidated financial statements. We record a valuation allowance to reduce our deferred tax assets to the amount that is more likely than not to be realized. While we have considered future taxable income and ongoing prudent and feasible tax planning strategies in assessing the need for the valuation allowance, in the event we were to determine that we would be able to realize our deferred tax assets in the future in excess of the net recorded amount, an adjustment to the deferred tax asset would increase income or equity in the period such determination was made. Likewise, should we determine that we would not be able to realize all or part of the net deferred tax asset in the future, an adjustment to the deferred tax asset would be charged to income in the period such determination was made.

We plan to repatriate earnings from China, Switzerland, Germany, the United Kingdom, and certain other countries in future years and expect the additional tax costs associated with the repatriation of such earnings will be non-U.S. withholding taxes, certain state taxes, and U.S. taxes on currency gains, if any. All other undistributed earnings are considered permanently reinvested.

The significant assumptions and estimates described in the preceding paragraphs are important contributors to our ultimate effective tax rate for each year in addition to our income mix from geographical regions. If any of our assumptions or estimates were to change, or should our income mix from our geographical regions change, our effective tax rate could be materially affected. Based on earnings before taxes of \$651.9 million for the year ended December 31, 2018, each increase of \$6.5 million in tax expense would increase our effective tax rate by 1%.

Revenue recognition

Product revenue is recognized from contracts with customers when a customer has obtained control of a product. We consider control to have transferred based upon shipping terms. To the extent that our contracts have a separate performance obligation, revenue related to any post-shipment performance obligation is deferred until completed. Shipping and handling costs charged to customers are included in total net sales and the associated expense is a component of cost of sales. Certain products are also sold through indirect distribution channels whereby the distributor assumes any further obligations to the end customer. Revenue is recognized on these distributor arrangements upon transfer of control to the distributor. Contracts do not contain variable pricing arrangements that are retrospective, except for rebate programs. Rebates are estimated based on expected sales volumes and offset against revenue at the time such revenue is recognized. We generally maintain the right to accept or reject a product return in our terms and conditions and also maintain appropriate accruals for outstanding credits. The provisions for estimated returns and rebates are immaterial to the consolidated financial statements.

Certain of our product arrangements include separate performance obligations, primarily related to installation. Such performance obligations are accounted for separately when the deliverables have stand-alone value and the satisfaction of the undelivered performance obligations is probable and within our control. The allocation of revenue between the performance obligations is based on the observable

standalone selling prices at the time of the sale in accordance with a number of factors including service technician billing rates, time to install, and geographic location.

Software is generally not considered a distinct performance obligation with the exception of a few small software applications. We generally do not sell software products without the related hardware instrument as the software is usually embedded in the product. Our products typically require no significant production, modification, or customization of the hardware or software that is essential to the functionality of the products.

Service revenue not under contract is recognized upon the completion of the service performed. Revenue from spare parts sold on a stand-alone basis is recognized when control is transferred to the customer, which is generally at the time of shipment or delivery. Revenue from service contracts is recognized ratably over the contract period using a time-based method. These contracts represent an obligation to perform repair and other services including regulatory compliance qualification, calibration, certification, and preventative maintenance on a customer's pre-defined equipment over the contract period.

New Accounting Pronouncements

See Note 2 to the audited consolidated financial statements.

Item 7A. Quantitative and Qualitative Disclosures about Market Risk

Discussion of this item is included in Management's Discussion and Analysis of Financial Condition and Results of Operations.

Item 8. Financial Statements and Supplementary Data

The financial statements required by this item are set forth starting on page F-1 and the related financial schedule is set forth on page S-1.

Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure

None.

Item 9A. Controls and Procedures

Conclusions Regarding the Effectiveness of Disclosure Controls and Procedures

Under the supervision and with the participation of our management, including the Chief Executive Officer and the Chief Financial Officer, we have evaluated the effectiveness of our disclosure controls and procedures as required by Exchange Act Rule 13a-15(b) as of the end of the period covered by this report. Based upon that evaluation, the Chief Executive Officer and the Chief Financial Officer have concluded that these disclosure controls and procedures are effective.

Management's Report on Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting. Our internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of the Company's financial statements for external reporting purposes in accordance with accounting principles generally accepted in the United States of America.

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.

Management assessed the effectiveness of the Company's internal control over financial reporting as of December 31, 2018. In making this assessment, we used the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) in Internal Control — Integrated Framework (2013). Based on our assessment, we concluded that, as of December 31, 2018, the Company's internal control over financial reporting is effective.

PricewaterhouseCoopers LLP, an independent registered public accounting firm that audited the financial statements included in this Report on Form 10-K, has issued their integrated audit report, which covers our internal control over financial reporting, which appears on page F-2.

Changes in Internal Control over Financial Reporting

There were no changes in our internal control over financial reporting during the quarter ended December 31, 2018 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Item 9B. Other Information

None.

PART III**Item 10. Directors, Executive Officers, and Corporate Governance**

The executive officers of the Company are set forth below. Officers are appointed by the Board of Directors and serve at the discretion of the Board.

Name	Age	Position
Olivier A. Filliol	52	President and Chief Executive Officer
Peter Aggersbjerg	50	Head of Laboratory
Marc de La Guéronnière	55	Head of European and North American Market Organizations
Michael Heidingsfelder	58	Head of Industrial
Gerhard Keller	51	Head of Process Analytics
Simon Kirk	59	Head of Product Inspection
Christian Magloth	53	Head of Human Resources
Shawn P. Vadala	50	Chief Financial Officer

Olivier A. Filliol has been a director since January 2009. He has been President and Chief Executive Officer of the Company since January 1, 2008. Mr. Filliol served as Head of Global Sales, Service, and Marketing of the Company from April 2004 to December 2007 and Head of Process Analytics of the Company from June 1999 to December 2007. From June 1998 to June 1999, he served as General Manager of the Company's U.S. checkweighing operations. Prior to joining the Company, he was a Strategy Consultant with the international consulting firm Bain & Company, working in the Geneva, Paris, and Sydney offices.

Peter Aggersbjerg has been Head of Laboratory of the Company since January 2018. From February 2016 to December 2017, he served as the Head of our Laboratory Weighing strategic business unit. He served as the Global BU Head for Medela's Neonatal Care business and a member of its Group management from February 2011 until joining the Company in February 2016. Prior to Medela, Mr. Aggersbjerg was CEO for Swissimplant from July 2010 to February 2011, Vernal from October 2006 to December 2008, and Tytex from October 2001 to October 2006.

Marc de La Guéronnière has been Head of European Market Organizations of the Company since January 2008 and Head of North American Market Organizations since April 2014. He was Head of Region South and General Manager of the Company's market organization in Spain from January 2006 to January 2008. He joined the Company in 2001 as the Industrial Business Area Manager for our market organization in France. Prior to joining the Company, Mr. de La Guéronnière held various management positions in Europe and the United States with ABB-Elsag Bailey and Danaher-Zellweger.

Michael Heidingsfelder joined the Company in April 2012 as Head of Industrial Division. Prior to joining the Company, Mr. Heidingsfelder held various management positions within the Freudenberg Group from 2004 to March 2012 in Europe, Asia, and the Americas, including Chief Operating Officer, Americas, and General Manager, China. Previously, he was a Partner of Roland Berger Strategy Consultants in the U.S. and Europe.

Gerhard Keller joined the Company in 1991 and has been Head of Process Analytics since July 2018 and Head of Pipettes since July 2013. He previously was Head of Region East Asia/Pacific and has also served in various Sales and Marketing leadership functions in Europe and Asia Pacific. Prior to joining the Company, he worked in Quality Control at Sandoz, now Novartis, in Switzerland.

Simon Kirk joined the Company in January 2012 as Head of Product Inspection. Previously, he worked at Schindler where he served since 2008 as Chief Executive Officer of Jardine Schindler Group, a

joint venture responsible for all of Schindler's operations in Southeast Asia. From 2004 until 2008, he was Vice President responsible for Eastern Europe at Schindler. He has also held various management positions at Eaton Corporation, Owens Corning, Imperial Chemical Industries, and British Railways Board.

Christian Magloth joined the Company in October 2010 and has been Head of Human Resources since December 2010. Prior to joining the Company, he served as Head of Human Resources of Straumann, a leading global medical devices company listed on the Swiss stock exchange, from April 2006 to September 2010. He previously served as Head of Human Resources at Hero Group, an international consumer foods company, and in various management positions at Hilti, a leading global construction supply company.

Shawn P. Vadala joined the Company in 1997 and has been Chief Financial Officer since January 2014, and also responsible for the Company's Pricing program since 2008. Mr. Vadala previously held various senior financial positions at the Company's Columbus, Ohio and Greifensee, Switzerland offices and was also responsible for Business Intelligence from 2010 to 2018. Prior to joining the Company, he worked in the Boston and Zurich, Switzerland offices of PricewaterhouseCoopers.

Certifications

Our Chief Executive Officer and Chief Financial Officer provide certifications pursuant to Section 302 of the Sarbanes-Oxley Act of 2002 in connection with our quarterly and annual financial statement filings with the Securities and Exchange Commission. The certifications relating to this annual report are attached as Exhibits 31.1 and 31.2.

The remaining information called for by this item is incorporated by reference from the discussion in the sections “Proposal One: Election of Directors,” “Board of Directors — General Information,” “Board of Directors — Operation,” and “Additional Information — Section 16(a) Beneficial Ownership Reporting Compliance” in the 2019 Proxy Statement.

Item 11. Executive Compensation

The information appearing in the sections captioned “Board of Directors — General Information — Director Compensation,” “Compensation Discussion and Analysis,” “Compensation Committee Report,” and “Additional Information — Compensation Committee Interlocks and Insider Participation” in the 2019 Proxy Statement is incorporated by reference herein.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters

The information appearing in the section “Share Ownership” in the 2019 Proxy Statement is incorporated by reference herein. Information appearing in “Securities Authorized for Issuance under Equity Compensation Plans as of December 31, 2018” is included within Note 12 to the financial statements.

Item 13. Certain Relationships and Related Transactions and Director Independence

Certain Relationships and Related Transactions — None.

Director Independence — The information in the section “Board of Directors — General Information — Independence of the Board” in the 2019 Proxy Statement is incorporated by reference herein.

Item 14. *Principal Accounting Fees and Services*

Information appearing in the section “Audit Committee Report” in the 2019 Proxy Statement is hereby incorporated by reference.

PART IV

Item 15. *Exhibits and Financial Statement Schedules*

(a) Exhibits, Financial Statements, and Schedules:

1. *Financial Statements*. See Index to Consolidated Financial Statements included on page F-1.
2. *Financial Statement Schedule*. See Schedule II, which is included on page S-1.
3. *List of Exhibits*. See Exhibit Index included on page E-1.

Item 16. *Form 10-K Summary*

None.

EXHIBIT INDEX

Exhibit No.	Description
3.1	Amended and Restated Certificate of Incorporation of the Company⁽¹⁾
3.2	Amended By-laws of the Company, effective as of November 3, 2016⁽²⁾
10.1	Credit Agreement among Mettler-Toledo International Inc. certain of its subsidiaries, JPMorgan Chase Bank, N.A. and certain other financial institutions, dated as of June 15, 2018⁽³⁾
10.11	Note Purchase Agreement dated as of October 10, 2012 by and among Mettler-Toledo International Inc., Massachusetts Mutual Life Insurance Company, C.M. Life Insurance Company, MassMutual Asia Limited, The Lincoln National Life Insurance Company, Lincoln Life & Annuity Company of New York and Aviva Life and Annuity Company Royal Neighbors of America⁽⁴⁾
10.12	Note Purchase Supplement dated July 29, 2013 by and among Mettler-Toledo International Inc., Aviva Life and Annuity Company and Teachers Insurance and Annuity Association of America to a Note Purchase Agreement dated October 10, 2012 by and among Mettler-Toledo International Inc., Massachusetts Mutual Life Insurance Company, C.M. Life Insurance Company, MassMutual Asia Limited, The Lincoln National Life Insurance Company, Lincoln Life & Annuity Company of New York and Aviva Life and Annuity Company Royal Neighbors of America⁽⁵⁾
10.13	Note Purchase Agreement dated as of June 27, 2014 by and among Mettler-Toledo International Inc., Babson Capital Management LLC, Cigna Investments, Inc. and Teachers Insurance and Annuity Association of America⁽⁶⁾
10.14	Note Purchase Agreement dated as of March 31, 2015 by and among Mettler-Toledo International Inc., Metropolitan Life Insurance Company, MetLife Insurance Company USA, OMI MLIC Investments Limited and Massachusetts Mutual Life Insurance Company⁽⁷⁾
10.20	Mettler-Toledo International Inc. 2004 Equity Incentive Plan⁽⁸⁾
10.21	Mettler-Toledo International Inc. 2007 Share Plan, effective February 7, 2008⁽⁹⁾
10.22	Mettler-Toledo International Inc. 2013 Equity Incentive Plan⁽¹⁰⁾
10.23	Form of Restricted Stock Unit Agreement⁽¹¹⁾
10.24	Form of Performance Share Unit Agreement⁽¹¹⁾
10.25	Performance Stock Option Agreement⁽¹¹⁾
10.26	Form of Stock Option Agreement Directors⁽¹¹⁾
10.27	Form of Stock Option Agreement CEO⁽¹¹⁾
10.28	Form of Stock Option Agreement NEOs⁽¹¹⁾
10.31	Regulations of the POBS PLUS — Incentive Scheme for Senior Management of Mettler Toledo, effective as of November, 2006⁽¹²⁾
10.32	Regulations of the POBS PLUS — Incentive Scheme for Members of the Group Management of Mettler Toledo, effective as of January, 2009⁽¹²⁾
10.50	Employment Agreement between Peter Aggersbjerg and Mettler-Toledo International Inc., dated as of December 15, 2017⁽¹⁴⁾
10.51	Employment Agreement between Marc de La Guéronnière and Mettler-Toledo International Inc., dated as of January 27, 2011⁽¹³⁾
10.52	Employment Agreement between William Donnelly and Mettler-Toledo International Inc., dated as of November 10, 1997⁽¹⁾
10.53	Employment Agreement between Olivier Filliol and Mettler-Toledo International Inc., dated as of November 1, 2007⁽¹⁵⁾
10.54	Employment Agreement between Michael Heidingsfelder and Mettler-Toledo International Inc., dated as of November 30, 2011⁽¹⁶⁾
10.55	Employment Agreement between Simon Kirk and Mettler-Toledo International Inc., dated as of November 28, 2011⁽¹⁶⁾
10.56	Employment Agreement between Christian Magloth and Mettler-Toledo International Inc., dated as of March 22, 2010⁽¹³⁾
10.57	Employment Agreement between Gerhard Keller and Mettler-Toledo International Inc., dated as of April 27, 2018⁽¹⁷⁾
10.58	Employment Agreement between Shawn P. Vadala and Mettler-Toledo International Inc., dated as of October 24, 2016⁽¹¹⁾
10.59	Form of Tax Equalization Agreement between Messrs. Filliol, Kirk, Magloth, and Spoerry, and Mettler-Toledo International Inc., dated October 10, 2007⁽⁹⁾
10.60	Amendment to Employment Agreement between William Donnelly and Mettler-Toledo International, Inc. dated November 3, 2016⁽²⁾
21*	Subsidiaries of the Company.
23.1*	Consent of PricewaterhouseCoopers LLP

Exhibit No.	Description
31.1*	Certification of the Chief Executive Officer Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002
31.2*	Certification of the Chief Financial Officer Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002
32*	Certification Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
101.INS*	XBRL Instance Document
101.SCH*	XBRL Taxonomy Extension Schema Document
101.CAL*	XBRL Taxonomy Extension Calculation Linkbase Document
101.LAB*	XBRL Taxonomy Extension Label Linkbase Document
101.PRE*	XBRL Taxonomy Extension Presentation Linkbase Document
101.DEF*	XBRL Taxonomy Extension Definition Linkbase Document

- (1) Incorporated by reference to the Company's Report on Form 10-K dated March 13, 1998*
- (2) Incorporated by reference to the Company's Report on Form 8-K dated November 8, 2016*
- (3) Incorporated by reference to the Company's Report on Form 8-K dated June 21, 2018*
- (4) Incorporated by reference to the Company's Report on Form 8-K dated October 16, 2012*
- (5) Incorporated by reference to the Company's Report on Form 8-K dated July 29, 2013*
- (6) Incorporated by reference to the Company's Report on Form 8-K dated July 2, 2014*
- (7) Incorporated by reference to the Company's Report on Form 8-K dated March 31, 2015*
- (8) Incorporated by reference to the Company's Form DEF 14-A filed March 29, 2004*
- (9) Incorporated by reference to the Company's Report on Form 10-K dated February 15, 2008*
- (10) Incorporated by reference to the Company's Registration Statement on Form S-8 dated July 26, 2013 (Reg. No. 333-190181)*
- (11) Incorporated by reference to the Company's Report on Form 10-K dated February 2, 2017*
- (12) Incorporated by reference to the Company's Report on Form 10-K dated February 13, 2009*
- (13) Incorporated by reference to the Company's Report on Form 10-K dated February 16, 2011*
- (14) Incorporated by reference to the Company's Report on Form 10-K dated February 8, 2018*
- (15) Incorporated by reference to the Company's Report on Form 8-K dated November 1, 2007*
- (16) Incorporated by reference to the Company's Report on Form 10-K dated February 8, 2013*
- (17) Incorporated by reference to the Company's Report on Form 10-Q dated July 27, 2018*
- * Filed herewith*

SIGNATURES

Pursuant to the requirements of Section 13 or Section 15(d) of the Securities Exchange Act of 1934, as amended, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

Mettler-Toledo International Inc.
(Registrant)

Date: February 8, 2019

By: /s/ Olivier A. Filliol
Olivier A. Filliol
President and Chief Executive Officer

Pursuant to the requirements of the Securities Exchange Act of 1934, as amended, this Annual Report on Form 10-K has been signed below by the following persons on behalf of the registrant as of the date set out above and in the capacities indicated.

<u>Signature</u>	<u>Title</u>
<u>/s/ Olivier A. Filliol</u> Olivier A. Filliol	President and Chief Executive Officer
<u>/s/ Shawn P. Vadala</u> Shawn P. Vadala	Chief Financial Officer
<u>/s/ Olivier A. Filliol</u> Olivier A. Filliol	Director
<u>/s/ Wah-Hui Chu</u> Wah-Hui Chu	Director
<u>/s/ Elisha Finney</u> Elisha Finney	Director
<u>/s/ Richard Francis</u> Richard Francis	Director
<u>/s/ Connie L. Harvey</u> Connie L. Harvey	Director
<u>/s/ Michael A. Kelly</u> Michael A. Kelly	Director
<u>/s/ Hans Ulrich Maerki</u> Hans Ulrich Maerki	Director
<u>/s/ Thomas P. Salice</u> Thomas P. Salice	Director
<u>/s/ Robert F. Spoerry</u> Robert F. Spoerry	Director

METTLER-TOLEDO INTERNATIONAL INC.
INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

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Report of Independent Registered Public Accounting Firm

To the Board of Directors and Shareholders of Mettler-Toledo International Inc.

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of Mettler-Toledo International Inc. and its subsidiaries ("the Company") as of December 31, 2018 and 2017 and the related consolidated statements of operations, comprehensive income, shareholders' equity and cash flows for each of the three years in the period ended December 31, 2018, including the related notes and schedule of valuation and qualifying accounts for each of the three years in the period ended December 31, 2018 appearing on page S-1 (collectively referred to as the "consolidated financial statements"). We also have audited the Company's internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control - Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of December 31, 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, 2018 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2018 based on criteria established in Internal Control - Integrated Framework (2013) issued by the COSO.

Basis for Opinions

The Company's management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in Management's Report on Internal Control over Financial Reporting appearing under Item 9A. Our responsibility is to express opinions on the Company's consolidated financial statements and on the Company's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) ("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 audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements 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. Our audit of internal control over financial reporting 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 audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

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 (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) 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 (iii) 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/ PricewaterhouseCoopers LLP

PricewaterhouseCoopers LLP

Columbus, Ohio
February 8, 2019

We have served as the Company's auditor since 2005.

METTLER-TOLEDO INTERNATIONAL INC.
CONSOLIDATED STATEMENTS OF OPERATIONS
For the years ended December 31
(In thousands, except share data)

	2018	2017	2016
Net sales			
Products	\$ 2,300,075	\$ 2,135,051	\$ 1,957,879
Service	635,511	590,002	550,378
Total net sales	2,935,586	2,725,053	2,508,257
Cost of sales			
Products	914,086	831,355	765,608
Service	337,122	317,947	304,917
Gross profit	1,684,378	1,575,751	1,437,732
Research and development	141,071	128,308	119,196
Selling, general, and administrative	812,802	794,861	745,358
Amortization	47,524	42,671	36,052
Interest expense	34,511	32,785	28,026
Restructuring charges	18,420	12,772	6,235
Other charges (income), net	(21,808)	(9,868)	(1,328)
Earnings before taxes	651,858	574,222	504,193
Provision for taxes	139,247	198,250	119,823
Net earnings	\$ 512,611	\$ 375,972	\$ 384,370
Basic earnings per common share:			
Net earnings	\$ 20.33	\$ 14.62	\$ 14.49
Weighted average number of common shares	25,215,674	25,713,575	26,517,768
Diluted earnings per common share:			
Net earnings	\$ 19.88	\$ 14.24	\$ 14.22
Weighted average number of common and common equivalent shares	25,781,324	26,393,783	27,023,905

The accompanying notes are an integral part of these consolidated financial statements.

METTLER-TOLEDO INTERNATIONAL INC.
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME
For the years ended December 31
(In thousands, except share data)

	2018	2017	2016
Net earnings	\$ 512,611	\$ 375,972	\$ 384,370
Other comprehensive income (loss), net of tax:			
Foreign currency translation adjustment	(32,573)	83,982	(57,928)
Unrealized gains (losses) on cash flow hedging arrangements:			
Unrealized gains (losses)	(658)	1,424	(513)
Effective portion of (gains) losses included in net earnings	2,441	(273)	(4,735)
Defined benefit pension and post-retirement plans:			
Net actuarial gains (losses)	(23,326)	(10,378)	(47,788)
Plan amendments and prior service cost	(780)	12,056	—
Amortization of actuarial (gains) losses and plan amendments and prior service cost	14,366	14,873	16,730
Impact of foreign currency	3,522	(12,092)	5,885
Total other comprehensive income (loss), net of tax	(37,008)	89,592	(88,349)
Comprehensive income	<u>\$ 475,603</u>	<u>\$ 465,564</u>	<u>\$ 296,021</u>

The accompanying notes are an integral part of these consolidated financial statements.

METTLER-TOLEDO INTERNATIONAL INC.
CONSOLIDATED BALANCE SHEETS
As of December 31
(In thousands, except share data)

	2018	2017
ASSETS		
Current assets:		
Cash and cash equivalents	\$ 178,110	\$ 148,687
Trade accounts receivable, less allowances of \$15,469 in 2018 and \$15,549 in 2017	535,528	528,615
Inventories	268,821	255,390
Other current assets and prepaid expenses	63,401	74,031
Total current assets	1,045,860	1,006,723
Property, plant, and equipment, net	717,526	668,271
Goodwill	534,780	539,838
Other intangible assets, net	217,308	226,718
Deferred tax assets, net	35,066	41,425
Other non-current assets	68,307	66,830
Total assets	\$ 2,618,847	\$ 2,549,805
LIABILITIES AND SHAREHOLDERS' EQUITY		
Current liabilities:		
Trade accounts payable	\$ 196,641	\$ 167,627
Accrued and other liabilities	156,449	152,834
Accrued compensation and related items	152,516	170,159
Deferred revenue and customer prepayments	105,381	107,166
Taxes payable	73,777	72,210
Short-term borrowings and current maturities of long-term debt	49,670	19,677
Total current liabilities	734,434	689,673
Long-term debt	985,021	960,170
Deferred tax liabilities, net	48,818	51,230
Other non-current liabilities	260,511	301,452
Total liabilities	2,028,784	2,002,525
Commitments and contingencies (Note 17)		
Shareholders' equity:		
Preferred stock, \$0.01 par value per share; authorized 10,000,000 shares	—	—
Common stock, \$0.01 par value per share; authorized 125,000,000 shares; issued 44,786,011 and 44,786,011 shares, outstanding 24,921,963 and 25,541,393 shares at December 31, 2018 and 2017, respectively	448	448
Additional paid-in capital	764,717	747,138
Treasury stock at cost (19,864,048 and 19,244,618 shares at December 31, 2018 and 2017, respectively)	(3,814,604)	(3,368,182)
Retained earnings	3,941,916	3,433,282
Accumulated other comprehensive income (loss)	(302,414)	(265,406)
Total shareholders' equity	590,063	547,280
Total liabilities and shareholders' equity	\$ 2,618,847	\$ 2,549,805

The accompanying notes are an integral part of these consolidated financial statements.

METTLER-TOLEDO INTERNATIONAL INC.
CONSOLIDATED STATEMENTS OF SHAREHOLDERS' EQUITY
For the years ended December 31
(In thousands, except share data)

	Common Stock		Additional Paid-In Capital	Treasury Stock	Retained Earnings	Accumulated Other Comprehensive Income (Loss)	Total
	Shares	Amount					
Balance at December 31, 2015	27,090,118	\$ 448	\$ 697,570	\$ (2,543,229)	\$ 2,692,317	\$ (266,649)	\$ 580,457
Exercise of stock options and restricted stock units	278,623	—	—	36,450	(10,979)	—	25,471
Repurchases of common stock	(1,348,507)	—	—	(499,992)	—	—	(499,992)
Tax benefit resulting from exercise of certain employee stock options	—	—	17,680	—	—	—	17,680
Share-based compensation	—	—	15,306	—	—	—	15,306
Net earnings	—	—	—	—	384,370	—	384,370
Other comprehensive income (loss), net of tax	—	—	—	—	—	(88,349)	(88,349)
Balance at December 31, 2016	26,020,234	\$ 448	\$ 730,556	\$ (3,006,771)	\$ 3,065,708	\$ (354,998)	\$ 434,943
Exercise of stock options and restricted stock units	270,413	—	—	38,586	(9,937)	—	28,649
Repurchases of common stock	(749,254)	—	—	(399,997)	—	—	(399,997)
Share-based compensation	—	—	16,582	—	—	—	16,582
Effect of accounting change	—	—	—	—	1,539	—	1,539
Net earnings	—	—	—	—	375,972	—	375,972
Other comprehensive income (loss), net of tax	—	—	—	—	—	89,592	89,592
Balance at December 31, 2017	25,541,393	\$ 448	\$ 747,138	\$ (3,368,182)	\$ 3,433,282	\$ (265,406)	\$ 547,280
Exercise of stock options and restricted stock units	183,379	—	—	28,577	(3,977)	—	24,600
Repurchases of common stock	(802,809)	—	—	(474,999)	—	—	(474,999)
Share-based compensation	—	—	17,579	—	—	—	17,579
Net earnings	—	—	—	—	512,611	—	512,611
Other comprehensive income (loss), net of tax	—	—	—	—	—	(37,008)	(37,008)
Balance at December 31, 2018	24,921,963	\$ 448	\$ 764,717	\$ (3,814,604)	\$ 3,941,916	\$ (302,414)	\$ 590,063

The accompanying notes are an integral part of these consolidated financial statements.

METTLER-TOLEDO INTERNATIONAL INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS
For the years ended December 31
(In thousands)

	2018	2017	2016
Cash flows from operating activities:			
Net earnings	\$ 512,611	\$ 375,972	\$ 384,370
Adjustments to reconcile net earnings to net cash provided by operating activities:			
Depreciation	37,167	33,458	32,743
Amortization	47,524	42,671	36,052
Deferred tax (benefit) provision	2,302	(2,745)	1,878
Share-based compensation	17,579	16,582	15,306
U.S. tax reform charge (Note 14)	3,597	71,982	—
Acquisition gain (Note 4)	(18,674)	—	—
Non-cash pension settlement charge	—	—	8,189
Other	(2,559)	(3,151)	181
Increase (decrease) in cash resulting from changes in:			
Trade accounts receivable, net	(19,540)	(38,985)	(52,151)
Inventories	(21,195)	(13,680)	(12,431)
Other current assets	622	(6,251)	291
Trade accounts payable	33,671	11,885	9,633
Taxes payable	(1,528)	13,615	(3,072)
Accruals and other	(26,572)	14,972	39,769
Net cash provided by operating activities	<u>565,005</u>	<u>516,325</u>	<u>460,758</u>
Cash flows from investing activities:			
Proceeds from sale of property, plant, and equipment	8,190	11,973	423
Purchase of property, plant, and equipment	(142,726)	(127,426)	(123,957)
Acquisitions	(5,527)	(108,445)	(111,381)
Net hedging settlements on intercompany loans	1,119	6,554	3,459
Net cash used in investing activities	<u>(138,944)</u>	<u>(217,344)</u>	<u>(231,456)</u>
Cash flows from financing activities:			
Proceeds from borrowings	940,615	1,244,195	905,774
Repayments of borrowings	(876,324)	(1,185,172)	(594,178)
Proceeds from exercise of stock options	24,600	28,649	25,471
Repurchases of common stock	(474,999)	(399,997)	(499,992)
Other financing activities	(1,914)	(7,205)	(680)
Net cash used in financing activities	<u>(388,022)</u>	<u>(319,530)</u>	<u>(163,605)</u>
Effect of exchange rate changes on cash and cash equivalents	(8,616)	10,562	(5,910)
Net increase (decrease) in cash and cash equivalents	<u>29,423</u>	<u>(9,987)</u>	<u>59,787</u>
Cash and cash equivalents:			
Beginning of period	148,687	158,674	98,887
End of period	<u>\$ 178,110</u>	<u>\$ 148,687</u>	<u>\$ 158,674</u>
Supplemental disclosures of cash flow information:			
Cash paid during the year for:			
Interest	\$ 34,451	\$ 33,333	\$ 28,025
Taxes	\$ 132,410	\$ 109,730	\$ 92,586

The accompanying notes are an integral part of these consolidated financial statements.

METTLER-TOLEDO INTERNATIONAL INC.
NOTES TO THE CONSOLIDATED FINANCIAL STATEMENTS
(In thousands, except share data, unless otherwise stated)

1. *BUSINESS DESCRIPTION AND BASIS OF PRESENTATION*

Mettler-Toledo International Inc. (“Mettler-Toledo” or the “Company”) is a leading global supplier of precision instruments and services. The Company manufactures weighing instruments for use in laboratory, industrial, packaging, logistics, and food retailing applications. The Company also manufactures several related analytical instruments and provides automated chemistry solutions used in drug and chemical compound discovery and development. In addition, the Company manufactures metal detection and other end-of-line inspection systems used in production and packaging and provides solutions for use in certain process analytics applications. The Company’s primary manufacturing facilities are located in China, Switzerland, the United States, Germany, the United Kingdom, and Mexico. The Company’s principal executive offices are located in Columbus, Ohio and Greifensee, Switzerland.

The consolidated financial statements have been prepared in accordance with accounting principles generally accepted in the United States of America (“U.S. GAAP”) and include all entities in which the Company has control, which are its wholly owned subsidiaries.

The preparation of financial statements in conformity with U.S. GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, as well as disclosure of contingent assets and liabilities at the date of the financial statements, and the reported amounts of revenues and expenses during the reporting periods. Actual results may differ from those estimates.

All intercompany transactions and balances have been eliminated.

2. *SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES*

Cash and Cash Equivalents

Cash and cash equivalents include highly liquid investments with original maturity dates of three months or less. The carrying value of these cash equivalents approximates fair value.

Trade Accounts Receivable

Trade accounts receivable are recorded at the invoiced amount and do not bear interest. The allowance for doubtful accounts represents the Company’s best estimate of probable credit losses in its existing trade accounts receivable. The Company determines the allowance based upon a review of both specific accounts for collection and the age of the accounts receivable portfolio.

Inventories

Inventories are valued at the lower of cost or net realizable value. Cost, which includes direct materials, labor, and overhead, is generally determined using the first in, first out (FIFO) method. The estimated net realizable value is based on assumptions for future demand and related pricing. Adjustments to the cost basis of the Company’s inventory are made for excess and obsolete items based on usage, orders, and technological obsolescence. If actual market conditions are less favorable than those projected by management, reductions in the value of inventory may be required.

Long-Lived Assets

a) Property, Plant, and Equipment

Property, plant, and equipment are stated at cost less accumulated depreciation. Repair and maintenance costs are charged to expense as incurred. The Company expenses all internal-use software costs incurred in the preliminary project stage and capitalizes certain direct costs associated with the development and purchase of internal-use software within property, plant, and equipment. Capitalized costs are amortized on a straight-line basis over the estimated useful lives of the software, generally not exceeding 10 years.

Depreciation and amortization are charged on a straight-line basis over the estimated useful lives of the assets as follows:

Buildings and improvements	15 to 50 years
Machinery and equipment	3 to 12 years
Computer software	3 to 10 years
Leasehold improvements	Shorter of useful life or lease term

b) Goodwill and Other Intangible Assets

Goodwill, representing the excess of purchase price over the net asset value of companies acquired, and indefinite-lived intangible assets are not amortized, but are reviewed for impairment annually in the fourth quarter, or more frequently if events or changes in circumstances indicate that an asset might be impaired. The annual evaluations of goodwill and indefinite-lived intangible assets are generally based on an assessment of qualitative factors to determine whether it is more likely than not that the fair value of the asset is less than its carrying amount.

If the Company is unable to conclude whether the goodwill asset is not impaired after considering the totality of events and circumstances during its qualitative assessment, the Company performs the first step of the two-step impairment test by estimating the fair value of the goodwill asset and comparing the fair value to the carrying amount of the goodwill asset. If the carrying amount of the goodwill asset exceeds its fair value, then the Company performs the second step of the impairment test to measure the amount of the impairment loss, if any.

If the Company is unable to conclude whether the indefinite-lived intangible asset is not impaired after considering the totality of events and circumstances, the Company performs an impairment test to measure the amount of the impairment loss, if any.

Other intangible assets include indefinite-lived assets and assets subject to amortization. Where applicable, amortization is charged on a straight-line basis over the expected period to be benefited. The straight-line method of amortization reflects an appropriate allocation of the cost of the intangible assets to earnings in proportion to the amount of economic benefits obtained by the Company in each reporting period. The Company assesses the initial acquisition of intangible assets in accordance with the provisions of ASC 805 "Business Combinations" and the continued accounting for previously recognized intangible assets and goodwill in accordance with the provisions of ASC 350 "Intangible - Goodwill and Other" and ASC 360 "Property, Plant, and Equipment."

Accounting for Impairment of Long-Lived Assets

The Company assesses the need to record impairment losses on long-lived assets (asset group) with finite lives when events or changes in circumstances indicate that the carrying amount of assets may not be recoverable. An impairment loss would be recognized when future estimated undiscounted cash flows expected to result from use and eventual disposition of that asset (asset group) are less than the asset's carrying value, with the loss measured as the difference between carrying value and estimated fair value.

Taxation

The Company files tax returns in each jurisdiction in which it operates. Deferred tax assets and liabilities are recognized for the future tax consequences attributable to differences between the financial statement carrying amounts of existing assets and liabilities, their respective tax bases, and operating loss and tax credit carryforwards. Deferred tax assets and liabilities are measured using enacted tax rates in the respective jurisdictions in which the Company operates. In assessing the ability to realize deferred tax assets, management considers whether it is more likely than not that some portion or all of the deferred tax assets will not be realized.

Deferred taxes are not provided on the unremitted earnings of subsidiaries outside of the United States when it is expected that these earnings are permanently reinvested. Such earnings may become taxable upon the sale or liquidation of these subsidiaries or upon the remittance of dividends. Deferred taxes are provided when the Company no longer considers subsidiary earnings to be permanently invested, such as in situations where the Company's subsidiaries plan to make future dividend distributions.

In accordance with the Tax Cuts and Jobs Act, the Company treats taxes due on future Global Intangible Low-Taxed Income ("GILTI") inclusions in U.S. taxable income as a current period expense when incurred.

The Company recognizes accrued amounts of interest and penalties related to its uncertain tax positions as part of income tax expense within its consolidated statement of operations.

Currency Translation and Transactions

The reporting currency for the consolidated financial statements of the Company is the U.S. dollar. The functional currency for the Company's operations is generally the applicable local currency. Accordingly, the assets and liabilities of companies whose functional currency is other than the U.S. dollar are included in the consolidated financial statements by translating the assets and liabilities into the reporting currency at the exchange rates applicable at the end of the reporting period. The statements of operations and cash flows of such non-U.S. dollar functional currency operations are translated at the monthly weighted average exchange rates during the year. Translation gains or losses are accumulated in other comprehensive income (loss) in the consolidated statements of shareholders' equity. Transaction gains and losses are included as a component of net earnings or in certain circumstances as a component of other comprehensive income (loss) where the underlying item is considered a hedge of a net investment or relates to intercompany notes that are long-term in nature.

Revenue Recognition

Product revenue is recognized from contracts with customers when a customer has obtained control of a product. The Company considers control to have transferred based upon shipping terms. To the extent the Company's contracts have a separate performance obligation, revenue related to any post-shipment

METTLER-TOLEDO INTERNATIONAL INC.
NOTES TO THE CONSOLIDATED FINANCIAL STATEMENTS - (Continued)
(In thousands, except share data, unless otherwise stated)

performance obligation is deferred until completed. Shipping and handling costs charged to customers are included in total net sales and the associated expense is a component of cost of sales. Certain products are also sold through indirect distribution channels whereby the distributor assumes any further obligations to the end customer. Revenue is recognized on these distributor arrangements upon transfer of control to the distributor. Contracts do not contain variable pricing arrangements that are retrospective, except for rebate programs. Rebates are estimated based on expected sales volumes and offset against revenue at the time such revenue is recognized. The Company generally maintains the right to accept or reject a product return in its terms and conditions and also maintains appropriate accruals for outstanding credits. The related provisions for estimated returns and rebates are immaterial to the consolidated financial statements.

Certain of the Company's product arrangements include separate performance obligations, primarily related to installation. Such performance obligations are accounted for separately when the deliverables have stand-alone value and the satisfaction of the undelivered performance obligations is probable and within the Company's control. The allocation of revenue between the performance obligations is based on the observable stand-alone selling prices at the time of the sale in accordance with a number of factors including service technician billing rates, time to install, and geographic location.

Software is generally not considered a distinct performance obligation with the exception of a few small software applications. The Company generally does not sell software products without the related hardware instrument as the software is embedded in the product. The Company's products typically require no significant production, modification, or customization of the hardware or software that is essential to the functionality of the products.

Service revenue not under contract is recognized upon the completion of the service performed. Revenue from spare parts sold on a stand-alone basis is recognized when control is transferred to the customer, which is generally at the time of shipment or delivery. Revenue from service contracts is recognized ratably over the contract period using a time-based method. These contracts represent an obligation to perform repair and other services including regulatory compliance qualification, calibration, certification, and preventative maintenance on a customer's pre-defined equipment over the contract period.

Research and Development

Research and development costs primarily consist of salaries, consulting, and other costs. The Company expenses these costs as incurred.

Warranty

The Company generally offers one-year warranties on most of its products. Product warranties are recorded at the time revenue is recognized. While the Company engages in extensive product quality programs and processes, its warranty obligations are affected by product failure rates, material usage, and service costs incurred in correcting a product failure.

Employee Termination Benefits

In situations where contractual termination benefits exist, the Company records accruals for employee termination benefits when it is probable that a liability has been incurred and the amount of the liability is reasonably estimable. All other employee termination arrangements are recognized and measured at their fair value at the communication date unless the employee is required to render additional service beyond the legal notification period, in which case the liability is recognized ratably over the future service period.

Earnings per Common Share

In accordance with the treasury stock method, the Company has included 565,650, 680,208, and 506,137 common equivalent shares in the calculation of diluted weighted average number of common shares for the years ended December 31, 2018, 2017, and 2016, respectively, relating to outstanding stock options and restricted stock units.

Outstanding options and restricted stock units to purchase or receive 63,019, 9,824, and 102,017 shares of common stock for the years ended December 31, 2018, 2017, and 2016, respectively, have been excluded from the calculation of diluted weighted average number of common and common equivalent shares as such options and restricted stock units would be anti-dilutive.

Equity-Based Compensation

The Company applies the fair value methodology in accounting for its equity-based compensation plan.

Derivative Financial Instruments

The Company has limited involvement with derivative financial instruments and does not use them for trading purposes. As described more fully in Note 6, the Company enters into foreign currency forward exchange contracts to economically hedge certain short-term intercompany balances involving its international businesses. Such contracts limit the Company's exposure to currency fluctuations on the underlying hedged item. These contracts are adjusted to fair market value as of each balance sheet date, with the resulting changes in fair value being recognized in other charges (income), consistent with the underlying hedged item.

The Company also enters into interest rate swap agreements and cross currency swaps in order to manage its exposure to changes in interest rates. The differential paid or received on interest rate swap agreements is recognized as incurred in interest expense over the life of the hedge agreements. Floating to fixed interest rate swap agreements are accounted for as cash flow hedges. Changes in fair value of outstanding interest rate swap agreements that are effective as cash flow hedges are initially recognized in other comprehensive income as incurred.

Fair Value Measurements

The Company measures or monitors certain assets and liabilities on a fair value basis. Fair value is used on a recurring basis for assets and liabilities in which fair value is the primary basis of accounting, mainly derivative instruments. Fair value is defined as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. When determining the fair value measurements for assets and liabilities required to be recorded at fair value, the Company considers the principal or most advantageous market in which it would transact and

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considers assumptions that market participants would use when pricing the asset or liability. The Company applies the fair value hierarchy established under U.S. GAAP and when possible looks to active and observable markets to price identical assets and liabilities. If identical assets and liabilities are not traded in active markets, the Company looks to observable market data for similar assets and liabilities.

Business Combinations and Asset Acquisitions

The Company accounts for business acquisitions under the accounting standards for business combinations. The results of each acquisition are included in the Company's consolidated results as of the acquisition date. The purchase price of an acquisition is allocated to tangible and intangible assets and assumed liabilities based on their estimated fair values and any consideration in excess of the net assets acquired is recognized as goodwill. Acquisition transaction costs are expensed when incurred.

In circumstances where an acquisition involves a contingent consideration arrangement, the Company recognizes a liability equal to the fair value of the expected contingent payments as of the acquisition date. Subsequent changes in the fair value of the contingent consideration are recorded to other charges (income), net.

Recent Accounting Pronouncements

On January 1, 2018, the Company retrospectively implemented ASU 2017-07 to ASC 715 "Compensation - Retirement Benefits," which requires the Company to report the non-service cost components of net periodic benefit cost (pension cost) in other charges (income), net. These amounts were previously reported in selling, general, and administrative, cost of sales, and research and development in the consolidated statement of operations. Non-service pension benefits were \$6.2 million, \$4.0 million, and \$9.8 million for December 31, 2018, 2017, and 2016, respectively.

In February 2016 and July 2018, the FASB issued ASU 2016-02 and ASU 2018-11 to ASC 842 "Leases." The new accounting standard requires operating leases, which were historically off balance sheet, to be recognized on the balance sheet as a right-of-use asset and a lease liability. The Company has identified its leases by asset class and has elected to adopt the practical expedients package, which allows a company to not reassess the Company's prior conclusions about lease identification, lease classification, and initial direct costs. The Company also expects to elect the short-term lease recognition exemption and the practical expedient to not separate nonlease components from lease components for real estate and other equipment. The Company will adopt the guidance January 1, 2019 using a modified retrospective approach without adjusting comparative periods. The Company has completed its assessment of the new standard and expects to recognize a right-of-use asset and a corresponding lease liability of approximately \$90-\$100 million.

In February 2018, the FASB issued ASU 2018-02, "Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income" which allowed companies to reclassify certain stranded tax effects as a result of the Tax Cuts and Jobs Act of 2017 in accumulated other comprehensive income to retained earnings. The reclassification is optional, and therefore, the Company has elected to not reclassify its stranded tax effects.

3. REVENUE

On January 1, 2018, the Company adopted ASC 606 "Revenue from Contracts with Customers" and all the related amendments using the modified retrospective method, whereby the adoption did not impact

METTLER-TOLEDO INTERNATIONAL INC.
NOTES TO THE CONSOLIDATED FINANCIAL STATEMENTS - (Continued)
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any prior periods. The effect of adopting the new standard did not require any cumulative effect adjustment to retained earnings as of January 1, 2018. There was no impact to our consolidated statements of operations, balance sheet, or statement of cash flows as of and for the period ended December 31, 2018.

The Company disaggregates revenue from contracts with customers by product, service, timing of revenue recognition, and geography. A summary by the Company's reportable segments follows for the twelve months ended December 31, 2018:

Twelve months ended December 31, 2018	U.S. Operations	Swiss Operations	Western European Operations	Chinese Operations	Other Operations	Total
Product Revenue	\$ 769,971	\$ 106,400	\$ 517,855	\$ 475,025	\$ 430,824	\$ 2,300,075
Service Revenue:						
Point in time	196,314	19,430	134,052	38,528	100,638	488,962
Over time	41,512	8,234	66,881	11,556	18,366	146,549
Total	\$ 1,007,797	\$ 134,064	\$ 718,788	\$ 525,109	\$ 549,828	\$ 2,935,586

The Company's global revenue mix by product category is laboratory (51% of sales), industrial (41% of sales), and retail (8% of sales). The Company's product revenue by reportable segment is proportionately similar to the Company's global mix except the Company's Swiss Operations, which is largely comprised of laboratory products while the Company's Chinese Operations has a slightly higher percentage of industrial products. A breakdown of the Company's sales by product category for the year ended December 31 follows:

	2018
Laboratory	\$ 1,504,600
Industrial	1,211,362
Retail	219,624
Total net sales	\$ 2,935,586

In certain circumstances, our reporting units sell directly into other geographies. A breakdown of net sales to external customers by geographic customer destination, net for the year ended December 31 follows:

	2018
Total Americas	\$ 1,105,956
Total Europe	908,773
Total Asia/Rest of World	920,857
Total	\$ 2,935,586

The payment terms in the Company's contracts with customers do not exceed one year and therefore contracts do not contain a significant financing component. In most cases, after appropriate credit evaluations, payments are due in arrears and are recognized as receivables. Unbilled revenue is recorded when performance obligations have been satisfied, but not yet billed to the customer. Unbilled revenue as of December 31, 2018 was \$12.4 million and is included within accounts receivable. Deferred revenue and customer prepayments are recorded when cash payments are received or due in advance of the performance obligation being satisfied. Deferred revenue primarily includes prepaid service contracts, as well as deferred installation.

METTLER-TOLEDO INTERNATIONAL INC.
NOTES TO THE CONSOLIDATED FINANCIAL STATEMENTS - (Continued)
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Changes in the components of deferred revenue and customer prepayments during the period are as follows:

	Deferred Revenue and Customer Pre- payments
Beginning balances as of December 31, 2017	\$ 107,166
Customer pre-payments/deferred revenue	619,257
Revenue recognized	(618,002)
Foreign currency translation	(3,040)
Ending balance as of December 31, 2018	<u>\$ 105,381</u>

The Company generally expenses sales commissions when incurred because the contract period is one year or less. These costs are recorded within selling, general, and administrative expenses. The Company has not disclosed the value of unsatisfied performance obligations other than customer prepayments and deferred revenue as most contracts have an expected length of one year or less and amounts greater than one year are immaterial.

4. ACQUISITIONS

In 2018, the Company incurred cumulative acquisition payments totaling \$5.5 million. The Company recorded \$4.9 million of identified intangibles primarily pertaining to technology and patents in connection with these acquisitions, which will be amortized on a straight-line basis over 10 years. Goodwill recorded in connection with these acquisitions totaled \$0.6 million.

In September 2017, the Company acquired all of the shares of Biotix, Inc., a U.S.-based manufacturer and distributor of plastic consumables associated with pipettes, including tips, tubes, and reagent reservoirs used in the life sciences market. The initial cash payment was \$105 million plus an initial contingent consideration obligation with an estimated fair value at the acquisition date of \$30.7 million. The contingent consideration was initially determined using a Monte Carlo simulation based on a forecast of future results. The Company settled the obligation for cash consideration of \$10 million (that will be paid in the first quarter of 2019) and the release of certain indemnifications that resulted in a one-time gain of \$18.7 million in 2018. Goodwill recorded in connection with the acquisition totaled \$51.7 million, which is included in the Company's U.S. Operations segment. Identified intangible finite-life assets acquired include customer relationships of \$49.5 million, technology and patents of \$8.0 million, indefinite-life tradenames of \$7.1 million, and other intangibles of \$0.6 million. The identifiable finite-life intangible assets will be amortized on a straight-line basis over periods ranging from 5 to 18 years and the annual aggregate amortization expense is estimated at \$3.7 million. Net tangible assets acquired were \$18.8 million and recorded at fair value in the consolidated financial statements.

In 2017, the Company also incurred cumulative additional acquisition payments totaling \$3.8 million. The Company recorded \$3.1 million of identified intangibles primarily pertaining to technology and patents in connection with these acquisitions, which will be amortized on a straight-line basis over 12 years. Goodwill recorded in connection with these acquisitions totaled \$0.3 million.

In 2016, the Company incurred total acquisition payments of \$111.4 million, including the acquisition of substantially all of the assets of Henry Troemner LLC (Troemner) for an aggregate purchase price of \$95.8 million. The Company recorded \$60.1 million of identified intangibles primarily pertaining to customer relationships and technology and patents in connection with these acquisitions, which will be

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amortized on a straight-line basis over 3 to 25 years. Goodwill recorded in connection with these acquisitions totaled \$41.3 million.

5. INVENTORIES

Inventory consisted of the following at December 31:

	2018	2017
Raw materials and parts	\$ 122,945	\$ 118,790
Work-in-progress	47,098	43,035
Finished goods	98,778	93,565
Total inventory	<u>\$ 268,821</u>	<u>\$ 255,390</u>

6. FINANCIAL INSTRUMENTS

The Company has limited involvement with derivative financial instruments and does not use them for trading purposes. The Company enters into certain interest rate swap agreements in order to manage its exposure to changes in interest rates. At December 31, 2018, the interest payments associated with 72% of the Company's debt are fixed obligations. The amount of the Company's fixed obligation interest payments may change based upon the expiration dates of its interest rate swap agreement and the level and composition of its debt. The Company also enters into certain foreign currency forward contracts to limit the Company's exposure to currency fluctuations on the respective hedged items. As also mentioned in Note 10, the Company has designated its euro-denominated debt as a hedge of a portion of its net investment in a euro-denominated foreign subsidiary. For additional disclosures on the fair value of financial instruments, see Note 7.

Cash Flow Hedges

In June 2017, the Company entered into a cross currency swap arrangement designated as a cash flow hedge. The agreement converts \$100 million of borrowings under the Company's credit facility into synthetic Swiss franc debt which allows the Company to effectively change the floating rate LIBOR-based interest payment to a fixed Swiss franc income of 0.01%. The swap began in June 2017 and matures in June 2019.

In June 2013, the Company entered into an interest rate swap agreement designated as a cash flow hedge. The agreement is a swap which has the effect of changing the floating rate LIBOR-based interest payments associated with \$50 million in borrowings under the Company's credit agreement to a fixed obligation of 2.52% beginning in October 2015 and matures in October 2020.

In March 2015, the Company entered into a forward-starting interest rate swap agreement. The agreement changes the floating rate LIBOR-based interest payments associated with \$100 million in borrowings under the Company's credit agreement to a fixed obligation of 2.25% which began in February 2017 and matures in February 2022.

The Company's cash flow hedges are recorded gross at fair value in the consolidated balance sheet at December 31, 2018 and 2017 and are disclosed in Note 7 to the consolidated financial statements. Amounts reclassified from other comprehensive income and the effective portions of the cash flow hedges are further disclosed in Note 10 to the consolidated financial statements. A derivative gain of \$1.8 million based upon interest rates at December 31, 2018 is expected to be reclassified from other comprehensive

income (loss) to earnings in the next twelve months. Through December 31, 2018, no hedge ineffectiveness has occurred in relation to these cash flow hedges.

Other Derivatives

The Company enters into foreign currency forward contracts in order to economically hedge short-term trade and non-trade intercompany balances largely denominated in Swiss franc, other major European currencies, and the Chinese renminbi with its foreign businesses. In accordance with U.S. GAAP, these contracts are considered “derivatives not designated as hedging instruments.” Gains or losses on these instruments are reported in current earnings. The foreign currency forward contracts are recorded at fair value in the consolidated balance sheet at December 31, 2018 and 2017, as disclosed in Note 7 to the consolidated financial statements. The Company recognized in other charges (income) a net loss of \$1.2 million and a net gain of \$9.4 million during the years ended December 31, 2018 and 2017, respectively, which offset the related net transaction gains (losses) associated with these contracts. At December 31, 2018 and 2017, these contracts had a notional value of \$436.7 million and \$394.8 million, respectively.

The Company may be exposed to credit losses in the event of nonperformance by the counterparties to its derivative financial instrument contracts. Counterparties are established banks and financial institutions with high credit ratings. The Company believes that such counterparties will be able to fully satisfy their obligations under these contracts.

7. FAIR VALUE MEASUREMENTS

At December 31, 2018 and 2017, the Company had derivative assets totaling \$3.2 million and \$1.9 million, respectively, and derivative liabilities totaling \$1.1 million and \$2.4 million, respectively. The fair values of the interest rate swap agreements, the cross currency swap agreement, and foreign currency forward contracts that economically hedge short-term intercompany balances are estimated based upon inputs from current valuation information obtained from dealer quotes and priced with observable market assumptions and appropriate valuation adjustments for credit risk. The Company has evaluated the valuation methodologies used to develop the fair values by dealers in order to determine whether such valuations are representative of an exit price in the Company’s principal market. In addition, the Company uses an internally developed model to perform testing on the valuations received from brokers. The Company has also considered both its own credit risk and counterparty credit risk in determining fair value and determined these adjustments were insignificant for the years ended December 31, 2018 and 2017.

The Company had \$9.0 million and \$5.6 million of cash equivalents at December 31, 2018 and 2017, respectively, the fair value of which is determined through quoted and corroborated prices in active markets. The fair value of cash equivalents approximates cost.

The fair value of the Company’s fixed interest rate debt was estimated using Level 2 inputs, primarily discounted cash flow models, based on estimated current rates offered for similar debt under current market conditions for the Company. The carrying value of the Company’s fixed interest rate debt exceeds the fair value by approximately \$1.5 million as of December 31, 2018, while the fair value of the Company’s fixed interest rate debt exceeded the carrying value by approximately \$6.6 million as of December 31, 2017.

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Under U.S. GAAP, fair value is defined as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. A fair value measurement consists of observable and unobservable inputs that reflect the assumptions that a market participant would use in pricing an asset or liability.

A fair value hierarchy has been established that categorizes these inputs into three levels:

Level 1: Quoted prices in active markets for identical assets and liabilities

Level 2: Observable inputs other than quoted prices in active markets for identical assets and liabilities

Level 3: Unobservable inputs

The following table presents, for each of these hierarchy levels, the Company's assets and liabilities that are measured at fair value on a recurring basis at December 31, 2018 and 2017:

	December 31, 2018				December 31, 2017			
	Total	Level 1	Level 2	Level 3	Total	Level 1	Level 2	Level 3
Assets:								
Cash equivalents	\$ 9,026	\$ —	\$ 9,026	\$ —	\$ 5,616	\$ —	\$ 5,616	\$ —
Interest rate swap agreements	545	—	545	—	—	—	—	—
Cross currency swap agreements	1,154	—	1,154	—	—	—	—	—
Foreign currency forward contracts not designated as hedging instruments	1,534	—	1,534	—	1,912	—	1,912	—
Total	\$ 12,259	\$ —	\$ 12,259	\$ —	\$ 7,528	\$ —	\$ 7,528	\$ —
Liabilities:								
Interest rate swap agreements	\$ 27	\$ —	\$ 27	\$ —	\$ 1,292	\$ —	\$ 1,292	\$ —
Cross currency swap agreement	—	—	—	—	106	—	106	—
Foreign currency forward contracts not designated as hedging instruments	1,059	—	1,059	—	986	—	986	—
Total	\$ 1,086	\$ —	\$ 1,086	\$ —	\$ 2,384	\$ —	\$ 2,384	\$ —

8. PROPERTY, PLANT, AND EQUIPMENT, NET

Property, plant, and equipment, net consisted of the following at December 31:

	2018	2017
Land	\$ 58,072	\$ 58,046
Building and leasehold improvements	317,636	300,850
Machinery and equipment	386,504	382,233
Computer software	470,976	436,249
Property, plant, and equipment, gross	1,233,188	1,177,378
Less accumulated depreciation and amortization	(515,662)	(509,107)
Property, plant, and equipment, net	\$ 717,526	\$ 668,271

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9. GOODWILL AND OTHER INTANGIBLE ASSETS

The following table shows the changes in the carrying amount of goodwill for the years ended December 31:

	2018	2017
Balance at beginning of year	\$ 539,838	\$ 476,378
Goodwill acquired	558	52,229
Foreign currency translation	(5,616)	11,231
Balance at year end	<u>\$ 534,780</u>	<u>\$ 539,838</u>

Goodwill and indefinite-lived assets are reviewed for impairment on an annual basis in the fourth quarter. The Company completed its impairment review and determined that there had been no impairment of these assets through December 31, 2018. The Company identified no triggering events or other circumstances which indicated the carrying amount of goodwill or intangibles assets may not be recoverable.

The components of other intangible assets as of December 31 are as follows:

	2018			2017		
	Gross Amount	Accumulated Amortization	Intangibles, Net	Gross Amount	Accumulated Amortization	Intangibles, Net
Customer relationships	\$ 197,942	\$ (49,887)	\$ 148,055	\$ 198,527	\$ (41,794)	\$ 156,733
Proven technology and patents	73,880	(42,750)	31,130	70,311	(38,890)	31,421
Tradenames (finite life)	4,504	(2,874)	1,630	4,518	(2,807)	1,711
Tradenames (indefinite life)	35,500	—	35,500	35,562	—	35,562
Other	3,684	(2,691)	993	3,490	(2,199)	1,291
	<u>\$ 315,510</u>	<u>\$ (98,202)</u>	<u>\$ 217,308</u>	<u>\$ 312,408</u>	<u>\$ (85,690)</u>	<u>\$ 226,718</u>

The Company recognized amortization expense associated with the above intangible assets of \$14.3 million, \$11.5 million, and \$8.3 million for the years ended December 31, 2018, 2017, and 2016, respectively. The annual aggregate amortization expense based on the current balance of other intangible assets is estimated at \$13.9 million for 2019, \$13.5 million for 2020, \$12.9 million for 2021, \$12.4 million for 2022, and \$12.3 million for 2023. The finite-lived intangible assets are amortized on a straight-line basis over periods ranging from 3 to 45 years. The straight-line method of amortization reflects an appropriate allocation of the cost of the intangible assets to earnings in proportion to the amount of economic benefits obtained by the Company in each reporting period. Purchased intangibles amortization was \$13.3 million, \$10.0 million after tax, \$10.9 million, \$7.1 million after tax, and \$7.4 million, \$5.0 million after tax, for the years ended December 31, 2018, 2017, and 2016, respectively.

In addition to the above amortization, the Company recorded amortization expense associated with capitalized software of \$33.0 million, \$31.0 million, and \$27.5 million for the years ended December 31, 2018, 2017, and 2016, respectively.

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10. DEBT

Debt consisted of the following at December 31:

	2018	2017
3.67% \$50 million Senior Notes due December 17, 2022	\$ 50,000	\$ 50,000
4.10% \$50 million Senior Notes due September 19, 2023	50,000	50,000
3.84% \$125 million Senior Notes due September 19, 2024	125,000	125,000
4.24% \$125 million Senior Notes due June 25, 2025	125,000	125,000
1.47% EUR 125 million Senior Notes due June 17, 2030	143,053	149,736
Senior notes debt issuance costs, net	(1,234)	(1,438)
Total Senior Notes	491,819	498,298
\$1.1 billion Credit Agreement, interest at LIBOR plus 87.5 basis points ⁽¹⁾	493,202	461,872
Other local arrangements	49,670	19,677
Total debt	1,034,691	979,847
Less: current portion	(49,670)	(19,677)
Total long-term debt	\$ 985,021	\$ 960,170

(1) See Note 6 for additional disclosures on the financial instruments associated with the Credit Agreement.

3.67% Senior Notes

In 2012, the Company issued and sold \$50 million of 3.67% Senior Notes due December 17, 2022 in a private placement. The 3.67% Senior Notes are senior unsecured obligations of the Company. Interest is payable semi-annually in June and December.

The 3.67% Senior Notes contain customary affirmative and negative covenants including, among others, limitations on the Company and its subsidiaries with respect to incurrence of liens and priority indebtedness, disposition of assets, mergers, and transactions with affiliates. The note purchase agreement also requires the Company to maintain a consolidated interest coverage ratio of not less than 3.5 to 1.0 and a consolidated leverage ratio of not more than 3.5 to 1.0. The 3.67% Senior Notes also contain customary events of default with customary grace periods, as applicable. The Company was in compliance with its covenants at December 31, 2018.

Issuance costs approximating \$0.4 million are being amortized to interest expense over the ten-year term of the 3.67% Senior Notes.

4.10% Senior Notes

In 2013, the Company issued and sold \$50 million of 4.10% Senior Notes due September 19, 2023 in a private placement. The 4.10% Senior Notes are senior unsecured obligations of the Company. Interest on the 4.10% Senior Notes is payable semi-annually in March and September each year.

The 4.10% Senior Notes contain customary affirmative and negative covenants, change in control, and prepayment provisions that are substantially similar to those contained in the previously issued debt of the Company as described above. The 4.10% Senior Notes also contain customary events of default with customary grace periods, as applicable. The Company was in compliance with its covenants at December 31, 2018.

Issuance costs approximating \$0.4 million are being amortized to interest expense over the ten-year term of the 4.10% Senior Notes.

3.84% Senior Notes and 4.24% Senior Notes

In 2014, the Company entered into an agreement to issue and sell \$250 million of ten-year Senior Notes in a private placement. The Company issued \$125 million with a fixed interest rate of 3.84% ("3.84% Senior Notes") in September 2014 and issued \$125 million with a fixed interest rate of 4.24% ("4.24% Senior Notes") in June 2015. The Senior Notes are senior unsecured obligations of the Company. Interest on the 3.84% Senior Notes is payable semi-annually in March and September each year, beginning in March 2015. Interest on the 4.24% Senior Notes is payable semi-annually in June and December of each year, beginning in December 2015.

The 3.84% Senior Notes and 4.24% Senior Notes contain customary affirmative and negative covenants, change in control, and prepayment provisions that are substantially similar to those contained in the previously issued debt of the Company as described above. The 3.84% Senior Notes and 4.24% Senior Notes also contain customary events of default with customary grace periods, as applicable. The Company was in compliance with its covenants at December 31, 2018.

Issuance costs approximating \$0.9 million are being amortized to interest expense over the ten-year term of the Senior Notes.

1.47% Euro Senior Notes

In 2015, the Company issued in a private placement Euro 125 million with a fixed interest rate of 1.47% fifteen-year Senior Notes ("1.47% Euro Senior Notes"). The Euro Senior Notes are senior unsecured obligations of the Company. The Company has designated the 1.47% Euro Senior Notes as a hedge of a portion of its net investment in a euro denominated foreign subsidiary to reduce foreign currency risk associated with this net investment. Changes in the carrying value of this debt resulting from fluctuations in the euro to U.S. dollar exchange rate are recorded as foreign currency translation adjustments within other comprehensive income (loss). The Company recorded in other comprehensive income (loss) related to this net investment hedge an unrealized gain of \$6.7 million and an unrealized loss of \$18.2 million for the years ended December 31, 2018 and 2017, respectively.

Interest on the 1.47% Senior Notes is payable in June and December each year. The 1.47% Senior Notes contain customary affirmative and negative covenants, change in control, and prepayment provisions that are substantially similar to those contained in the previously issued debt of the Company as described above. The 1.47% Senior Notes also contain customary events of default with customary grace periods, as applicable. The Company was in compliance with its covenants at December 31, 2018.

Issuance costs approximating \$0.4 million are being amortized to interest expense over the fifteen-year term of the Euro Senior Notes.

Credit Agreement

On June 15, 2018, the Company entered into an amended \$1.1 billion Credit Agreement (the "Credit Agreement"), which amended its \$800 million Amended and Restated Credit Agreement (the "Prior Credit Agreement"). As of December 31, 2018, the Company had \$600.7 million of availability remaining under its Credit Agreement.

The Credit Agreement is provided by a group of financial institutions (similar to the Company's Prior Credit Agreement) and has a maturity date of June 15, 2023. It is a revolving credit facility and is not subject to any scheduled principal payments prior to maturity. The obligations under the Credit Agreement are unsecured.

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Borrowings under the Credit Agreement bear interest at current market rates plus a margin based on the Company's consolidated leverage ratio, which was set at LIBOR plus 87.5 basis points as of June 15, 2018. The Company must also pay facility fees that are tied to its leverage ratio. The Credit Agreement contains covenants that are the same as those contained in the Prior Credit Agreement, with which the Company was in compliance as of December 31, 2018. The Company is required to maintain a ratio of funded debt to consolidated EBITDA of 3.5 to 1.0 or less and an interest coverage ratio of 3.5 to 1.0 or greater. The Credit Agreement also places certain limitations on the Company, including limiting the ability to incur liens or indebtedness at a subsidiary level. In addition, the Credit Agreement has several events of default. The Company capitalized \$2.0 million in financing fees in other long-term assets during 2018 associated with the Credit Agreement which will be amortized to interest expense through 2023.

Other Local Arrangements

In April 2018, two of the Company's non-U.S. pension plans issued loans totaling \$39.6 million (Swiss franc 38 million) to a wholly owned subsidiary of the Company. The loans have the same terms and conditions which include an interest rate of Swiss franc LIBOR plus 87.5 basis points, a maturity date of April 2019, and a one year mutual renewal term and, as such, are classified as short-term debt on the Company's consolidated balance sheet. The proceeds were used to repay outstanding amounts on the Company's credit facility.

The Company's weighted average interest rate was 3.3% for the years ended December 31, 2018 and 2017.

11. SHAREHOLDERS' EQUITY

Common Stock

The number of authorized shares of the Company's common stock is 125,000,000 shares with a par value of \$0.01 per share. Holders of the Company's common stock are entitled to one vote per share. At December 31, 2018, 3,252,712 shares of the Company's common stock were reserved for issuance pursuant to the Company's stock option plans.

Preferred Stock

The Board of Directors, without further shareholder authorization, is authorized to issue up to 10,000,000 shares of preferred stock, par value \$0.01 per share in one or more series and to determine and fix the rights, preferences, and privileges of each series, including dividend rights and preferences over dividends on the common stock and one or more series of the preferred stock, conversion rights, voting rights (in addition to those provided by law), redemption rights, and the terms of any sinking fund therefore, and rights upon liquidation, dissolution, or winding up, including preferences over the common stock and one or more series of the preferred stock. The issuance of shares of preferred stock, or the issuance of rights to purchase such shares, may have the effect of delaying, deferring, or preventing a change in control of the Company or an unsolicited acquisition proposal.

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Share Repurchase Program

In November 2018, the Company's Board of Directors authorized an additional \$2.0 billion to the share repurchase program which has \$2.1 billion of remaining availability as of December 31, 2018. The share repurchases are expected to be funded from cash generated from operating activities, borrowings, and cash balances. Repurchases will be made through open market transactions, and the amount and timing of purchases will depend on business and market conditions, the stock price, trading restrictions, the level of acquisition activity, and other factors.

The Company has purchased 27.5 million common shares since the inception of the program in 2004 through December 31, 2018, at a total cost of \$4.4 billion. During the years ended December 31, 2018 and 2017, the Company spent \$475 million and \$400 million on the repurchase of 802,809 shares and 749,254 shares at an average price per share of \$591.65 and \$533.84, respectively. The Company reissued 183,379 shares and 270,413 shares held in treasury for the exercise of stock options and restricted stock units during 2018 and 2017, respectively.

Accumulated Other Comprehensive Income (Loss)

The following table presents changes in accumulated other comprehensive income by component for the period ended December 31, 2018 and 2017:

	Currency Translation Adjustment, Net of Tax	Net Unrealized Gain (Loss) on Cash Flow Hedging Arrangements, Net of Tax	Pension and Post- Retirement Benefit Related Items, Net of Tax	Total
Balance at December 31, 2016	\$ (115,322)	\$ (2,232)	\$ (237,444)	\$ (354,998)
Other comprehensive income (loss), net of tax:				
Net unrealized actuarial gains (loss), prior service costs, and plan amendments	—	—	1,678	1,678
Net unrealized gains (loss) on cash flow hedging arrangements	—	1,424	—	1,424
Foreign currency translation adjustment	83,982	—	(12,092)	71,890
Amounts recognized from accumulated other comprehensive income (loss), net of tax	—	(273)	14,873	14,600
Net change in other comprehensive income (loss), net of tax	83,982	1,151	4,459	89,592
Balance at December 31, 2017	\$ (31,340)	\$ (1,081)	\$ (232,985)	\$ (265,406)
Other comprehensive income (loss), net of tax:				
Net unrealized actuarial gains (loss), prior service costs, and plan amendments	—	—	(24,106)	(24,106)
Net unrealized gains (loss) on cash flow hedging arrangements	—	(658)	—	(658)
Foreign currency translation adjustment	(32,573)	—	3,522	(29,051)
Amounts recognized from accumulated other comprehensive income (loss), net of tax	—	2,441	14,366	16,807
Net change in other comprehensive income (loss), net of tax	(32,573)	1,783	(6,218)	(37,008)
Balance at December 31, 2018	\$ (63,913)	\$ 702	\$ (239,203)	\$ (302,414)

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The following table presents amounts recognized from accumulated other comprehensive income (loss) for the twelve month period ended December 31, 2018 and 2017:

	2018	2017	Location of Amounts Recognized in Earnings
Effective portion of losses (gains) on cash flow hedging arrangements:			
Interest rate swap agreements	\$ 539	\$ 1,679	Interest expense
Cross currency swap	2,212	(1,416)	(a)
Total before taxes	2,751	263	
Provision for taxes	310	536	Provision for taxes
Total, net of taxes	\$ 2,441	\$ (273)	
Recognition of defined benefit pension and post-retirement items:			
Recognition of actuarial losses, plan amendments, prior service cost, and settlement charge before taxes	\$ 18,756	\$ 20,137	(b)
Provision for taxes	4,390	5,264	Provision for taxes
Total, net of taxes	\$ 14,366	\$ 14,873	

(a) The cross currency swap reflects an unrealized loss of \$0.8 million recorded in other charges (income) that was offset by the underlying unrealized gain on the hedged debt. The cross currency swap also reflects a realized gain of \$3.0 million recorded in interest expense.

(b) These accumulated other comprehensive income (loss) components are included in the computation of net periodic pension and post-retirement cost. See Note 13 for additional details for the year ended December 31, 2018.

12. EQUITY INCENTIVE PLAN

The Company's equity incentive plan provides employees and directors of the Company additional incentives to join and/or remain in the service of the Company as well as to maintain and enhance the long-term performance and profitability of the Company. The Company's 2013 equity incentive plan was approved by shareholders on May 2, 2013 and provides that 2 million shares of common stock, plus any shares that remained available for grant under the Company's prior equity incentive plan as well as options outstanding that terminate without being exercised, may be the subject of awards. The plan provides for the grant of options, restricted stock units, and other equity-based awards. The exercise price of options granted shall not be less than the fair market value of the common stock on the date of the award. Options primarily vest equally over a five-year period from the date of grant and have a maximum term of up to ten years and six months. Restricted units primarily vest equally over a five-year period from the date of grant. Performance share units generally vest after a three-year period from the date of the grant based upon satisfaction of the performance condition. The compensation committee of the Board of Directors has generally granted restricted share units to participating managers and non-qualified stock options and performance share units to executive officers.

All share-based compensation arrangements granted to employees, including stock option grants, are recognized in the consolidated statement of operations based on the grant-date fair value of the award over the period during which an employee is required to provide service in exchange for the award. Share-based compensation expense is recorded within selling, general, and administrative in the consolidated statement of operations with a corresponding offset to additional paid-in capital in the consolidated balance sheet.

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The fair values of stock options granted were calculated using the Black-Scholes pricing model. The aggregate intrinsic value of an option is the amount by which the fair value of the underlying stock exceeds its exercise price. The following table summarizes all stock option activity from December 31, 2017 through December 31, 2018:

	Number of Options	Weighted Average Exercise Price	Aggregate Intrinsic Value (in millions)
Outstanding at December 31, 2017	1,008,476	\$232.99	\$392.2
Granted	43,943	595.31	
Exercised	(163,120)	150.81	
Forfeited	(41,469)	369.93	
Outstanding at December 31, 2018	<u>847,830</u>	<u>\$260.88</u>	<u>\$264.0</u>
Options exercisable at December 31, 2018	676,202	\$208.01	\$242.8

The following table details the weighted average remaining contractual life of options outstanding at December 31, 2018 by range of exercise prices:

Number of Options Outstanding	Weighted Average Exercise Price	Remaining Contractual Life of Options Outstanding	Options Exercisable
74,868	\$90.76	0.8	74,868
86,140	\$133.00	1.8	86,140
214,451	\$159.78	3.3	214,451
113,906	\$244.99	4.9	113,906
<u>358,465</u>	<u>\$392.68</u>	<u>7.4</u>	<u>186,837</u>
<u>847,830</u>		<u>4.9</u>	<u>676,202</u>

As of the date granted, the weighted average grant-date fair value of the options granted during the years ended December 31, 2018, 2017, and 2016 was \$189.78, \$206.56, and \$118.31, respectively.

Such weighted average grant-date fair value was determined using the following assumptions:

	2018	2017	2016
Risk-free interest rate	3.09%	2.00%	1.26%
Expected life in years	5.9	5.8	5.7
Expected volatility	26%	28%	29%
Expected dividend yield	—	—	—

The total intrinsic value of options exercised during the years ended December 31, 2018, 2017, and 2016 was approximately \$74.3 million, \$105.6 million, and \$69.5 million, respectively.

The total fair value of options vested during the years ended December 31, 2018, 2017, and 2016 was approximately \$6.9 million, \$8.3 million, and \$7.4 million, respectively.

During the fourth quarter of 2016, the Company granted 12,678 performance-based options, with a grant-date fair value of \$1.5 million. Compensation expense is recognized over the five-year vesting provisions based upon the probability of the performance condition being met.

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The following table summarizes all restricted stock unit and performance share unit activity from December 31, 2017 through December 31, 2018:

	Number of Restricted Stock Units	Aggregate Intrinsic Value (in millions)	Number of Performance Share Units	Aggregate Intrinsic Value (in millions)
Outstanding at December 31, 2017	56,389	\$34.9	8,050	\$5.0
Granted	16,380		4,912	
Vested	(20,259)		—	
Forfeited	(3,258)		(148)	
Outstanding at December 31, 2018	<u>49,252</u>	<u>\$27.8</u>	<u>12,814</u>	<u>\$7.2</u>

The weighted average grant-date fair value of the restricted stock units granted during years ended 2018 and 2017 was \$595.31 and \$671.60 per unit, respectively, and the restricted units vest ratably primarily over a five-year period. The total fair value of the restricted stock units on the date of grant of \$9.6 million for 2018 and \$8.7 million for 2017 will be recorded as compensation expense on a straight-line basis over the vesting period. The total fair value of restricted stock units vested during the years ended December 31, 2018, 2017, and 2016 was approximately \$7.2 million, \$6.8 million, and \$6.3 million, respectively. Approximately \$6.8 million and \$6.5 million of compensation expense was recognized during the years ended December 31, 2018 and 2017, respectively.

The Company granted performance share units with a market condition during 2018 and 2017, respectively. Grantees of performance share units will be eligible to receive shares of the Company's common stock depending upon the Company's total shareholder return relative to the performance of companies in the S&P 500 Healthcare and S&P 500 Industrials over a three-year period. The awards actually earned will range from zero to 200% of the targeted number of performance share units for the three-year performance period and will be paid, to the extent earned, in the fiscal quarter following the end of the applicable three-year performance period. These awards were valued using a Monte Carlo simulation based on the following assumptions:

	2018	2017
Risk-free interest rate	3.03%	1.73%
Expected life in years	3.0	3.0
Expected volatility	26%	28%
Expected dividend yield	—	—

As of the date granted, the fair value of the performance share units granted was \$733.35 for 2018 and \$844.39 for 2017, respectively. The total fair value of the performance share units on the date of the grant was \$3.6 million for 2018 and \$3.0 million for 2017 and will be recorded as compensation expense on a straight-line basis over the three-year period.

At December 31, 2018, a total of 2,182,289 shares of common stock were available for grant in the form of stock options, restricted stock units, or performance share units.

As of December 31, 2018, the unrecorded deferred share-based compensation balance related to stock options, restricted stock units, and performance share units was \$51.3 million and will be recognized using a straight-line method over an estimated weighted average amortization period of 2.3 years.

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13. BENEFIT PLANS

The Company maintains a number of retirement and other post-retirement employee benefit plans.

Certain subsidiaries sponsor defined contribution plans. Benefits are determined and funded annually based upon the terms of the plans. Amounts recognized as cost under these plans amounted to \$18.9 million, \$17.2 million, and \$15.4 million for the years ended December 31, 2018, 2017, and 2016, respectively.

Certain subsidiaries sponsor defined benefit plans. Benefits are provided to employees primarily based upon years of service and employees' compensation for certain periods during the last years of employment. Prior to 2002, the Company's U.S. operations also provided post-retirement medical benefits to their employees. Contributions for medical benefits are related to employee years of service.

The following tables set forth the change in benefit obligation, the change in plan assets, the funded status, and amounts recognized in the consolidated financial statements for the Company's defined benefit plans and post-retirement plan at December 31, 2018 and 2017:

	U.S. Pension Benefits		Non-U.S. Pension Benefits		Other Benefits		Total	
	2018	2017	2018	2017	2018	2017	2018	2017
Change in benefit obligation:								
Benefit obligation at beginning of year	\$ 142,571	\$ 138,155	\$ 918,478	\$ 838,277	\$ 2,673	\$ 2,985	\$ 1,063,722	\$ 979,417
Service cost, gross	1,090	565	30,721	29,600	—	—	31,811	30,165
Interest cost	4,242	4,374	8,630	8,511	66	70	12,938	12,955
Actuarial losses (gains)	(10,019)	6,979	(40,469)	33,036	(167)	18	(50,655)	40,033
Plan amendments and other	—	—	974	(15,153)	(8)	137	966	(15,016)
Benefits paid	(7,682)	(7,502)	(36,379)	(30,356)	(378)	(537)	(44,439)	(38,395)
Impact of foreign currency	—	—	(17,860)	54,563	—	—	(17,860)	54,563
Benefit obligation at end of year	<u>\$ 130,202</u>	<u>\$ 142,571</u>	<u>\$ 864,095</u>	<u>\$ 918,478</u>	<u>\$ 2,186</u>	<u>\$ 2,673</u>	<u>\$ 996,483</u>	<u>\$ 1,063,722</u>
Change in plan assets:								
Fair value of plan assets at beginning of year	\$ 111,567	\$ 104,103	\$ 808,215	\$ 716,169	\$ —	\$ —	\$ 919,782	\$ 820,272
Actual return on plan assets	(8,419)	14,869	(34,102)	49,055	—	—	(42,521)	63,924
Employer contributions	75	97	26,032	22,961	227	400	26,334	23,458
Plan participants' contributions	—	—	15,176	13,503	151	137	15,327	13,640
Benefits paid	(7,682)	(7,502)	(36,379)	(30,356)	(378)	(537)	(44,439)	(38,395)
Impact of foreign currency and other	—	—	(11,532)	36,883	—	—	(11,532)	36,883
Fair value of plan assets at end of year	<u>\$ 95,541</u>	<u>\$ 111,567</u>	<u>\$ 767,410</u>	<u>\$ 808,215</u>	<u>\$ —</u>	<u>\$ —</u>	<u>\$ 862,951</u>	<u>\$ 919,782</u>
Funded status	<u>\$ (34,661)</u>	<u>\$ (31,004)</u>	<u>\$ (96,685)</u>	<u>\$ (110,263)</u>	<u>\$ (2,186)</u>	<u>\$ (2,673)</u>	<u>\$ (133,532)</u>	<u>\$ (143,940)</u>

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Amounts recognized in the consolidated balance sheets consist of:

	U.S. Pension Benefits		Non-U.S. Pension Benefits		Other Benefits		Total	
	2018	2017	2018	2017	2018	2017	2018	2017
Other non-current assets	\$ —	\$ —	\$ 46,014	\$ 40,493	\$ —	\$ —	\$ 46,014	\$ 40,493
Accrued and other liabilities	(110)	(88)	(4,884)	(4,990)	(431)	(411)	(5,425)	(5,489)
Pension and other post-retirement liabilities	(34,551)	(30,916)	(137,815)	(145,766)	(1,755)	(2,262)	(174,121)	(178,944)
Accumulated other comprehensive loss (income)	61,344	61,819	260,820	254,870	(910)	(2,365)	321,254	314,324
Total	\$ 26,683	\$ 30,815	\$ 164,135	\$ 144,607	\$ (3,096)	\$ (5,038)	\$ 187,722	\$ 170,384

The following amounts have been recognized in accumulated other comprehensive income (loss), before taxes, at December 31, 2018 and have not yet been recognized as a component of net periodic pension cost:

	U.S. Pension Benefits	Non-U.S. Pension Benefits	Other Benefits	Total	Total, After Tax
Plan amendments and prior service cost	\$ —	\$ (22,541)	\$ —	\$ (22,541)	\$ (17,873)
Actuarial losses (gains)	61,344	283,361	(910)	343,795	266,332
Total	\$ 61,344	\$ 260,820	\$ (910)	\$ 321,254	\$ 248,459

The following changes in plan assets and benefit obligations were recognized in other comprehensive income (loss), before taxes, for the year ended December 31, 2018:

	U.S. Pension Benefits	Non-U.S. Pension Benefits	Other Benefits	Total	Total, After Tax
Net actuarial losses (gains)	\$ 5,329	\$ 24,637	\$ (167)	\$ 29,799	\$ 23,326
Plan amendment	—	974	—	974	780
Amortization of:					
Actuarial (losses) gains	(5,804)	(21,521)	1,250	(26,075)	(20,173)
Plan amendments and prior service cost	—	6,947	372	7,319	5,807
Impact of foreign currency	—	(5,087)	—	(5,087)	(3,522)
Total	\$ (475)	\$ 5,950	\$ 1,455	\$ 6,930	\$ 6,218

The accumulated benefit obligations at December 31, 2018 and 2017 were \$130.2 million and \$142.6 million, respectively, for the U.S. defined benefit pension plan and \$731.4 million and \$785.7 million, respectively, for all non-U.S. plans. Certain of the plans included within non-U.S. pension benefits have accumulated benefit obligations which exceed the fair value of plan assets. The projected benefit obligation, the accumulated benefit obligation, and fair value of assets of these plans as of December 31, 2018 were \$189.2 million, \$179.0 million, and \$46.5 million, respectively.

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The assumed discount rates and rates of increase in future compensation levels used in calculating the projected benefit obligations vary according to the economic conditions of the country in which the retirement plans are situated. The weighted average rates used for the purposes of the Company's plans are as follows:

	U.S.		Non-U.S.	
	2018	2017	2018	2017
Discount rate	4.11%	3.49%	1.22%	0.97%
Compensation increase rate	n/a	n/a	0.87%	0.87%
Expected long-term rate of return on plan assets	6.50%	6.50%	3.84%	3.86%

The assumed discount rates, rates of increase in future compensation levels, and the long-term rate of return used in calculating the net periodic pension cost vary according to the economic conditions of the country in which the retirement plans are situated. The weighted average rates used for the purposes of the Company's plans are as follows:

	U.S.			Non-U.S.		
	2018	2017	2016	2018	2017	2016
Discount rate	3.49%	3.97%	4.27%	0.97%	0.98%	1.31%
Compensation increase rate	n/a	n/a	n/a	0.87%	0.85%	1.03%
Expected long-term rate of return on plan assets	6.50%	6.75%	7.25%	3.86%	4.09%	4.58%

Net periodic pension cost and net periodic post-retirement benefit for the defined benefit plans and U.S. post-retirement plan include the following components for the years ended December 31:

	U.S.			Non-U.S.			Other Benefits			Total		
	2018	2017	2016	2018	2017	2016	2018	2017	2016	2018	2017	2016
Service cost, net	\$ 1,090	\$ 565	\$ 432	\$ 15,545	\$ 16,341	\$ 16,804	\$ —	\$ —	\$ —	\$ 16,635	\$ 16,906	\$ 17,236
Interest cost on projected benefit obligations	4,242	4,374	4,428	8,630	8,511	10,664	66	70	76	12,938	12,955	15,168
Expected return on plan assets	(6,929)	(6,737)	(7,781)	(31,005)	(30,349)	(33,168)	—	—	—	(37,934)	(37,086)	(40,949)
Recognition of actuarial losses/(gains) and prior service costs	5,804	6,556	7,606	14,575	16,247	12,923	(1,623)	(2,674)	(4,567)	18,756	20,129	15,962
Settlement charge	—	—	7,963	—	—	—	—	—	—	—	—	7,963
Net periodic pension cost / (benefit)	<u>\$ 4,207</u>	<u>\$ 4,758</u>	<u>\$ 12,648</u>	<u>\$ 7,745</u>	<u>\$ 10,750</u>	<u>\$ 7,223</u>	<u>\$ (1,557)</u>	<u>\$ (2,604)</u>	<u>\$ (4,491)</u>	<u>\$ 10,395</u>	<u>\$ 12,904</u>	<u>\$ 15,380</u>

The amounts remaining in accumulated other comprehensive income (loss) that are expected to be recognized as a component of net periodic pension cost during 2019 are as follows:

	U.S. Pension Benefits	Non-U.S. Pension Benefits	Other Benefits	Total
Plan amendments and prior service costs	\$ —	\$ (6,798)	\$ —	\$ (6,798)
Actuarial losses (gains)	2,374	21,630	(691)	23,313
Total	<u>\$ 2,374</u>	<u>\$ 14,832</u>	<u>\$ (691)</u>	<u>\$ 16,515</u>

The projected post-retirement benefit obligation was principally determined using discount rates of 2.65% in 2018 and 2.55% in 2017. Net periodic post-retirement benefit cost was principally determined using discount rates of 3.15% in 2018, 3.41% in 2017, and 3.54% in 2016. The health care cost trend rate was 6.4% in 2018, 7.0% in 2017, and 7.5% in 2016, decreasing to 4.50% in 2027. A one-percentage-point change in health care cost trend rates would have an immaterial impact on total service and interest cost components and the post-retirement benefit obligation.

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The Company's overall asset investment strategy is to achieve long-term growth while minimizing volatility by widely diversifying among asset types and strategies. Target asset allocations and investment return criteria are established by the pension committee or designated officers of each plan. Target asset allocation ranges for the U.S. pension plan include 35-55% in equity securities, 18-28% in fixed income securities, and 20-40% in other types of investments. International plan assets relate primarily to the Company's Swiss plan with target allocations of 24-45% in equities, 35-55% in fixed income securities, and 15-25% in other types of investments. Actual results are monitored against targets and the trustees are required to report to the members of each plan, including an analysis of investment performance on an annual basis at a minimum. Day-to-day asset management is typically performed by third-party asset managers, reporting to the pension committees or designated officers.

The long-term rate of return on plan asset assumptions used to determine pension expense under U.S. GAAP is generally based on estimated future returns for the target investment mix determined by the trustees as well as historical investment performance.

The following table presents the fair value measurement of the Company's plan assets by hierarchy level:

Asset Category:	December 31, 2018				December 31, 2017			
	Quoted Prices in Active Markets for Identical Assets (Level 1)	Observable Inputs for Identical Assets (Level 2)	Unobservable Inputs (Level 3)	Total	Quoted Prices in Active Markets for Identical Assets (Level 1)	Observable Inputs for Identical Assets (Level 2)	Unobservable Inputs (Level 3)	Total
Cash and Cash Equivalents	\$ 111,484	\$ —	\$ —	\$ 111,484	\$ 154,751	\$ —	\$ —	\$ 154,751
Equity Securities:								
Mettler-Toledo Stock	2,436	—	—	2,436	3,154	—	—	3,154
Equity Mutual Funds:								
U.S. ⁽¹⁾	4,989	22,569	—	27,558	6,011	27,984	—	33,995
International ⁽²⁾	68,544	45,892	—	114,436	80,836	61,341	—	142,177
Emerging Markets ⁽³⁾	95,146	692	—	95,838	100,346	1,096	—	101,442
Fixed Income Securities:								
Corporate/Government Bonds ⁽⁴⁾	71,644	—	—	71,644	72,334	—	—	72,334
Fixed Income Mutual Funds:								
Insurance Contracts ⁽⁵⁾	—	22,852	1,461	24,313	—	23,421	1,514	24,935
Core Bond ⁽⁶⁾	95,493	54,448	—	149,941	136,157	57,499	—	193,656
Real Asset Mutual Funds:								
Real Estate ⁽⁷⁾	83,879	13,838	—	97,717	79,218	8,836	—	88,054
Commodities ⁽⁸⁾	40,267	—	—	40,267	37,302	—	—	37,302
Other Types of Investments:								
Debt Securities ⁽⁹⁾	38,616	—	—	38,616	—	—	—	—
Global Allocation Funds ⁽¹⁰⁾	11,195	10,562	—	21,757	11,781	12,545	—	24,326
Insurance Linked Securities ⁽¹¹⁾	18,664	—	—	18,664	12,147	—	—	12,147
Total assets in fair value hierarchy	\$ 642,357	\$ 170,853	\$ 1,461	\$ 814,671	\$ 694,037	\$ 192,722	\$ 1,514	\$ 888,273
Investments measured at net asset value:								
International ⁽²⁾				2,792				—
Emerging Markets ⁽³⁾				4,889				5,950
Multi-Strategy Fund of Hedge Funds ⁽¹²⁾				40,599				25,599
Total pension assets at fair value				\$ 862,951				\$ 919,782

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- (1) Represents primarily large capitalization equity mutual funds tracking the S&P 500 Index.
- (2) Represents all capitalization core and value equity mutual funds located primarily in Switzerland, the United Kingdom, and Canada.
- (3) Represents core and growth mutual funds and funds of mutual funds invested in emerging markets primarily in Eastern Europe, Latin America, and Asia.
- (4) Represents investments in high-grade corporate and government bonds located in Switzerland and the European Union.
- (5) Represents fixed and variable rate annuity contracts provided by insurance companies.
- (6) Represents fixed income mutual funds invested in the U.S., the United Kingdom, Switzerland, and European government bonds, high-grade corporate bonds, mortgage-backed securities, and collateralized mortgage obligations.
- (7) Represents mutual funds invested in real estate located primarily in Switzerland.
- (8) Represents commodity funds invested across a broad range of sectors.
- (9) Represents a loan to a wholly owned subsidiary of the Company. See Note 10 for additional disclosure.
- (10) Represents mutual funds invested globally in both equities and fixed income securities.
- (11) Represents a broadly diversified portfolio of assets that carry exposure to insurance risks, particularly insurance linked securities.
- (12) Represents investments in underlying globally diversified hedge funds. Investments that are measured using the net asset value (NAV) per share practical expedient have not been categorized in the fair value hierarchy. The amounts presented above are intended to permit reconciliation of the fair value hierarchy to the fair value of total plan assets in order to determine the amounts included in the consolidated balance sheet.

The fair value of the Company's stock and corporate and government bonds are valued at the year-end closing price as reported on the securities exchange on which they are traded. Mutual funds are valued at the exchange-listed year end closing price or at the net asset value of shares held by the fund at the end of the year. Insurance contracts are valued by discounting the related cash flows using a current year end market rate or at cash surrender value, which is presumed to equal fair value. Funds of hedge funds are valued at the net asset value of shares held by the fund at the end of the year.

The following table presents a roll-forward of activity for the years ended December 31, 2018 and 2017 for Level 3 asset categories:

	Commodities	Insurance Contract	Total
Balance at December 31, 2016	\$ 5,594	\$ 1,300	\$ 6,894
Actual return on plan assets related to assets held at end of year	—	21	21
Sales	(5,711)	(98)	(5,809)
Purchases	—	108	108
Impact of foreign currency	117	183	300
Balance at December 31, 2017	\$ —	\$ 1,514	\$ 1,514
Actual return on plan assets related to assets held at end of year	—	14	14
Sales	—	(85)	(85)
Purchases	—	82	82
Impact of foreign currency	—	(64)	(64)
Balance at December 31, 2018	\$ —	\$ 1,461	\$ 1,461

There were no transfers between any asset levels during the years ended December 31, 2018 and 2017.

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The following benefit payments, which reflect expected future service as appropriate, are expected to be paid:

	U.S. Pension Benefits	Non-U.S. Pension Benefits	Other Benefits Net of Subsidy	Total
2019	\$ 8,051	\$ 43,494	\$ 431	\$ 51,976
2020	8,247	43,111	249	51,607
2021	8,396	45,220	231	53,847
2022	8,546	43,543	207	52,296
2023	8,698	44,397	180	53,275
2024-2028	43,532	222,671	666	266,869

In 2019, the Company expects to make employer pension contributions of approximately \$25.3 million to its non-U.S. pension plan and employer contributions of approximately \$0.4 million to its U.S. post-retirement medical plan.

14. TAXES

The sources of the Company's earnings before taxes were as follows for the years ended December 31:

	2018	2017	2016
United States	\$ 60,043	\$ 45,105	\$ 37,363
Non-United States	591,815	529,117	466,830
Earnings before taxes	<u>\$ 651,858</u>	<u>\$ 574,222</u>	<u>\$ 504,193</u>

The provisions for taxes consist of:

	Current	Deferred	Total
Year ended December 31, 2018:			
United States federal	\$ 3,422	\$ (4,699)	\$ (1,277)
State and local	5,073	(161)	4,912
Non-United States	128,450	7,162	135,612
Total	<u>\$ 136,945</u>	<u>\$ 2,302</u>	<u>\$ 139,247</u>
Year ended December 31, 2017:			
United States federal	\$ 55,660	\$ 10,173	\$ 65,833
State and local	361	3,471	3,832
Non-United States	144,974	(16,389)	128,585
Total	<u>\$ 200,995</u>	<u>\$ (2,745)</u>	<u>\$ 198,250</u>
Year ended December 31, 2016:			
United States federal	\$ 20,116	\$ (4,817)	\$ 15,299
State and local	2,947	1,149	4,096
Non-United States	94,882	5,546	100,428
Total	<u>\$ 117,945</u>	<u>\$ 1,878</u>	<u>\$ 119,823</u>

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The provisions for tax expense differed from the amounts computed by applying the United States federal income tax rate of 21% for the year ended December 31, 2018 and 35% for the years ended December 31, 2017 and 2016 to earnings before taxes as a result of the following:

	2018	2017	2016
Expected tax	\$ 136,890	\$ 200,978	\$ 176,467
United States state and local income taxes, net of federal income tax benefit	2,787	376	3,064
Net effect of U.S. tax reform (see below)	3,597	71,982	—
Non-United States income taxes at other than U.S. federal rate	12,710	(43,691)	(65,917)
Excess tax benefits from stock option exercises	(13,836)	(35,171)	—
Effect of Biotix contingent consideration settlement	(4,394)	—	—
Other, net	1,493	3,776	6,209
Total provision for taxes	<u>\$ 139,247</u>	<u>\$ 198,250</u>	<u>\$ 119,823</u>

The Company's reported effective tax rate was 21.4% in 2018, 34.5% in 2017, and 23.8% in 2016. As discussed below, the provision for income taxes included charges of \$3.6 million in 2018 and \$72 million in 2017 related to the Tax Cuts and Jobs Act ("the Act") which had the effect of increasing our effective tax rate by 0.6% and 12.5% in 2018 and 2017, respectively. The 2018 effective tax rate also included a benefit of 0.7% associated with the one-time gain related to the settlement of the Biotix contingent consideration.

On December 22, 2017, the Act significantly revised U.S. corporate income tax law. The Act included, among other things, a reduction in the U.S. federal corporate income tax rate from 35% to 21% effective for taxable years beginning after December 31, 2017, and the implementation of a modified territorial tax system that included a one-time transition tax on deemed repatriated earnings of foreign subsidiaries ("Transition Tax") that is payable over a period of up to eight years.

The Company recorded charges of \$3.6 million in 2018 and \$72 million in 2017 relating to the Act. Of these amounts, \$62 million is expected to be payable over a period of up to eight years of which \$46 million is included as a component of other non-current liabilities, \$8 million is included in deferred tax liabilities, \$4 million is included in taxes payable and \$4.2 million has been paid. The components of the Company's charges included:

- Cash charges of \$62 million for un-repatriated foreign earnings due to the estimated Transition Tax of \$54 million, and \$8 million of foreign withholding taxes, and U.S. federal, state, and local taxes related to the reassessment of planned repatriation of certain foreign earnings that were previously determined to be permanently reinvested. All other undistributed earnings were considered permanently reinvested.
- A non-cash charge of \$13 million primarily related to changes in the treatment of certain deferred tax items and other non-cash items. The effect of remeasuring the U.S. net deferred tax balances resulting from the reduction of the U.S. income tax rate from 35% to 21% was immaterial.

The Company's accounting for the above items was based upon reasonable estimates of the tax effects of the Act, and its evaluation of recently issued regulatory guidance. During the fourth quarter of 2018, additional regulatory guidance was issued which clarified, among other things, the definition of cash equivalents used in the computation of the Transition Tax. As a result, the Company recorded a charge of \$3.6 million during the year ended December 31, 2018 that primarily related to an increase in

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the Transition Tax obligation. The increased Transition Tax is payable over a period of eight years beginning in 2018. In January 2019, further interpretive regulatory guidance was issued relating to Transition Tax. The Company has yet to complete its analysis of this recently issued guidance, but does not expect a material impact to its financial position, results of operations, or cash flows.

The tax effects of temporary differences that give rise to significant portions of the deferred tax assets and deferred tax liabilities are presented below at December 31:

	2018	2017
Deferred tax assets:		
Inventory	\$ 15,078	\$ 13,779
Accrued and other liabilities	65,879	62,175
Accrued post-retirement benefit and pension costs	50,496	55,545
Net operating loss and tax credit carryforwards	30,696	32,247
Other	17,397	12,099
Total deferred tax assets	179,546	175,845
Less valuation allowance	(15,084)	(12,857)
Total deferred tax assets less valuation allowance	164,462	162,988
Deferred tax liabilities:		
Inventory	4,890	4,730
Property, plant, and equipment	47,451	50,440
Acquired intangibles amortization	66,386	66,755
Prepaid post-retirement benefit and pension costs	31,473	27,747
International earnings	18,680	23,121
Unrealized currency gains	9,334	—
Total deferred tax liabilities	178,214	172,793
Net deferred tax (liability) asset	\$ (13,752)	\$ (9,805)

The increase in the valuation allowance during 2018 is primarily attributable to increases in valuation allowances against the Company's foreign tax credit carryforwards. Upon adoption of ASU 2016-09 in the first quarter of 2017, the Company recorded \$69 million in additional deferred tax assets related primarily to U.S. tax credit carryforwards which arose directly from tax deductions for share-based compensation arrangements, against which a full valuation allowance was recorded in the first quarter and subsequently released in the fourth quarter, along with \$11 million of other pre-existing valuation allowances, in connection with the determination of the Transition Tax related to the Act as described above.

The Company continues to record valuation allowances related to certain of its deferred income tax assets due to the uncertainty of the ultimate realization of future benefits from such assets. The potential decrease or increase of the valuation allowance in the near term is dependent on the future ability of the Company to realize the deferred tax assets that are affected by the future profitability of operations in various worldwide jurisdictions.

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A reconciliation of the beginning and ending amounts of unrecognized tax benefits is as follows:

	2018	2017
Unrecognized tax benefits at beginning of year	\$ 24,090	\$ 20,240
Increases related to current tax positions	7,638	2,484
Increases (decreases) related to prior year tax positions	(605)	1,434
Decreases relating to taxing authority settlements	(4,454)	(856)
Decreases resulting from a lapse of the applicable statute of limitations	(505)	(186)
Other, net	(488)	974
Unrecognized tax benefits at end of year	<u>\$ 25,676</u>	<u>\$ 24,090</u>

Included in the balance of unrecognized tax benefits at December 31, 2018 and 2017 were \$25.7 million and \$24.1 million, respectively, of tax benefits that if recognized would reduce the Company's effective tax rate. The Company recognizes accrued amounts of interest and penalties related to its uncertain tax positions as part of its income tax expense within its consolidated statement of operations. The amount of accrued interest and penalties included within other non-current liabilities within the Company's consolidated balance sheet as of December 31, 2018 and 2017 was \$3.7 million and \$2.8 million, respectively.

The Company believes that it is reasonably possible that the unrecognized tax benefit balance could change over the next twelve months, primarily related to potential disputes raised by the taxing authorities over income and expense recognition. The Company does not expect a change would have a material impact on its financial position, results of operations, or cash flows.

The Company plans to repatriate earnings from China, Switzerland, Germany, the United Kingdom, and certain other countries in future years and believes that there will be no additional tax costs associated with the repatriation of such foreign earnings other than non-U.S. withholding taxes, certain state taxes and U.S. taxes on currency gains, if any for which a deferred tax liability has been recorded. All other undistributed earnings not subject to the Transition Tax, any additional outside basis difference inherent in these entities and the contributed capital of our foreign subsidiaries, are considered to be permanently reinvested on which no U.S. deferred income taxes or foreign withholding taxes have been provided. It is not practicable to estimate the amount of deferred tax liability related to these undistributed earnings and additional outside basis differences in these entities due to the complexity of the calculation and the uncertainty regarding assumptions necessary to compute the tax.

As of December 31, 2018, the major jurisdictions for which the Company is subject to examinations are Germany for years after 2015, the United States after 2014, France after 2017, Switzerland after 2016, the United Kingdom after 2016, and China after 2017. Additionally, the Company is currently under examination in various taxing jurisdictions in which it conducts business operations. While the Company has not yet received any material assessments from these taxing authorities, the Company believes that adequate amounts of taxes and related interest and penalties have been provided for any adverse adjustments as a result of these examinations and that the ultimate outcome of these examinations will not result in a material impact on the Company's consolidated results of operations or financial position.

15. RESTRUCTURING CHARGES

During the past few years, we initiated cost reduction measures. For the years ended December 31, 2018 and 2017, we have incurred \$18.4 million and \$12.8 million, respectively, of restructuring expenses

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which primarily comprise employee related costs. Liabilities related to restructuring activities are included in accrued and other liabilities in the consolidated balance sheet.

A roll-forward of the Company's accrual for restructuring activities for the years ended December 31, 2018 and 2017 is as follows:

	Total
Balance at December 31, 2016	\$ 9,531
Restructuring charges	12,772
Cash payments / utilization	(12,663)
Impact of foreign currency	980
Balance at December 31, 2017	\$ 10,620
Restructuring charges	18,420
Cash payments / utilization	(20,820)
Impact of foreign currency	(248)
Balance at December 31, 2018	\$ 7,972

16. OTHER CHARGES (INCOME), NET

Other charges (income), net consisted of net income of \$21.8 million, \$9.9 million and \$1.3 million in 2018, 2017 and 2016, respectively. Other charges (income), net includes non-service pension costs (benefits), net (gains) losses from foreign currency transactions and hedging activities, interest income, and other items. Non-service pension benefits were \$6.2 million, \$4.0 million and \$9.8 million in 2018, 2017 and 2016, respectively. Other charges (income), net in 2018 also includes a one-time gain of \$18.7 million associated with the settlement of the Biotix acquisition contingent consideration, as well as a one-time legal charge of \$3.0 million. Other charges (income), net includes \$1.7 million and \$1.1 million of acquisition costs during 2017 and 2016, respectively. Other charges (income), net for 2017 also includes a one-time gain of \$3.4 million relating to the sale of a facility in Switzerland in connection with our initiative to consolidate certain Swiss operations into a new facility, while 2016 includes a one-time non-cash pension settlement charge of \$8.2 million related to a lump sum offering to former employees of our U.S. pension plan.

17. COMMITMENTS AND CONTINGENCIES

Operating Leases

The Company leases certain of its facilities and equipment under operating leases. The future minimum lease payments under non-cancelable operating leases are as follows at December 31, 2018:

2019	\$	32,113
2020		23,771
2021		16,986
2022		9,855
2023		7,435
Thereafter		5,081
Total	\$	<u>95,241</u>

Rent expense for operating leases amounted to \$38.9 million, \$36.9 million, and \$34.9 million for the years ended December 31, 2018, 2017, and 2016, respectively.

Legal

The Company is party to various legal proceedings, including certain environmental matters, incidental to the normal course of business. Management does not expect that any of such proceedings will have a material adverse effect on the Company's financial condition, results of operations, or cash flows.

18. SEGMENT REPORTING

The Company has five reportable segments: U.S. Operations, Swiss Operations, Western European Operations, Chinese Operations, and Other. U.S. Operations represent certain of the Company's marketing and producing organizations located in the United States. Western European Operations include the Company's marketing and producing organizations in Western Europe, excluding operations located in Switzerland. Swiss Operations include marketing and producing organizations located in Switzerland as well as extensive R&D operations that are responsible for the development, production, and marketing of precision instruments, including weighing, analytical, and measurement technologies for use in a variety of laboratory and industrial applications. Chinese Operations represent the Company's marketing and producing organizations located in China. The Company's market organizations are geographically focused and are responsible for all aspects of the Company's sales and service. Operations that exist outside these reportable segments are included in Other.

The accounting policies of the operating segments are the same as those described in the summary of significant accounting policies. The Company evaluates performance based on segment profit for segment reporting (gross profit less research and development and selling, general, and administrative expenses, before amortization, interest expense, restructuring charges, other charges (income), net, and taxes). Inter-segment sales and transfers are priced to reflect consideration of market conditions and the regulations of the countries in which the transferring entities are located.

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The following tables show the operations of the Company's reportable segments:

For the Year Ended December 31, 2018	Net Sales to External Customers	Net Sales to Other Segments	Total Net Sales	Segment Profit	Depreciation	Total Assets	Purchase of Property, Plant, and Equipment	Goodwill
U.S. Operations	\$ 1,007,798	\$ 104,458	\$ 1,112,256	\$ 161,615	\$ 10,425	\$ 2,113,268	\$ (27,896)	\$ 410,021
Swiss Operations	134,064	628,529	762,593	202,027	5,835	1,471,625	(1,123)	21,994
Western European Operations	718,788	176,995	895,783	122,574	4,173	983,809	(16,879)	87,242
Chinese Operations	525,109	242,452	767,561	270,668	7,869	1,237,248	(13,248)	644
Other ^(a)	549,827	6,543	556,370	78,317	3,774	319,070	(8,342)	14,879
Eliminations and Corporate ^(b)	—	(1,158,977)	(1,158,977)	(104,696)	5,091	(3,506,173)	(75,238)	—
Total	\$ 2,935,586	\$ —	\$ 2,935,586	\$ 730,505	\$ 37,167	\$ 2,618,847	\$ (142,726)	\$ 534,780

For the Year Ended December 31, 2017	Net Sales to External Customers	Net Sales to Other Segments	Total Net Sales	Segment Profit	Depreciation	Total Assets	Purchase of Property, Plant, and Equipment	Goodwill
U.S. Operations	\$ 944,825	\$ 99,117	\$ 1,043,942	\$ 177,705	\$ 7,659	\$ 1,937,688	\$ (38,969)	\$ 409,520
Swiss Operations	133,925	563,083	697,008	174,447	5,551	1,374,150	(19,589)	22,171
Western European Operations	673,776	170,820	844,596	123,841	4,052	1,805,294	(7,094)	91,927
Chinese Operations	452,617	232,882	685,499	231,860	7,168	1,068,811	(13,246)	690
Other ^(a)	519,910	7,934	527,844	72,681	3,474	310,667	(4,131)	15,530
Eliminations and Corporate ^(b)	—	(1,073,836)	(1,073,836)	(127,952)	5,554	(3,946,805)	(44,397)	—
Total	\$ 2,725,053	\$ —	\$ 2,725,053	\$ 652,582	\$ 33,458	\$ 2,549,805	\$ (127,426)	\$ 539,838

For the Year Ended December 31, 2016	Net Sales to External Customers	Net Sales to Other Segments	Total Net Sales	Segment Profit	Depreciation	Total Assets	Purchase of Property, Plant, and Equipment	Goodwill
U.S. Operations	\$ 867,962	\$ 90,580	\$ 958,542	\$ 161,539	\$ 6,094	\$ 1,747,338	\$ (52,255)	\$ 357,785
Swiss Operations	130,674	524,983	655,657	163,663	6,199	1,212,637	(7,260)	21,239
Western European Operations	640,558	176,501	817,059	129,001	4,048	1,120,751	(6,857)	82,500
Chinese Operations	386,541	219,766	606,307	187,924	6,879	702,571	(16,288)	636
Other ^(a)	482,522	7,709	490,231	64,146	3,461	277,476	(4,540)	14,218
Eliminations and Corporate ^(b)	—	(1,019,539)	(1,019,539)	(133,095)	6,062	(2,893,996)	(36,757)	—
Total	\$ 2,508,257	\$ —	\$ 2,508,257	\$ 573,178	\$ 32,743	\$ 2,166,777	\$ (123,957)	\$ 476,378

(a) Other includes reporting units in Southeast Asia, Latin America, Eastern Europe, and other countries.

(b) Eliminations and Corporate includes the elimination of inter-segment transactions as well as certain corporate expenses and intercompany investments, which are not included in the Company's operating segments.

METTLER-TOLEDO INTERNATIONAL INC.
NOTES TO THE CONSOLIDATED FINANCIAL STATEMENTS - (Continued)
(In thousands, except share data, unless otherwise stated)

A reconciliation of earnings before taxes to segment profit follows:

	2018	2017	2016
Earnings before taxes	\$ 651,858	\$ 574,222	\$ 504,193
Amortization	47,524	42,671	36,052
Interest expense	34,511	32,785	28,026
Restructuring charges	18,420	12,772	6,235
Other charges (income), net	(21,808)	(9,868)	(1,328)
Segment profit	<u>\$ 730,505</u>	<u>\$ 652,582</u>	<u>\$ 573,178</u>

During 2018, restructuring charges of \$18.4 million were recognized, of which \$11.0 million, \$4.0 million, \$2.8 million, \$0.3 million, and \$0.3 million relate to the Company's U.S., Swiss, Western European, Chinese, and Other Operations, respectively. Restructuring charges of \$12.8 million were recognized in 2017, of which \$6.2 million, \$1.8 million, \$3.0 million, \$0.8 million, and \$1.0 million relate to the Company's U.S., Swiss, Western European, Chinese, and Other Operations, respectively.

The Company sells precision instruments, including weighing instruments and certain analytical and measurement technologies, and related services to a variety of customers and industries. None of these end-customers account for more than 1% of net sales. Service revenues are primarily derived from repair and other services including regulatory compliance qualification, calibration, certification, and preventative maintenance. A breakdown of the Company's sales by product category for the years ended December 31 follows:

	2018	2017	2016
Laboratory	\$ 1,504,600	\$ 1,358,493	\$ 1,225,000
Industrial	1,211,362	1,158,335	1,067,858
Retail	219,624	208,225	215,399
Total net sales	<u>\$ 2,935,586</u>	<u>\$ 2,725,053</u>	<u>\$ 2,508,257</u>

METTLER-TOLEDO INTERNATIONAL INC.
NOTES TO THE CONSOLIDATED FINANCIAL STATEMENTS - (Continued)
(In thousands, except share data, unless otherwise stated)

In certain circumstances, our reporting units sell directly into other geographies. A breakdown of net sales to external customers by geographic customer destination and property, plant, and equipment by geographic destination for the years ended December 31 follows:

	Net Sales			Property, Plant, and Equipment, Net	
	2018	2017	2016	2018	2017
United States	\$ 933,419	\$ 888,241	\$ 815,153	\$ 234,395	\$ 220,401
Other Americas	172,537	162,672	153,607	2,946	3,406
Total Americas	1,105,956	1,050,913	968,760	237,341	223,807
Germany	205,296	192,126	182,644	48,030	49,376
France	141,513	130,427	118,681	7,810	6,386
United Kingdom	70,378	64,361	61,513	17,347	19,617
Switzerland	65,377	63,090	62,115	293,388	259,007
Other Europe	426,209	399,923	374,008	12,791	8,050
Total Europe	908,773	849,927	798,961	379,366	342,436
China	506,360	439,373	374,996	87,643	92,269
Rest of World	414,497	384,840	365,540	13,176	9,759
Total Asia/Rest of World	920,857	824,213	740,536	100,819	102,028
Total	\$ 2,935,586	\$ 2,725,053	\$ 2,508,257	\$ 717,526	\$ 668,271

METTLER-TOLEDO INTERNATIONAL INC.
NOTES TO THE CONSOLIDATED FINANCIAL STATEMENTS - (Continued)
(In thousands, except share data, unless otherwise stated)

19. QUARTERLY FINANCIAL DATA (UNAUDITED)

Quarterly financial data for the years ended December 31, 2018 and 2017 are as follows:

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
2018				
Net sales	\$ 660,821	\$ 721,996	\$ 734,846	\$ 817,923
Gross profit	\$ 374,933	\$ 412,625	\$ 419,254	\$ 477,566
Net earnings	\$ 93,304	\$ 111,468	\$ 126,653	\$ 181,186
Basic earnings per common share:				
Net earnings	\$ 3.66	\$ 4.41	\$ 5.04	\$ 7.25
Weighted average number of common shares	25,468,323	25,299,414	25,126,061	24,975,303
Diluted earnings per common share:				
Net earnings	\$ 3.58	\$ 4.31	\$ 4.93	\$ 7.11
Weighted average number of common and common equivalent shares	26,095,647	25,867,383	25,683,365	25,490,270
Market price per share:				
High	\$ 692.30	\$ 595.14	\$ 617.94	\$ 645.33
Low	\$ 566.87	\$ 546.43	\$ 559.44	\$ 524.03
2017				
Net sales	\$ 594,567	\$ 653,656	\$ 698,799	\$ 778,031
Gross profit	\$ 343,389	\$ 375,612	\$ 400,975	\$ 455,775
Net earnings	\$ 92,466	\$ 101,580	\$ 104,950	\$ 76,976
Basic earnings per common share:				
Net earnings	\$ 3.57	\$ 3.94	\$ 4.10	\$ 3.01
Weighted average number of common shares	25,932,112	25,751,374	25,613,433	25,562,542
Diluted earnings per common share:				
Net earnings	\$ 3.48	\$ 3.84	\$ 3.99	\$ 2.93
Weighted average number of common and common equivalent shares	26,586,061	26,439,529	26,303,529	26,229,052
Market price per share:				
High	\$ 486.90	\$ 601.16	\$ 635.17	\$ 689.11
Low	\$ 414.52	\$ 473.87	\$ 571.25	\$ 606.80

Schedule II — Valuation and Qualifying Accounts (in thousands)

Column A Description	Column B Balance at the Beginning of Period	Column C Additions		Column D -Deductions-	Column E Balance at End of Period
		(1)	(2)		
		Charged to Costs and Expenses	Charged to Other Accounts		
			Note (A)	Note (B)	
Accounts receivable — allowance for doubtful accounts:					
Year ended December 31, 2018	\$ 15,549	\$ 1,167	\$ (678)	\$ 569	\$ 15,469
Year ended December 31, 2017	\$ 14,234	\$ 1,403	\$ 1,005	\$ 1,093	\$ 15,549
Year ended December 31, 2016	\$ 14,435	\$ 1,087	\$ (760)	\$ 528	\$ 14,234
Deferred tax valuation allowance:					
Year ended December 31, 2018	\$ 12,857	\$ —	\$ 3,023	\$ 796	\$ 15,084
Year ended December 31, 2017	\$ 10,730	\$ 9,513	\$ 72,170	\$ 79,556	\$ 12,857
Year ended December 31, 2016	\$ 25,435	\$ —	\$ —	\$ 14,705	\$ 10,730

Note (A)

For accounts receivable, amounts comprise currency translation adjustments.

For deferred tax valuation allowance in 2018, 2017, and 2016, amounts relate primarily to changes in foreign tax credit carryforwards and R&D credit carryforwards.

Note (B)

For accounts receivable, amounts represent excess of uncollectible balances written off over recoveries of accounts previously written off.

For deferred tax valuation allowance, the decrease in 2017 and 2016 relates primarily to decreases in foreign tax credit and R&D credit carryforwards. Amounts in 2017 include certain excess tax benefits resulting from the adoption of ASU 2016-09, offset by the effects of the 2017 Tax Act.

Mettler-Toledo International Inc.
Subsidiaries

<u>Country</u>	<u>Legal Name</u>
Australia	Mettler-Toledo Limited
Australia	Ohaus Australia Pty. Ltd.
Austria	Mettler-Toledo Ges.m.b.H.
Barbados	Mettler-Toledo Finance SRL
Belgium	N.V. Mettler-Toledo
Bermuda	Mettler-Toledo Finance Ltd.
Brazil	Mettler-Toledo Indústria e Comércio Ltda.
Canada	Mettler-Toledo Inc. (Canada)
China	Mettler-Toledo (Changzhou) Precision Instruments Ltd.
China	Mettler-Toledo (Changzhou) Scale & System Ltd.
China	Mettler-Toledo (Changzhou) Measurement Technology Ltd.
China	Mettler-Toledo Instruments (Shanghai) Co., Ltd.
China	Mettler-Toledo International Trading (Shanghai) Co., Ltd.
China	Mettler-Toledo Measurement Instrument (Shanghai) Co., Ltd.
China	Ohaus International Trading (Shanghai) Co., Ltd.
China	Ohaus Instruments (Shanghai) Co. Ltd.
China	Ohaus Instruments (Changzhou) Co. Ltd.
China	Mettler-Toledo (Chengdu) Scale & System Ltd.
Croatia	Mettler-Toledo d.o.o.
Czech Republic	Mettler-Toledo spol. s.r.o.
Denmark	Mettler-Toledo A/S
France	Accurate Poly Services APS
France	Mettler-Toledo Analyse Industrielle SAS
France	Mettler-Toledo Holding (France) SAS
France	Mettler-Toledo SAS
Germany	Mettler-Toledo Garvens GmbH
Germany	Mettler-Toledo (Albstadt) GmbH
Germany	Mettler-Toledo GmbH
Germany	Mettler-Toledo Management Holding Deutschland GmbH
Germany	Mettler-Toledo Sales & Marketing Services GmbH
Germany	Pharmacontrol Electronic GmbH
Hong Kong	Mettler-Toledo (HK) Ltd.
Hong Kong	Mettler-Toledo (HK) Holding Limited
Hong Kong	Mettler-Toledo (HK) MTCN Limited
Hong Kong	Mettler-Toledo (HK) MTCS Limited
Hong Kong	Mettler-Toledo (HK) MTCZ Limited
Hong Kong	Ohaus (Hong Kong) Limited
Hungary	Mettler-Toledo Kereskedelmi Kft.
India	Mettler-Toledo India Private Limited
India	Ohaus Weighing India Private Limited
Indonesia	PT Mettler-Toledo Indonesia
Italy	Mettler-Toledo S.p.A.
Japan	Mettler-Toledo K.K.
Kazakhstan	Mettler-Toledo Central Asia
Kazakhstan	Mettler-Toledo Kazakhstan
Korea	Mettler-Toledo (Korea) Ltd.
Latvia	Mettler-Toledo Instrumente AG, filiale Latvija (Branch of MTIAG)
Luxembourg	Mettler-Toledo Luxembourg S.à r.l.
Luxembourg	Mettler-Toledo Luxembourg Holdings S.à r.l.

Country	Legal Name
Luxembourg	Mettler-Toledo Luxembourg Capital S.à r.l.
Malaysia	Mettler-Toledo (M) Sdn. Bhd.
Malaysia	Mettler-Toledo Services Asia-Pac Sdn. Bhd.
Malaysia	Ohaus (SEA) Sdn. Bhd.
Mexico	Mettler-Toledo S.A. de C.V.
Mexico	Ohaus de México S.A. de C.V.
Mexico	Biotix International S. de R.L. de C.V.
Netherlands	Mettler-Toledo B.V.
Netherlands	Mettler-Toledo Finance B.V.
Netherlands	Mettler-Toledo Holding B.V.
New Zealand	Mettler-Toledo Limited (Branch of MT-AUS)
Norway	Mettler-Toledo Cargoscan AS
Norway	Mettler-Toledo AS
Philippines	Mettler-Toledo Philippines Inc.
Poland	Mettler-Toledo Sp.z.o.o.
Russian Federation	Mettler-Toledo East
Russian Federation	Representation Office (Part of MTG)
Singapore	Mettler-Toledo (S) Pte. Ltd.
Slovak Republic	Mettler-Toledo s.r.o.
Slovenia	Mettler-Toledo d.o.o.
Spain	Mettler-Toledo S.A.E.
Sweden	Mettler-Toledo AB
Switzerland	Mettler-Toledo (Schweiz) GmbH
Switzerland	Mettler-Toledo GmbH
Switzerland	Mettler-Toledo Holding AG
Switzerland	Mettler-Toledo Instrumente AG
Switzerland	Mettler-Toledo International Inc.
Switzerland	Mettler-Toledo Logistik GmbH
Switzerland	Mettler-Toledo Logistik International GmbH
Switzerland	Mettler-Toledo Pac Rim AG
Switzerland	Mettler-Toledo OnLine GmbH
Switzerland	Mettler-Toledo Sales International GmbH
Switzerland	Microwa AG
Switzerland	Ohaus Europe GmbH
Taiwan	Mettler-Toledo Pac Rim AG, Taiwan Branch
Thailand	Mettler-Toledo (Thailand) Ltd.
Thailand	Ohaus Indochina Limited
Turkey	Mettler-Toledo TR Olcum Aletleri Ticaret Satis vs Servis Hizmetleri Anonim Sirketi
Ukraine	Mettler-Toledo Ukraine
United Arab Emirates	Mettler-Toledo GmbH, UAE Branch
United Kingdom	Anachem Limited
United Kingdom	Mettler-Toledo Finance (UK) Limited
United Kingdom	Mettler-Toledo Ltd.
United Kingdom	Mettler-Toledo Safeline X-Ray Limited
United Kingdom	Mettler-Toledo Safeline Limited
United Kingdom	Ohaus UK Ltd.
United Kingdom	Triton Technology Limited
United States	Mettler-Toledo AutoChem, Inc. [Delaware]
United States	Mettler-Toledo LLC [Delaware]
United States	Mettler-Toledo Process Analytics, Inc. [Massachusetts]
United States	Ohaus Corporation [New Jersey]
United States	Mettler-Toledo Rainin, LLC [Delaware]
United States	Mettler-Toledo Thornton Inc. [Massachusetts]
United States	Mettler-Toledo International Inc., Wilmington [Delaware]
United States	Mettler-Toledo International Finance, Inc. [Delaware]
United States	Mettler-Toledo Global Holdings, LLC [Delaware]
United States	Mettler-Toledo (US) Finance LLC [Delaware]

<u>Country</u>	<u>Legal Name</u>
United States	Mettler-Toledo International Holding, LLC [Delaware]
United States	Mettler-Toledo Global Finance LLC
United States	Mettler-Toledo Finance LLC
United States	Biotix Holdings Inc.
United States	Biotix Inc.
United States	Biotix California
United States	Eagle Product Inspection LLC [Delaware]
United States	Troemner, LLC [Delaware]
United States	Mettler-Toledo Holdings LLC [Delaware]
United States	Pipette Calibration Services, Inc.
Vietnam	Mettler-Toledo Vietnam Limited Liability Company

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in the Registration Statements on Form S-8 (Nos. 333-190181, 333-118260, 333-104083, and 333-31636) of Mettler-Toledo International Inc. of our report dated February 8, 2019 relating to the financial statements, financial statement schedules and the effectiveness of internal control over financial reporting, which appears in this Form 10-K.

/s/ PricewaterhouseCoopers LLP

PricewaterhouseCoopers LLP

Columbus, Ohio
February 8, 2019

CERTIFICATION PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Olivier A. Filliol, certify that:

1. I have reviewed this annual report on Form 10-K of Mettler-Toledo International Inc.;
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 registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officers 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 registrant 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 registrant, 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 registrant'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 registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officers and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant'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 registrant'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 registrant's internal control over financial reporting.

/s/ Olivier A. Filliol

Olivier A. Filliol
Chief Executive Officer

Date: February 8, 2019

CERTIFICATION PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Shawn P. Vadala, certify that:

1. I have reviewed this annual report on Form 10-K of Mettler-Toledo International Inc.;
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 registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officers 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 registrant 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 registrant, 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 registrant'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 registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officers and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant'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 registrant'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 registrant's internal control over financial reporting.

/s/ Shawn P. Vadala

Shawn P. Vadala

Officer

Chief Financial

Date: February 8, 2019

CERTIFICATION PURSUANT TO SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002 (subsections (a) and (b) of Section 1350, Chapter 63 of Title 18, United States Code), each of the undersigned officers of Mettler-Toledo International Inc. (the "Company") does hereby certify, to such officer's knowledge, that:

This annual report on Form 10-K for the period ending December 31, 2018 fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934 and the information contained in this report fairly presents, in all material respects, the financial condition and results of operations of the Company.

/s/ Olivier A. Filliol

Olivier A. Filliol
Chief Executive Officer

/s/ Shawn P. Vadala

Shawn P. Vadala *Chief Financial Officer*

Date: February 8, 2019