

FLOWSERVE CORP
Form 10-K
February 20, 2019

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

Form 10-K

☒ 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

Commission file number 1-13179

FLOWSERVE CORPORATION

(Exact name of registrant as specified in its charter)

New York	31-0267900
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)

5215 N. O'Connor Boulevard	75039
Suite 2300, Irving, Texas	(Zip Code)
(Address of principal executive offices)	

Registrant's telephone number, including area code:
(972) 443-6500

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

Title of Each Class	Name of Each Exchange on Which Registered
Common Stock, \$1.25 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 ☒ 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 ☒

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

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

Indicate by check mark 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. ☐

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.

Large accelerated filer ☒ 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 ☒

The aggregate market value of the common stock held by non-affiliates of the registrant, computed by reference to the closing price of the registrant's common stock as reported on June 29, 2018 (the last business day of the registrant's most recently completed second fiscal quarter), was approximately \$2,439,873,483. For purposes of the foregoing calculation only, all directors, executive officers and known 5% beneficial owners have been deemed affiliates.

Number of the registrant's common shares outstanding as of February 13, 2019 was 130,982,978.

DOCUMENTS INCORPORATED BY REFERENCE

Certain information contained in the definitive proxy statement for the registrant's 2019 Annual Meeting of Shareholders scheduled to be held on May 23, 2019 is incorporated by reference into Part III hereof.

FLOWSERVE CORPORATION
FORM 10-K

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PART I

ITEM 1. BUSINESS

OVERVIEW

Flowserve Corporation is a world leading manufacturer and aftermarket service provider of comprehensive flow control systems. Flowserve Corporation as it exists today was created in 1997 through the merger of two leading fluid motion and control companies — BW/IP and Durco International. Under the name of a predecessor entity, we were incorporated in the State of New York on May 1, 1912, but some of our heritage product brand names date back to our founding in 1790. Over the years, we have evolved through organic growth and strategic acquisitions, and our over 225-year history of Flowserve heritage brands serves as the foundation for the breadth and depth of our products and services today. Unless the context otherwise indicates, references to "Flowserve," "the Company" and such words as "we," "our" and "us" include Flowserve Corporation and its subsidiaries.

We develop and manufacture precision-engineered flow control equipment integral to the movement, control and protection of the flow of materials in our customers' critical processes. Our product portfolio of pumps, valves, seals, automation and aftermarket services supports global infrastructure industries, including oil and gas, chemical, power generation (including nuclear, fossil and renewable) and water management, as well as certain general industrial markets where our products and services add value. Through our manufacturing platform and global network of Quick Response Centers ("QRCs"), we offer a broad array of aftermarket equipment services, such as installation, advanced diagnostics, repair and retrofitting.

We sell our products and services to more than 10,000 companies, including some of the world's leading engineering, procurement and construction firms ("EPC"), original equipment manufacturers, distributors and end users. Our products and services are used in several distinct industries having a broad geographic reach. Our bookings mix by industry in 2018 and 2017 consisted of:

	2018	2017
• oil and gas	38 %	38 %
• general industries(1)	25 %	24 %
• chemical(2)	22 %	21 %
• power generation	11 %	13 %
• water management	4 %	4 %

General industries include mining and ore processing, pulp and paper, food and beverage and other smaller (1)applications, as well as sales to distributors whose end customers typically operate in the industries we primarily serve.

(2)Chemical industry is comprised of chemical-based and pharmaceutical products.

We have pursued a strategy of industry diversity and geographic breadth to mitigate the impact on our business of normal economic downturns in any one of the industries or in any particular part of the world we serve. For events that may occur and adversely impact our business, financial condition, results of operations and cash flows, refer to "Item 1A. Risk Factors" of this Annual Report on Form 10-K for the year ended December 31, 2018 ("Annual Report"). For information on our sales and long-lived assets by geographic areas, see Note 17 to our consolidated financial statements included in "Item 8. Financial Statements and Supplementary Data" ("Item 8") of this Annual Report.

Through December 31, 2018, we conducted our operations through three segments: Engineered Product Division ("EPD"), Industrial Product Division ("IPD") and Flow Control Division ("FCD"). Sales to external customers, intersegment sales, operating profit and the presentation of certain other financial information by segment are reported in Note 17 to our consolidated financial statements included in Item 8 of this Annual Report and in the Management's Discussion and Analysis of Financial Condition and Results of Operations.

Our business segments share a focus on industrial flow control technology and benefit from our global footprint and our economies of scale in reducing administrative and overhead costs to serve customers more cost effectively. EPD and IPD have a high number of common customers and complementary product offerings and technologies that are

often combined in applications that provide us a net competitive advantage. All segments share certain resources and functions, including elements of research and development ("R&D"), supply chain, safety, quality assurance and administrative functions that provide efficiencies and an overall lower cost structure.

Our operations leadership reports to our Chief Executive Officer and the segments share leadership for operational support functions such as R&D, marketing and supply chain. We believe this leadership structure positions the Company to leverage operational excellence, cost reduction initiatives and internal synergies across our entire operating platform to drive further growth and increase shareholders' value.

In the second quarter of 2018, we launched and committed resources to our Flowserve 2.0 Transformation ("Flowserve 2.0 Transformation"), a program designed to transform our business model to drive operational excellence, reduce complexity, accelerate growth, expand margins, increase capital efficiency and improve organizational health. During the latter part of 2018 and in connection with the Flowserve 2.0 Transformation, we determined that there are meaningful operational synergies and benefits to combining our EPD and IPD reportable segments into one reportable segment, the Flowserve Pump Division ("FPD"). The reorganization will be effective as of January 1, 2019 and as a result, beginning in 2019 we will report a two operating segment structure, FPD and FCD, and prior periods will be retrospectively adjusted to reflect the new reportable segment structure. For further discussion of the Flowserve 2.0 Transformation program refer to Note 19 to our consolidated financial statements included in Item 8 of this Annual Report.

Strategies

Our overarching objectives are to be a leader in each of the market segments we serve and become the employer of choice in the flow control industry. Additionally, we seek to be recognized by our customers as the most trusted brand in terms of reliability and quality, which we believe will help maximize shareholder value.

In pursuit of these objectives, we maintain a rolling, five-year strategic plan that takes a balanced approach to integrating both short-term and long-term initiatives in four key areas: People, Process & Technology, Customer and Finance.

People

With the goal of developing and maintaining a people-first culture that produces the finest talent, we focus on several elements in our strategic efforts to continuously enhance our organizational capability, including: (i) fully committing to providing a safe work environment for all our associates, worldwide, (ii) upholding a high-performance workforce, that is empowered, accountable, and flexible, (iii) becoming the employer of choice by fostering a people-first culture and (iv) recruiting, developing, and retaining a global and diverse workforce.

Process and Technology

With the goal of improving our productivity and delivering a continuous stream of innovating solutions to our customers, we focus on select strategies relating to: (i) developing and maintaining an enterprise-first business approach across all operating units and functional organizations, (ii) simplifying our business processes and optimizing corporate structural costs, (iii) significantly reducing our product cost and rationalizing our product portfolio and (iv) becoming the technical leader in the flow control industry.

Customer

With the goal of achieving the highest level of customer satisfaction amongst our peers, we focus on select strategies related to rigorous and disciplined selection of target markets and customers, while maintaining competitive lead times and emphasizing the highest levels of on-time delivery and quality. We seek to provide an outstanding experience for our customers over the entire product lifecycle by providing unique, integrated flow-control solutions that solve real-world application problems in our customers' facilities.

Finance

With the goal of growing the value of our enterprise, we focus on select strategies we believe will increase our revenue above the rate of market growth, while optimizing performance in terms of gross margin, selling, general and administrative ("SG&A") expense, operating margin, cash flow and primary working capital.

Flowserve 2.0 Transformation

The goals of the Flowserve 2.0 Transformation are to (i) accelerate revenue growth, (ii) drive margin expansion, (iii) increase capital efficiency and (iv) improve organizational health. The Flowserve 2.0 Transformation consists of over a hundred of individual projects spread over six work-streams (operations, commercial, growth, aftermarket, cost structure and working capital). A majority of these projects are primarily focused on accelerating revenue growth, while the balance are

primarily focused on cost reduction and capital efficiency. The projects include elements of organizational design, business process definition, process automation and metrics. Individual projects vary in terms of time to execute, ranging from one year for simple quick-fix efforts to five years for more complex infrastructure efforts. A structured process has been created to ensure that each project follows common milestones and delivers value over its lifecycle, with a governance process that oversees the portfolio to ensure that time-phased trade-offs between cost and benefits are proactively managed. The project portfolio is actively covered by a dedicated transformation office to ensure that projects are managed from inception to execution to protect the long-term value of the transformation.

Competition

Despite consolidation activities in past years, the markets for our products remain highly competitive, with primary competitive drivers being price, reputation, project management, timeliness of delivery, quality, proximity to service centers and technical expertise, as well as contractual terms and previous installation history. In the pursuit of large capital projects, competitive drivers and competition vary depending on the industry and products involved. Industries experiencing slow growth generally tend to have a competitive environment more heavily influenced by price due to supply outweighing demand and price competition tends to be more significant for original equipment orders than aftermarket services. Considering the current forecasts for 2019, pricing for original equipment orders may continue to be a particularly influential competitive factor. The unique competitive environments in each of our three business segments are discussed in more detail under the "Business Segments" heading below.

In the aftermarket portion of our business, we compete against large, well-established national and global competitors and, in some markets, against regional and local companies. In the oil and gas and chemical industries, the primary competitors for aftermarket services tend to be customers' own in-house capabilities. In the nuclear power generation industry, we possess certain competitive advantages due to our "N Stamp" certification, which is a prerequisite to serve customers in that industry, as well as our considerable base of proprietary knowledge. Aftermarket competition for standardized products is aggressive due to the existence of common standards allowing for easier replacement or repair of the installed products.

In the sale of aftermarket products and services, we benefit from our large installed base of pumps, valves and seals, which continually require maintenance, repair and replacement parts due to the nature of the products and the conditions under which they operate. Timeliness of delivery, quality and the proximity of service centers are important customer considerations when selecting a provider for aftermarket products and services. In geographic regions where we are locally positioned to provide a quick response, customers have traditionally relied on us, rather than our competitors, for aftermarket products relating to our highly-engineered and customized products, although we are seeing increased competition in this area.

Generally, our customers attempt to reduce the number of vendors from which they purchase, thereby reducing the size and diversity of their supply chain. Although vendor reduction programs could adversely affect our business, we have been successful in establishing long-term supply agreements with a number of customers. While the majority of these agreements do not provide us with exclusive rights, they can provide us a "preferred" status with our customers and thereby increase opportunities to win future business. We also utilize our LifeCycle Advantage program to establish fee-based contracts to manage customers' aftermarket requirements. These programs provide an opportunity to manage the customer's installed base and expand the business relationship with the customer.

Our ability to use our portfolio of products, solutions and services to meet customer needs is a competitive strength. Our market approach is to create value for our customers throughout the life cycle of their investments in flow control management. We continue to explore and develop potential new offerings in conjunction with our customers. In the early phases of project design, we endeavor to create value in optimizing the selection of equipment for the customer's specific application, as we are capable of providing technical expertise on product and system capabilities even outside the scope of our specific products, solutions and services. After the equipment is constructed and delivered to the customer's site, we continue to create value through our aftermarket capabilities by optimizing the performance of the equipment over its operational life. Our skilled service personnel can provide these aftermarket services for our products, as well as many competitors' products, within the installed base. This value is further enhanced by the global reach of our QRCs and, when combined with our other solutions for our customers' flow control management needs, allows us to create value for our customers during all phases of the capital and operating expenditure cycles.

Customers

We sell to a wide variety of customers globally including leading EPC firms, original equipment manufacturers, distributors and end users in several distinct industries: oil and gas, chemical, power generation, water management and general industries. We do not have sales to any individual customer that represent 10% or more of consolidated 2018 revenues. Customer information relating to each of our three business segments is discussed in more detail under the "Business Segments" heading below.

We are not normally required to carry unusually high amounts of inventory to meet customer delivery requirements, although higher backlog levels and longer lead times generally require higher amounts of inventory. We typically require advance cash payments from customers on longer lead time projects to help offset our investment in inventory. We have initiated programs targeted at improving our operational effectiveness to reduce our overall working capital needs. While we do provide cancellation policies through our contractual relationships, we generally do not provide rights of product return for our customers.

Selling and Distribution

We primarily distribute our products through direct sales by employees assigned to specific regions, industries or products. In addition, we use distributors and sales representatives to supplement our direct sales force in countries where it is more appropriate due to business practices or customs, or whenever the use of direct sales staff is not economically efficient. We generate a majority of our sales leads through existing relationships with vendors, customers and prospects or through referrals.

Intellectual Property

We own a number of trademarks and patents relating to the names and designs of our products. We consider our trademarks and patents to be valuable assets of our business. In addition, our pool of proprietary information, consisting of know-how and trade secrets related to the design, manufacture and operation of our products, is considered particularly valuable. Accordingly, we take proactive measures to protect such proprietary information. We generally own the rights to the products that we manufacture and sell and are unencumbered by licensing or franchise agreements. Our trademarks can typically be renewed indefinitely as long as they remain in use, whereas our existing patents generally expire 10 to 20 years from the dates they were filed, which has occurred at various times in the past. We do not believe that the expiration of any individual patent will have a material adverse impact on our business, financial condition or results of operations.

Raw Materials

The principal raw materials used in manufacturing our products are readily available and include ferrous and non-ferrous metals in the form of bar stock, machined castings, fasteners, forgings and motors, as well as silicon, carbon faces, gaskets and fluoropolymer components. A substantial volume of our raw materials is purchased from outside sources, and we have been able to develop a robust supply chain and anticipate no significant shortages of such materials in the future. We continually monitor the business conditions of our suppliers to manage competitive market conditions and to avoid potential supply disruptions. We continue to expand global sourcing to capitalize on localization in emerging markets and low-cost sources of purchased goods balanced with efficient consolidated and compliant logistics.

Metal castings used in the manufacture of our pump, valve, and mechanical seals are purchased from qualified and approved foundry sources. We remain vertically integrated with metal castings in certain strategic product families. Concerning the products we supply to customers in the nuclear power generation industry, suppliers of raw materials for nuclear power generation markets must be qualified to meet the requirements of nuclear industry standards and governmental regulations. Supply channels for these materials are currently adequate, and we do not anticipate difficulty in obtaining such materials in the future.

Employees and Labor Relations

We have approximately 17,000 employees globally as of December 31, 2018. In the United States ("U.S."), a portion of the hourly employees at our pump manufacturing plant located in Vernon, California, our valve manufacturing plant located in Lynchburg, Virginia and our pattern storage facility located in Dayton, Ohio, are represented by unions. Additionally, some employees at select facilities in the following countries are unionized or have employee works councils: Argentina, Australia, Austria, Brazil, Finland, France, Germany, India, Italy, Japan, Mexico, The Netherlands, South Africa, Spain, Sweden and the United Kingdom ("U.K."). We believe relations with our

employees throughout our operations are generally satisfactory,

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including those employees represented by unions and employee works councils. No unionized facility accounted for more than 10% of our consolidated 2018 revenues.

Environmental Regulations and Proceedings

We are subject to environmental laws and regulations in all jurisdictions in which we have operating facilities. These requirements primarily relate to the generation and disposal of waste, air emissions and waste water discharges. We periodically make capital expenditures to enhance our compliance with environmental requirements, as well as to abate and control pollution. At present, we have no plans for any material capital expenditures for environmental control equipment at any of our facilities. However, we have incurred and continue to incur operating costs relating to ongoing environmental compliance matters. Based on existing and proposed environmental requirements and our anticipated production schedule, we believe that future environmental compliance expenditures will not have a material adverse effect on our financial condition, results of operations or cash flows.

We use hazardous substances and generate hazardous wastes in many of our manufacturing and foundry operations. Most of our current and former properties are or have been used for industrial purposes and some may require clean-up of historical contamination. During the due diligence phase of our acquisitions, we conduct environmental site assessments to identify potential environmental liabilities and required clean-up measures. We are currently conducting follow-up investigation and/or remediation activities at those locations where we have known environmental concerns. We have cleaned up a majority of the sites with known historical contamination and are addressing the remaining identified issues.

Over the years, we have been involved as one of many potentially responsible parties ("PRP") at former public waste disposal sites that are or were subject to investigation and remediation. We are currently involved as a PRP at five Superfund sites. The sites are in various stages of evaluation by government authorities. Our total projected "fair share" cost allocation at these five sites is expected to be immaterial. See "Item 3. Legal Proceedings" included in this Annual Report for more information.

We have established reserves that we currently believe to be adequate to cover our currently identified on-site and off-site environmental liabilities.

Exports

Our export sales from the U.S. to foreign unaffiliated customers were \$234.3 million in 2018, \$258.3 million in 2017 and \$259.1 million in 2016.

Licenses are required from U.S. and other government agencies to export certain products. In particular, products with nuclear power generation and/or military applications are restricted, as are certain other pump, valve and seal products.

BUSINESS SEGMENTS

In addition to the business segment information presented below, Note 17 to our consolidated financial statements in Item 8 of this Annual Report contains additional financial information about our business segments and geographic areas in which we have conducted business in 2018, 2017 and 2016.

ENGINEERED PRODUCT DIVISION

Our largest business segment is EPD, through which we design, manufacture, distribute and service specialty, custom and other highly-engineered pumps and pump systems, mechanical seals, auxiliary systems, replacement parts and upgrades and related aftermarket services. EPD includes longer lead time, highly-engineered specialty pump products and systems and mechanical seals that are generally manufactured within shorter lead times. EPD also manufactures replacement pumps and upgrades and provides a full array of replacement parts, repair and support services (collectively referred to as "aftermarket"). EPD products and services are primarily used by companies that operate in the oil and gas, petrochemical, chemical, power generation, water management and other general industries. We market our pump and mechanical seal products through our global sales force and our regional QRCs and service and repair centers or through independent distributors and sales representatives. A portion of our mechanical seal products are sold directly to other original equipment manufacturers for incorporation into their rotating equipment requiring mechanical seals.

Our engineered pump products are manufactured in a wide range of metal alloys and with a variety of configurations to reliably meet the operating requirements of our customers. Mechanical seals are critical to the reliable operation of rotating equipment in that they prevent leakage and emissions of hazardous substances from the rotating equipment

and reduce shaft

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wear on the equipment caused by the use of non-mechanical seals. We also manufacture a gas-lubricated mechanical seal that is used in high-speed compressors for gas pipelines and in the oil and gas production and process markets. Our products are currently manufactured at 28 plants worldwide, eight of which are located in Europe, nine in North America, six in Asia Pacific and five in Latin America, including those co-located in manufacturing facilities and/or shared with IPD.

We also conduct business through strategic foreign joint ventures. We have five unconsolidated joint ventures that are located in China, India, Saudi Arabia, South Korea and the United Arab Emirates, where a portion of our products are manufactured, assembled or serviced in these territories. These relationships provide numerous strategic opportunities, including increased access to our current and new markets, access to additional manufacturing capacity and expansion of our operational platform to support best-cost sourcing initiatives and balance capacity demands for other markets.

EPD Products

We manufacture more than 40 different active types of pumps and approximately 185 different models of mechanical seals and sealing systems. The following is a summary list of our EPD product types and globally recognized brands:

EPD Product Types

Single and Multistage Between Bearings Pumps Single Stage Overhung Pumps

- Single Case — Axially Split
- Single Case — Radially Split
- Double Case
- API Process

Positive Displacement Pumps Mechanical Seals and Seal Support Systems

- Rotary Multiphase
- Rotary Screw
- Dry-Running Seals
- Gas Barrier Seals
- Standard Cartridge Seals
- Mixer Seals
- Compressor Seals
- Seal Support Systems
- Bearing Isolators
- Barrier Fluids and Lubricants

Vertical Pumps

- Vertical inline
- Vertical line shaft
- Vertical canned shaft
- Nuclear Pumps
- Nuclear Seals
- Cryogenic Pumps
- Concrete Volute Pumps
- Wireless Transmitters
- Ebullator recycle pumps
- Power Recovery — DWEER
- Power Recovery — Hydro turbine
- Energy Recovery Devices
- Hydraulic Decoking Systems
- API Slurry Pumps

Specialty Products

EPD Brand Names

- BW Seals
- Calder Energy Recovery Devices
- Durametallic
- Five Star Seal
- Flowserve
- GASPAC™
- IDP
- Interseal
- Lawrence
- LifeCycle Advantage
- Niigata Worthington
- QRC™
- Pacific
- Pacific Weitz
- Pac-Seal
- ReadySeal
- United Centrifugal
- Western Land Roller
- Wilson-Snyder
- Worthington
- Worthington-Simpson

EPD Services

We provide engineered aftermarket services through our global network of 119 QRCs, some of which are co-located in manufacturing facilities, in 47 countries. Our EPD service personnel provide a comprehensive set of equipment services for flow management control systems, including installation, commissioning, repair, advanced diagnostics, re-rate and retrofit programs, machining and comprehensive asset management solutions. We provide asset management services and condition monitoring for rotating equipment through special contracts with many of our customers that reduce maintenance costs. A large portion of EPD's service work is performed on a quick response basis, and we offer 24-hour service in all of our major markets.

EPD New Product Development

Our investments in new product R&D continue to focus on increasing the capability of our products as customer applications become more advanced, demanding greater levels of production (i.e., flow and power) and under more extreme conditions (i.e., erosive, corrosive and temperature) beyond the level of traditional technology. We continue to develop innovations that improve our competitive position in the engineered equipment industry, specifically upstream, offshore and downstream applications for the oil and gas market. Continued engagement with our end users is exemplified through completion of advancements that significantly improve energy efficiency, reduce total cost-of-ownership and enhance safety.

As new sources of energy generation are explored, we continue to develop new product designs to support the most critical applications in the power generation market. New designs and qualification test programs continue to support the critical services found in the coal fired, combined cycle, small modular nuclear and concentrated solar power generation plant.

We continue to address our core products with design enhancements that improve performance, reduce acquisition costs, extend operating life between required maintenance periods and reduce the lead times in which we can deliver our products. Our engineering teams continue to apply and develop sophisticated design technology and methods supporting continuous improvement of our proven technology. Additionally, we are incentivizing our operations and tracking the R&D projects more closely, which is leading to broader engagement in developing new products.

In 2018, EPD continued to advance our Intelligent Performance Solutions ("IPS") Insight platform. This platform utilizes a combination of our developed technologies and leading edge technology partners to increase our remote monitoring, diagnostics, asset management and service capabilities for our end-user customers. These technologies include intelligent devices, advanced communication and security protocols, wireless and satellite communications and web-enabled data convergence. Additionally, we have been exploring additive manufacturing opportunities in our products and auxiliary systems.

None of these newly developed products or services required the investment of a material amount of our assets or was otherwise material to our business.

EPD Customers

Our customer mix is diversified and includes leading EPC firms, major national oil companies, international oil companies, equipment end users in our served markets, other original equipment manufacturers, distributors and end users. Our sales mix of original equipment products and aftermarket products and services diversifies our business and helps mitigate the impact of normal economic cycles on our business. Our sales are diversified among several industries, including oil and gas, petrochemical, chemical, power generation, water management and other general industries.

EPD Competition

The pump and mechanical seal industry is highly fragmented, with thousands of competitors globally. We compete, however, primarily with a limited number of large companies operating on a global scale. There are also a number of smaller, newer entrants in some of our emerging markets. Competition among our closest competitors is generally driven by delivery times, application knowledge, experience, expertise, price, breadth of product offerings, contractual terms, previous installation history and reputation for quality. Some of our largest industry competitors include: Sulzer Pumps; Ebara Corp.; SPX FLOW, Inc.; Eagle Burgmann, which is a joint venture of two traditional global seal manufacturers, A. W. Chesterton Co. and AES Corp.; John Crane Inc., a unit of Smiths Group Plc; Weir Group Plc.; ITT Industries; and KSB SE & Co. KGaA.

The pump and mechanical seal industry continues to undergo considerable consolidation, which is primarily driven by (i) the need to lower costs through reduction of excess capacity and (ii) customers' preference to align with global full service suppliers to simplify their supplier base. Despite the consolidation activity, the market remains highly competitive.

We believe that our strongest sources of competitive advantage rest with our extensive range of pumps for the oil and gas, petrochemical, chemical and power generation industries, our large installed base of products, our strong customer relationships, our high technology, our more than 225 years of experience in manufacturing and servicing pumping equipment, our reputation for providing quality engineering solutions and our ability to deliver engineered new seal product orders within 72 hours from the customer's request.

EPD Backlog

EPD's backlog of orders as of December 31, 2018 was \$922.6 million (including \$15.3 million of interdivision backlog, which is eliminated and not included in consolidated backlog), compared with \$1,027.7 million (including \$16.0 million of interdivision backlog) as of December 31, 2017. The impact of the initial adoption of the New Revenue Standard reduced backlog by approximately \$181 million at January 1, 2018. We expect to ship approximately 92% of December 31, 2018 backlog during 2019.

INDUSTRIAL PRODUCT DIVISION

Through IPD we design, manufacture, pre-test, distribute and service engineered and pre-configured industrial pumps and pump systems, for variety of markets. Our globalized operating platform, low-cost sourcing and continuous improvement initiatives are essential aspects of this business. IPD's standardized, general purpose pump products are primarily utilized by the chemical, oil and gas, water resources, power and general industrial (i.e. Mining, Steel and Paper) industries. Our products are currently manufactured in 16 manufacturing facilities, five of which are located in the U.S and six in Europe and four in Asia. IPD operates 29 QRCs worldwide, including 18 sites in Europe, five in the U.S., three in Asia Pacific and two in Latin America, including those co-located in manufacturing facilities and/or shared with EPD.

IPD Products

We manufacture approximately 40 different active types of pumps, which are available in a wide range of metal alloys and non-metallics with a variety of configurations to meet the critical operating demands of our customers. The following is a summary list of our IPD products and globally recognized brands:

IPD Pump Product Types

Overhung

- Chemical Process ASME and ISO
- Industrial Process
- Slurry and Solids Handling
- Metallic & Lined Magnetic Drive Process

Between Bearings

- Side Channel Multistage
- Segmental Channel Multistage
- Split Case — Axially Split
- Split Case — Radially Split

Specialty Products

- Ag Chem
- Molten Salt Pump
- Submersible Pump
- Geothermal Deepwell
- Barge Pump
- Solids Handling Submersible

Vertical

- Wet Pit, Double case API & Double
- Deepwell Submersible Pump
- Slurry and Solids Handling
- Sump & Cantilever

Positive Displacement

- Gear

Vacuum Systems

- Liquid Ring
- LR Systems
- Dry Systems

IPD Brand Names

- Byron Jackson
- Durco
- Flowserve
- Halberg
- IDP
- Innomag
- Labour
- Meregalli
- Pacific
- Scienco
- Sier Bath
- SIHI
- TKL
- Western Land Roller
- Worthington
- Worthington-Simpson

IPD Services

We market our pump products through our worldwide sales force, regional service and repair centers through independent distributors and sales representatives. We provide an array of aftermarket services including product installation and commissioning services, seal systems spare parts, repairs, re-rate and upgrade solutions, advanced diagnostics and maintenance solutions through our global network of QRCs.

IPD New Product Development

Our IPD development projects target product feature enhancements, design improvements and sourcing opportunities that we believe will improve the competitive position of our industrial pump product lines. We will invest in our Durco and SIHI chemical product platform to expand and enhance our products offered to the global chemical industry.

We continue to address our core products with design enhancements to improve performance and the speed at which we can deliver our products. We continue to further our energy efficiency initiatives in response to various global governmental directives. Cost reduction projects incorporating product rationalization, value engineering, lean manufacturing and overhead reduction continue to be key drivers for IPD.

None of these newly developed products or services required the investment of a material amount of our assets or was otherwise material.

IPD Customers

Our customer mix is diversified and includes leading EPC firms, original equipment manufacturers, distributors and end users. Our sales mix of original equipment products and aftermarket products and services diversifies our business and helps mitigate the impact of normal economic cycles on our business. Our sales are diversified among several industries, including chemical, oil and gas, water resources, power and general industry industries.

IPD Competition

The industrial pump industry is highly fragmented, with many competitors. We compete, however, primarily with a limited number of large companies operating on a global scale. Competition among our closest competitors is generally driven by delivery times, expertise, price, breadth of product offerings, contractual terms, previous installation history and reputation for quality. Some of our largest industry competitors include ITT Industries, KSB SE & Co. KGaA and Sulzer Pumps.

We believe that our strongest sources of competitive advantage rest with our extensive range of pumps for the chemical industry, our large installed base, our strong customer relationships, our more than 200 years of legacy experience in manufacturing and servicing pumping equipment and our reputation for providing quality engineering solutions.

IPD Backlog

IPD's backlog of orders as of December 31, 2018 was \$394.0 million (including \$17.2 million of interdivision backlog, which is eliminated and not included in consolidated backlog), compared with \$424.3 million (including \$17.3 million of interdivision backlog) as of December 31, 2017. The impact of the initial adoption of the New Revenue Standard reduced backlog by approximately \$34 million at January 1, 2018. We expect to ship approximately 85% of December 31, 2018 backlog during 2019.

FLOW CONTROL DIVISION

FCD designs, manufactures, distributes and services a broad portfolio of engineered and industrial valve and automation solutions, including isolation and control valves, actuation, controls and related equipment. FCD leverages its experience and application know-how by offering a complete menu of engineering and project management services to complement its expansive product portfolio. FCD products are used to control, direct and manage the flow of liquids and gases and are an integral part of any flow control system. Our valve products are most often customized and engineered to perform specific functions within each customer's unique flow control environment.

Our flow control products are primarily used by companies operating in the chemical, power generation, oil and gas, water management and general industries. Our products are currently manufactured in 21 principal manufacturing facilities, five of which are located in the U.S., 10 located in Europe and five located in Asia Pacific. FCD operates 26 QRCs worldwide, including six sites in Europe, nine in North America, nine in Asia Pacific and two in Latin America, including those co-located in manufacturing facilities.

FCD Products

Our valve, automation and controls product and solutions portfolio represents one of the most comprehensive in the flow control industry. Our products are used in a wide variety of applications, from general service to the most severe and demanding services, including those involving high levels of corrosion, extreme temperatures and/or pressures, zero fugitive emissions and emergency shutdown.

Our "smart" valve and diagnostic technologies integrate sensors, microprocessor controls and software into high performance integrated control valves, digital positioners and switchboxes for automated on/off valve assemblies and electric actuators. These technologies permit real-time system analysis, system warnings and remote indication of asset health. These technologies have been developed in response to the growing demand for reduced maintenance, improved process control efficiency and digital communications at the plant level. We are committed to further enhancing the quality of our product portfolio by continuing to upgrade our existing offerings with cutting-edge technologies.

Our valve automation products encompass a broad range of pneumatic, electric, hydraulic and stored energy actuation designs to take advantage of whatever power source the customer has available. FCD's actuation products can utilize the process fluid flowing through the pipeline as a source of power to actuate the valve. Our actuation products also cover one of the widest ranges of output torques in the industry, providing the ability to automate anything from the smallest linear globe valve to the largest multi-turn gate valve. Most importantly, FCD combines best-in-class mechanical designs with the latest in digital controls in order to provide complete integrated automation solutions that optimize the combined valve-actuator-controls package.

The following is a summary list of our valve and automation products and globally recognized brands:

FCD Product Types

- Valve Automation Systems
- Control Valves
- Ball Valves
- Gate Valves
- Globe Valves
- Check Valves
- Butterfly Valves
- Lined Plug Valves
- Lined Ball Valves
- Lubricated Plug Valves
- Non-Lubricated Plug Valves
- Integrated Valve Controllers
- Diagnostic Software
- Electro Pneumatic Positioners
- Digital Positioners
- Pneumatic Positioners
- Intelligent Positioners
- Electric/Electronic Actuators
- Pneumatic Actuators
- Hydraulic Actuators
- Diaphragm Actuators
- Direct Gas and Gas-over-Oil Actuators
- Limit Switches
- Digital Communications
- Valve and Automation Repair Services

FCD Brand Names

- Accord
- Anchor/Darling
- Argus
- Atomac
- Automax
- Durco
- Edward
- Flowserve
- Kammer
- Limitorque
- McCANNA/MARPAC
- NAF
- Noble Alloy
- Norbro
- Nordstrom
- PMV
- Serck Audco
- Schmidt Armaturen
- Valbart
- Valtek
- Worcester Controls

FCD Services

Our service personnel provide comprehensive equipment maintenance services for flow control systems, including advanced diagnostics, repair, installation, commissioning, retrofit programs and field machining capabilities. A large portion of our service work is performed on a quick response basis, which includes 24-hour service in all of our major markets. We also provide in-house repair and return manufacturing services worldwide through our manufacturing facilities. We believe our ability to offer comprehensive, quick turnaround services provides us with a unique competitive advantage and unparalleled access to our customers' installed base of flow control products.

FCD New Product Development

Our R&D investment is focused on areas that will advance our technological leadership and further differentiate our competitive advantage from a product perspective. Investment has been focused on significantly enhancing the digital integration and interoperability of valve top-works (e.g., positioners, actuators, limit switches and associated accessories) with Distributed Control Systems ("DCS"). We continue to pursue the development and deployment of next-generation hardware and software for valve diagnostics and the integration of the resulting device intelligence through the DCS to provide a practical and effective asset management capability for the end user. In addition to developing these new capabilities and value-added services, our investments also include product portfolio expansion and fundamental research in material sciences in order to increase the temperature, pressure and corrosion/erosion-resistance limits of existing products, as well as noise and cavitation reduction. These investments are made by adding new resources and talent to the organization, as well as leveraging the experience of EPD and IPD and increasing our collaboration with third parties. We expect to continue our R&D investments in the areas discussed above.

None of these newly developed valve products or services required the investment of a material amount of our assets or was otherwise material.

FCD Customers

Our customer mix spans several markets, including the chemical, power generation, oil and gas, water management, pulp and paper, mining and other general industries. Our product mix includes original equipment and aftermarket parts and services. FCD contracts with a variety of customers, ranging from EPC firms, to distributors, end users and other original equipment manufacturers.

FCD Competition

While in recent years the valve market has undergone a significant amount of consolidation, the market remains highly fragmented. Some of the largest valve industry competitors include Cameron International Corp. (a Schlumberger company), Emerson Electric Co., General Electric Co., Rotork plc and Crane Co.

Our market research and assessments indicate that the top 10 global valve manufacturers collectively comprise less than 15% of the total valve market. Based on independent industry sources, we believe that we are the third largest industrial valve supplier in the world. We believe that our strongest sources of competitive advantage rest with our comprehensive portfolio of valve products and services, our ability to provide complementary pump and aftermarket products and services, our focus on execution and our expertise in severe corrosion and erosion applications.

FCD Backlog

FCD's backlog of orders as of December 31, 2018 was \$608.4 million, compared with \$617.4 million as of December 31, 2017. The impact of the initial adoption of the New Revenue Standard reduced backlog by approximately \$35 million at January 1, 2018. We expect to ship approximately 88% of December 31, 2018 backlog during 2019.

AVAILABLE INFORMATION

We maintain an Internet web site at www.flowserve.com. Our Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K and any amendments to those reports filed or furnished pursuant to Section 13(a) of the Securities Exchange Act of 1934 are made available free of charge through the "Investor Relations" section of our Internet web site as soon as reasonably practicable after we electronically file the reports with, or furnish the reports to, the U.S. Securities and Exchange Commission ("SEC"). Reports, proxy statements and other information filed or furnished with the SEC are also available at www.sec.gov.

Also available on our Internet web site are our Corporate Governance Guidelines for our Board of Directors and Code of Ethics and Business Conduct, as well as the charters of the Audit, Finance, Organization and Compensation and Corporate Governance and Nominating Committees of our Board of Directors and other important governance documents. All of the foregoing documents may be obtained through our Internet web site as noted above and are available in print without charge to shareholders who request them. Information contained on or available through our Internet web site is not incorporated into this Annual Report or any other document we file with, or furnish to, the SEC.

ITEM 1A. RISK FACTORS

Any of the events discussed as risk factors below may occur. If they do, our business, financial condition, results of operations and cash flows could be materially adversely affected. While we believe all known material risks are disclosed, additional risks and uncertainties not presently known to us, or that we currently deem immaterial, may also impair our business operations. Because of these risk factors, as well as other variables affecting our operating results, past financial performance may not be a reliable indicator of future performance, and historical trends should not be used to anticipate results or trends in future periods.

Our business depends on the levels of capital investment and maintenance expenditures by our customers, which in turn are affected by numerous factors, including the state of domestic and global economies, global energy demand, the cyclical nature of their markets, their liquidity and the condition of global credit and capital markets.

Demand for most of our products and services depends on the level of new capital investment and planned maintenance expenditures by our customers. The level of capital expenditures by our customers depends, in turn, on general economic conditions, availability of credit, economic conditions within their respective industries and expectations of future market behavior. Additionally, volatility in commodity prices can negatively affect the level of these activities and can result in postponement of capital spending decisions or the delay or cancellation of existing orders. The ability of our customers to finance capital investment and maintenance may also be affected by factors independent of the conditions in their industry, such as the condition of global credit and capital markets.

The businesses of many of our customers, particularly oil and gas companies, chemical companies and general industrial companies, are to varying degrees cyclical and have experienced periodic downturns. Our customers in these industries, particularly those whose demand for our products and services is primarily profit-driven, historically have tended to delay large capital projects, including expensive maintenance and upgrades, during economic downturns. For example, our chemical customers generally tend to reduce their spending on capital investments and operate their facilities at lower levels in a soft economic environment, which reduces demand for our products and services. Additionally, fluctuating energy demand forecasts and lingering uncertainty concerning commodity pricing, specifically the price of oil, can cause our customers to be more conservative in their capital planning, which may reduce demand for our products and services. Reduced demand for our products and services could result in the delay or cancellation of existing orders or lead to excess manufacturing capacity, which unfavorably impacts our absorption of fixed manufacturing costs. This reduced demand may also erode average selling prices in our industry. Any of these results could adversely affect our business, financial condition, results of operations and cash flows.

Additionally, some of our customers may delay capital investment and maintenance even during favorable conditions in their industries or markets. Despite these favorable conditions, the general health of global credit and capital markets and our customers' ability to access such markets may impact investments in large capital projects, including necessary maintenance and upgrades. In addition, the liquidity and financial position of our customers could impact capital investment decisions and their ability to pay in full and/or on a timely basis. Any of these factors, whether individually or in the aggregate, could have a material adverse effect on our customers and, in turn, our business, financial condition, results of operations and cash flows.

Volatility in commodity prices, effects from credit and capital market conditions and global economic growth forecasts could prompt customers to delay or cancel existing orders, which could adversely affect the viability of our backlog and could impede our ability to realize revenues on our backlog.

Our backlog represents the value of uncompleted customer orders. While we cannot be certain that reported backlog will be indicative of future results, our ability to accurately value our backlog can be adversely affected by numerous factors, including the health of our customers' businesses and their access to capital, volatility in commodity prices (e.g., copper, nickel, stainless steel) and economic uncertainty. While we attempt to mitigate the financial consequences of order delays and cancellations through contractual provisions and other means, if we were to experience a significant increase in order delays or cancellations that can result from the aforementioned economic conditions or other factors beyond our control, it could impede or delay our ability to realize anticipated revenues on our backlog. Such a loss of anticipated revenues could have a material adverse effect on our business, financial condition, results of operations and cash flows.

We may be unable to deliver our backlog on time, which could affect our revenues, future sales and profitability and our relationships with customers.

At December 31, 2018, backlog was \$1.9 billion. In 2019, our ability to meet customer delivery schedules for backlog is dependent on a number of factors including, but not limited to, sufficient manufacturing plant capacity, adequate supply channel access to the raw materials and other inventory required for production, an adequately trained and capable workforce, project engineering expertise for certain large projects and appropriate planning and scheduling of manufacturing resources. Our manufacturing plant operations and capacity may be disrupted as a result of equipment failure, natural disaster, power outage, fire, explosion, terrorism, cyber-based attack, adverse weather conditions, labor disputes, acts of God, or other reasons. We may also encounter capacity limitations due to changes in demand despite our forecasting efforts. Many of the contracts we enter into with our customers require long manufacturing lead times and contain penalty clauses related to late delivery. Failure to deliver in accordance with contract terms and customer expectations could subject us to financial penalties, may result in damage to existing customer relationships, could increase our costs, could reduce our sales and could have a material adverse effect on our business, financial condition, results of operations and cash flows.

If we are not able to successfully execute and realize the expected financial benefits from our transformation and strategic realignment and other cost-saving initiatives, our business could be adversely affected.

In the second quarter of 2018, we launched and committed resources to our Flowserve 2.0 Transformation ("Flowserve 2.0 Transformation"), a program designed to transform our business model to drive operational excellence, reduce complexity, accelerate growth, improve organizational health and better leverage our existing global platform.

While we expect significant financial benefits from our Flowserve 2.0 Transformation, we may not realize the full benefits that we currently expect within the anticipated time frame or at all. Adverse effects from our execution of transformation and realignment activities could interfere with our realization of anticipated synergies, customer service improvements and cost savings from these strategic initiatives. Additionally, our ability to fully realize the benefits and implement the transformation and realignment programs may be limited by the terms of our credit facilities and other contractual commitments. Moreover, because such expenses are difficult to predict and are necessarily inexact, we may incur substantial expenses in connection with the execution of our transformation and realignment plans in excess of what is currently forecast. Further, transformation and realignment activities are a complex and time-consuming process that can place substantial demands on management, which could divert attention from other business priorities or disrupt our daily operations. Any of these failures could, in turn, materially adversely affect our business, financial condition, results of operations and cash flows, which could constrain our liquidity.

If these measures are not successful or sustainable, we may undertake additional realignment and cost reduction efforts, which could result in future charges. Moreover, our ability to achieve our other strategic goals and business plans may be adversely affected, and we could experience business disruptions with customers and elsewhere if our transformation and realignment efforts prove ineffective.

We sell our products in highly competitive markets, which results in pressure on our profit margins and limits our ability to maintain or increase the market share of our products.

The markets for our products and services are geographically diverse and highly competitive. We compete against large and well-established national and global companies, as well as regional and local companies, low-cost replicators of spare parts and in-house maintenance departments of our end-user customers. We compete based on price, technical expertise, timeliness of delivery, contractual terms, previous installation history and reputation for quality and reliability. Competitive environments in slow-growth industries and for original equipment orders have been inherently more influenced by pricing and domestic and global economic conditions and current economic forecasts suggest that the competitive influence of pricing has broadened. Additionally, some of our customers have been attempting to reduce the number of vendors from which they purchase in order to reduce the size and diversity of their supply chain. To remain competitive, we must invest in manufacturing, technology, marketing, customer service and support and our distribution networks. No assurances can be made that we will have sufficient resources to continue to make the investment required to maintain or increase our market share or that our investments will be successful. In addition, negative publicity or other organized campaigns critical of us, through social media or

otherwise, could negatively affect our reputation. If we do not compete successfully, our business, financial condition, results of operations and cash flows could be materially adversely affected.

We may be unable to successfully develop and introduce new products, which could limit our ability to grow and maintain our competitive position and adversely affect our financial condition, results of operations and cash flow.

The success of new and improved products and services depends on their initial and continued acceptance by our customers. Our businesses are affected by varying degrees of technological change and corresponding shifts in customer demand, which result in unpredictable product transitions, shortened life cycles and increased importance of being first to market with new products and services. We may experience difficulties or delays in the research, development, production and/or marketing of new products and services which may negatively impact our operating results and prevent us from recouping or realizing a return on the investments required to continue to bring these products and services to market.

If we are unable to obtain raw materials at favorable prices, our operating margins and results of operations may be adversely affected.

We purchase substantially all electric power and other raw materials we use in the manufacturing of our products from outside sources. The costs of these raw materials have been volatile historically and are influenced by factors that are outside our control. In recent years, the prices for energy, metal alloys, nickel and certain other of our raw materials have been volatile. While we strive to offset our increased costs through supply chain management, contractual provisions and our Continuous Improvement Process initiative, where gains are achieved in operational efficiencies, our operating margins and results of operations and cash flows may be adversely affected if we are unable to pass increases in the costs of our raw materials on to our customers or operational efficiencies are not achieved.

Economic, political and other risks associated with international operations could adversely affect our business.

A substantial portion of our operations is conducted and located outside the U.S. We have manufacturing, sales or service facilities in more than 50 countries and sell to customers in over 90 countries, in addition to the U.S. Moreover, we primarily outsource certain of our manufacturing and engineering functions to, and source our raw materials and components from, China, Eastern Europe, India and Latin America. Accordingly, our business and results of operations are subject to risks associated with doing business internationally, including:

instability in a specific country's or region's political or economic conditions, particularly economic conditions in Europe, and political conditions in Russia, the Middle East, Asia, North Africa, Latin America and other emerging markets;

- trade protection measures, such as tariff increases, and import and export licensing and control requirements;
- political, financial market or economic instability relating to the Brexit referendum in the United Kingdom;
- uncertainties related to any geopolitical, economic and regulatory effects or changes due to recent domestic and international elections;
- the imposition of governmental economic sanctions on countries in which we do business, including Russia and Venezuela;
- potentially negative consequences from changes in tax laws or tax examinations;
- difficulty in staffing and managing widespread operations;
- increased aging and slower collection of receivables, particularly in Latin America and other emerging markets;
- difficulty of enforcing agreements and collecting receivables through some foreign legal systems;
- differing and, in some cases, more stringent labor regulations;
- potentially negative consequences from fluctuations in foreign currency exchange rates;
- partial or total expropriation;
- differing protection of intellectual property;
- inability to repatriate income or capital; and
- difficulty in administering and enforcing corporate policies, which may be different than the customary business practices of local cultures.

For example, political unrest or work stoppages could negatively impact the demand for our products from customers in affected countries and other customers, such as U.S. oil refineries, that could be affected by the resulting disruption in the

supply of crude oil. Similarly, military conflicts in Russia, the Middle East, Asia and North Africa could soften the level of capital investment and demand for our products and services.

In order to manage our day-to-day operations, we must overcome cultural and language barriers and assimilate different business practices. In addition, we are required to create compensation programs, employment policies and other administrative programs that comply with laws of multiple countries. We also must communicate and monitor standards and directives across our global network. In addition, emerging markets pose other uncertainties, including challenges to our ability to protect our intellectual property, pressure on the pricing of our products and increased risk of political instability, and may prefer local suppliers because of existing relationships or local restrictions or incentives. Our failure to successfully manage our geographically diverse operations could impair our ability to react quickly to changing business and market conditions and to enforce compliance with standards and procedures.

Our future success will depend, in large part, on our ability to anticipate and effectively manage these and other risks associated with our international operations. Any of these factors could, however, materially adversely affect our international operations and, consequently, our financial condition, results of operations and cash flows.

Our operations may be impacted by the United Kingdom's proposed exit from the European Union.

The United Kingdom's June 2016 referendum in which voters approved an exit from the European Union (commonly referred to as "Brexit") and subsequent negotiations related to the referendum has caused and may continue to cause volatility in the global stock markets, currency exchange rate fluctuations and global economic uncertainty, which could adversely affect our customers' ability to invest in capital expenditures, which may in turn reduce demand for our products and services. In addition, there may be greater restrictions on imports and exports between the U.K. and other E.U. countries and additional regulatory complexities. The uncertainties related to the Brexit referendum and its impact on the global economic climate could have a material adverse effect on our operations, financial condition, results of operations and cash flows.

Our operations are subject to a variety of complex and continually changing laws and regulations, both internationally and domestically.

Due to the international scope of our operations, the system of laws and regulations to which we are subject is complex and includes, without limitation, regulations issued by the U.S. Customs and Border Protection, the U.S. Department of Commerce's Bureau of Industry and Security, the U.S. Treasury Department's Office of Foreign Assets Control and various foreign governmental agencies, including applicable export controls, customs, currency exchange control and transfer pricing regulations, as applicable. No assurances can be made that we will continue to be found to be operating in compliance with, or be able to detect violations of, any such laws or regulations. In addition, we cannot predict the nature, scope or effect of future regulatory requirements to which our international operations might be subject or the manner in which existing laws might be administered or interpreted.

There is uncertainty related to the current U.S. administration's support or plans for new or existing treaty and trade relationships with other countries, such as the January 2017 U.S. withdrawal from the Trans-Pacific Partnership, which may affect restrictions or tariffs imposed on products we buy or sell. These factors, together with other key global events during 2018 (such as the continuing uncertainty arising from the Brexit transition, as well as ongoing terrorist activity), may adversely impact the ability or willingness of non-U.S. companies to transact business in the U.S. This uncertainty may also affect regulations and trade agreements affecting U.S. companies, global stock markets (including the NYSE, on which our common shares are traded), currency exchange rates, and general global economic conditions. All of these factors are outside of our control, but may nonetheless cause us to adjust our strategy in order to compete effectively in global markets.

In addition, in December 2017 the Tax Cuts and Jobs Act of 2017 (the "Tax Reform Act") was passed in the United States, which significantly changed U.S. tax law and affected, among other items, the Company's U.S. federal income tax rate. The impacts from the Tax Reform Act may differ, possibly materially, from the tax estimates we have recorded due to, among other things, additional analysis, changes from interpretations enacted and assumptions the Company has made, and additional regulatory guidance that may be issued. As a result, this (and other) tax legislation could adversely affect our financial condition, results of operations and cash flows.

Implementation of new tariffs and changes to or uncertainties related to tariffs and trade agreements could adversely affect our business.

The U.S. has recently announced the implementation of certain new tariffs on steel and aluminum imported into the country, and is reportedly also considering additional tariffs. In response, certain foreign governments have implemented or

are reportedly considering implementing additional tariffs on U.S. goods. In addition, there have been recent changes to trade agreements, like the U.S. withdrawal from the Trans-Pacific Partnership and the replacement of the North American Free Trade Agreement with the United States-Mexico-Canada Agreement. Uncertainties with respect to tariffs, trade agreements, or any potential trade wars could negatively impact the global economic markets and could affect our customers' ability to invest in capital expenditures, which may in turn result in reduced demand for our products and services, and could have a material adverse effect on our financial condition, results of operations and cash flows. Changes in tariffs could also result in changes in supply and demand of our raw material needs and could affect our manufacturing capabilities and could lead to increased prices that we may not be able to effectively pass on to customers, each of which could materially adversely affect our operating margins, results of operations and cash flows.

Our international operations expose us to fluctuations in foreign currency exchange rates.

A significant portion of our revenue and certain of our costs, assets and liabilities, are denominated in currencies other than the U.S. dollar. The primary currencies to which we have exposure are the Euro, British pound, Mexican peso, Brazilian real, Indian rupee, Japanese yen, Singapore dollar, Argentine peso, Canadian dollar, Australian dollar, Chinese yuan, Colombian peso, Chilean peso and South African rand. Certain of the foreign currencies to which we have exposure, such as the Venezuelan bolivar and Argentine peso, have undergone significant devaluation in the past, which can reduce the value of our local monetary assets, reduce the U.S. dollar value of our local cash flow, generate local currency losses that may impact our ability to pay future dividends from our subsidiary to the parent company and potentially reduce the U.S. dollar value of future local net income. Although we enter into forward exchange contracts to economically hedge some of our risks associated with transactions denominated in certain foreign currencies, no assurances can be made that exchange rate fluctuations will not adversely affect our financial condition, results of operations and cash flows.

We could be adversely affected by violations of the U.S. Foreign Corrupt Practices Act and similar worldwide anti-bribery laws and regulations.

The U.S. Foreign Corrupt Practices Act ("FCPA") and similar anti-bribery laws and regulations in other jurisdictions, such as the UK Bribery Act, generally prohibit companies and their intermediaries from making improper payments to government officials for the purpose of obtaining or retaining business or securing an improper advantage. Because we operate in many parts of the world and sell to industries that have experienced corruption to some degree, our policies mandate compliance with applicable anti-bribery laws worldwide. If we are found to be in violation of the FCPA or other similar anti-bribery laws or regulations, whether due to our or others' actions or inadvertence, we could be subject to civil and criminal penalties or other sanctions that could have a material adverse impact on our business, financial condition, results of operations and cash flows. In addition, actual or alleged violations could damage our reputation or ability to do business.

Terrorist acts, conflicts and wars may materially adversely affect our business, financial condition and results of operations and may adversely affect the market for our common stock.

As a global company with a large international footprint, we are subject to increased risk of damage or disruption to us, our employees, facilities, partners, suppliers, distributors, resellers or customers due to terrorist acts, conflicts and wars, wherever located around the world. The potential for future attacks, the national and international responses to attacks or perceived threats to national security, and other actual or potential conflicts or wars, such as the Israeli-Hamas conflict and ongoing instability in Syria and Egypt, have created many economic and political uncertainties. In addition, as a global company with headquarters and significant operations located in the U.S., actions against or by the U.S. may impact our business or employees. Although it is impossible to predict the occurrences or consequences of any such events, they could result in a decrease in demand for our products, make it difficult or impossible to deliver products to our customers or to receive components from our suppliers, create delays and inefficiencies in our supply chain and pose risks to our employees, resulting in the need to impose travel restrictions, any of which could adversely affect our business, financial condition, results of operations and cash flows.

Regulatory and customer focus on environmental, social and governance responsibility could expose us to additional costs or risks.

Regulators, shareholders, customers and other interested parties have focused increasingly on the environmental, social and governance practices of companies. This has led to an increase in regulations and may continue to cause us to be subject to additional regulations in the future. Our customers or other interested parties may also require us to implement certain environmental, social or governance procedures or standards before doing or continuing to do business with us. This increased

attention on environmental, social and governance practices could have a material adverse effect on our business, financial condition and results of operations.

Environmental compliance costs and liabilities could adversely affect our financial condition, results of operations and cash flows.

Our operations and properties are subject to regulation under environmental laws, which can impose substantial sanctions for violations. We must conform our operations to applicable regulatory requirements and adapt to changes in such requirements in all countries in which we operate.

We use hazardous substances and generate hazardous wastes in many of our manufacturing and foundry operations. Most of our current and former properties are or have been used for industrial purposes, and some may require clean-up of historical contamination. We are currently conducting investigation and/or remediation activities at a number of locations where we have known environmental concerns. In addition, we have been identified as one of many PRPs at five Superfund sites. The projected cost of remediation at these sites, as well as our alleged "fair share" allocation, while not anticipated to be material, has been reserved. However, until all studies have been completed and the parties have either negotiated an amicable resolution or the matter has been judicially resolved, some degree of uncertainty remains.

We have incurred, and expect to continue to incur, operating and capital costs to comply with environmental requirements. In addition, new laws and regulations, stricter enforcement of existing requirements, the discovery of previously unknown contamination or the imposition of new clean-up requirements could require us to incur costs or become the basis for new or increased liabilities. Moreover, environmental and sustainability initiatives, practices, rules and regulations are under increasing scrutiny of both governmental and non-governmental bodies, which can cause rapid change in operational practices, standards and expectations and, in turn, increase our compliance costs. Any of these factors could have a material adverse effect on our financial condition, results of operations and cash flows.

We are exposed to certain regulatory and financial risks related to climate change which could adversely affect our financial condition, results of operations and cash flows.

Climate change is receiving ever increasing attention worldwide. Many scientists, legislators and others attribute global warming to increased levels of greenhouse gases, including carbon dioxide, which has led to significant legislative and regulatory efforts to limit greenhouse gas emissions. The U.S. Congress, state and foreign legislatures and federal, state, local and foreign governmental agencies have been considering legislation and regulatory proposals that would regulate and limit greenhouse gas emissions. It is uncertain whether, when and in what form mandatory carbon dioxide emissions reduction program may be adopted. Similarly, certain countries have adopted the Kyoto Protocol and/or the Paris Climate Agreement and these and other existing international initiatives or those under consideration could affect our international operations. To the extent our customers, particularly those involved in the oil and gas, power generation, petrochemical processing or petroleum refining industries, are subject to any of these or other similar proposed or newly enacted laws and regulations, we are exposed to risks that the additional costs by customers to comply with such laws and regulations could impact their ability or desire to continue to operate at similar levels in certain jurisdictions as historically seen or as currently anticipated, which could negatively impact their demand for our products and services. In addition, new laws and regulations that might favor the increased use of non-fossil fuels, including nuclear, wind, solar and bio-fuels or that are designed to increase energy efficiency, could dampen demand for oil and gas production or power generation resulting in lower spending by customers for our products and services. These actions could also increase costs associated with our operations, including costs for raw materials and transportation. Because it is uncertain what laws will be enacted, we cannot predict the potential impact of such laws on our future financial condition, results of operations and cash flows.

We are party to asbestos-containing product litigation that could adversely affect our financial condition, results of operations and cash flows.

We are a defendant in a substantial number of lawsuits that seek to recover damages for personal injury allegedly resulting from exposure to asbestos-containing products formerly manufactured and/or distributed by us. Such products were used as internal components of process equipment, and we do not believe that there was any significant emission of asbestos-containing fibers during the use of this equipment. Although we are defending these allegations vigorously and believe that a high percentage of these lawsuits are covered by insurance or indemnities from other

companies, there can be no assurance that we will prevail or that coverage or payments made by insurance or such other companies would be adequate. Unfavorable rulings, judgments or settlement terms could have a material adverse impact on our business, financial condition, results of operations and cash flows.

Our business may be adversely impacted by work stoppages and other labor matters.

As of December 31, 2018, we had approximately 17,000 employees, of which approximately 5,000 were located in the U.S. Approximately 5% of our U.S. employees are represented by unions. We also have unionized employees or employee work councils in Argentina, Australia, Austria, Brazil, Finland, France, Germany, India, Italy, Japan, Mexico, The Netherlands, South Africa, Spain, Sweden and the U.K. No individual unionized facility produces more than 10% of our revenues. Although we believe that our relations with our employees are generally satisfactory and we have not experienced any material strikes or work stoppages recently, no assurances can be made that we will not in the future experience these and other types of conflicts with labor unions, works councils, other groups representing employees or our employees generally, or that any future negotiations with our labor unions will not result in significant increases in our cost of labor. If we are unsuccessful in negotiating new and acceptable agreements when the existing agreements with employees covered by collective bargaining expire, we could experience business disruptions or increased costs.

Our ability to implement our business strategy and serve our customers is dependent upon the continuing ability to employ talented professionals and attract, train, develop and retain a skilled workforce. We are subject to the risk that we will not be able to effectively replace the knowledge and expertise of an aging workforce as workers retire. Without a properly skilled and experienced workforce, our costs, including productivity costs and costs to replace employees may increase, and this could negatively impact our earnings.

In addition, our policies prohibit harassment or discrimination in the workplace. Notwithstanding our conducting training and taking disciplinary action or other actions against or in response to alleged violations, we may encounter additional costs from claims made and/or legal proceedings brought against us, and we could suffer reputational harm. We depend on key personnel, the loss of whom would harm our business.

Our future success will depend in part on the continued service of key executive officers and personnel. The loss of the services of any key individual could harm our business. Our future success also depends on our ability to recruit, retain and engage our personnel sufficiently, both to maintain our current business and to execute our strategic initiatives. Competition for officers and employees in our industry is intense and we may not be successful in attracting and retaining such personnel.

Inability to protect our intellectual property could negatively affect our competitive position.

We rely on a combination of patents, copyrights, trademarks, trade secrets, confidentiality provisions and licensing arrangements to establish and protect our proprietary rights. We cannot guarantee, however, that the steps we have taken to protect our intellectual property will be adequate to prevent infringement of our rights or misappropriation of our technology. For example, effective patent, trademark, copyright and trade secret protection may be unavailable or limited in some of the foreign countries in which we operate. In addition, while we generally enter into confidentiality agreements with our employees and third parties to protect our intellectual property, such confidentiality agreements could be breached or otherwise may not provide meaningful protection for our trade secrets and know-how related to the design, manufacture or operation of our products. If it became necessary for us to resort to litigation to protect our intellectual property rights, any proceedings could be burdensome and costly, and we may not prevail. Further, adequate remedies may not be available in the event of an unauthorized use or disclosure of our trade secrets and manufacturing expertise. If we fail to successfully enforce our intellectual property rights, our competitive position could suffer, which could harm our business, financial condition, results of operations and cash flows.

Significant changes in pension fund investment performance or assumptions changes may have a material effect on the valuation of our obligations under our defined benefit pension plans, the funded status of these plans and our pension expense.

We maintain defined benefit pension plans that are required to be funded in the U.S., Belgium, Canada, India, Mexico, The Netherlands, Switzerland and the U.K., and defined benefit plans that are not required to be funded in Austria, France, Germany, Italy, Japan and Sweden. Our pension liability is materially affected by the discount rate used to measure our pension obligations and, in the case of the plans that are required to be funded, the level of plan assets available to fund those obligations and the expected long-term rate of return on plan assets. A change in the discount rate can result in a significant increase or decrease in the valuation of pension obligations, affecting the reported status of our pension plans and our pension expense. Significant changes in investment performance or a change in the portfolio mix of invested assets can result in increases and decreases in the valuation of plan assets or in a change of

the expected rate of return on plan assets. This impact may be particularly prevalent where we maintain significant concentrations of specified investments, such as the U.K. equity and fixed income securities in our non-U.S. defined benefit plans. Changes in the expected return on plan assets assumption can result in significant changes in our pension expense and future funding requirements.

We continually review our funding policy related to our U.S. pension plan in accordance with applicable laws and regulations. U.S. regulations have increased the minimum level of funding for U.S. pension plans in prior years, which has at times required significant contributions to our pension plans. Contributions to our pension plans reduce the availability of our cash flows to fund working capital, capital expenditures, R&D efforts and other general corporate purposes.

We may incur material costs as a result of product liability and warranty claims, which could adversely affect our financial condition, results of operations and cash flows.

We may be exposed to product liability and warranty claims in the event that the use of one of our products results in, or is alleged to result in, bodily injury and/or property damage or our products actually or allegedly fail to perform as expected. Some of our products are designed to support the most critical, severe service applications in the markets that we serve and any failure of such products could result in significant product liability and warranty claims, as well as damage to our reputation in the marketplace. While we maintain insurance coverage with respect to certain product liability claims, we may not be able to obtain such insurance on acceptable terms in the future, and any such insurance may not provide adequate coverage against product liability claims. In addition, product liability claims can be expensive to defend and can divert the attention of management and other personnel for significant periods of time, regardless of the ultimate outcome. An unsuccessful defense of a product liability claim could have an adverse effect on our business, financial condition, results of operations and cash flows. Even if we are successful in defending against a claim relating to our products, claims of this nature could cause our customers to lose confidence in our products and our company. Warranty claims are not generally covered by insurance, and we may incur significant warranty costs in the future for which we would not be reimbursed.

The recording of increased deferred tax asset valuation allowances in the future or the impact of tax law changes on such deferred tax assets could affect our operating results.

We currently have significant net deferred tax assets resulting from tax credit carryforwards, net operating losses and other deductible temporary differences that are available to reduce taxable income in future periods. Based on our assessment of our deferred tax assets, we determined, based on projected future income and certain available tax planning strategies, that approximately \$116 million of our deferred tax assets will more likely than not be realized in the future, and no valuation allowance is currently required for this portion of our deferred tax assets. Should we determine in the future that these assets will not be realized we will be required to record an additional valuation allowance in connection with these deferred tax assets and our operating results would be adversely affected in the period such determination is made. In addition, tax law changes could negatively impact our deferred tax assets. Our outstanding indebtedness and the restrictive covenants in the agreements governing our indebtedness limit our operating and financial flexibility.

We are required to make scheduled repayments and, under certain events of default, mandatory repayments on our outstanding indebtedness, which may require us to dedicate a substantial portion of our cash flows from operations to payments on our indebtedness, thereby reducing the availability of our cash flows to fund working capital, capital expenditures, R&D efforts and other general corporate purposes, such as dividend payments and share repurchases, and could generally limit our flexibility in planning for, or reacting to, changes in our business and industry. In addition, we may need new or additional financing in the future to expand our business or refinance our existing indebtedness. Our current senior credit facility matures on October 14, 2020 and our senior notes are due in 2022 and 2023, respectively. For additional information regarding our current indebtedness refer to Note 11 to our consolidated financial statements included in Item 8 of this Annual Report. If we are unable to timely access capital on satisfactory terms, including as a result of market disruptions, we may not be able to expand our business as desired, and may be limited in our ability to refinance our indebtedness.

In addition, the agreements governing our indebtedness impose certain operating and financial restrictions on us and somewhat limit management's discretion in operating our businesses. These agreements limit or restrict our ability, among other things, to: incur additional debt; fully utilize the capacity under the Senior Credit Facility; pay dividends and make other distributions; prepay subordinated debt; make investments and other restricted payments; create liens; sell assets; and enter into transactions with affiliates.

We are also required to maintain certain debt ratings, comply with leverage and interest coverage financial covenants and deliver to our lenders audited annual and unaudited quarterly financial statements. Our ability to comply with

these covenants may be affected by events beyond our control. Failure to comply with these covenants could result in an event of default which, if not cured or waived, may have a material adverse effect on our business, financial condition, results of operations and cash flows.

We may not be able to continue to expand our market presence through acquisitions, and any future acquisitions may present unforeseen integration difficulties or costs.

Since 1997, we have expanded through a number of acquisitions, and we may pursue strategic acquisitions of businesses in the future. Our ability to implement this growth strategy will be limited by our ability to identify appropriate acquisition candidates, covenants in our credit agreement and other debt agreements and our financial resources, including available cash and borrowing capacity. Acquisitions may require additional debt financing, resulting in higher leverage and an increase in interest expense. In addition, acquisitions may require large one-time charges and can result in the incurrence of contingent liabilities, adverse tax consequences, substantial depreciation or deferred compensation charges, the amortization of identifiable purchased intangible assets or impairment of goodwill, any of which could have a material adverse effect on our business, financial condition, results of operations and cash flows.

Should we acquire another business, the process of integrating acquired operations into our existing operations may create operating difficulties and may require significant financial and managerial resources that would otherwise be available for the ongoing development or expansion of existing operations. Some of the more common challenges associated with acquisitions that we may experience include:

- loss of key employees or customers of the acquired company;
- conforming the acquired company's standards, processes, procedures and controls, including accounting systems and controls, with our operations, which could cause deficiencies related to our internal control over financial reporting;
- coordinating operations that are increased in scope, geographic diversity and complexity;
- retooling and reprogramming of equipment;
- hiring additional management and other critical personnel; and
- the diversion of management's attention from our day-to-day operations.

Further, no guarantees can be made that we would realize the cost savings, synergies or revenue enhancements that we may anticipate from any acquisition, or that we will realize such benefits within the time frame that we expect. If we are not able to timely address the challenges associated with acquisitions and successfully integrate acquired businesses, or if our integrated product and service offerings fail to achieve market acceptance, our business could be adversely affected.

Goodwill impairment could negatively impact our net income and stockholders' equity.

Goodwill is not amortized, but is tested for impairment at the reporting unit level, which is an operating segment or one level below an operating segment. Goodwill is required to be tested for impairment annually and between annual tests if events or circumstances indicate that it is more likely than not that the fair value of a reporting unit is less than its carrying value. Reductions in or impairment of the value of our goodwill or other intangible assets will result in charges against our earnings, which could have a material adverse effect on our reported results of operations and financial position in future periods.

There are numerous risks that may cause the fair value of a reporting unit to fall below its carrying amount, which could lead to the measurement and recognition of goodwill impairment. These risks include, but are not limited to, lowered expectations of future financial results, adverse changes in the business climate, increase in the discount rate, an adverse action or assessment by a regulator, the loss of key personnel, a more-likely-than-not expectation that all or a significant portion of a reporting unit may be disposed of, failure to realize anticipated synergies from acquisitions, a sustained decline in the Company's market capitalization, and significant, prolonged negative variances between actual and expected financial results. In recent years, the estimated fair value of EPO and IPD have fluctuated, partially due to broad-based capital spending declines and heightened pricing pressures experienced in the oil and gas markets.

Although we have concluded that there is no impairment on the goodwill associated with our EPO and IPD reporting units as of December 31, 2018, we will continue to monitor their performance and related market conditions for future indicators of potential impairment. For additional information, see the discussion in Item 7 of this Annual Report and under Note 1 to our consolidated financial statements included in Item 8 of this Annual Report.

Our information technology infrastructure could be subject to service interruptions, data corruption, cyber-based attacks or network security breaches, which could disrupt our business operations and result in the loss of critical and confidential information.

Our information technology networks and related systems and devices are critical to the operation of our business and essential to our ability to successfully perform day-to-day operations. These information technology networks and related systems and devices may be susceptible to damage, disruptions or shutdowns due to failures during the process of upgrading

or replacing software, databases or components or suffer from power outages, hardware failures or computer viruses. If these information technology systems and related systems and devices suffer severe damage, disruption or shutdown and business continuity plans do not effectively resolve the issues in a timely manner, our business, financial condition, results of operations, and liquidity could be materially adversely affected.

In addition, cybersecurity breaches could expose us to a risk of loss, misuse, or interruption of sensitive and critical information and functions, including our proprietary information and information related to our customers, suppliers and employees. It is also possible a security breach could result in theft of trade secret or other intellectual property. While we devote substantial resources to maintaining adequate levels of cybersecurity, there can be no assurance that we will be able to prevent all of the rapidly evolving forms of increasingly sophisticated and frequent cyberattacks. The potential consequences of a material cybersecurity incident include reputational damage, litigation with third parties, regulatory actions, theft of intellectual property, disruption of manufacturing plant operations and increased cybersecurity protection and remediation costs. If we are unable to prevent, detect or adequately respond to security breaches, our operations could be disrupted and our business could be materially and adversely affected.

Recent legal developments in Europe could result in changes to our business practices, penalties, increased cost of operations, or otherwise harm our business. To conduct our operations, we regularly move data across national borders and must comply with increasingly complex and rigorous regulatory standards enacted to protect business and personal data in the U.S. and elsewhere. For example, the E.U. recently adopted the General Data Protection Regulation (the “GDPR”). The GDPR imposes additional obligations on companies regarding the handling of personal data and provides certain individual privacy rights to persons whose data is stored. Compliance with existing, proposed and recently enacted laws and regulations can be costly; any failure to comply with these regulatory standards could subject us to legal and reputational risks, including proceedings against the Company by governmental entities or others, fines and penalties, damage to our reputation and credibility and could have a negative impact on our business and results of operations.

Ineffective internal controls could impact the accuracy and timely reporting of our business and financial results. Our internal control over financial reporting may not prevent or detect misstatements because of its inherent limitations, including the possibility of human error, the circumvention or overriding of controls or fraud. Even effective internal controls can provide only reasonable assurance with respect to the preparation and fair presentation of financial statements. If we fail to maintain the adequacy of our internal controls, including any failure to implement required new or improved controls, or if we experience difficulties in their implementation, our business and financial results could be harmed and we could fail to meet our financial reporting obligations. For example, during its evaluation of the effectiveness of our internal control over financial reporting as of December 31, 2016 management concluded that a deficiency in our internal controls related to the control environment primarily related to the operation of certain inventory controls or recording of unsupported manual journal entries at one of the non-U.S. sites and the design and maintenance of effective business performance reviews represented material weaknesses in our internal control over financial reporting and, therefore, that we did not maintain effective internal control over financial reporting as of December 31, 2016. Management actively engaged in the planning and implementation of remediation efforts to address these material weaknesses and to strengthen the overall internal control related to the control environment at the one non-U.S. site and the business review controls and believes that such remediation efforts have effectively remediated the material weaknesses.

Changes in accounting principles and guidance could result in unfavorable accounting charges or effects.

We prepare our consolidated financial statements in conformity with accounting principles generally accepted in the U.S. A change in these principles can have a significant effect on our reported financial position and financial results. The adoption of new or revised accounting principles may require us to make changes to our systems, processes and internal controls, which could have a significant effect on our reported financial results and internal controls, cause unexpected financial reporting fluctuations, retroactively affect previously reported results or require us to make costly changes to our operational processes and accounting systems upon our following the adoption of these standards.

Forward-Looking Information is Subject to Risk and Uncertainty

This Annual Report and other written reports and oral statements we make from time-to-time include “forward-looking statements” within the meaning of Section 27A of the Securities Act of 1933, Section 21E of the Securities Exchange

Act of 1934 and the Private Securities Litigation Reform Act of 1995. All statements other than statements of historical facts included in this Annual Report regarding our financial position, business strategy, plans and objectives of management for future operations, industry conditions, market conditions and indebtedness covenant compliance are forward-looking statements. Forward-looking statements may include, among others, statements about our goals and strategies, new product introductions, plans to cultivate new businesses, future economic conditions, revenue, pricing, gross profit margin and costs, capital spending,

expected cost savings from our realignment programs, depreciation and amortization, research and development expenses, potential impairment of assets, tax rate and pending tax and legal proceedings. In some cases forward-looking statements can be identified by terms such as "may," "should," "expects," "could," "intends," "projects," "predicts," "plans," "anticipates," "estimates," "believes," "forecasts," "seeks" or other comparable terminology. These statements are not historical facts or guarantees of future performance, but instead are based on current expectations and are subject to significant risks, uncertainties and other factors, many of which are outside of our control.

We have identified factors that could cause actual plans or results to differ materially from those included in any forward-looking statements. These factors include those described above under this "Risk Factors" heading, or as may be identified in our other SEC filings from time to time. These uncertainties are beyond our ability to control, and in many cases, it is not possible to foresee or identify all the factors that may affect our future performance or any forward-looking information, and new risk factors can emerge from time to time. Given these risks and uncertainties, undue reliance should not be placed on forward-looking statements as a prediction of actual results.

All forward-looking statements included in this Annual Report are based on information available to us on the date of this Annual Report and the risk that actual results will differ materially from expectations expressed in this report will increase with the passage of time. We undertake no obligation, and disclaim any duty, to publicly update or revise any forward-looking statement or disclose any facts, events or circumstances that occur after the date hereof that may affect the accuracy of any forward-looking statement, whether as a result of new information, future events, changes in our expectations or otherwise. This discussion is provided as permitted by the Private Securities Litigation Reform Act of 1995 and all of our forward-looking statements are expressly qualified in their entirety by the cautionary statements contained or referenced in this section.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

Our principal executive offices, including our global headquarters, are located at 5215 N. O'Connor Boulevard, Suite 2300, Irving, Texas 75039. Our global headquarters is a leased facility, which we began to occupy on January 1, 2004. In December 2018, we extended our original lease term an additional 10 years to December 2028. We have the option to renew the current lease for two additional five-year periods. We currently occupy 125,000 square feet at this facility.

Our major manufacturing facilities (those with 50,000 or more square feet of manufacturing capacity) operating at December 31, 2018 are presented in the table below. See "Item 1. Business" in this Annual Report for further information with respect to all of our manufacturing and operational facilities, including QRCs.

	Number of Facilities	Approximate Aggregate Square Footage
EPD		
U.S.	3	600,000
Non-U.S.	13	2,439,000
IPD		
U.S.	4	603,000
Non-U.S.	9	1,444,000
FCD		
U.S.	5	1,129,000
Non-U.S.	11	1,627,000

We own the majority of our manufacturing facilities, and those manufacturing facilities we do not own are leased. We also maintain a substantial network of U.S. and foreign service centers and sales offices, most of which are leased. The majority of our manufacturing leased facilities are covered by lease agreements with terms ranging from two to seven years, with individual lease terms generally varying based on the facilities' primary usage. We believe we will be able to extend leases on our various facilities as necessary, as they expire.

We believe that our current facilities are adequate to meet the requirements of our present and foreseeable future operations. We continue to review our capacity requirements as part of our strategy to optimize our global manufacturing efficiency. See Note 11 to our consolidated financial statements included in Item 8 of this Annual Report for additional information regarding our operating lease obligations.

ITEM 3. LEGAL PROCEEDINGS

We are party to the legal proceedings that are described in Note 13 to our consolidated financial statements included in Item 8 of this Annual Report, and such disclosure is incorporated by reference into this Item 3. In addition to the foregoing, we and our subsidiaries are named defendants in certain other routine lawsuits incidental to our business and are involved from time to time as parties to governmental proceedings, all arising in the ordinary course of business. Although the outcome of lawsuits or other proceedings involving us and our subsidiaries cannot be predicted with certainty, and the amount of any liability that could arise with respect to such lawsuits or other proceedings cannot be predicted accurately, management does not currently expect these matters, either individually or in the aggregate, to have a material effect on our financial position, results of operations or cash flows. We have established reserves covering exposures relating to contingencies to the extent believed to be reasonably estimable and probable based on past experience and available facts.

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable.

ITEM 5. MARKET FOR THE REGISTRANT'S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES

Market Information

Our common stock is traded on the New York Stock Exchange ("NYSE") under the symbol "FLS" and our CUSIP number is 34354P105. On February 13, 2019, our records showed 1,002 shareholders of record.

Issuer Purchases of Equity Securities

During the quarter ended December 31, 2018, we had no repurchases of common stock as part of publicly announced plans. As of December 31, 2018, we have \$160.7 million of remaining capacity under our current share repurchase program. The following table sets forth the repurchase data for each of the three months during the quarter ended December 31, 2018:

Period	Total Number of Shares Purchased (4)	Average Price Paid per Share	Total Number of Shares Purchased as Part of Publicly Announced Plan (3)(4)	Maximum Number of Shares (or Approximate Dollar Value) That May Yet Be Purchased Under the Plan (In millions)
October 1 - 31	1,211	(1)\$ 50.31	—	\$ 160.7
November 1 - 30	1,902	(2)49.45	—	160.7
December 1 - 31	483	(1)38.30	—	160.7
Total	3,596	\$ 48.24	—	

(1) Shares tendered by employees to satisfy minimum tax withholding amounts for Restricted Shares.

Represents 42 shares that were tendered by employees to satisfy minimum tax withholding amounts for Restricted Shares at an average price per share of \$49.78, and 1,860 shares purchased at a price of \$49.44 per share by a rabbi trust that we established in connection with our director deferral plans, pursuant to which non-employee directors may elect to defer directors' quarterly cash compensation to be paid at a later date in the form of common stock.

(2) On November 13, 2014, our Board of Directors approved a \$500.0 million share repurchase authorization. Our share repurchase program does not have an expiration date, and we reserve the right to limit or terminate the repurchase program at any time without notice.

(3) Note 15 to our consolidated financial statements included in Item 8 of this Annual Report provides additional information regarding our share repurchase activity and payment of quarterly dividends on our common stock.

Stock Performance Graph

The following graph depicts the most recent five-year performance of our common stock with the S&P 500 Index and S&P 500 Industrial Machinery. The graph assumes an investment of \$100 on December 31, 2013, and assumes the reinvestment of any dividends over the following five years. The stock price performance shown in the graph is not necessarily indicative of future price performance.

	Base Period	December 31,					
Company/Index	2013	2014	2015	2016	2017	2018	
Flowserve Corporation	\$100.00	\$76.59	\$54.70	\$63.46	\$56.36	\$51.74	
S&P 500 Index	100.00	113.68	115.24	129.02	157.17	150.27	
S&P 500 Industrial Machinery	100.00	105.05	100.89	128.07	170.93	145.07	

ITEM 6. SELECTED FINANCIAL DATA

	Year Ended December 31,				
	2018(b)	2017(a)(c)	2016(a)(d)	2015(a)(e)	2014(a)(f)
	(Amounts in thousands, except per share data and ratios)				
RESULTS OF OPERATIONS					
Sales	\$3,832,666	\$3,660,831	\$3,990,487	\$4,557,791	\$4,877,885
Gross profit	1,187,836	1,088,953	1,236,798	1,481,125	1,716,058
Selling, general and administrative expense	(943,714)	(901,727)	(965,376)	(970,608)	(933,463)
Gain (loss) on sale of businesses	(7,727)	141,317	(7,664)	—	—
Operating income	247,538	341,135	276,684	520,377	794,710
Interest expense	(58,160)	(59,730)	(60,137)	(65,270)	(60,322)
Provision for income taxes(g)	(51,224)	(258,679)	(77,380)	(148,351)	(209,311)
Net earnings attributable to Flowserve Corporation	119,671	2,652	132,455	258,411	513,372
Net earnings per share of Flowserve Corporation common shareholders (basic)	0.91	0.02	1.02	1.94	3.75
Net earnings per share of Flowserve Corporation common shareholders (diluted)	0.91	0.02	1.01	1.93	3.72
Cash flows from operating activities	190,831	311,066	240,476	440,759	594,481
Cash dividends declared per share	0.76	0.76	0.76	0.72	0.64
FINANCIAL CONDITION					
Working capital	\$1,302,170	\$1,315,837	\$1,119,251	\$1,106,946	\$1,164,381
Total assets	4,616,277	4,910,474	4,708,923	4,963,106	4,844,667
Total debt	1,483,047	1,575,257	1,570,623	1,620,996	1,145,658
Retirement obligations and other liabilities	459,693	496,954	407,839	387,786	362,970
Total equity	1,660,780	1,670,954	1,637,388	1,664,382	1,930,246
FINANCIAL RATIOS					
Return on average net assets(h)	5.4	% 0.2	% 5.2	% 9.4	% 17.9
Net debt to net capital ratio(i)	34.2	% 34.3	% 42.4	% 43.0	% 26.4

Retrospective adjustments were made to prior period information to conform to current period presentation. These retrospective adjustments resulted from our adoption ASU No. 2017-07, "Compensation-Retirement Benefits (a)(Topic 715): Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost," which was effective January 1, 2018. Refer to Note 1 included in this Annual Report for a discussion on the adoption of the standard.

(b) Results of operations in 2018 include costs of \$95.1 million resulting from realignment and transformation initiatives, resulting in a reduction of after tax net earnings of \$72.4 million.

(c) Results of operations in 2017 include costs of \$71.3 million resulting from realignment initiatives, resulting in a reduction of after tax net earnings of \$54.3 million.

(d) Results of operations in 2016 include costs of \$94.8 million resulting from realignment initiatives, resulting in a reduction of after tax net earnings of \$75.8 million.

(e) Results of operations in 2015 include costs of \$108.1 million resulting from realignment initiatives, resulting in a reduction of after tax net earnings of \$85.0 million.

(f) Results of operations in 2014 include costs of \$10.7 million resulting from realignment initiatives, resulting in a reduction of after tax net earnings of \$7.6 million.

(g) Provision for income taxes in 2017 was impacted by the Tax Reform Act. See Note 16 to our consolidated financial statements included in Item 8 of this Annual Report.

(h) Calculated as adjusted net income divided by adjusted net assets, where (i) adjusted net income is the sum of earnings before income taxes, plus interest expense, multiplied by one minus our effective tax rate, and (ii) adjusted net assets is the average of beginning of year and end of year net assets, excluding cash and cash

equivalents and debt due in one year.

- (i) Calculated as total debt minus cash and cash equivalents divided by the sum of total debt and shareholders' equity minus cash and cash equivalents.

ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

The following discussion and analysis is provided to increase the understanding of, and should be read in conjunction with, the accompanying consolidated financial statements and notes. See "Item 1A. Risk Factors" and the section titled "Forward-Looking Information is Subject to Risk and Uncertainty" included in this Annual Report on Form 10-K for the year ended December 31, 2018 ("Annual Report") for a discussion of the risks, uncertainties and assumptions associated with these statements. Unless otherwise noted, all amounts discussed herein are consolidated.

EXECUTIVE OVERVIEW

Our Company

We believe that we are a world-leading manufacturer and aftermarket service provider of comprehensive flow control systems. We develop and manufacture precision-engineered flow control equipment integral to the movement, control and protection of the flow of materials in our customers' critical processes. Our product portfolio of pumps, valves, seals, automation and aftermarket services supports global infrastructure industries, including oil and gas, chemical, power generation and water management, as well as general industrial markets where our products and services add value. Through our manufacturing platform and global network of Quick Response Centers ("QRCs"), we offer a broad array of aftermarket equipment services, such as installation, advanced diagnostics, repair and retrofitting. We employ approximately 17,000 employees in more than 50 countries as of December 31, 2018.

Our business model is significantly influenced by the capital spending of global infrastructure industries for the placement of new products into service and maintenance spending for aftermarket services for existing operations. The worldwide installed base of our products is an important source of aftermarket revenue, where products are expected to ensure the maximum operating time of many key industrial processes. Over the past several years, we have significantly invested in our aftermarket strategy to provide local support to drive customer investments in our offerings and use of our services to replace or repair installed products. The aftermarket portion of our business also helps provide business stability during various economic periods. The aftermarket business, which is primarily served by our network of 171 QRCs located around the globe, provides a variety of service offerings for our customers including spare parts, service solutions, product life cycle solutions and other value-added services. Over the past several years, we have significantly focused on our aftermarket strategy to provide local support to drive customer investments in our offerings and use of our services to replace or repair installed base. It is generally a higher margin business compared to our original equipment business and a key component of our profitable growth strategy.

Through December 31, 2018, our operations were conducted through three business segments that are referenced throughout this Management's Discussion and Analysis of Financial Condition and Results of Operations ("MD&A"): EPD for long lead time, custom and other highly-engineered pumps and pump systems, mechanical seals, auxiliary systems and replacement parts and related services;

IDP for engineered and pre-configured industrial pumps and pump systems and related products and services; and

FCD for engineered and industrial valves, control valves, actuators and controls and related services.

Our business segments share a focus on industrial flow control technology and have a high number of common customers. These segments also have complementary product offerings and technologies that are often combined in applications that provide us a net competitive advantage. Our segments also benefit from our global footprint, our economies of scale in reducing administrative and overhead costs to serve customers more cost effectively and shared leadership for operational support functions, such as research and development, marketing and supply chain.

The reputation of our product portfolio is built on more than 50 well-respected brand names such as Worthington, IDP, Valtek, Limatorque, Durco, Argus, Edward, Valbart and Durametallc, which we believe to be one of the most comprehensive in the industry. Our products and services are sold either directly or through designated channels to more than 10,000 companies, including some of the world's leading engineering, procurement and construction ("EPC") firms, original equipment manufacturers, distributors and end users.

We continue to leverage our QRC network to be positioned as near to customers as possible for service and support in order to capture valuable aftermarket business. Along with ensuring that we have the local capability to sell, install and service our equipment in remote regions, it is equally imperative to continuously improve our global operations. We also continue to expand our global supply chain capability to meet global customer demands and ensure the quality and timely delivery of our products. We are focusing on our ongoing low-cost sourcing, including greater use of third-party suppliers and increasing our lower-cost, emerging market capabilities. Additionally, we continue to devote resources to improving the supply chain processes across our business segments to find areas of synergy and cost reduction and to improve our supply chain management capability to ensure it can meet global customer demands. We also remain focused on improving on-time delivery and quality, while managing warranty costs as a percentage of sales across our global operations, through the assistance of a focused Continuous Improvement Process ("CIP") initiative. The goal of the CIP initiative, which includes lean manufacturing, six sigma business management strategy and value engineering, is to maximize service fulfillment to customers through on-time delivery, reduced cycle time and quality at the highest internal productivity.

Over the past year we have experienced a stabilization in business and improved conditions in certain of our key markets. With continued stability in oil prices at improved levels beginning in the second half of 2017 through the middle of 2018, our large-project business is showing continued signs of recovery and we anticipate that customers will continue to invest in maintenance and short cycle equipment during 2019. During 2016 and 2017, we were challenged by broad-based capital spending declines, originating in the oil and gas industry, heightened pricing pressures and negative currency impacts caused by a stronger U.S. dollar.

In the second quarter of 2018, we launched and committed resources to our Flowserve 2.0 Transformation, a program designed to transform our business model to drive operational excellence, reduce complexity, accelerate growth, expand margins, increase capital efficiency and improve organizational health. For further information regarding our Flowserve 2.0 Transformation, see "Our Results of Operations" below and Note 19 to our consolidated financial statements included in Item 8 of this Annual Report. During the latter part of 2018 and in connection with the Flowserve 2.0 Transformation, we determined that there are meaningful operational synergies and benefits to combining our EPD and IPD reportable segments into one reportable segment, the Flowserve Pump Division ("FPD"). The reorganization will be effective as of January 1, 2019 and as a result, beginning in 2019 we will report a two operating segment structure, FPD and FCD, and prior periods will be retrospectively adjusted to reflect the new reportable segment structure.

Our Markets

The following discussion should be read in conjunction with the "Outlook for 2019" section included below in this MD&A.

Our products and services are used in several distinct industries: oil and gas, chemical, power generation, water management, and several other industries, such as mining, steel and paper, that are collectively referred to as "general industries."

Demand for most of our products depends on the level of new capital investment as well as planned and unplanned maintenance expenditures by our customers. The level of new capital investment depends, in turn, on capital infrastructure projects driven by the need for products that rely on oil and gas, chemicals, power generation and water resource management, as well as general economic conditions. These drivers are generally related to the phase of the business cycle in their respective industries and the expectations of future market behavior. The levels of maintenance expenditures are additionally driven by the reliability of equipment, planned and unplanned downtime for maintenance and the required capacity utilization of the process.

Sales to EPC firms and original equipment manufacturers are typically for large project orders and critical applications, as are certain sales to distributors. Project orders are typically procured for customers either directly from us or indirectly through contractors for new construction projects or facility enhancement projects.

The quick turnaround business, which we also refer to as "short-cycle," is defined as orders that are received from the customer (booked) and shipped generally within six months of receipt. These orders are typically for more standardized, general purpose products, parts or services. Each of our three business segments generate certain levels of this type of business.

In the sale of aftermarket products and services, we benefit from a large installed base of our original equipment, which requires periodic maintenance, repair and replacement parts. We use our manufacturing platform and global network of QRCs to offer a broad array of aftermarket equipment services, such as installation, advanced diagnostics, repair and retrofitting. In geographic regions where we are positioned to provide quick response, we believe customers have traditionally relied on us, rather than our competitors, for aftermarket products due to our highly engineered and customized products. However, the

aftermarket for standard products is competitive, as the existence of common standards allows for easier replacement of the installed products. As proximity of service centers, timeliness of delivery and quality are important considerations for all aftermarket products and services, we continue to selectively expand our global QRC capabilities to improve our ability to capture this important aftermarket business.

Oil and Gas

The oil and gas industry, which represented approximately 38% of our bookings in both 2018 and 2017, experienced an increase in capital spending in 2018 compared to the previous year. The increase was primarily due to increased broad-based maintenance and short cycle investment. Aftermarket opportunities in this industry solidified throughout 2018 due to catch up of deferred spending on our customers' repair and maintenance budgets from previous years. The outlook for the oil and gas industry is heavily dependent on the demand growth from both mature markets and developing geographies as well as changes in the regulatory environment. In the short-term, we believe that stable oil prices will support oil and gas upstream and mid-stream investment and we further expect increased investment in later cycle downstream projects due to emerging market growth and certain regulatory requirements, such as IMO 2020. A recovery in the overall level of spending by oil and gas companies could continue to increase demand for our aftermarket products and services. We believe the medium and long-term fundamentals for this industry remain attractive, and see a stabilized environment as the industry works through current excess supply. In addition, we believe projected depletion rates of existing fields and forecasted long-term demand growth will require additional investments. With our long-standing reputation in providing successful solutions for upstream, mid-stream and downstream applications, along with the advancements in our portfolio of offerings, we believe that we continue to be well-positioned to assist our customers in this improving environment.

Chemical

The chemical industry represented approximately 22% and 21% of our bookings in 2018 and 2017, respectively. The chemical industry is comprised of chemical-based and pharmaceutical products. Capital spending in 2018 increased primarily due to global economic growth and forecasted demand for chemical-based products. The aftermarket opportunities solidified throughout 2018 due to catch up of deferred spending of our customers' repair and maintenance budgets from previous years.

The outlook for the chemical industry remains heavily dependent on global economic conditions. As global economies stabilize and unemployment conditions improve, a rise in consumer spending should follow. An increase in spending would drive greater demand for chemical-based products supporting improved levels of capital investment. We believe the chemical industry in the near-term will continue to invest in North America and Middle East capacity additions, maintenance and upgrades for optimization of existing assets and that developing regions will selectively invest in capital infrastructure to meet current and future indigenous demand. We believe our global presence and our localized aftermarket capabilities are well-positioned to serve the potential growth opportunities in this industry.

Power Generation

The power generation industry represented approximately 11% and 13% of our bookings in 2018 and 2017, respectively. In 2018, the power generation industry continued to experience softness in thermal power generation capital spending in the mature and key developing markets. China continued to curtail the construction of new coal-fired power generation over the last year, while in India and southeast Asia capital investment remained in place driven by increased demand forecasts.

Natural gas-fired combined cycle ("NGCC") plants increased its share of the energy mix, driven by market prices for gas remaining low and stable (partially due to the increasing global availability of liquefied natural gas ("LNG")), low capital expenditures, and the ability of NGCC to stabilize unpredictable renewable sources. With the potential of unconventional sources of gas, the global power generation industry is forecasting an increased use of this form of fuel for power generation plants.

Despite fewer new nuclear plants being constructed, nuclear power remains an important contributor to the global energy mix. We continue to support our significant installed base in the global nuclear fleet by providing aftermarket and life extension products and services. Due to our extensive history, we believe we are well positioned to take advantage of this ongoing source of aftermarket and new construction opportunities.

Political efforts to limit the emissions of carbon dioxide may have some adverse effect on thermal power investment plans depending on the potential requirements imposed and the timing of compliance by country. However, many

proposed methods of capturing and limiting carbon dioxide emissions offer business opportunities for our products and services. At

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the same time, we continue to take advantage of new investments in concentrated solar power generating capacity, where our pumps, valves, and seals are uniquely positioned for both molten salt applications as well as the traditional steam cycle.

We believe the long-term fundamentals for the power generation industry remain solid based on projected increases in demand for electricity driven by global population growth, growth of urbanization in developing markets and the increased use of electricity driven transportation. We also believe that our long-standing reputation in the power generation industry, our portfolio of offerings for the various generating methods, our advancements in serving the renewable energy market and carbon capture methodologies, as well as our global service and support structure, position us well for the future opportunities in this important industry.

Water Management

The water management industry represented approximately 4% our bookings in both 2018 and 2017. Water management industry activity levels increased in 2018 as worldwide demand for fresh water, water treatment and re-use, desalination and flood control continued to create requirements for new facilities or for upgrades of existing systems, many of which require products that we offer, particularly pumps. Capital and aftermarket spending is on the rise in developed and emerging markets with governments and private industry providing funding for critical projects. The proportion of people living in regions that find it difficult to meet water requirements is expected to double by 2025. We believe that the persistent demand for fresh water during all economic cycles supports continued investments, especially in North America and developing regions.

General Industries

General industries represented, in the aggregate, approximately 25% and 24% of our bookings in 2018 and 2017, respectively. General industries comprise a variety of different businesses, including mining and ore processing, pulp and paper, food and beverage and other smaller applications, none of which individually represented more than 5% of total bookings in 2018 and 2017. General industries also include sales to distributors, whose end customers operate in the industries we primarily serve.

The outlook for this group of industries is heavily dependent upon the condition of global economies and consumer confidence levels. The long-term fundamentals of many of these industries remain sound, as many of the products produced by these industries are common staples of industrialized and urbanized economies. We believe that our specialty product offerings designed for these industries and our aftermarket service capabilities will provide continued business opportunities.

OUR RESULTS OF OPERATIONS

Effective January 1, 2018, we adopted ASU No. 2014-09, "Revenue from Contracts with Customers (Topic 606)" and all related ASUs ("New Revenue Standard"), using the modified retrospective method for transition. For a discussion related to our adoption of the New Revenue Standard requirements refer to Note 2 to our consolidated financial statements included in Item 8 of this Annual Report.

Throughout this discussion of our results of operations, we discuss the impact of fluctuations in foreign currency exchange rates. We have calculated currency effects on operations by translating current year results on a monthly basis at prior year exchange rates for the same periods.

Effective August 9, 2018, we divested two IPD locations and associated product lines, including the related assets and liabilities, which included a manufacturing facility in Germany and a related assembly facility in France. The sale was to a private company. In 2017, net sales related to the divested business totaled approximately \$42 million, although the business produced an operating loss in each of the last two fiscal years.

Effective July 6, 2017, we sold our FCD Vogt product line and related assets and liabilities to a privately held company. In 2016, sales related to the Vogt business totaled approximately \$17 million, with earnings before interest and taxes of approximately \$4 million.

Effective May 2, 2017 we sold our FCD Gestra AG business to a leading provider of steam system solutions. In 2016, Gestra recorded sales of approximately \$101 million with earnings before interest and taxes of approximately \$17 million.

Note 3 to our consolidated financial statements included in Item 8 of this Annual Report discusses the details of the above dispositions.

In the second quarter of 2018, we launched and committed resources to our Flowserve 2.0 Transformation, a program designed to transform our business model to drive operational excellence, reduce complexity, accelerate growth, expand margins, increase capital efficiency and improve organizational health, which is further discussed in Note 19 to our consolidated financial statements included in Item 8 of this Annual Report. We anticipate that the Flowserve 2.0 Transformation will continue to incur restructuring charges, non-restructuring charges and other related transformation expenses (such as professional services, project management and related travel and expense). For the year ended December 31, 2018, we incurred Flowserve 2.0 Transformation related expenses of \$41.2 million, primarily consisting of professional services and project management costs recorded in SG&A. We are currently evaluating the total investment in and financial benefits of the various initiatives associated with this program. In 2015, we initiated Realignment Programs that consist of both restructuring and non-restructuring charges that are further discussed in Note 19 to our consolidated financial statements included in Item 8 of this Annual Report. As of December 31, 2018 the Realignment Programs are substantially complete. The total charges for Realignment Programs by segment are detailed below for the years ended December 31, 2018 and 2017:

(Amounts in thousands)	December 31, 2018			Subtotal—Reportable Segments	Eliminations and All Other	Consolidated Total
	Engineered Product Division	Industrial Product Division	Flow Control Division			
Total Realignment Program Charges						
COS	\$34,050	\$ 5,427	\$ 3,221	\$ 42,698	\$ —	\$ 42,698
SG&A	4,189	1,721	(294)	5,616	5,618	11,234
Income tax expense	(1,000)	—	—	(1,000)	—	(1,000)
Total	\$37,239	\$ 7,148	\$ 2,927	\$ 47,314	\$ 5,618	\$ 52,932

(Amounts in thousands)	December 31, 2017			Subtotal—Reportable Segments	Eliminations and All Other	Consolidated Total
	Engineered Product Division	Industrial Product Division	Flow Control Division			
Total Realignment Program Charges						
COS	\$18,364	\$13,983	\$11,600	\$ 43,947	\$ —	\$ 43,947
SG&A	7,376	11,311	2,870	21,557	5,751	27,308
Income tax expense	1,000	—	—	1,000	—	1,000
Total	\$26,740	\$25,294	\$14,470	\$ 66,504	\$ 5,751	\$ 72,255

We anticipate a total investment in these Realignment Programs of approximately \$360 million, of which we have incurred charges of \$347.8 million inception to date. Based on actions under our Realignment Programs, we estimate that we have achieved cost savings of approximately \$230 million as of December 31, 2018, as compared with approximately \$200 million as of December 31, 2017. Approximately \$169 million of those savings are in COS with the remainder in SG&A. The Realignment Programs are substantially complete.

Bookings and Backlog

	2018	2017	2016
(Amounts in millions)			
Bookings	\$4,019.8	\$3,803.9	\$3,760.4
Backlog (at period end)	1,891.6	2,033.4	1,901.8

We define a booking as the receipt of a customer order that contractually engages us to perform activities on behalf of our customer in regards to the manufacture, delivery, and/or support of products or the delivery of service. Bookings recorded and subsequently canceled within the same fiscal period are excluded from reported bookings. Bookings of \$4.0 billion in

2018 increased by \$215.9 million, or 5.7%, as compared with 2017. The increase included currency benefits of approximately \$30 million. The increase was primarily driven by the oil and gas, general and chemical industries, partially offset by a decrease in the power generation industry. The increase was more heavily-weighted towards customer aftermarket bookings.

Bookings of \$3.8 billion in 2017 increased by \$43.5 million, or 1.2%, as compared with 2016. The increase included currency benefits of approximately \$27 million. The increase was primarily driven by the oil and gas industry, partially offset by a decrease in the power generation industry. The increase was more heavily weighted towards customer original equipment bookings.

Backlog represents the aggregate value of booked but uncompleted customer orders and is influenced primarily by bookings, sales, cancellations and currency effects. Backlog of \$1.9 billion at December 31, 2018 decreased by \$141.8 million, or 7.0%, as compared with December 31, 2017. Currency effects provided a decrease of approximately \$83 million (currency effects on backlog are calculated using the change in period end exchange rates). The impact of the initial adoption of the New Revenue Standard reduced backlog by approximately \$237 million on January 1, 2018. Backlog related to aftermarket orders was approximately 36% and 31% of the backlog at December 31, 2018 and 2017, respectively. We expect to ship approximately 89% of December 31, 2018 backlog during 2019. Backlog includes our unsatisfied (or partially unsatisfied) performance obligations related to contracts having an original expected duration in excess of one year of approximately \$450 million as discussed in Note 2 to our consolidated financial statements included in Item 8 of this Annual Report.

Backlog of \$2.0 billion at December 31, 2017 increased by \$131.6 million, or 6.9%, as compared with December 31, 2016. Currency effects provided an increase of approximately \$110 million. Backlog related to aftermarket orders was approximately 31% and 30% of the backlog at December 31, 2017 and 2016, respectively. We expected to ship approximately 92% of December 31, 2017 backlog during 2018.

Sales

	2018	2017	2016
	(Amounts in millions)		
Sales	\$3,832.7	\$3,660.8	\$3,990.5

Sales in 2018 increased by \$171.9 million, or 4.7%, as compared with 2017. The increase included currency benefits of approximately \$31 million. The increase was more heavily-weighted to aftermarket sales, with increased sales into North America, Asia Pacific and Africa, partially offset by decreased sales in the Middle East and Europe. The impact of the adoption of the New Revenue Standard increased sales by approximately \$71 million for the year ended December 31, 2018.

Sales in 2017 decreased by \$329.7 million, or 8.3%, as compared with 2016. The decrease included currency benefits of approximately \$34 million. The decrease was more heavily weighted toward original equipment sales. Sales decreased into every region.

Sales to international customers, including export sales from the U.S., were approximately 63% of total sales in 2018 and 64% for both 2017 and 2016. Sales into Europe, the Middle East and Africa ("EMA") were approximately 32%, 36% and 35% of total sales in 2018, 2017 and 2016, respectively. Sales into Asia Pacific were approximately 20% of total sales for 2018 and 19% for both 2017 and 2016. Sales into Latin America were approximately 6% of total sales in both 2018 and 2017 and 7% for 2016.

Gross Profit and Gross Profit Margin

	2018	2017	2016
	(Amounts in millions, except percentages)		
Gross profit	\$1,187.8	\$1,089.0	\$1,236.8
Gross profit margin	31.0 %	29.7 %	31.0 %

Gross profit in 2018 increased by \$98.8 million, or 9.1%, as compared with 2017. Gross profit margin in 2018 of 31.0% increased from 29.7% in 2017. The impact of the adoption of the New Revenue Standard had an immaterial impact on gross profit margin for the year ended December 31, 2018. The increase in gross profit margin was primarily attributable to a \$16.9 million charge for costs related to a contract to supply oil and gas platform equipment to an end user in Latin

America in 2017 that did not recur, revenue recognized on higher margin projects, a mix shift to higher margin aftermarket sales, favorable impact of increased sales on our absorption of fixed manufacturing costs and increased savings related to our Realignment Programs, partially offset by a \$7.7 million charge for cost incurred related to the write-down of inventory associated with the divestiture of two IPD locations and related product lines in the second quarter of 2018. Aftermarket sales increased to approximately 50% of total sales, as compared with approximately 48% of total sales in 2017.

Gross profit in 2017 decreased by \$147.8 million, or 12.0%, as compared with 2016. Gross profit margin in 2017 of 29.7% decreased from 31.0% in 2016. The decrease in gross profit and gross profit margin was primarily attributable to the negative impact of decreased sales on our absorption of fixed manufacturing costs, lower margin projects that shipped from backlog and a \$16.9 million charge for costs incurred related to a contract to supply oil and gas platform equipment to an end user in Latin America, partially offset by \$10.9 million of charges to write down inventory in Brazil in 2016 that did not recur, a mix shift to higher margin aftermarket sales and lower charges and increased savings related to our Realignment Programs. Aftermarket sales increased to approximately 48% of total sales, as compared with approximately 45% of total sales in 2016.

SG&A

	2018	2017	2016
	(Amounts in millions, except percentages)		
SG&A	\$943.7	\$901.7	\$965.4
SG&A as a percentage of sales	24.6 %	24.6 %	24.2 %

SG&A in 2018 increased by \$42.0 million, or 4.7%, as compared with 2017. Currency effects yielded an increase of approximately \$7 million. In 2018, SG&A as a percentage of sales remained relatively unchanged as compared with 2017. SG&A was favorably impacted by increased sales leverage, a \$26.0 million impairment charge related to our manufacturing facility in Brazil in 2017 that did not recur, lower stock-based compensation expense, lower bad debt expense and lower charges and increased savings related to our Realignment Programs. These favorable cost impacts were substantially offset by charges related to the Flowserve 2.0 Transformation program, implementation costs associated with our adoption of the New Revenue Standard, increased accrued broad-based annual incentive compensation expense and an impairment charge of \$9.7 million related to the long-lived assets associated with the divestiture of two IPD locations and related product lines in the second quarter of 2018.

SG&A in 2017 decreased by \$63.7 million, or 6.6%, as compared with 2016. Currency effects yielded an increase of approximately \$6 million. SG&A as a percentage of sales in 2017 increased 40 basis points as compared with 2016 due to a \$26.0 million impairment charge related to our manufacturing facility in Brazil, increased accrued broad-based annual incentive compensation and lower sales leverage, partially offset by the \$73.5 million reserve established for our primary Venezuelan customer in 2016 that did not recur and savings related to our Realignment Programs.

(Loss) Gain on Sale of Businesses

	2018	2017	2016
	(Amounts in millions)		
(Loss) gain on sale of businesses	\$(7.7)	\$141.3	\$(7.7)

The loss on sale of businesses in 2018 of \$7.7 million resulted from the divestiture of two IPD locations and related product lines. The gain on sale of businesses in 2017 was the result of the \$141.3 million gain from the sales of the Gestra and Vogt businesses. See Note 3 to our consolidated financial statements included in Item 8 of this Annual Report for additional information on these sales. The \$7.7 million loss in 2016 resulted from the sale of a non-strategic foundry business.

Net Earnings from Affiliates

2018	2017	2016
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(Amounts in
millions)

Net earnings from affiliates \$11.1 \$12.6 \$12.9

Net earnings from affiliates represents our net income from investments in seven joint ventures (one located in each of Chile, India, Saudi Arabia, South Korea and the United Arab Emirates and two in China) that are accounted for using the equity method of accounting. Net earnings from affiliates in 2018 decreased by \$1.5 million, or 11.9%, as compared to the prior year, primarily as a result of decreased earnings of our EPD joint venture in South Korea. Net earnings from affiliates in 2017 remained relatively constant compared to the prior year.

Operating Income

	2018	2017	2016
	(Amounts in millions, except percentages)		
Operating income	\$247.5	\$341.1	\$276.7
Operating income as a percentage of sales	6.5 %	9.3 %	6.9 %

Operating income in 2018 decreased by \$93.6 million, or 27.4%, as compared with 2017. The decrease included negative currency effects of approximately \$2 million. The decrease was primarily a result of the \$141.3 million gain from the sales of the Gestra and Vogt businesses in 2017 that did not recur, the \$42.0 million increase in SG&A and the loss of \$7.7 million from the divestiture of two IPD locations and related product lines, partially offset by the \$98.8 million increase in gross profit discussed above.

Operating income in 2017 increased by \$64.4 million, or 23.3%, as compared with 2016. The increase included currency benefits of approximately \$2 million. The increase was primarily a result of the \$141.3 million pre-tax gain from the sales of the Gestra and Vogt businesses and the \$63.7 million decrease in SG&A, partially offset by the \$147.8 million decrease in gross profit discussed above.

Interest Expense and Interest Income

	2018	2017	2016
	(Amounts in millions)		
Interest expense	\$(58.2)	\$(59.7)	\$(60.1)
Interest income	6.5	3.4	2.8

Interest expense in 2018 decreased by \$1.5 million as compared with 2017. The decrease was primarily attributable to lower borrowings in 2018, as compared to the same period in 2017. Interest expense in 2017 decreased by \$0.4 million as compared with 2016. The decrease was primarily attributable to decreased borrowings under our Revolving Credit Facility in 2017, as compared to the same period in 2016.

Interest income in 2018 increased by \$3.1 million as compared with 2017. The increase in interest income was primarily attributable to higher average cash balances compared with 2017. Interest income in 2017 increased by \$0.6 million as compared with 2016.

Other Expense, net

	2018	2017	2016
	(Amounts in millions)		
Other expense, net	\$(19.6)	\$(21.8)	\$(6.4)

Other expense, net decreased \$2.2 million as compared to 2017, due to a \$6.4 million decrease in net periodic benefit costs for pensions and post retirement obligations, partially offset by a \$5.3 million increase in losses from foreign exchange contracts. The net change in transactions in currencies and foreign exchange contracts was primarily due to the foreign currency exchange rate movements in the Euro, Indian rupee, Mexican peso and Argentinian peso in relation to the U.S. dollar during the year ended December 31, 2018, as compared with the same period in 2017.

Other expense, net increased \$15.4 million in 2017, due primarily to a \$13.2 million increase in losses arising from transactions in currencies other than our sites' functional currencies and a \$3.6 million increase in losses from foreign exchange contracts. The net change was primarily due to the foreign currency exchange rate movements in the Mexican peso, Euro, Brazilian real and British pound in relation to the U.S. dollar during the year ended December 31, 2017, as compared with the same period in 2016.

Tax Expense and Tax Rate

	2018	2017	2016
	(Amounts in millions, except percentages)		
Provision for income taxes	\$51.2	\$258.7	\$77.4
Effective tax rate	29.0 %	98.4 %	36.3 %

On December 22, 2017, the U.S. enacted the Tax Reform Act, which significantly changed U.S. tax law. The Tax Reform Act, among other things, lowered the Company's U.S. statutory federal income tax rate from 35% to 21% effective January 1, 2018, while imposing a deemed repatriation tax on deferred foreign income and implementing a modified territorial tax system. The Tax Reform Act also provides for a one-time transition tax on certain foreign earnings and the acceleration of depreciation for certain assets placed into service after September 27, 2017 as well as prospective changes which began in 2018, including repeal of the domestic manufacturing deduction, capitalization of research and development expenditures, additional limitations on executive compensation and limitations on the deductibility of interest. The Tax Reform Act also provides for two new anti-base erosion provisions, the global intangible low-taxed income ("GILTI") provision and the base-erosion and anti-abuse tax ("BEAT") provision which effectively creates a new minimum tax on certain future foreign earnings.

The 2018 tax rate differed from the federal statutory rate of 21% primarily due to the net impact of foreign operations, including losses in certain foreign jurisdictions for which no tax benefit was provided. Our effective tax rate of 29.1% for the year ended December 31, 2018 decreased from 98.4% in 2017 due to a change in the U.S. statutory tax rate for 2018, taxation of previously unremitted earnings for the year ended December 31, 2017 imposed as a result of the Tax Reform Act that did not reoccur in 2018, and the net impact of foreign operations. The 2017 tax rate differed from the federal statutory rate of 35% primarily due to the impacts pursuant to enactment of the Tax Reform Act, the net impact of foreign operations, the establishment of a valuation allowance against our deferred tax assets in various foreign jurisdictions, primarily Germany and Mexico, and taxes related to the sale of the Gestra and Vogt businesses. The 2016 tax rate differed from the federal statutory rate of 35% primarily due to the net impact of foreign operations, tax impacts from our Realignment Programs and losses in certain foreign jurisdictions for which no tax benefit was provided.

Our effective tax rate is based upon current earnings and estimates of future taxable earnings for each domestic and international location. Changes in any of these and other factors, including our ability to utilize foreign tax credits and net operating losses or results from tax audits, could impact the tax rate in future periods. As of December 31, 2018, we have foreign tax credits of \$16.1 million, expiring in 2026 and 2028 tax years, against which we recorded a valuation allowance of \$16.1 million. Additionally, we have recorded other net deferred tax assets of \$44.7 million, which relate to net operating losses, tax credits and other deductible temporary differences that are available to reduce taxable income in future periods, most of which do not have a definite expiration. Should we not be able to utilize all or a portion of these credits and losses, our effective tax rate would increase.

Net Earnings and Earnings Per Share

	2018	2017	2016
	(Amounts in millions, except per share amounts)		
Net earnings attributable to Flowserve Corporation	\$119.7	\$2.7	\$132.5
Net earnings per share — diluted	\$0.91	\$0.02	\$1.01
Average diluted shares	131.3	131.4	131.0

Net earnings in 2018 increased by \$117.0 million to \$119.7 million, or to \$0.91 per diluted share, as compared with 2017. The increase was primarily attributable to a \$207.5 million decrease in tax expense, a \$2.2 million decrease in other expense net, and a \$1.5 million decrease in interest expense, partially offset by a decrease in operating income of \$93.6 million.

Net earnings in 2017 decreased by \$129.8 million to \$2.7 million, or to \$0.02 per diluted share, as compared with 2016. The decrease was primarily attributable to a \$181.3 million increase in tax expense and a \$18.4 million increase in other expense, partially offset by a \$67.4 million increase in operating income and a \$0.4 million decrease in interest expense.

Other Comprehensive (Loss) Income

2018 2017 2016

(Amounts in millions)

Other comprehensive (loss) income \$(67.8) \$119.8 \$(85.8)

Other comprehensive loss in 2018 increased by \$187.6 million to \$67.8 million from income of \$119.8 million in 2017. The loss was primarily due to foreign currency translation adjustments resulting primarily from exchange rate movements of the Euro, Argentinian peso, Indian rupee and British pound versus the U.S. dollar at December 31, 2018 as compared with 2017. For a discussion related to hyperinflation in Argentina, refer to Note 1 to our consolidated financial statements included in Item 8 of this Annual Report.

Other comprehensive income in 2017 increased by \$205.6 million to \$119.8 million from a loss of \$85.8 million in 2016. The income was primarily due to foreign currency translation adjustments resulting primarily from exchange rate movements of the Euro, British pound and Indian rupee versus the U.S. dollar at December 31, 2017 as compared with 2016.

Business Segments

We conduct our operations through three business segments based on type of product and how we manage the business. We evaluate segment performance and allocate resources based on each segment's operating income (loss). See Note 17 to our consolidated financial statements included in Item 8 of this Annual Report for further discussion of our segments. The key operating results for our three business segments, EPD, IPD and FCD, are discussed below.

Engineered Product Division Segment Results

Our largest business segment is EPD, through which we design, manufacture, distribute and service custom and other highly-engineered pumps and pump systems, mechanical seals and auxiliary systems (collectively referred to as "original equipment"). EPD includes longer lead time, highly-engineered pump products and mechanical seals that are generally manufactured within shorter lead times. EPD also manufactures replacement parts and related equipment and provides aftermarket services. EPD primarily operates in the oil and gas, petrochemical, chemical, power generation, water management and other general industries. EPD operates in 47 countries with 28 manufacturing facilities worldwide, eight of which are located in Europe, nine in North America, six in Asia and five in Latin America, and it has 119 QRCs, including those co-located in manufacturing facilities.

EPD

2018 2017 2016

(Amounts in millions, except percentages)

Bookings	\$1,995.1	\$1,842.1	\$1,823.8
Sales	1,899.2	1,775.4	1,996.0
Gross profit	586.0	545.9	624.0
Gross profit margin	30.9 %	30.7 %	31.3 %
SG&A	390.5	399.3	457.6
Loss on sale of business	—	—	(7.7)
Segment operating income	206.9	159.1	171.1
Segment operating income as a percentage of sales	10.9 %	9.0 %	8.6 %
Backlog (at period end)	922.6	1,027.7	966.8

Bookings in 2018 increased by \$153.0 million, or 8.3%, as compared with 2017, which included 2017 bookings for an order of approximately \$80 million to provide pumps and related equipment for the Hengli Integrated Refining Complex Project in China that did not recur. The increase included currency benefits of approximately \$7 million. The increase in customer bookings was primarily driven by the oil and gas, water management and general industries. Increased customer bookings of \$78.1 million into Europe, \$64.8 million into the Middle East and \$58.3 million into North America were partially offset by decreased customer bookings of \$27.1 million into Asia Pacific and \$18.3 million into Africa. The increase was driven by increased customer aftermarket bookings. Of the \$2.0 billion of bookings in 2018, approximately 51% were from oil and gas, 17% from chemical, 17% from general industries, 12%

from power generation and 3% from water management.

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Interdivision bookings (which are eliminated and are not included in consolidated bookings as disclosed above) decreased \$1.3 million.

Bookings in 2017 increased by \$18.3 million, or 1.0%, as compared with 2016 and included an order for approximately \$80 million to provide pumps and related equipment for the Hengli Integrated Refining Complex Project in China. The increase included currency benefits of approximately \$11 million. The increase in customer bookings was primarily driven by the oil and gas and chemical industries, partially offset by a decrease in the power generation and general industries. Customer bookings increased \$112.8 million into Asia Pacific and \$39.0 million into Africa and were partially offset by decreased customer bookings of \$60.1 million into the Middle East, \$46.9 million into Europe, \$20.0 million into North America and \$18.4 million into Latin America. The increase was driven by customer original equipment bookings. Of the \$1.8 billion of bookings in 2017, approximately 51% were from oil and gas, 19% from chemical, 17% from general industries and 13% from power generation. Interdivision bookings (which are eliminated and are not included in consolidated bookings as disclosed above) increased \$6.6 million.

Sales in 2018 increased \$123.8 million, or 7.0%, as compared with 2017. The increase included currency benefits of approximately \$12 million. The increase was more heavily-weighted towards aftermarket sales, resulting from increased customer sales of \$57.7 million into Asia Pacific, \$51.9 million into Africa, \$50.6 million into Latin America and \$49.2 million into North America that were partially offset by decreased sales of \$73.0 million into the Middle East and \$11.4 million into the Europe. The impact of the adoption of the New Revenue Standard increased sales by approximately \$44 million for the year ended December 31, 2018. Interdivision sales (which are eliminated and are not included in consolidated sales as disclosed above) increased \$1.4 million.

Sales in 2017 decreased \$220.6 million, or 11.1%, as compared with 2016. The decrease included currency benefits of approximately \$13 million. The decrease was more heavily weighted towards customer original equipment sales, resulting from decreased customer sales of \$129.2 million into North America, \$64.0 million into Latin America, \$15.0 million into Europe, \$11.2 million into the Middle East and \$6.3 million into Africa. Interdivision sales (which are eliminated and are not included in consolidated sales as disclosed above) increased \$4.5 million. Gross profit in 2018 increased by \$40.1 million, or 7.3%, as compared with 2017. Gross profit margin in 2018 of 30.9% increased from 30.7% in 2017. The increase in gross profit margin was primarily attributable to the favorable impact of increased sales on our absorption of fixed manufacturing costs and increased savings achieved related to our Realignment Programs, partially offset by increased charges related to our Realignment Programs and revenue recognized on lower margin projects. The impact of the adoption of the New Revenue Standard had a slightly favorable impact on gross profit margin.

Gross profit in 2017 decreased by \$78.1 million, or 12.5%, as compared with 2016. Gross profit margin in 2017 of 30.7% decreased from 31.3% in 2016. The decrease in gross profit margin was primarily attributable to the negative impact of decreased sales on our absorption of fixed manufacturing costs and lower margin projects that shipped from backlog, partially offset by lower costs and increased savings related to our Realignment Programs, a mix shift to higher margin aftermarket sales and \$10.9 million of charges to write down inventory in Brazil in 2016 that did not recur.

SG&A in 2018 decreased by \$8.8 million, or 2.2%, as compared with 2017. Currency effects provided an increase of approximately \$2 million. The decrease in SG&A is primarily attributable to a \$26.0 million impairment charge related to our manufacturing facility in Brazil in 2017 that did not recur, lower bad debt expense and decreased charges related to our Realignment Programs, partially offset by higher selling and administrative related expenses. SG&A in 2017 decreased by \$58.3 million, or 12.7%, as compared with 2016. Currency effects provided an increase of approximately \$2 million. The decrease in SG&A is primarily due to EPD's \$71.2 million portion of the \$73.5 million reserve established for our primary Venezuelan customer in the third quarter of 2016 that did not recur and increased savings related to our Realignment Programs, partially offset by a \$26.0 million impairment charge in the second quarter of 2017 related to our manufacturing facility in Brazil.

Operating income in 2018 increased by \$47.8 million, or 30.0%, as compared with 2017. The increase included currency benefits of approximately \$1 million. The increase was due to the \$40.1 million increase in gross profit and the \$8.8 million decrease in SG&A.

Operating income in 2017 decreased by \$12.0 million, or 7.0%, as compared with 2016. The decrease included currency benefits of approximately \$1 million. The decrease was due to the \$78.1 million decrease in gross profit, partially offset by a \$58.3 million decrease in SG&A .

Backlog of \$922.6 million at December 31, 2018 decreased by \$105.1 million, or 10.2%, as compared with December 31, 2017. The impact of the initial adoption of the New Revenue Standard reduced backlog by approximately \$181

million at January 1, 2018. Currency effects provided a decrease of approximately \$53 million. Backlog at December 31, 2018 included \$15.3 million of interdivision backlog (which is eliminated and not included in consolidated backlog as disclosed above). Backlog of \$1.0 billion at December 31, 2017 increased by \$58.9 million, or 6.1%, as compared with December 31, 2016. Currency effects provided an increase of approximately \$52 million. Backlog at December 31, 2017 included \$16.0 million of interdivision backlog (which is eliminated and not included in consolidated backlog as disclosed above).

Industrial Product Division Segment Results

Through IPD we design, manufacture, distribute and service engineered and pre-configured industrial pumps and pump systems, collectively referred to as "original equipment." Additionally, IPD manufactures replacement parts and related equipment, and provides a full array of support services, collectively referred to as "aftermarket". IPD primarily operates in the chemical, oil and gas, water resources, power and general industries. IPD operates 16 manufacturing facilities, five of which are located in the U.S and six in Europe and four in Asia and it operates 29 QRCs worldwide, including 18 sites in Europe and five in the U.S., three in Asia and two in Latin America and including those co-located in manufacturing facilities and/or shared with EPD.

	IPD		
	2018	2017	2016
	(Amounts in millions, except percentages)		
Bookings	\$838.5	\$821.7	\$797.7
Sales	799.4	775.2	835.1
Gross profit	189.4	144.1	183.2
Gross profit margin	23.7 %	18.6 %	21.9 %
SG&A	188.4	193.7	189.3
Loss on sale of business	(7.7)	—	—
Segment operating loss	(6.2)	(48.8)	(5.2)
Segment operating loss as a percentage of sales	(0.8)%	(6.3)%	(0.6)%
Backlog (at period end)	394.0	424.3	375.6

Bookings in 2018 increased by \$16.8 million, or 2.0%, as compared with 2017. The increase included currency benefits of approximately \$12 million and was partially offset by approximately \$23 million in reduced bookings due to the divestiture of two IPD locations and related product lines in the third quarter of 2018. The increase in customer bookings was primarily driven by the chemical, power generation, and general industries, partially offset by a decrease in the water management industry. Increased customer bookings of \$22.0 million into Asia Pacific and \$13.4 million into Europe were partially offset by decreased bookings of \$14.6 million into North America and \$7.4 million into Latin America. The increase was in both customer original equipment and aftermarket bookings. Of the \$838.5 million of bookings in 2018, approximately 44% were from general industries, 21% from chemical, 16% from oil and gas, 12% from water management and 7% from power generation. Interdivision bookings (which are eliminated and are not included in consolidated bookings as disclosed above) increased \$6.9 million.

Bookings in 2017 increased by \$24.0 million, or 3.0%, as compared with 2016. The increase included currency benefits of approximately \$7 million. The increase in customer bookings was primarily driven by the oil and gas and general industries, partially offset by a decrease in the chemical industry. Bookings increased \$23.8 million into Europe, \$19.3 million into Latin America and \$12.6 million into North America and were partially offset by decreased bookings of \$22.5 million into the Middle East and \$18.2 million into Asia Pacific. The increase was driven by customer original equipment bookings. Of the \$821.7 million of bookings in 2017, approximately 45% were from general industries, 19% from chemical, 17% from oil and gas, 13% from water management and 6% from power generation. Interdivision bookings (which are eliminated and are not included in consolidated bookings as disclosed above) increased \$1.7 million.

Sales in 2018 increased by \$24.2 million, or 3.1%, as compared with 2017. The increase included currency benefits of approximately \$11 million and was partially offset by approximately \$19 million in reduced sales due to the

divestiture of two IPD locations and related product lines in the third quarter of 2018. The increase was more heavily-weighted towards aftermarket sales. Customer sales increased \$16.9 million into North America, \$8.9 million into Europe and \$3.9 million into Africa, partially offset by decreased sales of \$9.4 million into the Middle East. The impact of the adoption of the New

Revenue Standard increased sales by approximately \$19 million for the year ended December 31, 2018. Interdivision sales (which are eliminated and are not included in consolidated sales as disclosed above) increased \$3.9 million.

Sales in 2017 decreased by \$59.9 million, or 7.2%, as compared with 2016. The decrease included currency benefits of approximately \$8 million and was driven by decreased customer original equipment sales. Customer sales decreased \$35.0 million into Asia Pacific, \$26.0 million into North America, \$14.1 million into Africa and \$5.7 million into Latin America, partially offset by increased sales of \$10.0 million into the Middle East and \$7.4 million into Europe. Interdivision sales (which are eliminated and are not included in consolidated sales as disclosed above) increased \$0.4 million.

Gross profit in 2018 increased by \$45.3 million, or 31.4%, as compared with 2017. Gross profit margin in 2018 of 23.7% increased from 18.6% in 2017. The increase in gross profit margin was primarily attributable to a \$16.9 million charge for costs related to a contract to supply oil and gas platform equipment to an end user in Latin America in 2017 that did not recur, lower charges and increased savings related to our Realignment Programs and revenue recognized on higher margin projects, partially offset by a \$7.7 million charge for cost incurred related to the write-down of inventory associated with the divestiture of two IPD locations and related product lines.

Gross profit in 2017 decreased by \$39.1 million, or 21.3%, as compared with 2016. Gross profit margin in 2017 of 18.6% decreased from 21.9% in 2016. The decrease in gross profit margin was primarily attributable to a \$16.9 million charge in the second quarter of 2017 for costs incurred related to a contract to supply oil and gas platform equipment to an end user in Latin America and the negative impact of decreased sales on our absorption of fixed manufacturing costs, partially offset by lower charges and increased savings related to our Realignment Programs. SG&A in 2018 decreased by \$5.3 million, or 2.7%, as compared with 2017. Currency effects provided an increase of \$3.0 million. The decrease in SG&A was primarily due to lower charges and increased savings related to our Realignment Programs compared to 2017, partially offset by an impairment charge on long-lived assets related to the divestiture of two IPD locations and related product lines of \$9.7 million.

SG&A in 2017 increased by \$4.4 million, or 2.3%, as compared with the same period in 2016. Currency effects provided an increase of approximately \$2 million. The increase in SG&A is primarily due to increased charges related to our Realignment Programs which were partially offset by increased savings related to our Realignment Programs. The loss on sale of businesses in 2018 of \$7.7 million resulted from the divestiture of two IPD locations and related product lines. Refer to Note 3 to our consolidated financial statements included in Item 8 of this Annual Report for additional information on this divestiture.

Operating loss for 2018 decreased by \$42.6 million, or 87.3%, as compared with 2017. The decrease included negative currency effects of approximately \$2 million. The decrease was primarily due to the \$45.3 million increase in gross profit and a \$5.3 million decrease in SG&A, partially offset by a \$7.7 million loss from the divestiture of two IPD locations and related product lines.

Operating loss for 2017 increased by \$43.6 million, or 838.5%, as compared with 2016. The increase included negative currency effects of approximately \$1 million. The increase was primarily due to the \$39.1 million decrease in gross profit and a \$4.4 million increase in SG&A.

Backlog of \$394.0 million at December 31, 2018 decreased by \$30.3 million, or 7.1%, as compared with December 31, 2017. The impact of the initial adoption of the New Revenue Standard reduced backlog by approximately \$34 million at January 1, 2018. Currency effects provided a decrease of approximately \$13 million. Backlog at December 31, 2018 included \$17.2 million of interdivision backlog (which is eliminated and not included in consolidated backlog as disclosed above). Backlog of \$424.3 million at December 31, 2017 increased by \$48.7 million, or 13.0%, as compared with December 31, 2016. Currency effects provided an increase of approximately \$38 million. Backlog at December 31, 2017 included \$17.3 million of interdivision backlog (which is eliminated and not included in consolidated backlog as disclosed above).

Flow Control Division Segment Results

Our second largest business segment is FCD, which designs, manufactures and distributes a broad portfolio of engineered-to-order and configured-to-order isolation valves, control valves, valve automation products, boiler controls and related services. FCD leverages its experience and application know-how by offering a complete menu of engineered services to complement its expansive product portfolio. FCD has a total of 47 manufacturing facilities and

QRCs in 21 countries around the world, with five of its 21 manufacturing operations located in the U.S., 10 located in Europe and five located in Asia Pacific. Based on independent industry sources, we believe that FCD is the third largest industrial valve supplier on a global basis.

	FCD					
	2018		2017		2016	
	(Amounts in millions, except percentages)					
Bookings	\$1,274.3		\$1,225.7		\$1,216.8	
Sales	1,215.8		1,188.1		1,233.7	
Gross profit	416.9		396.7		429.9	
Gross profit margin	34.3	%	33.4	%	34.8	%
SG&A	215.0		213.6		226.9	
Gain on sale of businesses	—		141.3		—	
Segment operating income	201.2		323.7		202.6	
Segment operating income as a percentage of sales	16.5	%	27.2	%	16.4	%
Backlog (at period end)	608.4		617.4		584.5	

Bookings in 2018 increased \$48.6 million, or 4.0%, as compared with 2017. The increase included currency benefits of approximately \$11 million. The increase in customer bookings in the general, oil and gas and chemical industries were partially offset by decreases in the power generation and water management industries. Increased customer bookings of \$78.7 million into North America and \$17.4 million into Asia Pacific were partially offset by decreased bookings of \$27.7 million into Europe and \$18.0 million into the Middle East. The increase was driven by both customer original equipment and aftermarket bookings. Of the \$1.3 billion of bookings in 2018, approximately 33% were from oil and gas, 29% from chemical, 27% from general industries and 11% from power generation.

Bookings in 2017 increased \$8.9 million, or 0.7%, as compared with 2016. The increase included currency benefits of approximately \$9 million. The increase in customer bookings was primarily driven by the oil and gas, water management and power generation industries and was partially offset by decreased customer bookings in general industries. Increased customer bookings of \$43.2 million into North America, \$39.4 million into Asia Pacific and \$10.0 million into Africa were largely offset by decreased bookings of \$66.8 million into Europe and \$18.8 million into Latin America. The increase was driven by customer aftermarket bookings. Of the \$1.2 billion of bookings in 2017, approximately 32% were from oil and gas, 29% from chemical, 21% from general industries, 16% from power generation and 2% from water management.

Sales in 2018 increased by \$27.7 million, or 2.3%, as compared with 2017. The increase included currency benefits of approximately \$8 million and was driven by increased customer original equipment sales. Sales increased \$62.4 million into North America, \$40.1 million into Asia Pacific and \$7.9 million into Africa, partially offset by a decreased customer sales of \$46.0 million into Europe, \$25.1 million into the Middle East and \$10.8 million into Latin America. The impact of the adoption of the New Revenue Standard increased sales by approximately \$8 million for the year ended December 31, 2018.

Sales in 2017 decreased by \$45.6 million, or 3.7%, as compared with 2016. The decrease included currency benefits of approximately \$13 million and was driven by decreased customer original equipment sales.

Sales decreased \$21.4 million into Europe, \$17.7 million into the Middle East and \$16.1 million into Latin America, partially offset by an increase of \$6.8 million into Asia Pacific.

Gross profit in 2018 increased by \$20.2 million, or 5.1%, as compared with 2017. Gross profit margin in 2018 of 34.3% increased from 33.4% in 2017. The increase in gross profit margin was primarily attributable to the positive impact of increased sales on our absorption of fixed manufacturing costs and decreased charges and increased savings achieved related to our Realignment Programs compared to the same period in 2017. The impact of the adoption of the New Revenue Standard had a slightly unfavorable impact on gross profit margin.

Gross profit in 2017 decreased by \$33.2 million, or 7.7%, as compared with 2016. Gross profit margin in 2017 of 33.4% decreased from 34.8% in 2016. The decrease in gross profit margin was primarily attributable to the negative impact of decreased sales on our absorption of fixed manufacturing costs and lower margin projects shipped

from backlog, partially offset by increased savings achieved related to our Realignment Programs compared to the same period in 2016.

SG&A in 2018 increased by \$1.4 million, or 0.7% as compared with 2017. Currency effects provided an increase of approximately \$2 million. The increase in SG&A was primarily due to higher selling and administrative related expenses, partially offset by lower charges and increased savings related to our Realignment Programs compared to 2017.

SG&A in 2017 decreased by \$13.3 million, or 5.9%, as compared with 2016. Currency effects provided an increase of approximately \$1 million. The decrease in SG&A was primarily due to reduced sales-related expenses and savings achieved related to our Realignment Programs compared to the same period in 2016.

The gain on sale of businesses in 2017 was the result of the \$141.3 million gain from the sales of the Gestra and Vogt businesses. See Note 3 to our consolidated financial statements included in Item 8 of this Annual Report for additional information on these sales.

Operating income in 2018 decreased by \$122.5 million, or 37.8%, as compared with 2017. The decrease included negative currency effects of approximately \$1 million. The decrease was due to the \$141.3 million gain from the sales of the Gestra and Vogt businesses in 2017, which was partially offset by the \$20.2 million increase in gross profit. Operating income in 2017 increased by \$121.1 million, or 59.8%, as compared with 2016. The increase included currency benefits of approximately \$2 million. The increase was primarily attributable to the \$141.3 million of gain from the sales of the Gestra and Vogt businesses and a decrease in SG&A of \$13.3 million, partially offset by the \$33.2 million decrease in gross profit.

Backlog of \$608.4 million at December 31, 2018 decreased by \$9.0 million, or 1.5%, as compared with December 31, 2017. The impact of the initial adoption of the New Revenue Standard reduced backlog by approximately \$35 million at January 1, 2018. Currency effects provided a decrease of approximately \$17 million. Backlog of \$617.4 million at December 31, 2017 increased by \$32.9 million, or 5.6%, as compared with December 31, 2016. Currency effects provided an increase of approximately \$20 million.

LIQUIDITY AND CAPITAL RESOURCES

Cash Flow Analysis

	2018	2017	2016
	(Amounts in millions)		
Net cash flows provided by operating activities	\$190.8	\$311.1	\$240.5
Net cash flows (used) provided by investing activities	(81.5)	176.6	(91.5)
Net cash flows used by financing activities	(173.3)	(185.4)	(143.7)

Existing cash, cash generated by operations and borrowings available under our existing revolving credit facility are our primary sources of short-term liquidity. We monitor the depository institutions that hold our cash and cash equivalents on a regular basis, and we believe that we have placed our deposits with creditworthy financial institutions. Our sources of operating cash generally include the sale of our products and services and the conversion of our working capital, particularly accounts receivable and inventories. Our total cash balance at December 31, 2018 was \$619.7 million, compared with \$703.4 million at December 31, 2017 and \$367.2 million at December 31, 2016. Our cash provided by operating activities was \$190.8 million, \$311.1 million and \$240.5 million in 2018, 2017 and 2016, respectively, which provided cash to support short-term working capital needs. Cash flow used by working capital increased in 2018 due primarily to cash used by higher inventory of \$29.3 million, higher accounts receivable of \$25.4 million, higher contract assets of \$23.7 million and lower accrued liabilities and income taxes payable of \$18.2 million, partially offset by cash provided by higher contract liabilities of \$33.7 million. Cash flow provided by working capital increased in 2017 due primarily to cash provided by lower accounts receivable of \$60.2 million, lower inventory of \$48.6 million and higher accounts payable of \$12.4 million. During 2018, we contributed \$48.1 million to our defined benefit pension plans as compared to \$44.9 million in 2017.

Increases in accounts receivable used \$25.4 million of cash flow in 2018, as compared with cash provided of \$60.2 million in 2017 and \$36.9 million in 2016. The increase in cash used by accounts receivable in 2018 was partially attributable to higher sales during the period as compared to the same period in 2017. For the fourth quarter of 2018 our days' sales outstanding ("DSO") was 72 days as compared to 75 days for 2017 and 74 days for 2016. The adoption of the New Revenue Standard as of January 1, 2018 had an estimated favorable impact of 3 days on DSO as of December 31, 2018. We have not experienced a significant increase in customer payment defaults in 2018.

Increases in inventory used \$29.3 million of cash flow in 2018 as compared with cash provided of \$48.6 million and \$52.9 million in 2017 and 2016, respectively. The use of cash from inventory in 2018 was primarily due to decreased progress billings and in 2017 the cash provided was due to decreased work in process and finished goods inventory. Inventory turns were 4.2 times at December 31, 2018, as compared with 3.3 times for both 2017 and 2016. The adoption of the New Revenue Standard as of January 1, 2018 had an estimated favorable impact of approximately 1.1 times on our inventory turn calculation as of December 31, 2018. Our calculation of inventory turns does not reflect the impact of advanced cash received from our customers.

Increases in contract assets used \$23.7 million of cash flow and increases in contract liabilities provided \$33.7 million of cash flow in 2018.

Decreases in accounts payable used \$4.8 million of cash flow in 2018 compared with cash provided of \$12.4 million in 2017 and cash used of \$71.0 million in 2016. Decreases in accrued liabilities and income taxes payable used \$18.2 million of cash flow in 2018 compared with \$3.4 million in 2017 and \$88.8 million in 2016.

Cash flows used by investing activities were \$81.5 million in 2018, as compared to cash provided of \$176.6 million and cash used of \$91.5 million in 2017 and 2016, respectively. The decrease of cash provided in 2018 was primarily due to \$232.8 million in net proceeds from the sale of our Gestra and Vogt businesses in 2017 that did not recur. Capital expenditures were \$84.0 million, \$61.6 million and \$89.7 million in 2018, 2017 and 2016, respectively. In 2019, we currently estimate capital expenditures to be between \$90 million and \$100 million before consideration of any acquisition activity.

Cash flows used by financing activities were \$173.3 million in 2018 compared to \$185.4 million and \$143.7 million in 2017 and 2016, respectively. Cash outflows during 2018 resulted primarily from \$99.4 million of dividend payments and \$60.0 million in payments on long-term debt. Cash outflows during 2017 resulted primarily from \$99.2 million of dividend payments and \$60.0 million in payments on long-term debt. Cash outflows during 2016 resulted primarily from \$97.7 million of dividend payments and \$60.0 million in payments on long-term debt.

We have maintained our previously-announced policy of annually returning 40% to 50% of running two-year average net earnings to shareholders following attainment of the previously announced target leverage ratio. We had no share repurchase activity in 2018, 2017 or 2016 and as of December 31, 2018 we had \$160.7 million of remaining capacity under our share repurchase plan previously approved by the Board of Directors. While we intend to adhere to this policy for the foreseeable future, any future returns of cash through dividends and/or share repurchases, will be reviewed individually, declared by our Board of Directors and implemented by management at its discretion, depending on our financial condition, business opportunities and market conditions at such time.

Our cash needs for the next 12 months are expected to be lower than those of 2018 due to our Realignment Programs being substantially completed and anticipated benefits from working capital reductions. We believe cash flows from operating activities, combined with availability under our Revolving Credit Facility and our existing cash balances, will be sufficient to enable us to meet our cash flow needs for the next 12 months. However, cash flows from operations could be adversely affected by a decrease in the rate of general global economic growth and an extended decrease in capital spending of our customers, as well as economic, political and other risks associated with sales of our products, operational factors, competition, regulatory actions, fluctuations in foreign currency exchange rates and fluctuations in interest rates, among other factors. We believe that cash flows from operating activities and our expectation of continuing availability to draw upon our credit agreements are also sufficient to meet our cash flow needs for periods beyond the next 12 months.

Dispositions

We regularly evaluate acquisition opportunities of various sizes. The cost and terms of any financing to be raised in conjunction with any acquisition, including our ability to raise economical capital, is a critical consideration in any such evaluation.

Note 3 to our consolidated financial statements included in Item 8 of this Annual Report contains a discussion of our disposition activity.

Financing

Our amended credit agreement provides for a \$195.0 million term loan (“Term Loan Facility”) and a \$800.0 million revolving credit facility (“Revolving Credit Facility” and, together with the Term Loan Facility, the “Senior Credit Facility”) with a maturity of October 14, 2020. The current Senior Credit Facility includes the following: (i) leverage

ratio of 4.00 times debt to total Consolidated EBITDA through June 30, 2019, with a step-down to 3.75 for any fiscal quarter ending after July

1, 2019, (ii) a pricing level on our senior unsecured long-term debt ratings at or below Ba2/BB, with an interest rate margin for LIBOR loans of 2.00% and for base rate loans of 1.00% and (iii) maximum principal amount of priority debt up to 7.5% of the consolidated tangible assets and a maximum amount of receivables that can be securitized of \$100 million. Subject to certain conditions, including lender approval, we have the right to increase the amount of the Term Loan Facility or the Revolving Credit Facility by an aggregate amount not to exceed \$400.0 million. A discussion of our debt and related covenants is included in Note 11 to our consolidated financial statements included in Item 8 of this Annual Report. We were in compliance with all covenants as of December 31, 2018.

Certain financing arrangements contain provisions that may result in an event of default if there was a failure under other financing arrangements to meet payment terms or to observe other covenants that could result in an acceleration of payment due. Such provisions are referred to as "cross default" provisions. The Senior Credit Facility and the Senior Notes as described in Note 11 to our consolidated financial statements included in Item 8 of this Annual Report are cross-defaulted to each other.

The rating agencies assign credit ratings to certain of our debt. Our access to capital markets and costs of debt could be directly affected by our credit ratings. Any adverse action with respect to our credit ratings could generally cause borrowing costs to increase and the potential pool of investors and funding sources to decrease. In particular, a decline in credit ratings would increase the cost of borrowing under our Senior Credit Facility.

Liquidity Analysis

Our cash balance decreased by \$83.8 million to \$619.7 million as of December 31, 2018 as compared with December 31, 2017. The cash decrease included \$84.0 million in capital expenditures, \$99.4 million in dividend payments and \$60.0 million in payments on long-term debt, partially offset by \$190.8 million in operating cash inflows.

Approximately 57% of our currently outstanding Term Loan Facility and \$13.5 million of other short-term borrowings are due to mature in 2019 and 2020. Our Senior Credit Facility matures in October 2020. Our borrowing capacity is subject to financial covenant limitations based on the terms of our Senior Credit Facility and is also reduced by outstanding letters of credit. As of December 31, 2018, we had an available capacity of \$513.7 million, no borrowings outstanding and \$92.9 million of letters of credit outstanding under our Revolving Credit Facility. Our Revolving Credit Facility is committed and held by a diversified group of financial institutions. For additional information on our Senior Credit Facility, see Note 11 to our consolidated financial statements included in Item 8 of this Annual Report.

At December 31, 2018 and 2017, as a result of the values of the plan's assets and our contributions to the plan, our U.S. pension plan was fully-funded as defined by applicable law. After consideration of our intent to maintain fully funded status, we contributed \$20.0 million to our U.S. pension plan in 2018, excluding direct benefits paid of \$3.3 million. We continue to maintain an asset allocation consistent with our strategy to maximize total return, while reducing portfolio risks through asset class diversification.

OUTLOOK FOR 2019

Our future results of operations and other forward-looking statements contained in this Annual Report, including this MD&A, involve a number of risks and uncertainties — in particular, the statements regarding our goals and strategies, new product introductions, plans to cultivate new businesses, future economic conditions, revenue, pricing, gross profit margin and costs, capital spending, expected cost savings from our transformation and realignment programs, global economic and political risk, depreciation and amortization, research and development expenses, potential impairment of assets, tax rate and pending tax and legal proceedings. Our future results of operations may also be affected by employee incentive compensation including our annual program and the amount, type and valuation of share-based awards granted, as well as the amount of awards forfeited due to employee turnover. In addition to the various important factors discussed above, a number of other factors could cause actual results to differ materially from our expectations. See the risks described in "Item 1A. Risk Factors" as well as the section titled "Forward-Looking Information is Subject to Risk and Uncertainty" of this Annual Report.

Our bookings were \$4,019.8 million during 2018. Because a booking represents a contract that can be, in certain circumstances, modified or canceled, and can include varying lengths between the time of booking and the time of revenue recognition, there is no guarantee that bookings will result in comparable revenues or otherwise be indicative

of future results.

The outlook for the oil and gas industry is heavily dependent on the demand growth from both mature markets and developing geographies. In the short-term, we believe that stable oil prices will support oil and gas upstream and mid-stream investment and we further expect increased investment in later cycle downstream projects due to emerging market growth and certain regulatory requirements, such as IMO 2020. A recovery in the overall level of spending by oil and gas companies could continue to increase demand for our aftermarket products and services. We believe the medium and long-term

fundamentals for this industry remain attractive, and see a stabilized environment as the industry works through current excess supply. In addition, we believe projected depletion rates of existing fields and forecasted long-term demand growth will require additional investments. With our long-standing reputation in providing successful solutions for upstream, mid-stream and downstream applications, along with the advancements in our portfolio of offerings, we believe that we continue to be well-positioned to assist our customers in this improving environment. We expect a continued competitive economic environment in 2019. We anticipate benefits from the continuation of our Flowserve 2.0 Transformation efforts, end-user strategies, the strength of our high margin aftermarket business, continued disciplined cost management, our diverse customer base, our broad product portfolio and our unified operating platform. Similar to prior years, we expect our results will be weighted towards the second half of the year. While we believe that our primary markets continue to provide opportunities, we remain cautious in our outlook for 2019 given the continuing uncertainty of capital spending in many of our markets as well as economic and political risk associated with our international operations which could have a negative effect on global economic conditions.

On December 31, 2018, we had \$1,364.8 million of fixed-rate Senior Notes outstanding and \$104.8 million of variable-rate debt under our Term Loan Facility. As of December 31, 2018, we had no variable to fixed interest rate derivative contracts. Due to the fact that a portion of our debt carries a variable rate of interest, our debt is subject to volatility in rates, which could impact interest expense. We expect our interest expense in 2019 will be relatively consistent with amounts incurred in 2018. Our results of operations may also be impacted by unfavorable foreign currency exchange rate movements. See “Item 7A. Quantitative and Qualitative Disclosures about Market Risk” of this Annual Report.

We expect to generate sufficient cash from operations and have sufficient capacity under our Revolving Credit Facility to fund our working capital, capital expenditures, dividend payments, share repurchases, debt payments and pension plan contributions in 2019. The amount of cash generated or consumed by working capital is dependent on our level of revenues, customer cash advances, backlog, customer-driven delays and other factors. We will seek to improve our working capital utilization, with a particular focus on improving the management of accounts receivable and inventory. In 2019, our cash flows for investing activities will be focused on strategic initiatives, information technology infrastructure, general upgrades and cost reduction opportunities and we currently estimate capital expenditures to be between \$90 million and \$100 million, before consideration of any acquisition activity. We have \$60.0 million in scheduled principal repayments in 2019 under our Term Loan Facility, and we expect to comply with the covenants under our Senior Credit Facility in 2019. See Note 11 to our consolidated financial statements included in Item 8 of this Annual Report for further discussion of our debt covenants.

We currently anticipate that our minimum contribution to our qualified U.S. pension plan will be approximately \$20 million, excluding direct benefits paid, in 2019 in order to maintain fully-funded status as defined by applicable law. We currently anticipate that our contributions to our non-U.S. pension plans will be approximately \$9 million in 2019, excluding direct benefits paid.

CONTRACTUAL OBLIGATIONS AND COMMERCIAL COMMITMENTS

The following table presents a summary of our contractual obligations at December 31, 2018:

	Payments Due By Period				
	Within 1 Year	1-3 Years	3-5 Years	Beyond 5 Years	Total
	(Amounts in millions)				
Term Loan Facility and Senior Notes:	\$60.0	\$ 44.8	\$ 1,364.8	\$—	\$1,469.6
Fixed interest payments(1)	36.6	73.3	36.4	—	146.3
Variable interest payments(2)	3.5	0.9	—	—	4.4
Other debt and capital lease obligations	8.2	5.3	—	—	13.5
Operating leases	68.4	88.3	50.0	66.5	273.2
Purchase obligations:(3)					
Inventory	411.1	3.4	—	0.2	414.7
Non-inventory	39.2	0.1	0.3	—	39.6
Pension and postretirement benefits(4)	59.5	123.3	122.7	295.9	601.4
Total	\$686.5	\$ 339.4	\$ 1,574.2	\$ 362.6	\$2,962.7

(1) Fixed interest payments represent interest payments on the Senior Notes and Term Loan Facility as defined in Note 11 to our consolidated financial statements included in Item 8 of this Annual Report.

(2) Variable interest payments under our Term Loan Facility were estimated using a base rate of three-month LIBOR as of December 31, 2018.

(3) Purchase obligations are presented at the face value of the purchase order, excluding the effects of early termination provisions. Actual payments could be less than amounts presented herein.

Retirement and postretirement benefits represent estimated benefit payments for our U.S. and non-U.S. defined (4) benefit plans and our postretirement medical plans, as more fully described below and in Note 12 to our consolidated financial statements included in Item 8 of this Annual Report.

As of December 31, 2018, the gross liability for uncertain tax positions was \$41.2 million. We do not expect a material payment related to these obligations to be made within the next twelve months. We are unable to provide a reasonably reliable estimate of the timing of future payments relating to the uncertain tax positions.

The following table presents a summary of our commercial commitments at December 31, 2018:

	Commitment Expiration By Period				
	Within 1 Year	1-3 Years	3-5 Years	Beyond 5 Years	Total
	(Amounts in millions)				
Letters of credit	\$315.5	\$ 136.8	\$ 13.2	\$ 26.4	\$491.9
Surety bonds	94.6	1.0	8.9	—	104.5
Total	\$410.1	\$ 137.8	\$ 22.1	\$ 26.4	\$596.4

We expect to satisfy these commitments through performance under our contracts.

PENSION AND POSTRETIREMENT BENEFITS OBLIGATIONS**Plan Descriptions**

We and certain of our subsidiaries have defined benefit pension plans and defined contribution plans for full-time and part-time employees. Approximately 65% of total defined benefit pension plan assets and approximately 53% of defined benefit pension obligations are related to the U.S. qualified plan as of December 31, 2018. Unless specified otherwise, the references in this section are to all of our U.S. and non-U.S. plans. None of our common stock is directly held by these plans.

Our U.S. defined benefit plan assets consist of a balanced portfolio of equity and fixed income securities. Our non-U.S. defined benefit plan assets include a significant concentration of United Kingdom ("U.K.") fixed income securities, as discussed in Note 12 to our consolidated financial statements included in Item 8 of this Annual Report. We monitor investment allocations and manage plan assets to maintain acceptable levels of risk. At December 31, 2018, the estimated fair market value of U.S. and non-U.S. plan assets for our defined benefit pension plans decreased to \$658.0 million from \$713.5 million at December 31, 2017. Assets were allocated as follows:

	U.S. Plan	
Asset category	2018	2017
Cash and Cash Equivalents	1 %	1 %
Global Equity	30%	36 %
Global Real Assets	13%	12 %
Equity securities	43%	48 %
Diversified Credit	13%	12 %
Liability-Driven Investment	43%	39 %
Fixed income	56%	51 %

	Non-U.S. Plans	
Asset category	2018	2017
Cash and Cash Equivalents	7 %	3 %
North American Companies	3 %	3 %
Global Equity	2 %	3 %
Equity securities	5 %	6 %
U.K. Government Gilt Index	43%	41 %
U.K. Corporate Bond Index	—%	1 %
Global Fixed Income Bond	2 %	2 %
Liability-Driven Investment	9 %	9 %
Fixed income	54%	53 %
Multi-asset	19%	22 %
Buy-in Contract	10%	10 %
Other	5 %	6 %
Other Types	34%	38 %

The projected benefit obligation ("Benefit Obligation") for our defined benefit pension plans was \$809.2 million and \$875.3 million as of December 31, 2018 and 2017, respectively. Benefits under our defined benefit pension plans are based primarily on participants' compensation and years of credited service.

The estimated prior service cost and the estimated actuarial net loss for the defined benefit pension plans that will be amortized from accumulated other comprehensive loss into net pension expense in 2019 is approximately \$0.4 million and \$6.4 million, respectively. We amortize any estimated net gains or losses over the remaining expected service period or over the remaining expected lifetime for plans with only inactive participants.

We sponsor defined benefit postretirement medical plans covering certain current retirees and a limited number of future retirees in the U.S. These plans provide for medical and dental benefits and are administered through insurance companies. We fund the plans as benefits are paid, such that the plans hold no assets in any period presented.

Accordingly, we have no investment strategy or targeted allocations for plan assets. The benefits under the plans are not available to new employees or most existing employees.

The Benefit Obligation for our defined benefit postretirement medical plans was \$18.8 million and \$23.9 million as of December 31, 2018 and 2017, respectively. The estimated actuarial net gain for the defined benefit postretirement medical plans that will be amortized from accumulated other comprehensive loss into net pension expense in 2019 is \$0.2 million. The estimated prior service cost that is expected to be amortized from accumulated other comprehensive loss into pension expense in 2019 is \$0.1 million. We amortize any estimated net gain or loss over the remaining average life expectancy of approximately 11 years.

Accrual Accounting and Significant Assumptions

We account for pension benefits using the accrual method, recognizing pension expense before the payment of benefits to retirees. The accrual method of accounting for pension benefits requires actuarial assumptions concerning future events that will determine the amount and timing of the benefit payments.

Our key assumptions used in calculating our cost of pension benefits are the discount rate, the rate of compensation increase and the expected long-term rate of return on plan assets. We, in consultation with our actuaries, evaluate the key actuarial assumptions and other assumptions used in calculating the cost of pension and postretirement benefits, such as discount rates, expected return on plan assets for funded plans, mortality rates, retirement rates and assumed rate of compensation increases, and determine such assumptions as of December 31 of each year to calculate liability information as of that date and pension and postretirement expense for the following year. See discussion of our accounting for and assumptions related to pension and postretirement benefits in the “Our Critical Accounting Estimates” section of this MD&A.

In 2018, net pension expense for our defined benefit pension plans included in operating income was \$28.2 million compared with \$35.2 million in 2017 and \$37.5 million in 2016.

The following are assumptions related to our defined benefit pension plans as of December 31, 2018:

	U.S. Plan	Non-U.S. Plans
Weighted average assumptions used to determine Benefit Obligation:		
Discount rate	4.34%	2.42 %
Rate of increase in compensation levels	3.50	3.28
Weighted average assumptions used to determine 2018 net pension expense:		
Long-term rate of return on assets	6.00%	3.62 %
Discount rate	3.63	2.25
Rate of increase in compensation levels	4.01	3.25
The following provides a sensitivity analysis of alternative assumptions on the U.S. qualified and aggregate non-U.S. pension plans and U.S. postretirement plans.		

Effect of Discount Rate Changes and Constancy of Other Assumptions:

	0.5% Increase (Amounts in millions)	0.5% Decrease
U.S. defined benefit pension plan:		
Effect on net pension expense	\$(1.4)	\$ 1.4
Effect on Benefit Obligation	(16.2)	17.5
Non-U.S. defined benefit pension plans:		
Effect on net pension expense	(1.0)	0.9
Effect on Benefit Obligation	(26.7)	30.2
U.S. Postretirement medical plans:		
Effect on postretirement medical expense	(0.1)	0.1
Effect on Benefit Obligation	(0.5)	0.6
Effect of Changes in the Expected Return on Assets and Constancy of Other Assumptions:		
	0.5% Increase	0.5% Decrease
(Amounts in millions)		
U.S. defined benefit pension plan:		
Effect on net pension expense	\$ (2.1)	\$ 2.1

Non-U.S.

defined

benefit

pension

plans:

Effect on net

pension (1.2) 1.2

expense

As discussed below, accounting principles generally accepted in the U.S. ("U.S. GAAP") provide that differences between expected and actual returns are recognized over the average future service of employees or over the remaining expected lifetime for plans with only inactive participants.

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At December 31, 2018, as compared with December 31, 2017, we increased our discount rate for the U.S. plan from 3.63% to 4.34% based on an analysis of publicly-traded investment grade U.S. corporate bonds, which had higher yields due to current market conditions. The average discount rate for the non-U.S. plans increased from 2.25% to 2.42% based on analysis of bonds and other publicly-traded instruments, by country, which had higher yields due to market conditions. The average assumed rate of compensation decreased from 4.01% to 3.50% for the U.S. plan and increased to 3.28% from 3.25% for our non-U.S. plans. To determine the 2018 pension expense, the expected rate of return on U.S. plan assets remained constant at 6.00% and we decreased our average rate of return on non-U.S. plan assets from 3.88% to 3.62%, primarily based on our target allocations and expected long-term asset returns. As the expected rate of return on plan assets is long-term in nature, short-term market changes do not significantly impact the rate. For all U.S. plans, we adopted the RP-2006 mortality tables and the MP-2018 improvement scale published in October 2018. We applied the RP-2006 tables based on the constituency of our plan population for union and non-union participants. We adjusted the improvement scale to utilize 75% of the ultimate improvement rate, consistent with assumptions adopted by the Social Security Administration trustees, based on long-term historical experience. Currently, we believe this approach provides the best estimate of our future obligation. Most plan participants elect to receive plan benefits as a lump sum at the end of service, rather than an annuity. As such, the updated mortality tables had an immaterial effect on our pension obligation.

We expect that the net pension expense for our defined benefit pension plans included in earnings before income taxes will be approximately \$0.6 million higher in 2019 than the \$28.2 million in 2018, primarily due to a decrease in the amortization of actuarial gains and losses and no anticipated special events. We have used discount rates of 4.34%, 2.42% and 4.20% at December 31, 2018, in calculating our estimated 2019 net pension expense for U.S. pension plans, non-U.S. pension plans and postretirement medical plans, respectively.

The assumed ranges for the annual rates of increase in health care costs were 7.0% for 2018, 7.0% for 2017 and 7.5% for 2016, with a gradual decrease to 5.0% for 2029 and future years. If actual costs are higher than those assumed, this will likely put modest upward pressure on our expense for retiree health care.

Plan Funding

Our funding policy for defined benefit plans is to contribute at least the amounts required under applicable laws and local customs. We contributed \$48.1 million, \$44.9 million and \$46.8 million to our defined benefit plans in 2018, 2017 and 2016, respectively. After consideration of our intent to remain fully-funded based on standards set by law, we currently anticipate that our contribution to our U.S. pension plan in 2019 will be approximately \$20 million, excluding direct benefits paid. We expect to contribute approximately \$9 million to our non-U.S. pension plans in 2019, excluding direct benefits paid.

For further discussion of our pension and postretirement benefits, see Note 12 to our consolidated financial statements included in Item 8 of this Annual Report.

OUR CRITICAL ACCOUNTING ESTIMATES

The process of preparing financial statements in conformity with U.S. GAAP requires the use of estimates and assumptions to determine reported amounts of certain assets, liabilities, revenues and expenses and the disclosure of related contingent assets and liabilities. These estimates and assumptions are based upon information available at the time of the estimates or assumptions, including our historical experience, where relevant. The most significant estimates made by management include: timing and amount of revenue recognition; deferred taxes, tax valuation allowances and tax reserves; reserves for contingent loss; pension and postretirement benefits; and valuation of goodwill, indefinite-lived intangible assets and other long-lived assets. The significant estimates are reviewed at least annually if not quarterly by management. Because of the uncertainty of factors surrounding the estimates, assumptions and judgments used in the preparation of our financial statements, actual results may differ from the estimates, and the difference may be material.

Our critical accounting policies are those policies that are both most important to our financial condition and results of operations and require the most difficult, subjective or complex judgments on the part of management in their application, often as a result of the need to make estimates about the effect of matters that are inherently uncertain. We believe that the following represent our critical accounting policies. For a summary of all of our significant accounting policies, see Note 1 to our consolidated financial statements included in Item 8 of this Annual Report. Management

and our external auditors have discussed our critical accounting estimates and policies with the Audit Committee of our Board of Directors.

Revenue Recognition

Effective January 1, 2018, we adopted ASU No. 2014-09, "Revenue from Contracts with Customers (Topic 606)" and all related ASUs ("New Revenue Standard"), using the modified retrospective method for transition. For a discussion related to our adoption of the New Revenue Standard requirements refer to Note 1 included in Item 8 of this Annual Report.

We recognize revenue either over time or at a point in time, depending on the specific facts and circumstances for each contract, including the terms and conditions of the contract as agreed with the customer and the nature of the products or services to be provided.

Our primary method for recognizing revenue over time is the percentage of completion ("POC") method, whereby progress towards completion is measured by applying an input measure based on costs incurred to date relative to total estimated costs at completion. If control of the products and/or services does not transfer over time, then control transfers at a point in time. We determine the point in time that control transfers to a customer based on the evaluation of specific indicators, such as title transfer, risk of loss transfer, customer acceptance and physical possession. For a discussion related to revenue recognition refer to Note 2 included in Item 8 of this Annual Report.

Deferred Taxes, Tax Valuation Allowances and Tax Reserves

We recognize valuation allowances to reduce the carrying value of deferred tax assets to amounts that we expect are more likely than not to be realized. Our valuation allowances primarily relate to the deferred tax assets established for certain tax credit carryforwards and net operating loss carryforwards for non-U.S. subsidiaries, and we evaluate the realizability of our deferred tax assets by assessing the related valuation allowance and by adjusting the amount of these allowances, if necessary. We assess such factors as our forecast of future taxable income and available tax planning strategies that could be implemented to realize the net deferred tax assets in determining the sufficiency of our valuation allowances. Failure to achieve forecasted taxable income in the applicable tax jurisdictions could affect the ultimate realization of deferred tax assets and could result in an increase in our effective tax rate on future earnings. Implementation of different tax structures in certain jurisdictions could, if successful, result in future reductions of certain valuation allowances.

The amount of income taxes we pay is subject to ongoing audits by federal, state and foreign tax authorities, which often result in proposed assessments. Significant judgment is required in determining income tax provisions and evaluating tax positions. We establish reserves for open tax years for uncertain tax positions that may be subject to challenge by various tax authorities. The consolidated tax provision and related accruals include the impact of such reasonably estimable losses and related interest and penalties as deemed appropriate. Tax benefits recognized in the financial statements from uncertain tax positions are measured based on the largest benefit that has a greater than fifty percent likelihood of being realized upon ultimate settlement.

While we believe we have adequately provided for any reasonably foreseeable outcome related to these matters, our future results may include favorable or unfavorable adjustments to our estimated tax liabilities. To the extent that the expected tax outcome of these matters changes, such changes in estimate will impact the income tax provision in the period in which such determination is made.

Reserves for Contingent Loss

Liabilities are recorded for various contingencies arising in the normal course of business when it is both probable that a loss has been incurred and such loss is reasonably estimable. Assessments of reserves are based on information obtained from our independent and in-house experts, including recent legal decisions and loss experience in similar situations. The recorded legal reserves are susceptible to changes due to new developments regarding the facts and circumstances of each matter, changes in political environments, legal venue and other factors. Recorded environmental reserves could change based on further analysis of our properties, technological innovation and regulatory environment changes.

Estimates of liabilities for unsettled asbestos-related claims are based on known claims and on our experience during the preceding two years for claims filed, settled and dismissed, with adjustments for events deemed unusual and unlikely to recur. A substantial majority of our asbestos-related claims are covered by insurance or indemnities.

Estimated indemnities and receivables from insurance carriers for unsettled claims and receivables for settlements and legal fees paid by us for asbestos-related claims are estimated using our historical experience with insurance recovery rates and estimates of future recoveries, which include estimates of coverage and financial viability of our insurance

carriers. We have claims pending against certain insurers that, if resolved more favorably than estimated future recoveries, would result in discrete gains in the applicable quarter. We are currently unable to estimate the impact, if any, of unasserted asbestos-related claims, although future claims would also be subject to existing indemnities and insurance coverage. Changes in claims filed, settled and

dismissed and differences between actual and estimated settlement costs and insurance or indemnity recoveries could impact future expense.

Pension and Postretirement Benefits

We provide pension and postretirement benefits to certain of our employees, including former employees, and their beneficiaries. The assets, liabilities and expenses we recognize and disclosures we make about plan actuarial and financial information are dependent on the assumptions and estimates used in calculating such amounts. The assumptions include factors such as discount rates, health care cost trend rates, inflation, expected rates of return on plan assets, retirement rates, mortality rates, turnover, rates of compensation increases and other factors. The assumptions utilized to compute expense and benefit obligations are shown in Note 12 to our consolidated financial statements included in Item 8 of this Annual Report. These assumptions are assessed annually in consultation with independent actuaries and investment advisors as of December 31 and adjustments are made as needed. We evaluate prevailing market conditions and local laws and requirements in countries where plans are maintained, including appropriate rates of return, interest rates and medical inflation (health care cost trend) rates. We ensure that our significant assumptions are within the reasonable range relative to market data. The methodology to set our significant assumptions includes:

- Discount rates are estimated using high quality debt securities based on corporate or government bond yields with a duration matching the expected benefit payments. For the U.S. the discount rate is obtained from an analysis of publicly-traded investment-grade corporate bonds to establish a weighted average discount rate. For plans in the U.K. and the Eurozone we use the discount rate obtained from an analysis of AA-graded corporate bonds used to generate a yield curve. For other countries or regions without a corporate AA bond market, government bond rates are used. Our discount rate assumptions are impacted by changes in general economic and market conditions that affect interest rates on long-term high-quality debt securities, as well as the duration of our plans' liabilities.

The expected rates of return on plan assets are derived from reviews of asset allocation strategies, expected long-term performance of asset classes, risks and other factors adjusted for our specific investment strategy. These rates are impacted by changes in general market conditions, but because they are long-term in nature, short-term market changes do not significantly impact the rates. Changes to our target asset allocation also impact these rates.

The expected rates of compensation increase reflect estimates of the change in future compensation levels due to general price levels, seniority, age and other factors.

Depending on the assumptions used, the pension and postretirement expense could vary within a range of outcomes and have a material effect on reported earnings. In addition, the assumptions can materially affect benefit obligations and future cash funding. Actual results in any given year may differ from those estimated because of economic and other factors.

We evaluate the funded status of each retirement plan using current assumptions and determine the appropriate funding level considering applicable regulatory requirements, tax deductibility, reporting considerations, cash flow requirements and other factors. We discuss our funding assumptions with the Finance Committee of our Board of Directors.

Valuation of Goodwill, Indefinite-Lived Intangible Assets and Other Long-Lived Assets

The initial recording of goodwill and intangible assets requires subjective judgments concerning estimates of the fair value of the acquired assets. We test the value of goodwill and indefinite-lived intangible assets for impairment as of December 31 each year or whenever events or circumstances indicate such assets may be impaired.

The test for goodwill impairment involves significant judgment in estimating projections of fair value generated through future performance of each of the reporting units. The identification of our reporting units began at the operating segment level and considered whether components one level below the operating segment levels should be identified as reporting units for purpose of testing goodwill for impairment based on certain conditions. These conditions included, among other factors, (i) the extent to which a component represents a business and (ii) the aggregation of economically similar components within the operating segments and resulted in four reporting units. Other factors that were considered in determining whether the aggregation of components was appropriate included the similarity of the nature of the products and services, the nature of the production processes, the methods of distribution and the types of industries served.

An impairment loss for goodwill is recognized if the implied fair value of goodwill is less than the carrying value. We estimate the fair value of our reporting units based on an income approach, whereby we calculate the fair value of a reporting unit based on the present value of estimated future cash flows. A discounted cash flow analysis requires us to make various judgmental assumptions about future sales, operating margins, growth rates and discount rates, which are based on our budgets,

business plans, economic projections, anticipated future cash flows and market participants. Assumptions are also made for varying perpetual growth rates for periods beyond the long-term business plan period.

We did not record an impairment of goodwill in 2018, 2017 or 2016; however, the estimated fair value of our EPO and IPD reporting units reduced significantly in 2016 and 2015 due to broad-based capital spending declines and heightened pricing pressure experienced in the oil and gas markets which are anticipated to continue in the near to mid-term. The EPO reporting unit is a component of our EPD reporting segment and is primarily focused on long lead time, custom and other highly-engineered pump products and systems. As of December 31, 2018, our EPO reporting unit had approximately \$158 million of goodwill and its estimated fair value exceeded its carrying value by approximately 60% as compared to approximately \$159 million of goodwill and its estimated fair value exceeded its carrying value by approximately 82% as of December 31, 2017. In addition, our IPD reporting unit had approximately \$311 million of goodwill and its fair value exceeded its carrying value by approximately 40% as of December 31, 2018 as compared to approximately \$319 million of goodwill and its fair value exceeded its carrying value by approximately 66% as of December 31, 2017. Key assumptions used in determining the estimated fair value of our EPO and IPD reporting units included the annual operating plan and forecasted operating results, successful execution of our current Flowserve Transformation 2.0 program and identified strategic initiatives, a constant cost of capital, continued stabilization and mid to long-term improvement of the macro-economic conditions of the oil and gas market, and a relatively stable global gross domestic product. Although we have concluded that there is no impairment on the goodwill associated with our EPO and IPD reporting units as of December 31, 2018, we will continue to closely monitor their performance and related market conditions for future indicators of potential impairment and reassess accordingly.

We considered our market capitalization in our evaluation of the fair value of our goodwill. Our market capitalization decreased slightly as compared with 2017 and did not indicate a potential impairment of our goodwill as of December 31, 2018.

Impairment losses for indefinite-lived intangible assets are recognized whenever the estimated fair value is less than the carrying value. Fair values are calculated for trademarks using a "relief from royalty" method, which estimates the fair value of a trademark by determining the present value of estimated royalty payments that are avoided as a result of owning the trademark. This method includes judgmental assumptions about sales growth and discount rates that have a significant impact on the fair value and are substantially consistent with the assumptions used to determine the fair value of our reporting units discussed above. We did not record a material impairment of our trademarks in 2018, 2017 or 2016.

The recoverable value of other long-lived assets, including property, plant and equipment and finite-lived intangible assets, is reviewed when indicators of potential impairments are present. The recoverable value is based upon an assessment of the estimated future cash flows related to those assets, utilizing assumptions similar to those for goodwill. Additional considerations related to our long-lived assets include expected maintenance and improvements, changes in expected uses and ongoing operating performance and utilization.

Due to uncertain market conditions and potential changes in strategy and product portfolio, it is possible that forecasts used to support asset carrying values may change in the future, which could result in non-cash charges that would adversely affect our financial condition and results of operations.

ACCOUNTING DEVELOPMENTS

We have presented the information about accounting pronouncements not yet implemented in Note 1 to our consolidated financial statements included in Item 8 of this Annual Report.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

We have market risk exposure arising from changes in interest rates and foreign currency exchange rate movements. We are exposed to credit-related losses in the event of non-performance by counterparties to financial instruments, but we currently expect all counterparties will continue to meet their obligations given their current creditworthiness.

Interest Rate Risk

Our earnings are impacted by changes in short-term interest rates as a result of borrowings under our Senior Credit Facility, which bear interest based on floating rates. At December 31, 2018, we had \$104.8 million of variable rate debt obligations outstanding under our Senior Credit Facility with a weighted average interest rate of 4.30%. A hypothetical change of 100 basis points in the interest rate for these borrowings, assuming constant variable rate debt levels, would have changed interest expense by \$1.0 million for the year ended December 31, 2018. At December 31, 2017, we had \$164.4 million of variable rate debt obligations outstanding under our Senior Credit Facility with a weighted average interest rate of 3.19%. A hypothetical change of 100 basis points in the interest rate for these borrowings, assuming constant variable rate debt levels, would have changed interest expense by \$1.6 million for the year ended December 31, 2017.

Foreign Currency Exchange Rate Risk

A substantial portion of our operations are conducted by our subsidiaries outside of the U.S. in currencies other than the U.S. dollar. The primary currencies in which we operate, in addition to the U.S. dollar, are the Argentine peso, Australian dollar, Brazilian real, British pound, Canadian dollar, Chinese yuan, Colombian peso, Euro, Indian rupee, Japanese yen, Mexican peso, Singapore dollar, Swedish krona, Russian ruble, Malaysian ringgit and Venezuelan bolivar. Almost all of our non-U.S. subsidiaries conduct their business primarily in their local currencies, which are also their functional currencies. Foreign currency exposures arise from translation of foreign-denominated assets and liabilities into U.S. dollars and from transactions, including firm commitments and anticipated transactions, denominated in a currency other than a non-U.S. subsidiary's functional currency. In March 2015, we designated €255.7 million of our €500.0 million 2022 EUR Senior Notes as a net investment hedge of our investments in certain of our international subsidiaries that use the Euro as their functional currency. Generally, we view our investments in foreign subsidiaries from a long-term perspective and use capital structuring techniques to manage our investment in foreign subsidiaries as deemed necessary. We realized net (losses) gains associated with foreign currency translation of \$(63.1) million, \$98.8 million and \$(72.0) million for the years ended December 31, 2018, 2017 and 2016, respectively, which are included in other comprehensive loss. The net loss in 2018 was primarily driven by the weakening of the Euro, Argentinian peso, Indian rupee and British pound versus the U.S. dollar at December 31, 2018 as compared with December 31, 2017.

We employ a foreign currency risk management strategy to minimize potential changes in cash flows from unfavorable foreign currency exchange rate movements. Where available, the use of forward exchange contracts allows us to mitigate transactional exposure to exchange rate fluctuations as the gains or losses incurred on the forward exchange contracts will offset, in whole or in part, losses or gains on the underlying foreign currency exposure. Our policy allows foreign currency coverage only for identifiable foreign currency exposures. As of December 31, 2018, we had a U.S. dollar equivalent of \$280.9 million in aggregate notional amount outstanding in foreign exchange contracts with third parties, compared with \$235.6 million at December 31, 2017. Transactional currency gains and losses arising from transactions outside of our sites' functional currencies and changes in fair value of foreign exchange contracts are included in our consolidated results of operations. We recognized foreign currency net (losses) gains of \$(18.7) million, \$(14.0) million and \$2.8 million for the years ended December 31, 2018, 2017 and 2016, respectively, which are included in other expense, net in the accompanying consolidated statements of income.

Based on a sensitivity analysis at December 31, 2018, a 10% change in the foreign currency exchange rates for the year ended December 31, 2018 would have impacted our net earnings by approximately \$3 million. At December 31, 2017, a 10% change in the foreign currency exchange rates for the year ended December 31, 2017 would have impacted our net earnings by approximately \$7 million. This calculation assumes that all currencies change in the same direction and proportion relative to the U.S. dollar and that there are no indirect effects, such as changes in non-U.S. dollar sales volumes or prices. This calculation does not take into account the impact of the foreign currency forward exchange contracts discussed above.

ITEM 8. FINANCIAL STATEMENTS AND
SUPPLEMENTARY DATA

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Board of Directors and Shareholders of Flowserve Corporation

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of Flowserve Corporation and its subsidiaries (the “Company”) as of December 31, 2018 and 2017, and the related consolidated statements of income, 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 listed in the index under Item 15(a)(2) (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.

Change in Accounting Principle

As discussed in Notes 1 and 2 to the consolidated financial statements, the Company changed the manner in which it accounts for sales from contracts with customers in 2018.

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
Dallas, Texas
February 20, 2019

We have served as the Company's auditor since 2000.

FLOWSERVE CORPORATION
CONSOLIDATED BALANCE SHEETS

December 31,
2018 2017
(Amounts in thousands,
except per share data)

ASSETS

Current assets:

Cash and cash equivalents	\$619,683	\$703,445
Accounts receivable, net	792,434	856,711
Contract assets, net	228,579	—
Inventories, net	633,871	884,273
Prepaid expenses and other	108,578	114,316
Total current assets	2,383,145	2,558,745
Property, plant and equipment, net	610,096	671,796
Goodwill	1,197,640	1,218,188
Deferred taxes	44,682	51,974
Other intangible assets, net	190,550	210,049
Other assets, net	190,164	199,722
Total assets	\$4,616,277	\$4,910,474

LIABILITIES AND EQUITY

Current liabilities:

Accounts payable	\$418,893	\$443,113
Accrued liabilities	391,406	724,196
Contract liabilities	202,458	—
Debt due within one year	68,218	75,599
Total current liabilities	1,080,975	1,242,908
Long-term debt due after one year	1,414,829	1,499,658
Retirement obligations and other liabilities	459,693	496,954
Commitments and contingencies (See Note 13)		
Shareholders' equity:		
Common shares, \$1.25 par value	220,991	220,991
Shares authorized — 305,000		
Shares issued — 176,793 and 176,793, respectively		
Capital in excess of par value	494,551	488,326
Retained earnings	3,543,007	3,503,947
Treasury shares, at cost — 46,237 and 46,471 shares, respectively	(2,049,404)	(2,059,558)
Deferred compensation obligation	7,117	6,354
Accumulated other comprehensive loss	(573,947)	(505,473)
Total Flowserve Corporation shareholders' equity	1,642,315	1,654,587
Noncontrolling interests	18,465	16,367
Total equity	1,660,780	1,670,954
Total liabilities and equity	\$4,616,277	\$4,910,474

See accompanying notes to consolidated financial statements.

FLOWSERVE CORPORATION
CONSOLIDATED STATEMENTS OF INCOME

	Year Ended December 31,		
	2018	2017	2016
	(Amounts in thousands, except per share data)		
Sales	\$3,832,666	\$3,660,831	\$3,990,487
Cost of sales	(2,644,830)	(2,571,878)	(2,753,689)
Gross profit	1,187,836	1,088,953	1,236,798
Selling, general and administrative expense	(943,714)	(901,727)	(965,376)
(Loss) gain on sale of businesses	(7,727)	141,317	(7,664)
Net earnings from affiliates	11,143	12,592	12,926
Operating income	247,538	341,135	276,684
Interest expense	(58,160)	(59,730)	(60,137)
Interest income	6,465	3,429	2,804
Other expense, net	(19,569)	(21,827)	(6,439)
Earnings before income taxes	176,274	263,007	212,912
Provision for income taxes	(51,224)	(258,679)	(77,380)
Net earnings, including noncontrolling interests	125,050	4,328	135,532
Less: Net earnings attributable to noncontrolling interests	(5,379)	(1,676)	(3,077)
Net earnings attributable to Flowserve Corporation	\$119,671	\$2,652	\$132,455
Net earnings per share attributable to Flowserve Corporation common shareholders:			
Basic	\$0.91	\$0.02	\$1.02
Diluted	0.91	0.02	1.01

See accompanying notes to consolidated financial statements.

FLOWSERVE CORPORATION
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME

	Year Ended December 31,		
	2018	2017	2016
	(Amounts in thousands)		
Net earnings, including noncontrolling interests	\$125,050	\$4,328	\$135,532
Other comprehensive (loss) income:			
Foreign currency translation adjustments, net of deferred taxes of \$(490), \$19,593 and \$(8,628) in 2018, 2017 and 2016, respectively	(63,146)	98,830	(71,994)
Pension and other postretirement effects, net of deferred taxes of \$3,103, \$(14,228) and \$9,737 in 2018, 2017 and 2016, respectively	(4,892)	20,775	(16,069)
Cash flow hedging activity, net of deferred taxes of \$(38) and \$(296) in 2017 and 2016, respectively	232	148	2,220
Other comprehensive (loss) income	(67,806)	119,753	(85,843)
Comprehensive income, including noncontrolling interests	57,244	124,081	49,689
Comprehensive income attributable to noncontrolling interests	(6,047)	(2,114)	(3,787)
Comprehensive income attributable to Flowserve Corporation	\$51,197	\$121,967	\$45,902

See accompanying notes to consolidated financial statements.

FLOWSERVE CORPORATION
CONSOLIDATED STATEMENTS OF SHAREHOLDERS' EQUITY

Total Flowserve Corporation Shareholders' Equity										
	Common Stock		Capital in Excess of Par Value	Retained Earnings	Treasury Stock		Deferred Compensation Obligation	Accumulated Other Comprehensive Loss	Noncontrol Interests	Total Equity
	Shares	Amount			Shares	Amount				
(Amounts in thousands)										
Balance, as reported — January 1, 2016	176,793	\$220,991	\$494,961	\$3,565,958	(47,703)	\$(2,106,785)	\$10,233	\$(538,232)	\$17,256	\$1,664,390
Stock activity under stock plans	—	—	(33,571)	—	723	28,258	—	—	—	(5,313)
Stock-based compensation	—	—	30,203	10	—	—	—	—	—	30,213
Tax benefit associated with stock-based compensation	—	—	255	—	—	—	—	—	—	255
Net earnings	—	—	—	132,455	—	—	—	—	3,077	135,532
Cash dividends declared	—	—	—	(100,027)	—	—	—	—	—	(100,027)
Other comprehensive loss, net of tax	—	—	—	—	—	—	—	(86,556)	713	(85,843)
Purchase of shares from and dividends paid to noncontrolling interests	—	—	—	—	—	—	—	—	(85)	(85)
Other, net	—	—	—	—	—	—	(1,726)	—	—	(1,726)
Balance — December 31, 2016	176,793	220,991	491,848	3,598,396	(46,980)	(2,078,527)	8,507	(624,788)	20,961	1,637,390
ASU No. 2016-09, Compensation - Stock	—	—	(2,966)	2,966	—	—	—	—	—	—
Stock activity under stock plans	—	—	(23,479)	—	509	18,969	—	—	—	(4,510)
Stock-based compensation	—	—	22,820	—	—	—	—	—	—	22,820
Tax benefit associated with stock-based compensation	—	—	103	—	—	—	—	—	—	103
Net earnings	—	—	—	2,652	—	—	—	—	1,676	4,328

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Cash dividends declared	—	—	—	(100,067)	—	—	—	—	—	(100,067)
Other comprehensive income, net of tax	—	—	—	—	—	—	—	119,315	438	119,753
Purchase of shares from and dividends paid to noncontrolling interests	—	—	—	—	—	—	—	—	(6,708)	(6,708)
Other, net	—	—	—	—	—	—	(2,153)	—	—	(2,153)
Balance —	—	—	—	—	—	—	—	—	—	—
December 31, 2017	176,793	\$220,991	\$488,326	\$3,503,947	(46,471)	\$(2,059,558)	\$6,354	\$(505,473)	\$16,367	\$1,670,000
ASU No. 2014-09, Revenue from Contracts with Customers (Topic 606)	—	—	—	19,642	—	—	—	—	—	19,642
Stock activity under stock plans	—	—	(13,687)	—	234	10,154	—	—	—	(3,533)
Stock-based compensation	—	—	19,912	—	—	—	—	—	—	19,912
Tax benefit associated with stock-based compensation	—	—	—	—	—	—	—	—	—	—
Net earnings	—	—	—	119,671	—	—	—	—	5,379	125,050
Cash dividends declared	—	—	—	(100,253)	—	—	—	—	—	(100,253)
Other comprehensive loss, net of tax	—	—	—	—	—	—	—	(68,474)	668	(67,806)
Purchase of shares from and dividends paid to noncontrolling interests	—	—	—	—	—	—	—	—	(3,949)	(3,949)
Other, net	—	—	—	—	—	—	763	—	—	763
Balance —	—	—	—	—	—	—	—	—	—	—
December 31, 2018	176,793	\$220,991	\$494,551	\$3,543,007	(46,237)	\$(2,049,404)	\$7,117	\$(573,947)	\$18,465	\$1,660,000

See accompanying notes to consolidated financial statements.

FLOWSERVE CORPORATION
CONSOLIDATED STATEMENTS OF CASH FLOWS

	Year Ended December 31,		
	2018	2017	2016
	(Amounts in thousands)		
Cash flows — Operating activities:			
Net earnings, including noncontrolling interests	\$ 125,050	\$ 4,328	\$ 135,532
Adjustments to reconcile net earnings to net cash provided by operating activities:			
Depreciation	95,820	101,438	99,897
Amortization of intangible and other assets	16,653	17,016	16,855
Loss (gain) on disposition of businesses	7,727	(141,317)	7,664
Stock-based compensation	19,912	22,820	30,213
Provision for U.S. Tax Cuts and Jobs Act of 2017 and Latin America accounts receivable reserve	(5,654)	115,320	73,452
Foreign currency, asset impairment and other non-cash adjustments	36,052	33,087	(8,127)
Change in assets and liabilities:			
Accounts receivable, net	(25,448)	60,216	36,927
Inventories, net	(29,314)	48,642	52,892
Contract assets, net	(23,693)	—	—
Prepaid expenses and other assets, net	(7,869)	32,935	(45,475)
Contract liabilities	33,710	—	—
Accounts payable	(4,823)	12,403	(71,008)
Accrued liabilities and income taxes payable	(18,248)	(3,383)	(88,770)
Retirement obligations and other	(44,314)	(43,431)	16,372
Net deferred taxes	15,270	50,992	(15,948)
Net cash flows provided by operating activities	190,831	311,066	240,476
Cash flows — Investing activities:			
Capital expenditures	(83,993)	(61,602)	(89,699)
Proceeds from disposal of assets	6,190	5,435	3,294
(Payments for) proceeds from disposition of businesses	(3,663)	232,767	(5,064)
Net cash flows (used) provided by investing activities	(81,466)	176,600	(91,469)
Cash flows — Financing activities:			
Payments on long-term debt	(60,000)	(60,000)	(60,000)
Payments of deferred loan costs	—	(1,503)	—
Proceeds under other financing arrangements	3,377	7,359	35,680
Payments under other financing arrangements	(9,853)	(19,030)	(12,636)
Payments related to tax withholding for stock-based compensation	(3,061)	(6,238)	(10,405)
Payments of dividends	(99,416)	(99,233)	(97,746)
Other	(4,331)	(6,708)	1,386
Net cash flows used by financing activities	(173,284)	(185,353)	(143,721)
Effect of exchange rate changes on cash	(19,843)	33,970	(4,568)
Net change in cash and cash equivalents	(83,762)	336,283	718
Cash and cash equivalents at beginning of year	703,445	367,162	366,444
Cash and cash equivalents at end of year	\$ 619,683	\$ 703,445	\$ 367,162
Income taxes paid (net of refunds)	\$ 87,009	\$ 59,409	\$ 151,191
Interest paid	54,576	56,808	57,393
See accompanying notes to consolidated financial statements.			

FLOWSERVE CORPORATION
 NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
 AS OF DECEMBER 31, 2018 AND 2017 AND FOR THE
 THREE YEARS ENDED DECEMBER 31, 2018

1. SIGNIFICANT ACCOUNTING POLICIES AND ACCOUNTING DEVELOPMENTS

We are principally engaged in the worldwide design, manufacture, distribution and service of industrial flow management equipment. We provide long lead time, custom and other highly-engineered pumps; standardized, general-purpose pumps; mechanical seals; engineered and industrial valves; and related automation products and solutions primarily for oil and gas, chemical, power generation, water management and other general industries requiring flow management products and services. Equipment manufactured and serviced by us is predominantly used in industries that deal with difficult-to-handle and corrosive fluids, as well as environments with extreme temperatures, pressure, horsepower and speed. Our business is affected by economic conditions in the United States ("U.S.") and other countries where our products are sold and serviced, by the cyclical nature and competitive environment of our industries served, by the relationship of the U.S. dollar to other currencies and by the demand for and pricing of our customers' end products.

Principles of Consolidation — The consolidated financial statements include the accounts of our company and our wholly and majority-owned subsidiaries. In addition, we would consolidate any variable interest entities for which we are deemed to be the primary beneficiary. Noncontrolling interests of non-affiliated parties have been recognized for all majority-owned consolidated subsidiaries. Intercompany profits/losses, transactions and balances among consolidated entities have been eliminated from our consolidated financial statements. Investments in unconsolidated affiliated companies, which represent noncontrolling ownership interests between 20% and 50%, are accounted for using the equity method, which approximates our equity interest in their underlying equivalent net book value under accounting principles generally accepted in the U.S. ("U.S. GAAP"). Investments in interests where we own less than 20% of the investee are accounted for by the cost method, whereby income is only recognized in the event of dividend receipt. Investments accounted for by the cost method are tested for impairment if an impairment indicator is present.

Use of Estimates — The process of preparing financial statements in conformity with U.S. GAAP requires us to make estimates and assumptions that affect reported amounts of certain assets, liabilities, revenues and expenses. We believe our estimates and assumptions are reasonable; however, actual results may differ materially from such estimates. The most significant estimates and assumptions are used in determining:

- Timing and amount of revenue recognition;
- Deferred taxes, tax valuation allowances and tax reserves;
- Reserves for contingent loss;
- Pension and postretirement benefits; and
- Valuation of goodwill, indefinite-lived intangible assets and other long-lived assets.

Argentina Highly Inflationary — Effective July 1, 2018, Argentina was designated as hyperinflationary, and as a result, we began using the U.S. dollar as our functional currency in Argentina. Our Argentinian subsidiary's sales for the year ended December 31, 2018 represented approximately 1% of consolidated sales and its assets at December 31, 2018 represented approximately 1% of total consolidated assets. Assets primarily consisted of U.S. dollar-denominated monetary assets and Argentinian peso-denominated non-monetary assets at December 31, 2018. In addition, certain of our operations in other countries sell equipment and parts that are typically denominated in U.S. dollars directly to Argentinian customers.

Revenue Recognition — Our contracts with customers often have multiple commitments to provide goods and/or services, including any combination of designing, developing, manufacturing, modifying, installing and commissioning of flow management equipment and providing services and parts related to the performance of such products. We recognize revenue when (or as) we satisfy a performance obligation by transferring control to a customer. We recognize revenue either over time or at a point in time, depending on the specific facts and circumstances for each contract, including the terms and conditions of the contract as agreed with the customer and the nature of the products or services to be provided.

Our primary method for recognizing revenue over time is the percentage of completion (“POC”) method, whereby progress towards completion is measured by applying an input measure based on costs incurred to date relative to total estimated costs at completion. If control of the products and/or services does not transfer over time, then control transfers at a point in time. We determine the point in time that control transfers to a customer based on the evaluation of specific indicators, such as title transfer, risk of loss transfer, customer acceptance and physical possession. For a detailed discussion related to revenue recognition refer to Note 2.

Cash and Cash Equivalents — We place temporary cash investments with financial institutions and, by policy, invest in those institutions and instruments that have minimal credit risk and market risk. These investments, with an original maturity of three months or less when purchased, are classified as cash equivalents. They are highly liquid and principal values are not subject to significant risk of change due to interest rate fluctuations.

Allowance for Doubtful Accounts and Credit Risk — The allowance for doubtful accounts is established based on estimates of the amount of uncollectible accounts receivable, which is determined principally based upon the aging of the accounts receivable, but also customer credit history, industry and market segment information, economic trends and conditions and credit reports. Customer credit issues, customer bankruptcies or general economic conditions may also impact our estimates.

Credit risks are mitigated by the diversity of our customer base across many different geographic regions and industries and by performing creditworthiness analyses on our customers. Additionally, we mitigate credit risk through letters of credit and advance payments received from our customers. We do not believe that we have any other significant concentrations of credit risk.

Inventories and Related Reserves — Inventories are stated at the lower of cost and net realizable value. Cost is determined by the first-in, first-out method. Reserves for excess and obsolete inventories are based upon our assessment of market conditions for our products determined by historical usage and estimated future demand. Due to the long life cycles of our products, we carry spare parts inventories that have historically low usage rates and provide reserves for such inventory based on demonstrated usage and aging criteria.

Income Taxes, Deferred Taxes, Tax Valuation Allowances and Tax Reserves — We account for income taxes under the asset and liability method. 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 and their respective tax bases and operating loss and tax credit carryforwards. Deferred tax assets and liabilities are calculated using enacted tax rates expected to apply to taxable income in the years in which those temporary differences are expected to be recovered or settled. The effect on deferred tax assets and liabilities of a change in tax rates is recognized in the period that includes the enactment date. We record valuation allowances to reflect the estimated amount of deferred tax assets that may not be realized based upon our analysis of existing deferred tax assets, net operating losses and tax credits by jurisdiction and expectations of our ability to utilize these tax attributes through a review of past, current and estimated future taxable income and establishment of tax strategies.

We provide deferred taxes for the temporary differences associated with our investment in foreign subsidiaries that have a financial reporting basis that exceeds tax basis, unless we can assert permanent reinvestment in foreign jurisdictions. Financial reporting basis and tax basis differences in investments in foreign subsidiaries consist of both unremitted earnings and losses, as well as foreign currency translation adjustments.

The amount of income taxes we pay is subject to ongoing audits by federal, state, and foreign tax authorities, which often result in proposed assessments. We establish reserves for open tax years for uncertain tax positions that may be subject to challenge by various tax authorities. The consolidated tax provision and related accruals include the impact of such reasonably estimable losses and related interest and penalties as deemed appropriate.

We recognize the tax benefit from an uncertain tax position only if it is more likely than not that the tax position will be sustained on examination by the taxing authorities. The determination is based on the technical merits of the position and presumes that each uncertain tax position will be examined by the relevant taxing authority that has full knowledge of all relevant information. The tax benefits recognized in the financial statements from such a position are measured based on the largest benefit that has a greater than fifty percent likelihood of being realized upon ultimate settlement.

Legal and Environmental Contingencies — Legal and environmental reserves are recorded based upon a case-by-case analysis of the relevant facts and circumstances and an assessment of potential legal obligations and costs. Amounts

relating

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to legal and environmental liabilities are recorded when it is probable that a loss has been incurred and such loss is reasonably estimable. Assessments of legal and environmental costs are based on information obtained from our independent and in-house experts and our loss experience in similar situations. Estimates are updated as applicable when new information regarding the facts and circumstances of each matter becomes available. Legal fees associated with legal and environmental liabilities are expensed as incurred.

Estimates of liabilities for unsettled asbestos-related claims are based on known claims and on our experience during the preceding two years for claims filed, settled and dismissed, with adjustments for events deemed unusual and unlikely to recur, and are included in retirement obligations and other liabilities in our consolidated balance sheets. A substantial majority of our asbestos-related claims are covered by insurance or indemnities. Estimated indemnities and receivables from insurance carriers for unsettled claims and receivables for settlements and legal fees paid by us for asbestos-related claims are estimated using our historical experience with insurance recovery rates and estimates of future recoveries, which include estimates of coverage and financial viability of our insurance carriers. Estimated receivables are included in other assets, net in our consolidated balance sheets. We have claims pending against certain insurers that, if resolved more favorably than estimated future recoveries, would result in discrete gains in the applicable quarter. We are currently unable to estimate the impact, if any, of unasserted asbestos-related claims, although future claims would also be subject to existing indemnities and insurance coverage.

Warranty Accruals — Warranty obligations are based upon product failure rates, materials usage, service delivery costs, an analysis of all identified or expected claims and an estimate of the cost to resolve such claims. The estimates of expected claims are generally a factor of historical claims and known product issues. Warranty obligations based on these factors are adjusted based on historical sales trends for the preceding 24 months.

Insurance Accruals — Insurance accruals are recorded for wholly or partially self-insured risks such as medical benefits and workers' compensation and are based upon an analysis of our claim loss history, insurance deductibles, policy limits and other relevant factors that are updated annually and are included in accrued liabilities in our consolidated balance sheets. The estimates are based upon information received from actuaries, insurance company adjusters, independent claims administrators or other independent sources. Receivables from insurance carriers are estimated using our historical experience with insurance recovery rates and estimates of future recoveries, which include estimates of coverage and financial viability of our insurance carriers. Estimated receivables are included in accounts receivable, net and other assets, net, as applicable, in our consolidated balance sheets.

Pension and Postretirement Obligations — Determination of pension and postretirement benefits obligations is based on estimates made by management in consultation with independent actuaries and investment advisors. Inherent in these valuations are assumptions including discount rates, expected rates of return on plan assets, retirement rates, mortality rates and rates of compensation increase and other factors all of which are reviewed annually and updated if necessary. Current market conditions, including changes in rates of return, interest rates and medical inflation rates, are considered in selecting these assumptions.

Actuarial gains and losses and prior service costs are recognized in accumulated other comprehensive loss as they arise and we amortize these costs into net pension expense over the remaining expected service period.

Property, Plant and Equipment and Depreciation — Property, plant and equipment are stated at historical cost, less accumulated depreciation. If asset retirement obligations exist, they are capitalized as part of the carrying amount of the asset and depreciated over the remaining useful life of the asset. The useful lives of leasehold improvements are the lesser of the remaining lease term or the useful life of the improvement. When assets are retired or otherwise disposed of, their costs and related accumulated depreciation are removed from the accounts and any resulting gains or losses are included in income from operations for the period. Depreciation is computed by the straight-line method based on the estimated useful lives of the depreciable assets, or in the case of assets under capital leases, over the related lease term. Generally, the estimated useful lives of the assets are:

Buildings and improvements	10 to 40 years
Machinery, equipment and tooling	3 to 14 years
Software, furniture and fixtures and other	3 to 7 years

Costs related to routine repairs and maintenance are expensed as incurred.

Internally Developed Software — We capitalize certain costs associated with the development of internal-use software. Generally, these costs are related to significant software development projects and are amortized over their estimated useful life, typically three to five years, upon implementation of the software.

Intangible Assets — Intangible assets, excluding trademarks (which are considered to have an indefinite life), consist primarily of engineering drawings, patents, existing customer relationships, software, distribution networks and other items that are being amortized over their estimated useful lives generally ranging from four to 40 years. These assets are reviewed for impairment whenever events and circumstances indicate impairment may have occurred.

Valuation of Goodwill, Indefinite-Lived Intangible Assets and Other Long-Lived Assets — The value of goodwill and indefinite-lived intangible assets is tested for impairment as of December 31 each year or whenever events or circumstances indicate such assets may be impaired. The identification of our reporting units began at the operating segment level and considered whether components one level below the operating segment levels should be identified as reporting units for purpose of testing goodwill for impairment based on certain conditions. These conditions included, among other factors, (i) the extent to which a component represents a business and (ii) the aggregation of economically similar components within the operating segments and resulted in four reporting units. Other factors that were considered in determining whether the aggregation of components was appropriate included the similarity of the nature of the products and services, the nature of the production processes, the methods of distribution and the types of industries served.

An impairment loss for goodwill is recognized if the implied fair value of goodwill is less than the carrying value. We estimate the fair value of our reporting units based on an income approach, whereby we calculate the fair value of a reporting unit based on the present value of estimated future cash flows. A discounted cash flow analysis requires us to make various judgmental assumptions about future sales, operating margins, growth rates and discount rates, which are based on our budgets, business plans, economic projections, anticipated future cash flows and market participants. Assumptions are also made for varying perpetual growth rates for periods beyond the long-term business plan period.

We did not record an impairment of goodwill in 2018, 2017 or 2016; however, the estimated fair value of our EPO and IPD reporting units reduced significantly in 2016 and 2015 due to broad-based capital spending declines and heightened pricing pressure experienced in the oil and gas markets which are anticipated to continue in the near to mid-term. The EPO reporting unit is a component of our EPD reporting segment and is primarily focused on long lead time, custom and other highly-engineered pump products and systems. As of December 31, 2018, our EPO reporting unit had approximately \$158 million of goodwill and its estimated fair value exceeded its carrying value by approximately 60% as compared to approximately \$159 million of goodwill and its estimated fair value exceeded its carrying value by approximately 82% as of December 31, 2017. In addition, our IPD reporting unit had approximately \$311 million of goodwill and its fair value exceeded its carrying value by approximately 40% as of December 31, 2018 as compared to approximately \$319 million of goodwill and its fair value exceeded its carrying value by approximately 66% as of December 31, 2017. Key assumptions used in determining the estimated fair value of our EPO and IPD reporting units included the annual operating plan and forecasted operating results, successful execution of our current Flowserve Transformation 2.0 program and identified strategic initiatives, a constant cost of capital, continued stabilization and mid to long-term improvement of the macro-economic conditions of the oil and gas market, and a relatively stable global gross domestic product. Although we have concluded that there is no impairment on the goodwill associated with our EPO and IPD reporting units as of December 31, 2018, we will continue to closely monitor their performance and related market conditions for future indicators of potential impairment and reassess accordingly.

We considered our market capitalization in our evaluation of the fair value of our goodwill. Our market capitalization decreased slightly as compared with 2017 and did not indicate a potential impairment of our goodwill as of December 31, 2018.

Impairment losses for indefinite-lived intangible assets are recognized whenever the estimated fair value is less than the carrying value. Fair values are calculated for trademarks using a "relief from royalty" method, which estimates the fair value of a trademark by determining the present value of estimated royalty payments that are avoided as a result of owning the trademark. This method includes judgmental assumptions about sales growth and discount rates that have a significant impact on the fair value and are substantially consistent with the assumptions used to determine the fair

value of our reporting units discussed above. We did not record a material impairment of our trademarks in 2018, 2017 or 2016.

The recoverable value of other long-lived assets, including property, plant and equipment and finite-lived intangible assets, is reviewed when indicators of potential impairments are present. The recoverable value is based upon an assessment of the estimated future cash flows related to those assets, utilizing assumptions similar to those for goodwill. Additional

considerations related to our long-lived assets include expected maintenance and improvements, changes in expected uses and ongoing operating performance and utilization.

Deferred Loan Costs — Deferred loan costs, consisting of fees and other expenses associated with debt financing, are amortized over the term of the associated debt using the effective interest method. Additional amortization is recorded in periods where optional prepayments on debt are made.

Fair Values of Financial Instruments — Our financial instruments are presented at fair value in our consolidated balance sheets, with the exception of our long-term debt. 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.

Where available, fair value is based on observable market prices or parameters or derived from such prices or parameters. Where observable prices or inputs are not available, valuation models may be applied.

Assets and liabilities recorded at fair value in our consolidated balance sheets are categorized based upon the level of judgment associated with the inputs used to measure their fair values. Hierarchical levels, as defined by Accounting Standards Codification ("ASC") 820, "Fair Value Measurements and Disclosures," are directly related to the amount of subjectivity associated with the inputs to fair valuation of these assets and liabilities. An asset or a liability's categorization within the fair value hierarchy is based on the lowest level of significant input to its valuation.

Hierarchical levels are as follows:

Level I — Inputs are unadjusted, quoted prices in active markets for identical assets or liabilities at the measurement date.

Level II — Inputs (other than quoted prices included in Level I) are either directly or indirectly observable for the asset or liability through correlation with market data at the measurement date and for the duration of the instrument's anticipated life.

Level III — Inputs reflect management's best estimate of what market participants would use in pricing the asset or liability at the measurement date. Consideration is given to the risk inherent in the valuation technique and the risk inherent in the inputs to the model.

Recurring fair value measurements are limited to investments in derivative instruments and certain equity securities. The fair value measurements of our derivative instruments are determined using models that maximize the use of the observable market inputs including interest rate curves and both forward and spot prices for currencies, and are classified as Level II under the fair value hierarchy. The fair values of our derivative instruments are included in Note 7. The fair value measurements of our investments in equity securities are determined using quoted market prices and are classified as Level I. The fair values of our investments in equity securities, and changes thereto, are immaterial to our consolidated financial position and results of operations.

Derivatives and Hedging Activities — We have a foreign currency derivatives and hedging policy outlining the conditions under which we can enter into financial derivative transactions. We do not use derivative instruments for trading or speculative purposes. All derivative instruments are recognized on the balance sheet at their fair values.

We employ a foreign currency economic hedging strategy to mitigate certain financial risks resulting from foreign currency exchange rate movements that impact foreign currency denominated receivables and payables, firm committed transactions and forecasted sales and purchases. The changes in the fair values are recognized immediately in other expense, net in the consolidated statements of income. See Note 7 for further discussion of forward exchange contracts.

We are exposed to risk from credit-related losses resulting from nonperformance by counterparties to our financial instruments. We perform credit evaluations of our counterparties under forward exchange contracts and expect all counterparties to meet their obligations. If necessary, we would adjust the values of our derivative contracts for our or our counterparties' credit risks.

Foreign Currency Translation — Assets and liabilities of our foreign subsidiaries are translated to U.S. dollars at exchange rates prevailing at the balance sheet date, while income and expenses are translated at average rates for each month. Translation gains and losses are reported as a component of accumulated other comprehensive loss.

Transactional currency gains and losses arising from transactions in currencies other than our sites' functional currencies are included in our consolidated results of operations.

Transaction and translation gains and losses arising from intercompany balances are reported as a component of accumulated other comprehensive loss when the underlying transaction stems from a long-term equity investment or from debt designated as not due in the foreseeable future. Otherwise, we recognize transaction gains and losses arising from intercompany transactions as a component of income. Where intercompany balances are not long-term investment related or not designated as due beyond the foreseeable future, we may mitigate risk associated with foreign currency fluctuations by entering into forward exchange contracts.

Stock-Based Compensation — Stock-based compensation is measured at the grant-date fair value. The exercise price of stock option awards and the value of restricted share, restricted share unit and performance-based unit awards (collectively referred to as "Restricted Shares") are set at the closing price of our common stock on the New York Stock Exchange on the date of grant, which is the date such grants are authorized by our Board of Directors.

Restricted share units and performance-based units refer to restricted awards that do not have voting rights and accrue dividends, which are forfeited if vesting does not occur.

The intrinsic value of Restricted Shares, which is typically the product of share price at the date of grant and the number of Restricted Shares granted, is amortized on a straight-line basis to compensation expense over the periods in which the restrictions lapse based on the expected number of shares that will vest. We account for forfeitures as they occur resulting in the reversal of cumulative expense previously recognized.

Earnings Per Share — We use the two-class method of calculating Earnings Per Share ("EPS"), which determines earnings per share for each class of common stock and participating security as if all earnings for the period had been distributed. Unvested restricted share awards that earn non-forfeitable dividend rights qualify as participating securities and, accordingly, are included in the basic computation as such. Our unvested restricted shares participate on an equal basis with common shares; therefore, there is no difference in undistributed earnings allocated to each participating security. Accordingly, the presentation below is prepared on a combined basis and is presented as earnings per common share. The following is a reconciliation of net earnings of Flowserve Corporation and weighted average shares for calculating basic net earnings per common share.

Earnings per weighted average common share outstanding was calculated as follows:

	Year Ended December 31,		
	2018	2017	2016
	(Amounts in thousands, except per share data)		
Net earnings of Flowserve Corporation	\$119,671	\$2,652	\$132,455
Dividends on restricted shares not expected to vest	—	—	6
Earnings attributable to common and participating shareholders	\$119,671	\$2,652	\$132,461
Weighted average shares:			
Common stock	130,794	130,600	130,147
Participating securities	29	103	285
Denominator for basic earnings per common share	130,823	130,703	130,432
Effect of potentially dilutive securities	448	655	543
Denominator for diluted earnings per common share	131,271	131,358	130,975
Net earnings per share attributable to Flowserve Corporation common shareholders:			
Basic	\$0.91	\$0.02	\$1.02
Diluted	0.91	0.02	1.01

Diluted earnings per share is based upon the weighted average number of shares as determined for basic earnings per share plus shares potentially issuable in conjunction with stock options, restricted share units and performance share units.

Research and Development Expense — Research and development costs are charged to expense when incurred. Aggregate research and development costs included in SG&A were \$39.6 million, \$38.6 million and \$42.8 million in 2018, 2017 and 2016, respectively. Costs incurred for research and development primarily include salaries and benefits and

consumable supplies, as well as rent, professional fees, utilities and the depreciation of property and equipment used in research and development activities.

Accounting Developments

Pronouncements Implemented

In May 2014, the FASB issued Accounting Standards Update ("ASU") No. 2014-09, "Revenue from Contracts with Customers (Topic 606)" (the "New Revenue Standard" or "ASC 606"), which supersedes most of the revenue recognition requirements in "Revenue Recognition (Topic 605)" ("Topic 605"). On January 1, 2018, we adopted the New Revenue Standard using the modified retrospective method for transition, applying the guidance to those contracts which were not completed as of that date. According to our method of transition we adjusted for the cumulative effect of the changes made to our consolidated balance sheet and recorded a cumulative effect adjustment to increase retained earnings by approximately \$20 million, mostly associated with the increase in POC method revenue, as a result of initially applying the standard. We have modified our accounting policies and practices, business processes, systems and controls to support compliance with the New Revenue Standard. Revenue recognition and related financial information for this Annual Report are based on the requirements of ASC 606. Accordingly, periods prior to January 1, 2018 are presented in accordance with Topic 605. Refer to Note 2 for a discussion on our adoption of the New Revenue Standard.

In January 2016, the FASB issued ASU No. 2016-01, "Financial Instruments - Overall (Subtopic 825-10): Recognition and Measurement of Financial Assets and Financial Liabilities." The ASU requires entities to measure equity investments that do not result in consolidation and are not accounted for under the equity method at fair value with changes in fair value recognized in net income. The ASU also requires an entity to present separately in other comprehensive income the portion of the total change in the fair value of a liability resulting from a change in the instrument-specific credit risk when the entity has elected to measure the liability at fair value in accordance with the fair value option for financial instruments. The requirement to disclose the method(s) and significant assumptions used to estimate the fair value for financial instruments measured at amortized cost on the balance sheet has been eliminated by this ASU. In February 2018, the FASB issued ASU No. 2018-03, "Technical Corrections and Improvements to Financial Instruments-Overall (Subtopic 825-10)" to clarify certain aspects of ASU No. 2016-01. Our adoption of ASU No. 2016-01 and ASU No. 2018-03 effective January 1, 2018 did not have an impact on our consolidated financial condition and results of operations.

In August 2016, the FASB issued ASU No. 2016-15, "Statement of Cash Flows (Topic 230): Classification of Certain Cash Receipts and Cash Payments - A consensus of the FASB Emerging Issues Task Force." The update was issued with the objective of reducing the existing diversity in practice in how certain cash receipts and cash payments are presented and classified in the statement of cash flows under Topic 230 and other topics. Our adoption of ASU No. 2016-15 effective January 1, 2018 did not have a material impact on our consolidated statement of cash flows.

In October 2016, the FASB issued ASU No. 2016-16, "Income Taxes (Topic 740) Intra-Entity Transfers of Assets Other Than Inventory." The ASU guidance requires the recognition of the income tax consequences of an intercompany asset transfer, other than transfers of inventory, when the transfer occurs. For intercompany transfers of inventory, the income tax effects will continue to be deferred until the inventory has been sold to a third party. Our adoption of ASU No. 2016-16 effective January 1, 2018 did not have a material impact on our consolidated financial condition and results of operations.

In March 2017, the FASB issued ASU No. 2017-07, "Compensation-Retirement Benefits (Topic 715): Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost." The ASU requires entities to disaggregate the current service cost component from the other components of net benefit cost and present it with other current compensation costs for related employees in the income statement and present the other components of net benefit cost elsewhere in the income statement and outside of operating income. Entities are required to retrospectively apply the requirement for a separate presentation in the income statement of service costs and other components of net benefit cost. We adopted the income statement presentation aspects of this new guidance on a retrospective basis. The following is a reconciliation of the effect of the reclassification of the net post-retirement benefit cost from cost of sales ("COS") and selling, general and administrative expenses ("SG&A") to other expense, net in our consolidated statement of income for the years ended December 31, 2017 and 2016:

December 31, 2017

(Amounts in thousands)	As		
	Previously Reported	Adjustments(1)	As Reported
Cost of sales	\$(2,575,454)	\$ 3,576	\$(2,571,878)
Gross profit	1,085,377	3,576	1,088,953
Selling, general and administrative expense	(903,864)	) 2,137	(901,727)
Operating income	335,422	5,713	341,135
Other expense, net	(16,114)	) (5,713)	) (21,827)

December 31, 2016

Cost of sales	\$(2,759,254)	\$ 5,565	\$(2,753,689)
Gross profit	1,231,233	5,565	1,236,798
Selling, general and administrative expense	(968,530)	) 3,154	(965,376)
Operating income	267,965	8,719	276,684
Other expense, net	2,280	(8,719)	) (6,439)

(1) We elected the practical expedient that allows us to use the amounts disclosed in prior comparative periods' pension and postretirement plan footnotes as the basis for the retrospective application of the new income statement presentation requirements. Refer to Note 12 for additional information on the components of the net periodic cost for retirement and postretirement benefits plans.

In May 2017, the FASB issued ASU No. 2017-09, "Compensation-Stock Compensation (Topic 718): Scope of Modification Accounting." The ASU provides guidance on the types of changes to the terms or conditions of share-based payment awards, to which an entity would be required to apply modification accounting. The ASU is applied prospectively to awards modified on or after the effective date. Our adoption of ASU No. 2017-09 effective January 1, 2018 did not have an impact on our consolidated financial condition and results of operations.

Pronouncements Not Yet Implemented

In February 2016, the FASB issued ASU No. 2016-02, "Leases (Topic 842)". The ASU requires that organizations that lease assets recognize assets and liabilities on the balance sheet for the rights and obligations created by those leases. The ASU will affect the presentation of lease-related expenses on the income statement and statement of cash flows and will increase the required disclosures related to leases. This ASU is effective for annual periods beginning after December 15, 2018, including interim periods within those fiscal years with early adoption permitted.

During our evaluation of ASU No. 2016-02 and all related ASU's, we formed a project team to assess the critical components and requirements of the new guidance, which included a review of our leasing contracts and a completeness assessment over our lease population. To support the requirements of the new standard, we have implemented a lease administration system and modified changes to our business processes, systems and controls. Effective January 1, 2019, we adopted the new standard under the modified retrospective approach, applying the current-period adjustment method. Under the transition guidance of the modified retrospective approach there are a number of optional practical expedients that we have elected to apply, of which among other things include, the carryforward of the historical lease classification under the previous standard, the hindsight practical expedient which will result in the shortening of lease terms for certain existing leases and corresponding leasehold improvements and a policy election to keep leases with an initial term of 12 months or less off of the balance sheet.

While we are still in the process of final evaluation, we expect the adoption of the standard will result in recognition of additional net lease assets and lease liabilities of approximately \$220 million as of January 1, 2019. We do not currently believe that the standard will have a material impact on our results of operations. Additionally, we believe the new standard will not have a notable impact on our liquidity and will have no impact on our debt-covenant compliance under our current agreements.

In June 2016, the FASB issued ASU No. 2016-13, "Financial Instruments-Credit Losses (Topic 326), Measurement of Credit Losses on Financial Instruments." The ASU requires, among other things, the use of a new current expected credit loss ("CECL") model in order to determine our allowances for doubtful accounts with respect to accounts receivable and contract assets. The CECL model requires that we estimate our lifetime expected credit loss with respect to our receivables and contract assets and record allowances that, when deducted from the balance of the receivables, represent the net amounts expected to be collected. We will also be required to disclose information about how we developed the allowances, including changes in the factors that influenced our estimate of expected credit losses and the reasons for those changes. The amendments of the ASU are effective for fiscal years beginning after December 15, 2019, including interim periods within those fiscal years. We are currently evaluating the impact of ASU No. 2016-13 on our consolidated financial condition and results of operations.

In January 2017, the FASB issued ASU No. 2017-04, "Intangibles - Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment." The amendments in this ASU allow companies to apply a one-step quantitative test and record the amount of goodwill impairment as the excess of a reporting unit's carrying amount over its fair value, not to exceed the total amount of goodwill allocated to the reporting unit. The amendments of the ASU are effective for annual or interim goodwill impairment tests in fiscal years beginning after December 15, 2019. Early adoption is permitted for interim or annual goodwill impairment tests performed on testing dates after January 1, 2017. We are currently evaluating the impact of ASU No. 2017-04 on our consolidated financial condition and results of operations.

On July 13, 2017, the FASB issued ASU No. 2017-11, "Earnings Per Share (Topic 260); Distinguishing Liabilities from Equity (Topic 480); Derivatives and Hedging (Topic 815): (Part I) Accounting for Certain Financial Instruments with Down Round Features, (Part II) Replacement of the Indefinite Deferral for Mandatory Redeemable Financial Instruments of Certain Nonpublic Entities and Certain Mandatory Redeemable Noncontrolling Interests with a Scope Exception." The ASU amends guidance in FASB Accounting Standards Codification ("ASC") 260, Earnings Per Share, FASB ASC 480, Distinguishing Liabilities from Equity, and FASB ASC 815, Derivatives and Hedging. The amendments in Part I of this ASU change the classification analysis of certain equity-linked financial instruments (or embedded features) with down round features. The amendments in Part II of the ASU re-characterize the indefinite deferral of certain provisions of Topic 480 that now are presented as pending content in the codification, to a scope exception. The amendments in this ASU must be applied to annual reporting periods beginning after December 15, 2018. Early adoption is permitted. The adoption of ASU No. 2017-11 will not have an impact on our consolidated financial condition and results of operations.

On August 28, 2017, the FASB issued ASU No. 2017-12 and all related ASU's, "Derivatives and Hedging (Topic 815): Targeted improvements of Accounting for Hedging Activities." The purpose of this ASU is to better align a company's risk management activities and financial reporting for hedging relationships. Additionally, the ASU simplifies the hedge accounting requirements and improve the disclosures of hedging arrangements. The amendments in this ASU must be applied to annual reporting periods beginning after December 15, 2019. Early adoption is permitted. We are currently evaluating the impact of ASU No. 2017-12 on our consolidated financial condition and results of operations.

In February 2018, the FASB issued ASU No. 2018-02, "Income Statement - Reporting Comprehensive Income (Topic 220): Reclassification of Certain Tax Effects from Accumulated Comprehensive Income ("AOCI")." The ASU and its amendments were issued as a result of the enactment of the U.S. Tax Cuts and Jobs Act of 2017. The amendments of this ASU address the available options to reclassify stranded tax effects within AOCI to retained earnings in each period in which the effect of the change (or portion thereof) is recorded. Additionally, the ASU outlines the disclosure requirements for releasing income tax effects from AOCI. The ASU is effective for fiscal years beginning after December 15, 2018 and interim periods within those fiscal years. Early adoption is permitted. The ASU should be applied either in the period of adoption or retrospectively to each period (or periods) in which the effect of the change in the U.S. federal corporate income tax rate in the Tax Cuts and Jobs Act is recognized. We are currently evaluating the impact of ASU No. 2018-02 on our consolidated financial condition and results of operations.

In July 2018, the FASB issued ASU No. 2018-07, "Compensation - Stock Compensation (Topic 718) - Improvements to Non-employee Share-based Payment Accounting." The amendments of this ASU apply to all share-based payment transactions to non-employees, in which a grantor acquires goods or services to be used or consumed in a grantor's own operations, accounted under ASC 505-50, Equity-Based Payments to Non-Employees. Under the amendments of

ASU 2018-07, most of the guidance on compensation to nonemployees would be aligned with the requirements for shared based payments granted to employees, Topic 718. The ASU is effective for fiscal years beginning after December 15, 2018 and interim periods within those fiscal years. Early adoption is permitted. The adoption of ASU No. 2018-07 will not have an impact on our consolidated financial condition and results of operations.

In August 2018, the FASB issued ASU No. 2018-13, "Fair Value Measurement (Topic 820): Disclosure Framework—Changes to the Disclosure Requirements for Fair Value Measurement." The amendments of the ASU modify the disclosure requirements for fair value measurements by removing, modifying, or adding certain disclosure information requirements for assets and liabilities measured at fair value in the statement of financial position or disclosed in the notes to financial statements. The ASU is effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2019, with early adoption permitted for the removed disclosures and delayed adoption until fiscal year 2020 permitted for the new disclosures. The removed and modified disclosures will be adopted on a retrospective basis and the new disclosures will be adopted on a prospective basis. We are currently evaluating the impact of ASU No. 2018-13 on our consolidated financial condition and results of operations.

In August 2018, the FASB issued ASU No. 2018-14, "Compensation-Retirement Benefits-Defined Benefit Plans-General (Subtopic 715-20): Disclosure Framework-Changes to the Disclosure Requirements for Defined Benefit Plans." The ASU amends the disclosure requirements by adding, clarifying, or removing certain disclosures for sponsor defined benefit pension or other postretirement plans. The amendments are effective for fiscal years ending after December 15, 2020 and the amendments should be applied retrospectively to all periods presented. We are currently evaluating the impact of ASU No. 2018-14 on our consolidated financial condition and results of operations.

In August 2018, the FASB issued ASU No. 2018-15, "Intangibles-Goodwill and Other-Internal-Use Software (Subtopic 350-40): Customer's Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement That Is a Service Contract." The ASU addresses how entities should account for costs associated with implementing a cloud computing arrangement that is considered a service contract. Per the amendments of the ASU, implementation costs incurred in a cloud computing arrangement that is a service contract should be accounted for in the same manner as implementation costs incurred to develop or obtain software for internal use as prescribed by guidance in ASC350-40. The ASU requires that implementation costs incurred in a cloud computing arrangement be capitalized rather than expensed. Further, the ASU specifies the method for the amortization of costs incurred during implementation, and the manner in which the unamortized portion of these capitalized implementation costs should be evaluated for impairment. The ASU also provides guidance on how to present such implementation costs in the financial statements and also creates additional disclosure requirements. The amendments are effective for fiscal years beginning after December 15, 2019, including interim periods. Early adoption of the ASU requirements is permitted, including adoption in any interim period. The amendments in this ASU should be applied either retrospectively or prospectively to all implementation costs incurred after the date of adoption. We are currently evaluating the impact of ASU No. 2018-15 on our consolidated financial condition and results of operations.

In October 2018, the FASB issued ASU No. 2018-17, "Consolidation (Topic 810): Targeted Improvements to Related Party Guidance for Variable Interest Entities ("VIEs")." The standard reduces the cost and complexity of financial reporting associated with VIEs. The new standard amends the guidance for determining whether a decision-making fee is a VIE. The amendments require organizations to consider indirect interests held through related parties under common control on a proportional basis rather than as the equivalent of a direct interest in its entirety as currently required in GAAP. The amendments of this ASU are effective for fiscal years beginning after December 15, 2019, and interim periods within those fiscal years. We are currently evaluating the impact of ASU No. 2018-17 on our consolidated financial condition and results of operations.

In November 2018, the FASB issued ASU No. 2018-18, "Collaborative Arrangements (Topic 808): Clarifying the Interaction Between Topic 808 and Topic 606." The ASU clarifies the interaction between the guidance for certain collaborative arrangements and the New Revenue Standard. The amendments of the ASU provide guidance on how to assess whether certain transactions between collaborative arrangement participants should be accounted for within the New Revenue Standard. The ASU also provides more comparability in the presentation of revenue for certain transactions between collaborative arrangement participants. Parts of the collaborative arrangement that are not in the purview of the revenue recognition standard should be presented separately. The amendments are effective for fiscal years beginning after December 15, 2019, and interim periods within those fiscal years. Early adoption is permitted. We are currently evaluating the impact of ASU No. 2018-18 on our consolidated financial condition and results of operations.

2. REVENUE RECOGNITION

We enter into contracts with customers often having multiple commitments of goods and services including any combination of designing, developing, manufacturing, modifying, installing and commissioning of flow management equipment and providing services and parts related to the performance of such products. We evaluate the commitments in our contracts with customers to determine if the commitments are both capable of being distinct and distinct in the context of the contract in order to identify performance obligations.

We recognize revenue when (or as) we satisfy a performance obligation by transferring control of the performance obligation to a customer. Control of a performance obligation may transfer to the customer either over time or at a point in time depending on an evaluation of the specific facts and circumstances for each contract, including the terms and conditions of the contract as agreed with the customer, as well as the nature of the products or services to be provided. Our larger contracts are typically completed within a one to three-year period, while many other contracts, such as “short cycle” contracts, have a shorter timeframe for revenue recognition.

Control transfers over time when the customer is able to direct the use of and obtain substantially all of the benefits of our work as we perform. This typically occurs when products have no alternative use and we have a right to payment for performance completed to date, including a reasonable profit margin. Our contracts often include cancellation provisions that require the customer to reimburse us for costs incurred up to the date of cancellation, and some contracts also provide for reimbursement of profit upon cancellation in addition to costs incurred to date.

Our primary method for recognizing revenue over time is the POC method. We measure progress towards completion by applying an input measure based on costs incurred to date relative to total estimated costs at completion (i.e., the cost-to-cost method). This method provides a reasonable depiction of the transfer of control of products and services to customers as it ensures our efforts towards satisfying a performance obligation, as reflected by costs incurred, are included in the measure of progress used for recognition of revenue. Costs generally include direct labor, direct material and manufacturing overhead. Costs that do not contribute towards control transfer are generally immaterial, but are excluded from the measure of progress in the event they are significant.

Historically, revenue recognized under the POC method has been 5% to 10% of our consolidated sales. Under the New Revenue Standard, we have experienced an increase in the amount of revenue recognized over time. This increase is primarily due to the application of the new “transfer of control” model for revenue recognition. Under this model, revenue for performance obligations subject to contractual transfer of control during the manufacturing process are recognized over time. This includes contracts with cancellation provisions that require reimbursement for costs incurred plus a reasonable margin and for which the performance obligation has no alternative use. Revenue from products and services transferred to customers over time accounted for approximately 22%, 4% and 6% of total revenue for the years ended December 31, 2018, 2017 and 2016, respectively.

If control does not transfer over time, then control transfers at a point in time. We recognize revenue at a point in time at the level of each performance obligation based on the evaluation of certain indicators of control transfer, such as title transfer, risk of loss transfer, customer acceptance and physical possession. Revenue from products and services transferred to customers at a point in time accounted for approximately 78%, 96% and 94% of total revenue for the years ended December 31, 2018, 2017 and 2016, respectively.

A contract modification, or “change order,” occurs when the existing enforceable rights and obligations of a contract change, such as a change in the scope, price or terms and conditions. We account for a change order as a new accounting contract when the change order is limited to adding new, distinct products and services that are priced in an amount consistent with standalone selling price. Other change orders are accounted for as a modification of the existing accounting contract. When a change order occurs for a contract having in-process over time performance obligations, the effect of the change order on the transaction price and the measure of progress for the performance obligations to which it relates is recognized as an adjustment to revenue (either as an increase in or a reduction of revenue) on a cumulative catch-up basis.

Freight charges billed to customers are included in sales and the related shipping costs are included in cost of sales in our consolidated statements of income. If shipping activities are performed after a customer obtains control of a product, we apply a policy election to account for shipping as an activity to fulfill the promise to transfer the product to the customer.

We apply a policy election to exclude transaction taxes collected from customers from sales when the tax is both imposed on and concurrent with a specific revenue-producing transaction.

In certain instances, we provide guaranteed completion dates under the terms of our contracts. Failure to meet contractual delivery dates can result in late delivery penalties or liquidated damages. In the event that the transaction price of such a contract is probable of experiencing a significant reversal due to a penalty, we constrain a portion of the transaction price.

This reduction to the transaction price could potentially cause estimated total contract costs to exceed the transaction price, in which case we record a provision for the estimated loss in the period the loss is first projected. In circumstances where the transaction price still exceeds total projected costs, the estimated penalty generally reduces profitability of the contract at the time of subsequent revenue recognition.

Our incremental costs to obtain a contract are limited to sales commissions. We apply the practical expedient to expense commissions as incurred for contracts having a duration of one year or less. Sales commissions related to contracts with a duration of greater than one year are immaterial to our financial statements and are also expensed as incurred.

We have not identified any material costs to fulfill a contract that qualify for capitalization under ASC 340-40.

Performance Obligations

A performance obligation is a promise in a contract to transfer a distinct good or service to the customer, and is the unit of account for recognition of revenue. Many of our contracts have multiple performance obligations as the promise to transfer the individual goods or services, or certain groups of goods and services, is separately identifiable from other promises in the contract.

We allocate the transaction price of each contract to the performance obligations on the basis of standalone selling price and recognize revenue when, or as, control of each performance obligation transfers to the customer. For standard products, we identify the standalone selling price based on directly observable information. For customized or unique products and services, we apply the cost plus margin approach to estimate the standalone selling price. Under this method, we forecast our expected costs of satisfying a performance obligation and then add an appropriate standalone market margin for that distinct good or service.

We have elected to use the practical expedient to not adjust the transaction price of a contract for the effects of a significant financing component if, at the inception of the contract, we expect that the period between when we transfer a promised good or service to a customer and when the customer pays for that good or service will be one year or less.

A material product warranty exists when a customer has specifically requested or negotiated a warranty period that is significantly longer than our standard warranty period (i.e., a “service-type warranty”) and where the warranty obligation is material in the context of the contract. It is not common for our contracts to contain material product warranties. However, when such a warranty exists, we account for it as a separate performance obligation. We estimate the standalone selling price of the warranty obligation utilizing a cost plus margin approach and allocate a portion of the transaction price to the warranty performance obligation on the basis of estimated standalone selling price. We recognize revenue for warranty performance obligations over time on a straight line basis over the extended warranty period.

A material right option is a benefit provided to a customer in a current contract, such as an option to receive future products or services for free or at a significant discount, that is incremental to benefits widely available to similar customers that do not enter into a specific contract. It is not common for our contracts to contain material right options. However, when a material right option exists, it is accounted for as a separate performance obligation and a portion of the transaction price is allocated to the performance obligation based on the estimated standalone selling price of the option. Revenue is recognized when (or as) the customer exercises the right to acquire future products and/or services.

On December 31, 2018, the aggregate transaction price allocated to unsatisfied (or partially unsatisfied) performance obligations related to contracts having an original expected duration in excess of one year was approximately \$450 million. We estimate recognition of approximately \$361 million of this amount as revenue in 2019 and an additional \$89 million in 2020 and thereafter.

Revenue recognized for performance obligations satisfied (or partially satisfied) in prior periods for the year ended December 31, 2018 was not material.

ASC 606 Adoption Impact

We applied ASC 606 only to contracts that were not substantially complete as of January 1, 2018 and reflected the aggregate impact of all contract modifications (“change orders”) that occurred before the beginning of the earliest period presented when accounting for modified contracts at transition. The following table presents the cumulative effect of the changes made to our consolidated balance sheet as of January 1, 2018 related to the adoption of the New Revenue Standard:

(Amounts in thousands)	December 31, 2017	Adjustments due to adoption of		January 1, 2018
		New Revenue Standard		
Accounts receivable, net of allowance for doubtful accounts(1)	856,711	(49,247)		807,464
Contract assets, net(2)	—	219,361		219,361
Inventories, net(3)	884,273	(238,573)		645,700
Prepaid expenses and other	114,316	(4,457)		109,859
Total current assets	2,558,745	(72,916)		2,485,829
Deferred taxes	51,974	(2,706)		49,268
Other assets, net	199,722	2,004		201,726
Total assets	4,910,474	(73,618)		4,836,856
Accounts payable	443,113	11,784		454,897
Accrued liabilities(4)	724,196	(290,445)		433,751
Contract liabilities(5)	—	178,515		178,515
Total current liabilities	1,242,908	(100,146)		1,142,762
Retirement obligations and other liabilities	496,954	6,568		503,522
Retained earnings	3,503,947	19,642		3,523,589
Total equity	1,670,954	19,960		1,690,914
Total liabilities and equity	4,910,474	(73,618)		4,836,856

(1) Adjusted for contract assets accounted for under delivery based methods, previously reported in receivables, net.

(2) Represents our revenue recognized in advance of our contractual right to bill the customer.

(3) Adjusted for contract assets accounted under the over time method, previously reported in inventories, net.

(4) Adjusted for deferred revenue previously reported in accrued liabilities and reclassified to contract assets and contract liabilities.

(5) Represents contractual billings in excess of revenue recognized at the contract level, previously reported in accrued liabilities.

The modified retrospective approach requires a dual reporting presentation to be disclosed in the year of adoption. The dual reporting requirement outlines the impact amount by which a financial statement line is affected in the current reporting period by the adoption of the New Revenue Standard as compared with the previous standard in effect before the adoption.

The following tables present the dual reporting requirements:

(Amounts in thousands, except percentages)	December 31, 2018		
	Balances without Adoption of New Revenue Standard	Effect of Change	As Reported
Sales	\$3,761,470	\$71,196	\$3,832,666
Cost of sales	(2,598,904)	(45,926)	(2,644,830)
Gross profit	1,162,566	25,270	1,187,836
Gross profit margin	30.9 %		31.0 %
Selling, general and administrative expense	(942,648)	(1,066)	(943,714)
Loss on sale of business	(7,727)	—	(7,727)
Net earnings from affiliates	11,143	—	11,143
Operating income	223,334	24,204	247,538
Operating income as a percent of sales	5.9 %		6.5 %
Interest expense	(58,160)	—	(58,160)
Interest income	6,465	—	6,465
Other expense, net	(22,066)	2,497	(19,569)
Earnings before income taxes	149,573	26,701	176,274
Provision for income taxes	(47,309)	(3,915)	(51,224)
Net earnings, including noncontrolling interests	102,264	22,786	125,050
Less: Net earnings attributable to noncontrolling interests	(5,379)	—	(5,379)
Net earnings attributable to Flowserve Corporation	\$96,885	\$22,786	\$119,671

(Amounts in thousands)	December 31, 2018		
	Balances without Adoption of New Revenue Standard	Effect of Change	As Reported
Accounts receivable, net	852,055	(59,621)	792,434
Contract assets, net	—	228,579	228,579
Inventories, net	895,677	(261,806)	633,871
Prepaid expenses and other	121,796	(13,218)	108,578
Total current assets	2,489,211	(106,066)	2,383,145
Other assets, net	183,493	6,671	190,164
Total assets	4,715,916	(99,639)	4,616,277
Accounts payable	406,569	12,324	418,893
Accrued liabilities	750,505	(359,099)	391,406
Contract liabilities	—	202,458	202,458
Total current liabilities	1,225,292	(144,317)	1,080,975
Retained earnings	3,500,566	42,441	3,543,007
Total equity	1,618,802	41,978	1,660,780
Total liabilities and equity	4,715,916	(99,639)	4,616,277

Disaggregated Revenue

We conduct our operations through three business segments based on the type of product and how we manage the business:

- Engineered Product Division ("EPD") for long lead time, custom and other highly-engineered pumps and pump systems, mechanical seals, auxiliary systems and replacement parts and related services;
- Industrial Product Division ("IPD") for engineered and pre-configured industrial pumps and pump systems and related products and services; and
- Flow Control Division ("FCD") for engineered and industrial valves, control valves, actuators and controls and related services.

Our revenue sources are derived from our original equipment manufacturing and our aftermarket sales and services. Our original equipment revenues are generally related to originally designed, manufactured, distributed and installed equipment that can range from pre-configured, short-cycle products to more customized, highly-engineered equipment ("Original Equipment"). Our aftermarket sales and services are derived from sales of replacement equipment, as well as maintenance, advanced diagnostic, repair and retrofitting services ("Aftermarket"). Each of our three business segments generate Original Equipment and Aftermarket revenues.

The following table presents our customer revenues disaggregated by revenue source:

	December 31, 2018			
(Amounts in thousands)	EPD	IPD	FCD	Total
Original Equipment	\$529,005	\$463,157	\$943,893	\$1,936,055
Aftermarket	1,331,484	296,842	268,285	1,896,611
	\$1,860,489	\$759,999	\$1,212,178	\$3,832,666

	December 31, 2017 (1)			
(Amounts in thousands)	EPD	IPD	FCD	Total
Original Equipment	\$511,060	\$457,992	\$906,890	\$1,875,942
Aftermarket	1,227,022	281,664	276,203	1,784,889
	\$1,738,082	\$739,656	\$1,183,093	\$3,660,831

	December 31, 2016 (1)			
(Amounts in thousands)	EPD	IPD	FCD	Total
Original Equipment	\$683,871	\$534,957	\$975,786	\$2,194,614
Aftermarket	1,279,215	264,966	251,692	1,795,873
	\$1,963,086	\$799,923	\$1,227,478	\$3,990,487

(1) Prior periods are presented in accordance with Topic 605.

Our customer sales are diversified geographically. The following table presents our revenues disaggregated by geography, based on the shipping addresses of our customers:

December 31, 2018

(Amounts in thousands)	EPD	IPD	FCD	Total
North America(1)	\$715,571	\$322,066	\$540,316	\$1,577,953
Latin America(1)	190,605	28,771	22,405	241,781
Middle East and Africa	280,461	49,023	138,240	467,724
Asia Pacific	408,104	94,455	279,109	781,668
Europe	265,748	265,684	232,108	763,540
	\$1,860,489	\$759,999	\$1,212,178	\$3,832,666

December 31, 2017 (2)

(Amounts in thousands)	EPD	IPD	FCD	Total
North America(1)	\$667,572	\$301,841	\$477,275	\$1,446,688
Latin America(1)	140,418	28,559	33,207	202,184
Middle East and Africa	301,998	54,535	155,447	511,980
Asia Pacific	351,178	93,834	239,197	684,209
Europe	276,916	260,887	277,967	815,770
	\$1,738,082	\$739,656	\$1,183,093	\$3,660,831

December 31, 2016 (2)

(Amounts in thousands)	EPD	IPD	FCD	Total
North America(1)	\$795,919	\$328,026	\$478,462	\$1,602,407
Latin America(1)	204,123	34,112	49,440	287,675
Middle East and Africa	320,529	58,389	169,212	548,130
Asia Pacific	351,153	128,289	233,027	712,469
Europe	291,362	251,107	297,337	839,806
	\$1,963,086	\$799,923	\$1,227,478	\$3,990,487

(1) North America represents United States and Canada; Latin America includes Mexico.

(2) Prior periods are presented in accordance with Topic 605.

Contract Balances

We receive payment from customers based on a contractual billing schedule and specific performance requirements as established in our contracts. We record billings as accounts receivable when an unconditional right to consideration exists. A contract asset represents revenue recognized in advance of our right to bill the customer under the terms of a contract. A contract liability represents our contractual billings in advance of revenue recognized for a contract. The following table presents opening and closing balances of contract assets and contract liabilities, current and long-term, for the year ended December 31, 2018:

(Amounts in thousands)	Contract Assets, net (Current)	Long-term Contract Assets, net(1)	Contract Liabilities (Current)	Long-term Contract Liabilities(2)
Beginning balance, January 1, 2018	\$219,361	\$ 3,990	\$178,515	\$ 3,925
Revenue recognized that was included in contract liabilities at the beginning of the period	—	—	(123,458)	(1,360)
Increase due to revenue recognized in the period in excess of billings	846,922	6,668	—	—
Increase due to billings arising during the period in excess of revenue recognized	—	—	152,664	(481)
Amounts transferred from contract assets to receivables	(815,213)	(2,503)	—	—
Currency effects and other, net	(22,491)	2,812	(5,263)	(714)
Ending balance, December 31, 2018	\$228,579	\$ 10,967	\$202,458	\$ 1,370

(1) Included in other assets, net.

(2) Included in retirement obligations and other liabilities.

3. DISPOSITIONS

IPD Business Divestiture

On June 29, 2018, pursuant to a plan of sale approved by management, we executed an agreement to divest two IPD locations and associated product lines, including the related assets and liabilities. This transaction did not meet the criteria for classification of assets held for sale as of June 30, 2018 due to a contingency that could have potentially impacted the final terms and/or timing of the divestiture. The sale transaction was completed on August 9, 2018. During the twelve months ended December 31, 2018, we recorded a pre-tax charge of \$25.1 million, including a pre-tax charge of \$17.4 million in the second quarter of 2018 and a loss on sale of the business of \$7.7 million in the third quarter of 2018. The second quarter of 2018 pre-tax charge related to write-downs of inventory and long-lived assets to their estimated fair value, of which \$7.7 million was recorded in COS and \$9.7 million was recorded in SG&A. The third quarter of 2018 pre-tax charge primarily related to working capital changes since the second quarter of 2018 and net cash transferred at the closing date of \$3.7 million. The sale included a manufacturing facility in Germany and a related assembly facility in France. In 2017, net sales related to the business totaled approximately \$42 million, although the business produced an operating loss in each of the last two fiscal years.

Vogt

Effective July 6, 2017, we sold our FCD's Vogt product line and related assets and liabilities to a privately held company for \$28.0 million of cash received at closing. The sale resulted in a pre-tax gain of \$11.1 million recorded in gain on sale of business in the consolidated statements of income. In 2016, net sales related to the Vogt business totaled approximately \$17 million, with earnings before interest and taxes of approximately \$4 million.

Gestra AG

Effective May 2, 2017, we sold our FCD's Gestra AG ("Gestra") business to a leading provider of steam system solutions for \$203.6 million (€178.3 million), which included \$180.8 million (€158.3 million) of cash received at closing (net of divested cash and subsequent working capital adjustments) and \$24.0 million (€20.0 million) of previous escrow amounts collected in the fourth quarter of 2017. The sale resulted in a pre-tax gain of \$130.2 million (\$79.4 million after-tax) recorded in gain on sale of business in the consolidated statements of income. The sale included Gestra's manufacturing facility in Germany as well as related operations in the U.S., the United Kingdom ("U.K."), Spain,

Poland, Italy, Singapore and Portugal. In 2016,

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Gestra recorded revenues of approximately \$101 million (€92 million) with earnings before interest and taxes of approximately \$17 million (€15 million).

4. GOODWILL AND OTHER INTANGIBLE ASSETS

The changes in the carrying amount of goodwill for the years ended December 31, 2018 and 2017 are as follows:

	EPD	IPD	FCD	Total
	(Amounts in thousands)			
Balance as of December 31, 2016	\$473,831	\$299,765	\$431,458	\$1,205,054
Dispositions	—	(1,900)	(36,880)	(38,780)
Currency translation and other	8,378	21,435	22,101	51,914
Balance as of December 31, 2017	\$482,209	\$319,300	\$416,679	\$1,218,188
Currency translation and other	(3,338)	(8,032)	(9,178)	(20,548)
Balance as of December 31, 2018	\$478,871	\$311,268	\$407,501	\$1,197,640

The following table provides information about our intangible assets for the years ended December 31, 2018 and 2017:

		December 31, 2018		December 31, 2017	
	Useful Life (Years)	Ending Gross Amount	Accumulated Amortization	Ending Gross Amount	Accumulated Amortization
(Amounts in thousands, except years)					
Finite-lived intangible assets:					
Engineering drawings(1)	10-22	\$89,796	\$(75,239)	\$90,442	\$(71,761)
Existing customer relationships(2)	5-10	82,235	(47,016)	84,291	(41,279)
Patents	9-16	26,251	(26,136)	26,876	(26,231)
Other	4-40	88,138	(37,145)	88,887	(34,251)
		\$286,420	\$(185,536)	\$290,496	\$(173,522)
Indefinite-lived intangible assets(3)		\$91,251	\$(1,585)	\$94,665	\$(1,590)

(1) Engineering drawings represent the estimated fair value associated with specific acquired product and component schematics.

(2) Existing customer relationships acquired prior to 2011 had a useful life of five years.

(3) Accumulated amortization for indefinite-lived intangible assets relates to amounts recorded prior to the implementation date of guidance issued in ASC 350.

The following schedule outlines actual amortization expense recognized during 2018 and an estimate of future amortization based upon the finite-lived intangible assets owned at December 31, 2018:

	Amortization Expense (Amounts in thousands)
Actual for year ended December 31, 2018	\$ 14,068
Estimated for year ended December 31, 2019	16,178
Estimated for year ended December 31, 2020	15,030
Estimated for year ended December 31, 2021	10,982
Estimated for year ended December 31, 2022	9,692
Estimated for year ended December 31, 2023	7,132
Thereafter	41,874

Amortization expense for finite-lived intangible assets was \$15.3 million in 2017 and \$13.9 million in 2016.

5. INVENTORIES

Inventories, net consisted of the following:

	December 31,	
	2018	2017
	(Amounts in thousands)	
Raw materials	\$310,204	\$358,827
Work in process(1)	191,660	548,250
Finished goods(2)	205,814	215,849
Less: Progress billings	—	(160,044)
Less: Excess and obsolete reserve	(73,807)	(78,609)
Inventories, net	\$633,871	\$884,273

(1) In the second quarter of 2017, we recorded a \$16.9 million charge for costs incurred related to a contract to supply oil and gas platform equipment to an end user in Latin America. This charge was primarily related to our IPD reporting segment and resulted in a decrease to work in process.

(2) In the second quarter of 2018, we recorded a \$7.7 million charge related to the divestiture of two IPD locations and related product lines, which resulted in a decrease to finished goods. Refer to Note 3 for further discussion.

During 2018, 2017 and 2016, we recognized expenses of \$16.2 million, \$22.9 million and \$14.6 million, respectively, for excess and obsolete inventory. These expenses are included in COS in our consolidated statements of income.

As part of the adoption of the New Revenue Standard, certain work in process inventory and progress billings associated with POC contracts were recognized as cost of sales or reclassified to contract assets or contract liabilities. Refer to Note 2 for further discussion.

6. STOCK-BASED COMPENSATION PLANS

We maintain the Flowserve Corporation Equity and Incentive Compensation Plan (the "2010 Plan"), which is a shareholder-approved plan authorizing the issuance of up to 8,700,000 shares of our common stock in the form of incentive stock options, non-statutory stock options, restricted shares, restricted share units and performance-based units (collectively referred to as "Restricted Shares"), stock appreciation rights and bonus stock. Of the 8,700,000 shares of common stock authorized under the 2010 Plan, 2,089,079 were available for issuance as of December 31, 2018. The long-term incentive program was amended to allow Restricted Shares granted after January 1, 2016 to employees who retire and have achieved at least 55 years of age and ten years of service to continue to vest over the original vesting period ("55/10 Provision").

Stock Options — Options granted to officers, other employees and directors allow for the purchase of common shares at the market value of our stock on the date the options are granted. Options generally become exercisable after three years. Options generally expire ten years from the date of the grant or within a short period of time following the termination of employment or cessation of services by an option holder. No stock options were granted during the year ended December 31, 2018, compared to the 114,943 stock options granted for the same period in 2017. No stock options were granted for the same period in 2016. As of December 31, 2018, 114,943 stock options were outstanding, with a grant date fair value of \$2.0 million, which is expected to be recognized over a weighted-average period of approximately one year. No stock options were vested during years ended December 31, 2018, 2017 or 2016.

Information related to stock options issued to officers, other employees and directors under all plans is presented in the following table:

	2018		2017		2016	
	Shares	Weighted Average Exercise Price	Shares	Weighted Average Exercise Price	Shares	Weighted Average Exercise Price
Number of shares under option:						
Outstanding — beginning of year	14,943	\$ 48.63	—	\$ —	84,261	\$ 17.42
Granted	—	—	114,943	48.63	—	—
Exercised	—	—	—	—	(84,261)	17.42
Canceled	—	—	—	—	—	—
Outstanding — end of year	114,943	\$ 48.63	114,943	\$ 48.63	—	\$ —
Exercisable — end of year	—	\$ —	—	\$ —	—	\$ —

The weighted average remaining contractual life of options outstanding at December 31, 2018 and 2017 was 8.3 years and 9.3 years, respectively. The total intrinsic value of stock options exercised for the year ended December 31, 2016 was \$2.4 million.

Restricted Shares — Generally, the restrictions on Restricted Shares do not expire for a minimum of one year and a maximum of three years, and shares are subject to forfeiture during the restriction period. Most typically, Restricted Share grants have staggered vesting periods over one to three years from grant date. The intrinsic value of the Restricted Shares, which is typically the product of share price at the date of grant and the number of Restricted Shares granted, is amortized on a straight-line basis to compensation expense over the periods in which the restrictions lapse.

Awards of Restricted Shares are valued at the closing market price of our common stock on the date of grant. The unearned compensation is amortized to compensation expense over the vesting period of the restricted shares, except for awards related to the 55/10 Provision which are expensed when granted. Unearned compensation is amortized to compensation expense over the vesting period of the Restricted Shares. As of December 31, 2018 and 2017, we had \$24.3 million and \$16.7 million, respectively, of unearned compensation cost related to unvested Restricted Shares, which is expected to be recognized over a weighted-average period of approximately one year. These amounts will be recognized into net earnings in prospective periods as the awards vest. The total fair value of Restricted Shares vested during the years ended December 31, 2018, 2017 and 2016 was \$14.3 million, \$30.5 million and \$38.8 million, respectively.

We recorded stock-based compensation for Restricted Shares as follows:

	Year Ended December 31,		
	2018	2017	2016
	(Amounts in millions)		
Stock-based compensation expense	\$19.9	\$22.8	\$30.2
Related income tax benefit	(4.5)	(5.2)	(10.4)
Net stock-based compensation expense	\$15.4	\$17.6	\$19.8

The following table summarizes information regarding Restricted Shares:

	Year Ended December 31, 2018	
	Shares	Weighted Average Grant-Date Fair Value
Number of unvested Restricted Shares:		
Outstanding — beginning of year	1,203,852	\$ 47.10
Granted	932,392	44.14
Vested	(308,747)	46.38
Canceled	(297,283)	49.09
Outstanding — ending of year	1,530,214	\$ 45.06

Unvested Restricted Shares outstanding as of December 31, 2018, includes approximately 767,000 units with performance-based vesting provisions. Performance-based units are issuable in common stock and vest upon the achievement of pre-defined performance targets. Performance-based units granted prior to 2017 have performance targets based on our average annual return on net assets over a three-year period as compared with the same measure for a defined peer group for the same period. Performance-based units granted in 2017 and 2018 have performance targets based on our average return on invested capital and our total shareholder return ("TSR") over a three-year period. Most units were granted in three annual grants since January 1, 2016 and have a vesting percentage between 0% and 200% depending on the achievement of the specific performance targets. Except for shares granted under the 55/10 Provision, compensation expense is recognized ratably over a cliff-vesting period of 36 months based on the fair value of our common stock on the date of grant, as adjusted for actual forfeitures. During the performance period, earned and unearned compensation expense is adjusted based on changes in the expected achievement of the performance targets for all performance-based units granted except for the TSR-based units. Vesting provisions range from 0 to approximately 1,534,000 shares based on performance targets. As of December 31, 2018, we estimate vesting of approximately 615,000 shares based on expected achievement of performance targets.

7.DERIVATIVES AND HEDGING ACTIVITIES

Our risk management and foreign currency derivatives and hedging policy specifies the conditions under which we may enter into derivative contracts. See Note 1 for additional information on our purpose for entering into derivatives and our overall risk management strategies. We enter into foreign exchange forward contracts to hedge our cash flow risks associated with transactions denominated in currencies other than the local currency of the operation engaging in the transaction.

Foreign exchange contracts had a notional values of \$280.9 million and \$235.6 million at December 31, 2018 and 2017, respectively. At December 31, 2018, the length of foreign exchange contracts currently in place ranged from 4 days to 21 months. During the second quarter of 2017, we discontinued our program to designate forward exchange contracts. The discontinuance of this program had no impact on our financial position as of December 31, 2017.

We are exposed to risk from credit-related losses resulting from nonperformance by counterparties to our financial instruments. We perform credit evaluations of our counterparties under forward exchange contracts and expect all counterparties to meet their obligations. We have not experienced credit losses from our counterparties.

The fair values of foreign exchange contracts are summarized below:

	Year Ended December 31, 2018 2017 (Amounts in thousands)	
Current derivative assets	\$ 535	\$ 2,489
Noncurrent derivative assets	5	177

Current derivative liabilities	3,285	284
Noncurrent derivative liabilities	2	56

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Current and noncurrent derivative assets are reported in our consolidated balance sheets in prepaid expenses and other and other assets, net, respectively. Current and noncurrent derivative liabilities are reported in our consolidated balance sheets in accrued liabilities and retirement obligations and other liabilities, respectively.

The impact of net changes in the fair values of foreign exchange contracts are summarized below:

	Year Ended		
	December 31,		
	2018	2017	2016
	(Amounts in thousands)		
(Loss) gain recognized in income	\$(3,154)	\$2,122	\$5,693

Gains and losses recognized in our consolidated statements of income for foreign exchange contracts are classified as Other expense, net.

In March 2015, we designated €255.7 million of our €500.0 million 2022 EUR Senior Notes discussed in Note 11 as a net investment hedge of our investments in certain of our international subsidiaries that use the Euro as their functional currency. We used the spot method to measure the effectiveness of our net investment hedge. Under this method, for each reporting period, the change in the carrying value of the 2022 EUR Senior Notes due to remeasurement of the effective portion is reported in accumulated other comprehensive loss on our consolidated balance sheet and the remaining change in the carrying value of the ineffective portion, if any, is recognized in Other expense, net in our consolidated statements of income. We evaluate the effectiveness of our net investment hedge on a prospective basis at the beginning of each quarter. We did not record any ineffectiveness for the years ended December 31, 2018, 2017 or 2016.

8. FAIR VALUE OF FINANCIAL INSTRUMENTS

The fair value of our debt, excluding the Senior Notes (as described in Note 11), was estimated using interest rates on similar debt recently issued by companies with credit metrics similar to ours and is classified as Level II under the fair value hierarchy. The carrying value of our debt is included in Note 11 and, except for the Senior Notes, approximates fair value. The estimated fair value of the Senior Notes is based on Level I quoted market rates. The estimated fair value of our Senior Notes at December 31, 2018 was \$1,362.5 million compared to the carrying value of \$1,364.8 million. The carrying amounts of our other financial instruments (i.e., cash and cash equivalents, accounts receivable, net and accounts payable) approximated fair value due to their short-term nature at December 31, 2018 and December 31, 2017.

9. DETAILS OF CERTAIN CONSOLIDATED BALANCE SHEET CAPTIONS

The following tables present financial information of certain consolidated balance sheet captions.

Accounts Receivable, net — Accounts receivable, net were:

	December 31,	
	2018	2017
	(Amounts in thousands)	
Accounts receivable	\$843,935	\$915,824
Less: allowance for doubtful accounts	(51,501)	(59,113)
Accounts receivable, net	\$792,434	\$856,711

Property, Plant and Equipment, net — Property, plant and equipment, net were:

	December 31,	
	2018	2017
	(Amounts in thousands)	
Land	\$72,701	\$84,551
Buildings and improvements	441,006	470,354
Machinery, equipment and tooling	634,838	682,316
Software, furniture and fixtures and other	418,185	402,608
Gross property, plant and equipment(1)	1,566,730	1,639,829
Less: accumulated depreciation	(956,634)	(968,033)
Property, plant and equipment, net	\$610,096	\$671,796

(1) In the second quarter of 2018, we recorded a \$9.7 million charge related to the divestiture of two IPD locations and related product lines. In the second quarter of 2017, we recorded a \$26.0 million impairment charge related to our manufacturing facility in Brazil.

Accrued Liabilities — Accrued liabilities were:

	December 31,	
	2018	2017
	(Amounts in thousands)	
Wages, compensation and other benefits	\$198,311	\$180,717
Commissions and royalties	19,673	23,240
Customer advance payments	—	273,127
Progress billings in excess of accumulated costs	—	4,411
Warranty costs and late delivery penalties	31,683	53,027
Sales and use tax	14,486	14,830
Income tax	9,865	27,862
Other	117,388	146,982
Accrued liabilities	\$391,406	\$724,196

As part of the adoption of the New Revenue Standard, customer advance payments and progress billings in excess of accumulated costs were reclassified to contract assets or contract liabilities. Refer to Note 2 of this Annual Report for further discussion. "Other" accrued liabilities include professional fees, lease obligations, insurance, interest, freight, accrued cash dividends payable, legal and environmental matters, derivative liabilities, restructuring reserves and other items, none of which individually exceed 5% of current liabilities.

Retirement Obligations and Other Liabilities — Retirement obligations and other liabilities were:

	December 31,	
	2018	2017
	(Amounts in thousands)	
Pension and postretirement benefits	\$183,012	\$203,640
Deferred taxes	159,404	156,276
Legal and environmental	21,949	25,996
Uncertain tax positions and other tax liabilities	57,553	72,711
Other	37,775	38,331
Retirement obligations and other liabilities	\$459,693	\$496,954

10. EQUITY METHOD INVESTMENTS

We occasionally enter into joint venture arrangements with local country partners as our preferred means of entry into countries where barriers to entry may exist. Similar to our consolidated subsidiaries, these unconsolidated joint ventures generally operate within our primary businesses of designing, manufacturing, assembling and distributing fluid motion and control products and services. We have agreements with certain of these joint ventures that restrict us from otherwise entering the respective market and certain joint ventures produce and/or sell our products as part of their broader product offering. Net earnings from investments in unconsolidated joint ventures is reported in net earnings from affiliates in our consolidated statements of income. Given the integrated role of the unconsolidated joint ventures in our business, net earnings from affiliates is presented as a component of operating income.

As of December 31, 2018, we had investments in seven joint ventures, one located in each of Chile, India, Saudi Arabia, South Korea and the United Arab Emirates and two in China that were accounted for using the equity method and are immaterial for disclosure purposes.

11. DEBT AND LEASE OBLIGATIONS

Debt, including capital lease obligations, consisted of:

	December 31,	
	2018	2017
	(Amounts in thousands)	
1.25% EUR Senior Notes due March 17, 2022, net of unamortized discount and debt issuance costs of \$3,914 and \$5,335 at December 31, 2018 and 2017, respectively	\$569,536	\$594,465
3.50% USD Senior Notes due September 15, 2022, net of unamortized discount and debt issuance costs of \$2,589 and \$3,230 at December 31, 2018 and 2017, respectively	497,411	496,770
4.00% USD Senior Notes due November 15, 2023, net of unamortized discount and debt issuance costs of \$2,192 and \$2,590 at December 31, 2018 and 2017, respectively	297,808	297,410
Term Loan Facility, interest rate of 4.30% and 3.19% at December 31, 2018 and 2017, net of debt issuance costs of \$249 and \$585, respectively	104,751	164,415
Capital lease obligations and other borrowings	13,541	22,197
Debt and capital lease obligations	1,483,047	1,575,257
Less amounts due within one year	68,218	75,599
Total debt due after one year	\$1,414,829	\$1,499,658

Scheduled maturities of the Senior Credit Facility (as described below), as well as our Senior Notes and other debt, are:

	Term Loan	Senior Notes and other debt	Total
	(Amounts in thousands)		
2019	\$60,000	\$8,218	\$68,218
2020	44,751	5,322	50,073
2022	—	1,066,948	1,066,948
2023 and thereafter	—	297,808	297,808
Total	\$104,751	\$1,378,296	\$1,483,047

Senior Notes

On March 17, 2015, we completed a public offering of €500.0 million of Euro senior notes in aggregate principal amount due March 17, 2022 ("2022 EUR Senior Notes"). The 2022 EUR Senior Notes bear an interest rate of 1.25% per year, payable each year on March 17. The 2022 EUR Senior Notes were priced at 99.336% of par value, reflecting a discount to the aggregate principal amount.

On November 1, 2013 we completed the public offering of \$300.0 million in aggregate principal amount of senior notes due November 15, 2023 ("2023 Senior Notes"). The 2023 Senior Notes bear an interest rate of 4.00% per year, payable on May 15 and November 15 of each year. The 2023 Senior Notes were priced at 99.532% of par value, reflecting a discount to the aggregate principal amount.

On September 11, 2012, we completed the public offering of \$500.0 million in aggregate principal amount of senior notes due September 15, 2022 ("2022 Senior Notes"). The 2022 Senior Notes bear an interest rate of 3.50% per year, payable on March 15 and September 15 of each year. The 2022 Senior Notes were priced at 99.615% of par value, reflecting a discount to the aggregate principal amount.

We have the right to redeem the 2022 Senior Notes and 2023 Senior Notes at any time prior to June 15, 2022 and August 15, 2023, respectively, in whole or in part, at our option, at a redemption price equal to the greater of: (1) 100% of the principal amount of the senior notes being redeemed; or (2) the sum of the present values of the remaining scheduled payments of principal and interest in respect of the Senior Notes being redeemed discounted to the redemption date on a semi-annual basis, at the applicable Treasury Rate plus 30 basis points for the 2022 Senior Notes and plus 25 basis points for the 2023 Senior Notes. In addition, at any time on or after June 15, 2022 for the 2022 Senior Notes and August 15, 2023 for the 2023 Senior Notes, we may redeem the Senior Notes at a redemption price equal to 100% of the principal amount of the Senior Notes being redeemed. In each case, we will also pay the accrued and unpaid interest on the principal amount being redeemed to the redemption date. Similarly, we have the right to redeem the 2022 EUR Senior Notes on or after December 17, 2021, in whole or in part, at our option, at a redemption price equal to the greater of: (1) 100% of the principal amount of the senior notes being redeemed; or (2) the sum of the present values of the remaining scheduled payments of principal and interest in respect of the Senior Notes being redeemed (exclusive of interest accrued to, but excluding, the date of redemption) discounted to the redemption date on an annual basis, at the Comparable German Government Bond Rate plus 25 basis points.

Senior Credit Facility

Our amended credit agreement provides for a \$195.0 million term loan ("Term Loan Facility") and a \$800.0 million revolving credit facility ("Revolving Credit Facility" and, together with the Term Loan Facility, the "Senior Credit Facility") with a maturity of October 14, 2020. The current Senior Credit Facility includes the following: (i) leverage ratio of 4.00 times debt to total Consolidated EBITDA through June 30, 2019, with a step-down to 3.75 for any fiscal quarter ending after July 1, 2019, (ii) a pricing level on our senior unsecured long-term debt ratings at or below Ba2/BB, with an interest rate margin for LIBOR loans of 2.00% and for base rate loans of 1.00% and (iii) maximum principal amount of priority debt up to 7.5% of the consolidated tangible assets and a maximum amount of receivables that can be securitized of \$100 million. Subject to certain conditions, including lender approval, we have the right to increase the amount of the Term Loan Facility or the Revolving Credit Facility by an aggregate amount not to exceed \$400.0 million.

As of December 31, 2018 and December 31, 2017, we had no revolving loans outstanding under the Revolving Credit Facility. We had outstanding letters of credit of \$92.9 million and \$94.8 million at December 31, 2018 and December 31, 2017, respectively, which together with financial covenant limitations based on the terms of our Senior Credit Facility, contributed to the reduction of our borrowing capacity to \$513.7 million and \$644.8 million, respectively. The Senior Credit Facility contains, among other things, covenants defining our and our subsidiaries' ability to dispose of assets, merge, pay dividends, repurchase or redeem capital stock and indebtedness, incur indebtedness and guarantees, create liens, enter into agreements with negative pledge clauses, make certain investments or acquisitions, enter into transactions with affiliates or engage in any business activity other than our existing business. Our compliance with these financial covenants under the Senior Credit Facility is tested quarterly. We were in compliance with the covenants as of December 31, 2018.

Repayment of Obligations — We may prepay loans under our Senior Credit Facility in whole or in part, without premium or penalty, at any time. A commitment fee, which is payable quarterly on the daily unused portions of the Senior Credit Facility, was 0.20% (per annum) at December 31, 2018. We made scheduled principal repayments under our Term Loan Facility of \$60.0 million in both 2018 and 2017 and 2016. We have scheduled principal repayments of \$15.0 million due in each of the next four quarters of 2019 under our Term Loan Facility.

Operating Leases

We have non-cancellable operating leases for certain offices, service and quick response centers, manufacturing and operating facilities, machinery, equipment and automobiles. Rental expense relating to operating leases was \$53.7 million, \$54.9 million and \$54.7 million in 2018, 2017 and 2016, respectively.

The future minimum lease payments due under non-cancellable operating leases are (amounts in thousands):

Year Ended December 31,

2019	\$68,443
2020	49,874
2021	38,446
2022	28,496
2023	21,473
Thereafter	66,518
Total minimum lease payments	\$273,250

12. PENSION AND POSTRETIREMENT BENEFITS

We sponsor several noncontributory defined benefit pension plans, covering substantially all U.S. employees and certain non-U.S. employees, which provide benefits based on years of service, age, job grade levels and type of compensation. Retirement benefits for all other covered employees are provided through contributory pension plans, cash balance pension plans and government-sponsored retirement programs. All funded defined benefit pension plans receive funding based on independent actuarial valuations to provide for current service and an amount sufficient to amortize unfunded prior service over periods not to exceed 30 years, with funding falling within the legal limits prescribed by prevailing regulation. We also maintain unfunded defined benefit plans that, as permitted by local regulations, receive funding only when benefits become due.

Our defined benefit plan strategy is to ensure that current and future benefit obligations are adequately funded in a cost-effective manner. Additionally, our investing objective is to achieve the highest level of investment performance that is compatible with our risk tolerance and prudent investment practices. Because of the long-term nature of our defined benefit plan liabilities, our funding strategy is based on a long-term perspective for formulating and implementing investment policies and evaluating their investment performance.

The asset allocation of our defined benefit plans reflects our decision about the proportion of the investment in equity and fixed income securities, and, where appropriate, the various sub-asset classes of each. At least annually, we complete a comprehensive review of our asset allocation policy and the underlying assumptions, which includes our long-term capital markets rate of return assumptions and our risk tolerances relative to our defined benefit plan liabilities.

The expected rates of return on defined benefit plan assets are derived from review of the asset allocation strategy, expected long-term performance of asset classes, risks and other factors adjusted for our specific investment strategy. These rates are impacted by changes in general market conditions, but because they are long-term in nature, short-term market changes do not significantly impact the rates.

Our U.S. defined benefit plan assets consist of a balanced portfolio of equity and fixed income securities. Our non-U.S. defined benefit plan assets include a significant concentration of United Kingdom ("U.K.") fixed income securities. We monitor investment allocations and manage plan assets to maintain acceptable levels of risk.

For all periods presented, we used a measurement date of December 31 for each of our U.S. and non-U.S. pension plans and postretirement medical plans.

U.S. Defined Benefit Plans

We maintain qualified and non-qualified defined benefit pension plans in the U.S. The qualified plan provides coverage for substantially all full-time U.S. employees who receive benefits, up to an earnings threshold specified by the U.S. Department of Labor. The non-qualified plans primarily cover a small number of employees including current and former members of senior management, providing them with benefit levels equivalent to other participants, but that are otherwise limited by U.S. Department of Labor rules. The U.S. plans are designed to operate as "cash balance" arrangements, under which the employee has the option

to take a lump sum payment at the end of their service. The total accumulated benefit obligation is equivalent to the total projected benefit obligation ("Benefit Obligation").

The following are assumptions related to the U.S. defined benefit pension plans:

	Year Ended December 31,		
	2018	2017	2016
Weighted average assumptions used to determine Benefit Obligations:			
Discount rate	4.34 %	3.63 %	4.00 %
Rate of increase in compensation levels	3.50	4.01	4.00
Weighted average assumptions used to determine net pension expense:			
Long-term rate of return on assets	6.00 %	6.00 %	6.00 %
Discount rate	3.63	4.00	4.75
Rate of increase in compensation levels	4.01	4.01	4.00

At December 31, 2018 as compared with December 31, 2017, we increased our discount rate from 3.63% to 4.34% based on an analysis of publicly-traded investment grade U.S. corporate bonds, which had a higher yield due to current market conditions. In determining 2018 expense, the expected rate of return on U.S. plan assets remained constant at 6.00%, primarily based on our target allocations and expected long-term asset returns. The long-term rate of return assumption is calculated using a quantitative approach that utilizes unadjusted historical returns and asset allocation as inputs for the calculation. For all U.S. plans, we adopted the RP-2006 mortality tables and the MP-2018 improvement scale published in October 2018. We applied the RP-2006 tables based on the constituency of our plan population for union and non-union participants. We adjusted the improvement scale to utilize 75% of the ultimate improvement rate, consistent with assumptions adopted by the Social Security Administration trustees, based on long-term historical experience. Currently, we believe this approach provides the best estimate of our future obligation. Most plan participants elect to receive plan benefits as a lump sum at the end of service, rather than an annuity. As such, the updated mortality tables had an immaterial effect on our pension obligation.

Net pension expense for the U.S. defined benefit pension plans (including both qualified and non-qualified plans) was:

	Year Ended December 31,		
	2018	2017	2016
	(Amounts in thousands)		
Service cost	\$22,195	\$22,257	\$22,583
Interest cost	15,789	16,878	19,072
Expected return on plan assets	(25,704)	(24,505)	(23,997)
Settlement (gain) loss	(462)	(216)	91
Amortization of unrecognized prior service cost	164	112	488
Amortization of unrecognized net loss	5,514	6,021	4,999
U.S. net pension expense	\$17,496	\$20,547	\$23,236

The estimated prior service cost and the estimated net loss for the U.S. defined benefit pension plans that will be amortized from accumulated other comprehensive loss into pension expense in 2019 is \$0.2 million and \$3.5 million, respectively. We amortize estimated prior service benefits and estimated net losses over the remaining expected service period.

The following summarizes the net pension (liability) asset for U.S. plans:

	December 31,	
	2018	2017
	(Amounts in thousands)	
Plan assets, at fair value	\$425,792	\$464,779
Benefit Obligation	(432,595)	(461,355)
Funded status	\$(6,803)	\$3,424

The following summarizes amounts recognized in the balance sheet for U.S. plans:

	December 31,	
	2018	2017
	(Amounts in thousands)	
Noncurrent assets	\$—	\$10,853
Current liabilities	(232)	(459)
Noncurrent liabilities	(6,571)	(6,970)
Funded status	\$(6,803)	\$3,424

The following is a summary of the changes in the U.S. defined benefit plans' pension obligations:

	December 31,	
	2018	2017
	(Amounts in thousands)	
Balance — January 1	\$461,355	\$449,601
Service cost	22,195	22,257
Interest cost	15,789	16,878
Plan amendments and settlements	(3,016)	(3,006)
Actuarial (gain) loss(1)	(25,908)	9,404
Benefits paid	(37,820)	(33,779)
Balance — December 31	\$432,595	\$461,355
Accumulated benefit obligations at December 31	\$431,973	\$461,355

(1) The actuarial (gain) loss in 2018 and 2017 primarily reflect the impact of changes in the discount rate.

The following table summarizes the expected cash benefit payments for the U.S. defined benefit pension plans in the future (amounts in millions):

2019	\$41.1
2020	42.8
2021	43.5
2022	41.4
2023	42.4
2024-2028	196.1

The following table shows the change in accumulated other comprehensive loss attributable to the components of the net cost and the change in Benefit Obligations for U.S. plans, net of tax:

	December 31,	
	2018	2017
	(Amounts in thousands)	
Balance — January 1	\$(49,790)	\$(69,132)
Amortization of net loss	4,216	3,766
Amortization of prior service cost	125	70
Net (loss) gain arising during the year	(16,216)	16,009
Settlement gain	(353)	(135)
Prior service cost arising during the year	—	(368)
Balance — December 31	\$(62,018)	\$(49,790)

Amounts recorded in accumulated other comprehensive loss consist of:

	December 31,	
	2018	2017
	(Amounts in thousands)	
Unrecognized net loss	\$(61,129)	\$(48,825)
Unrecognized prior service cost	(889)	(965)
Accumulated other comprehensive loss, net of tax	\$(62,018)	\$(49,790)

The following is a reconciliation of the U.S. defined benefit pension plans' assets:

	December 31,	
	2018	2017
	(Amounts in thousands)	
Balance — January 1	\$464,779	\$418,854
Return on plan assets	(21,414)	59,462
Company contributions	23,263	23,836
Benefits paid	(37,820)	(33,779)
Settlements	(3,016)	(3,594)
Balance — December 31	\$425,792	\$464,779

We contributed \$23.3 million and \$23.8 million to the U.S. defined benefit pension plans during 2018 and 2017, respectively. These payments exceeded the minimum funding requirements mandated by the U.S. Department of Labor rules. Our estimated contribution in 2019 is expected to be approximately \$20 million, excluding direct benefits paid.

All U.S. defined benefit plan assets are held by the qualified plan. The asset allocations for the qualified plan at the end of 2018 and 2017 by asset category, are as follows:

Asset category	Target Allocation at December 31,		Percentage of Actual Plan Assets at December 31,	
	2018	2017	2018	2017
Cash and cash equivalents	— %	— %	1 %	1 %
Cash and cash equivalents	— %	— %	1 %	1 %
Global Equity	30 %	36 %	30 %	36 %
Global Real Assets	13 %	12 %	13 %	12 %
Equity securities	43 %	48 %	43 %	48 %
Diversified Credit	12 %	12 %	13 %	12 %
Liability-Driven Investment	45 %	40 %	43 %	39 %
Fixed income	57 %	52 %	56 %	51 %

None of our common stock is directly held by our qualified plan. Our investment strategy is to earn a long-term rate of return consistent with an acceptable degree of risk and minimize our cash contributions over the life of the plan, while taking into account the liquidity needs of the plan. We preserve capital through diversified investments in high quality securities. Our current allocation target is to invest approximately 43% of plan assets in equity securities and 57% in fixed income securities. Within each investment category, assets are allocated to various investment strategies. Professional money management firms manage our assets, and we engage a consultant to assist in evaluating these activities. We periodically review the allocation target, generally in conjunction with an asset and liability study and in consideration of our future cash flow needs. We regularly rebalance the actual allocation to our target investment allocation.

Plan assets are invested in commingled funds. Our "Pension and Investment Committee" is responsible for setting the investment strategy and the target asset allocation for the plan's assets. As the qualified plan approached fully funded status, we implemented a Liability-Driven Investing ("LDI") strategy, which more closely aligns the duration of the plan's assets with the

duration of its liabilities. The LDI strategy results in an asset portfolio that more closely matches the behavior of the liability, thereby reducing the volatility of the plan's funded status.

The plan's financial instruments, shown below, are presented at fair value. See Note 1 for further discussion on how the hierarchical levels of the fair values of the Plan's investments are determined. The fair values of our U.S. defined benefit plan assets were:

	At December 31, 2018				At December 31, 2017			
	Hierarchical Levels				Hierarchical Levels			
	Total	I	II	III	Total	I	II	III
	(Amounts in thousands)				(Amounts in thousands)			
Cash and cash equivalents	\$4,778	\$4,778	\$—	\$—	\$5,494	\$5,494	\$—	\$—
Commingled Funds:								
Equity securities								
Global Equity(a)	126,165	—	126,165	—	167,336	—	167,336	—
Global Real Assets(b)	55,046	—	55,046	—	55,261	—	55,261	—
Fixed income securities								
Diversified Credit(c)	55,039	—	55,039	—	55,440	—	55,440	—
Liability-Driven Investment(d)	184,764	—	184,764	—	181,248	—	181,248	—
	\$425,792	\$4,778	\$421,014	\$—	\$464,779	\$5,494	\$459,285	\$—

(a) Global Equity fund seeks to closely track the performance of the MSCI All Country World Index.

(b) Global Real Asset funds seek to provide exposure to the listed global real estate investment trusts (REITs) and infrastructure markets.

(c) Diversified Credit funds seek to provide exposure to the high yield, emerging markets, bank loans, and securitized credit markets.

(d) LDI funds seek to invest in high quality fixed income securities that collectively closely match those found in discount curves used to value the plan's liabilities.

Non-U.S. Defined Benefit Plans

We maintain defined benefit pension plans, which cover some or all of our employees in the following countries: Austria, Belgium, Canada, France, Germany, India, Italy, Mexico, The Netherlands, Sweden, Switzerland and the U.K. The assets of the plans in the U.K. (two plans), The Netherlands and Canada represent 100% of the total non-U.S. plan assets ("non-U.S. assets"). Details of other countries' plan assets have not been provided due to immateriality.

The following are assumptions related to the non-U.S. defined benefit pension plans:

	Year Ended December 31,		
	2018	2017	2016
Weighted average assumptions used to determine Benefit Obligations:			
Discount rate	2.42 %	2.25 %	2.34 %
Rate of increase in compensation levels	3.28	3.25	3.22
Weighted average assumptions used to determine net pension expense:			
Long-term rate of return on assets	3.62 %	3.88 %	4.68 %
Discount rate	2.25	2.34	3.13
Rate of increase in compensation levels	3.25	3.22	3.61

At December 31, 2018 as compared with December 31, 2017, we increased our average discount rate for non-U.S. plans from 2.25% to 2.42% based on analysis of bonds and other publicly-traded instruments, by country, which had higher yields due to market conditions. To determine 2018 pension expense, we decreased our average expected rate of return on plan assets from 3.88% at December 31, 2017 to 3.62% at December 31, 2018, primarily

based on our target allocations and expected long-term asset returns. As the expected rate of return on plan assets is long-term in nature, short-term market changes do not significantly impact the rate.

Many of our non-U.S. defined benefit plans are unfunded, as permitted by local regulation. The expected long-term rate of return on assets for funded plans was determined by assessing the rates of return for each asset class and is calculated using a quantitative approach that utilizes unadjusted historical returns and asset allocation as inputs for the calculation. We work with our actuaries to determine the reasonableness of our long-term rate of return assumptions by looking at several factors including historical returns, expected future returns, asset allocation, risks by asset class and other items.

Net pension expense for non-U.S. defined benefit pension plans was:

	Year Ended December 31,		
	2018	2017	2016
	(Amounts in thousands)		
Service cost	\$7,208	\$7,247	\$7,131
Interest cost	8,970	9,320	11,623
Expected return on plan assets	(8,747)	(8,834)	(10,013)
Amortization of unrecognized net loss	3,626	3,741	4,751
Amortization of unrecognized prior service cost (benefit)	33	(4)	4
Settlement (gain) loss and other	(521)	2,434	780
Non-U.S. net pension expense	\$10,569	\$13,904	\$14,276

In 2019, there is \$0.3 million estimated prior service cost that will be amortized from accumulated other comprehensive loss into pension expense for the non-U.S. defined benefit pension plans. The estimated net loss for the non-U.S. defined benefit pension plans that will be amortized from accumulated other comprehensive loss into pension expense in 2019 is \$3.0 million. We amortize estimated net losses over the remaining expected service period or over the remaining expected lifetime of inactive participants for plans with only inactive participants.

The following summarizes the net pension liability for non-U.S. plans:

	December 31,	
	2018	2017
	(Amounts in thousands)	
Plan assets, at fair value	\$232,175	\$248,733
Benefit Obligation	(376,649)	(413,960)
Funded status	\$(144,474)	\$(165,227)

The following summarizes amounts recognized in the balance sheet for non-U.S. plans:

	December 31,	
	2018	2017
	(Amounts in thousands)	
Noncurrent assets	\$17,864	\$13,908
Current liabilities	(7,782)	(8,392)
Noncurrent liabilities	(154,556)	(170,743)
Funded status	\$(144,474)	\$(165,227)

The following is a reconciliation of the non-U.S. plans' defined benefit pension obligations:

	December 31,	
	2018	2017
	(Amounts in thousands)	
Balance — January 1	\$413,960	\$383,947
Service cost	7,208	7,247
Interest cost	8,970	9,320
Employee contributions	238	228
Settlements and other	(7,896)	(9,260)
Actuarial gain(1)	(8,839)	(1,913)
Net benefits and expenses paid	(16,632)	(18,701)
Currency translation impact(2)	(20,360)	43,092
Balance — December 31	\$376,649	\$413,960
Accumulated benefit obligations at December 31	\$356,989	\$391,102

(1) The 2018 actuarial gain primarily reflects the increase in the discount rates for U.K., the Euro-zone and Mexico.

In 2018 the currency translation impact reflects the strengthening of the U.S. dollar against our significant (2)currencies, primarily the Euro and British pound, while in 2017 the currency translation impact reflects the weakening of the U.S. dollar against our significant currencies, primarily the Euro and British pound.

The following table summarizes the expected cash benefit payments for the non-U.S. defined benefit plans in the future (amounts in millions):

2019	\$15.8
2020	15.8
2021	16.6
2022	17.6
2023	17.6
2024-2028	93.0

The following table shows the change in accumulated other comprehensive loss attributable to the components of the net cost and the change in Benefit Obligations for non-U.S. plans, net of tax:

	December 31,	
	2018	2017
	(Amounts in thousands)	
Balance — January 1	\$(67,872)	\$(68,260)
Amortization of net loss	3,260	2,756
Net gain arising during the year	2,458	2,289
Settlement (gain) loss	(386)	) 1,668
Prior service (cost) benefit arising during the year	(3,080)	) 28
Currency translation impact and other	3,532	(6,353)
Balance — December 31	\$(62,088)	\$(67,872)

Amounts recorded in accumulated other comprehensive loss consist of:

	December 31,	
	2018	2017
	(Amounts in thousands)	
Unrecognized net loss	\$(58,697)	\$(67,886)
Unrecognized prior service (cost) gain	(3,391)	) 14
Accumulated other comprehensive loss, net of tax	\$(62,088)	\$(67,872)

The following is a reconciliation of the non-U.S. plans' defined benefit pension assets:

	December 31,	
	2018	2017
	(Amounts in thousands)	
Balance — January 1	\$248,733	\$223,491
(Loss) return on plan assets	(580)	) 10,871
Employee contributions	238	228
Company contributions	21,696	18,494
Settlements	(7,776)	) (7,383)
Currency translation impact and other	(13,504)	) 21,733
Net benefits and expenses paid	(16,632)	) (18,701)
Balance — December 31	\$232,175	\$248,733

Our contributions to non-U.S. defined benefit pension plans in 2019 are expected to be approximately \$9 million, excluding direct benefits paid.

The asset allocations for the non-U.S. defined benefit pension plans at the end of 2018 and 2017 are as follows:

Asset category	Target Allocation at December 31,				Percentage of Actual Plan Assets at December 31,			
	2018	2017	2018	2017	2018	2017	2018	2017
Cash and cash equivalents	7 %	3 %	7 %	3 %	7 %	3 %	7 %	3 %
Cash and cash equivalents	7 %	3 %	7 %	3 %	7 %	3 %	7 %	3 %
North American Companies	3 %	3 %	3 %	3 %	3 %	3 %	3 %	3 %
Global Equity	2 %	3 %	2 %	3 %	2 %	3 %	2 %	3 %
Equity securities	5 %	6 %	5 %	6 %	5 %	6 %	5 %	6 %
U.K. Government Gilt Index	43 %	41 %	43 %	41 %	43 %	41 %	43 %	41 %
U.K. Corporate Bond Index	— %	1 %	— %	1 %	— %	1 %	— %	1 %
Global Fixed Income Bond	2 %	2 %	2 %	2 %	2 %	2 %	2 %	2 %
Liability-Driven Investment	9 %	9 %	9 %	9 %	9 %	9 %	9 %	9 %
Fixed income	54 %	53 %	54 %	53 %	54 %	53 %	54 %	53 %
Multi-asset	19 %	22 %	19 %	22 %	19 %	22 %	19 %	22 %
Buy-in Contract	10 %	10 %	10 %	10 %	10 %	10 %	10 %	10 %
Other	5 %	6 %	5 %	6 %	5 %	6 %	5 %	6 %
Other types	34 %	38 %	34 %	38 %	34 %	38 %	34 %	38 %

None of our common stock is held directly by these plans. In all cases, our investment strategy for these plans is to earn a long-term rate of return consistent with an acceptable degree of risk and minimize our cash contributions over the life of the plan, while taking into account the liquidity needs of the plan and the legal requirements of the particular country. We preserve capital through diversified investments in high quality securities.

Asset allocation differs by plan based upon the plan's benefit obligation to participants, as well as the results of asset and liability studies that are conducted for each plan and in consideration of our future cash flow needs. Professional money management firms manage plan assets and we engage a consultant in the U.K. to assist in evaluation of these activities. The assets of the U.K. plans are overseen by a group of Trustees who review the investment strategy, asset allocation and fund selection. These assets are passively managed as they are invested in index funds that attempt to match the performance of the specified benchmark index.

The fair values of the non-U.S. assets were:

	At December 31, 2018				At December 31, 2017			
	Hierarchical Levels				Hierarchical Levels			
	Total	I	II	III	Total	I	II	III
	(Amounts in thousands)				(Amounts in thousands)			
Cash	\$15,105	\$15,105	\$—	—	\$6,815	\$6,815	\$—	\$—
Commingled Funds:								
Equity securities								
North American Companies(a)	6,603	—	6,603	—	7,119	—	7,119	—
Global Equity(b)	4,648	—	4,648	—	8,951	—	8,951	—
Fixed income securities								
U.K. Government Gilt Index(c)	99,482	—	99,482	—	103,230	—	103,230	—
U.K. Corporate Bond Index(d)	1,192	—	1,192	—	1,316	—	1,316	—
Global Fixed Income Bond(e)	4,110	—	4,110	—	5,350	—	5,350	—
Liability-Driven Investment(f)	20,004	—	20,004	—	21,837	—	21,837	—
Other Types of Investments:								
Multi-asset(g)	44,147	—	44,147	—	55,503	—	55,503	—
Buy-in Contract(h)	23,616	—	—	23,616	24,484	—	—	24,484
Other(i)	13,268	—	—	13,268	14,128	—	—	14,128
	\$232,175	\$15,105	\$180,186	\$36,884	\$248,733	\$6,815	\$203,306	\$38,612

(a) North American Companies represents U.S. and Canadian large cap equity funds, which are managed and track their respective benchmarks (FTSE All-World USA Index and FTSE All-World Canada Index).

Global Equity represents actively managed, global equity funds taking a top-down strategic view on the different (b) regions by analyzing companies based on fundamentals, market-driven, thematic and quantitative factors to generate alpha.

(c) U.K. Government Gilt Index represents U.K. government issued fixed income investments which are passively managed and track their respective benchmarks.

(d) U.K. Corporate Bond Index represents U.K. corporate bond investments, which are passively managed and track the iBoxx Over 15 years £ Non-Gilt Index.

(e) Global Fixed Income Bond represents investment funds that are actively managed, diversified and invested in traditional government bonds, high-quality corporate bonds, asset-backed securities and emerging market debt.

(f) Liability-Driven Investment seeks to invest in fixed income securities that collectively closely match those found in discount curves used to value the plan's liabilities.

(g) Multi-asset seeks an attractive risk-adjusted return by investing in a diversified portfolio of strategies, including equities and fixed income.

Buy-in contract represents an asset held by the Netherlands plan, whereby the cost of providing benefits is funded by the contract. The fair value of the asset as January 1, 2018 was \$24.5 million with contributions and currency (h) adjustments resulting in a fair value of \$23.6 million at December 31, 2018. The fair value of this asset is based on the current present value of accrued benefits and will fluctuate based on changes in the obligations associated with covered plan members as well as the assumptions used in the present value calculation.

(i) Includes assets held by plans outside the United Kingdom and the Netherlands. Details, including Level III rollforward details are not material.

Defined Benefit Pension Plans with Accumulated Benefit Obligations in Excess of Plan Assets

The following summarizes key pension plan information regarding U.S. and non-U.S. plans whose accumulated benefit obligations exceed the fair value of their respective plan assets.

	December 31,	
	2018	2017
	(Amounts in thousands)	
Benefit Obligation	\$613,441	\$217,510
Accumulated benefit obligation	596,584	197,816
Fair value of plan assets	444,929	32,052

Postretirement Medical Plans

We sponsor several defined benefit postretirement medical plans covering certain current retirees and a limited number of future retirees in the U.S. These plans provide for medical and dental benefits and are administered through insurance companies and health maintenance organizations. The plans include participant contributions, deductibles, co-insurance provisions and other limitations and are integrated with Medicare and other group plans. We fund the plans as benefits and health maintenance organization premiums are paid, such that the plans hold no assets in any period presented. Accordingly, we have no investment strategy or targeted allocations for plan assets. Benefits under our postretirement medical plans are not available to new employees or most existing employees.

The following are assumptions related to postretirement benefits:

	Year Ended December 31,		
	2018	2017	2016
Weighted average assumptions used to determine Benefit Obligation:			
Discount rate	4.20%	3.48%	3.75%
Weighted average assumptions used to determine net expense:			
Discount rate	3.48%	3.75%	4.25%

The assumed ranges for the annual rates of increase in medical costs used to determine net expense were 7.0% for 2018, 7.0% for 2017 and 7.5% for 2016, with a gradual decrease to 5.0% for 2029 and future years.

Net postretirement benefit cost for postretirement medical plans was:

	Year Ended December 31,		
	2018	2017	2016
	(Amounts in thousands)		
Service cost	\$—	\$—	\$1
Interest cost	779	919	1,154
Amortization of unrecognized prior service cost	122	122	122
Amortization of unrecognized net gain	(764)	(275)	(355)
Net postretirement benefit expense	\$137	\$766	\$922

The estimated prior service cost expected to be amortized from accumulated other comprehensive loss into U.S. pension expense in 2019 is \$0.1 million. The estimated net gain for postretirement medical plans that will be amortized from accumulated other comprehensive gain into U.S. expense in 2019 is \$0.2 million.

The following summarizes the accrued postretirement benefits liability for the postretirement medical plans:

	December 31,	
	2018	2017
	(Amounts in thousands)	
Postretirement Benefit Obligation	\$18,810	\$23,882
Funded status	\$(18,810)	\$(23,882)

The following summarizes amounts recognized in the balance sheet for postretirement Benefit Obligation:

	December 31,	
	2018	2017
	(Amounts in thousands)	
Current liabilities	\$(2,500)	\$(2,952)
Noncurrent liabilities	(16,310)	(20,930)
Funded status	\$(18,810)	\$(23,882)

The following is a reconciliation of the postretirement Benefit Obligation:

	December 31,	
	2018	2017
	(Amounts in thousands)	
Balance — January 1	\$23,882	\$27,317
Interest cost	779	919
Employee contributions	883	939
Medicare subsidies receivable	127	235
Actuarial gain	(2,662)	(1,818)
Net benefits and expenses paid	(4,199)	(3,710)
Balance — December 31	\$18,810	\$23,882

The following presents expected benefit payments for future periods (amounts in millions):

	Expected Payments	Medicare Subsidy
2019	\$ 2.6	\$ 0.1
2020	2.4	0.1
2021	2.2	0.1
2022	2.0	0.1
2023	1.8	0.1
2024-2028	6.8	0.3

The following table shows the change in accumulated other comprehensive loss attributable to the components of the net cost and the change in Benefit Obligations for postretirement benefits, net of tax:

	2018 2017	
	(Amounts in thousands)	
Balance — January 1	\$880	\$(163)
Amortization of net gain	(584)	(172)
Amortization of prior service cost	93	76
Net gain arising during the year	2,036	1,139
Balance — December 31	\$2,425	\$880

Amounts recorded in accumulated other comprehensive loss consist of:

	December 31,	
	2018	2017
	(Amounts in thousands)	
Unrecognized net gain	\$3,365	\$1,921
Unrecognized prior service cost	(940)	(1,041)
Accumulated other comprehensive income, net of tax	\$2,425	\$880

We made contributions to the postretirement medical plans to pay benefits of \$3.2 million in 2018, \$2.5 million in 2017 and \$4.4 million in 2016. Because the postretirement medical plans are unfunded, we make contributions as the covered individuals' claims are approved for payment. Accordingly, contributions during any period are directly correlated to the benefits paid.

Assumed health care cost trend rates have an effect on the amounts reported for the postretirement medical plans. A one-percentage point change in assumed health care cost trend rates would have the following effect on the 2018 reported amounts (in thousands):

	1% Increase	1% Decrease
Effect on postretirement Benefit Obligation	\$ 73	\$ (72)
Effect on service cost plus interest cost	4	(3)

Defined Contribution Plans

We sponsor several defined contribution plans covering substantially all U.S. and Canadian employees and certain other non-U.S. employees. Employees may contribute to these plans, and these contributions are matched in varying amounts by us, including opportunities for discretionary matching contributions by us. Defined contribution plan expense was \$18.7 million in 2018, \$17.7 million in 2017 and \$17.2 million in 2016.

13. LEGAL MATTERS AND CONTINGENCIES

Asbestos-Related Claims

We are a defendant in a substantial number of lawsuits that seek to recover damages for personal injury allegedly caused by exposure to asbestos-containing products manufactured and/or distributed by our heritage companies in the past. While the overall number of asbestos-related claims has generally declined in recent years, there can be no assurance that this trend will continue, or that the average cost per claim will not further increase. Asbestos-containing materials incorporated into any such products were encapsulated and used as internal components of process equipment, and we do not believe that any significant emission of asbestos fibers occurred during the use of this equipment.

Our practice is to vigorously contest and resolve these claims, and we have been successful in resolving a majority of claims with little or no payment. Historically, a high percentage of resolved claims have been covered by applicable insurance or indemnities from other companies, and we believe that a substantial majority of existing claims should continue to be covered by insurance or indemnities, in whole or in part. Accordingly, we have recorded a liability for our estimate of the most likely settlement of asserted claims and a related receivable from insurers or other companies for our estimated recovery, to the extent we believe that the amounts of recovery are probable. While unfavorable rulings, judgments or settlement terms regarding these claims could have a material adverse impact on our business, financial condition, results of operations and cash flows, we currently believe the likelihood is remote.

Additionally, we have claims pending against certain insurers that, if resolved more favorably than reflected in the recorded receivables, would result in discrete gains in the applicable quarter. We are currently unable to estimate the

impact, if any, of unasserted asbestos-related claims, although we expect that future claims would also be subject to then existing indemnities and insurance coverage.

Other

We are currently involved as a potentially responsible party at five former public waste disposal sites in various stages of evaluation or remediation. The projected cost of remediation at these sites, as well as our alleged "fair share" allocation, will remain uncertain until all studies have been completed and the parties have either negotiated an amicable resolution or the matter has been judicially resolved. At each site, there are many other parties who have similarly been identified. Many

of the other parties identified are financially strong and solvent companies that appear able to pay their share of the remediation costs. Based on our information about the waste disposal practices at these sites and the environmental regulatory process in general, we believe that it is likely that ultimate remediation liability costs for each site will be apportioned among all liable parties, including site owners and waste transporters, according to the volumes and/or toxicity of the wastes shown to have been disposed of at the sites. We believe that our financial exposure for existing disposal sites will not be materially in excess of accrued reserves.

As previously disclosed, we terminated an employee of an overseas subsidiary after uncovering actions that violated our Code of Business Conduct and may have violated the Foreign Corrupt Practices Act. We completed our internal investigation into the matter, self-reported the potential violation to the United States Department of Justice (the “DOJ”) and the SEC, and continue to cooperate with the DOJ and SEC. We previously received a subpoena from the SEC requesting additional information and documentation related to the matter and have completed our response to the subpoena. We currently believe that this matter will not have a material adverse financial impact on the Company, but there can be no assurance that the Company will not be subjected to monetary penalties and additional costs.

We are also a defendant in a number of other lawsuits, including product liability claims, that are insured, subject to the applicable deductibles, arising in the ordinary course of business, and we are also involved in other uninsured routine litigation incidental to our business. We currently believe none of such litigation, either individually or in the aggregate, is material to our business, operations or overall financial condition. However, litigation is inherently unpredictable, and resolutions or dispositions of claims or lawsuits by settlement or otherwise could have an adverse impact on our financial position, results of operations or cash flows for the reporting period in which any such resolution or disposition occurs.

Although none of the aforementioned potential liabilities can be quantified with absolute certainty except as otherwise indicated above, we have established reserves covering exposures relating to contingencies, to the extent believed to be reasonably estimable and probable based on past experience and available facts. While additional exposures beyond these reserves could exist, they currently cannot be estimated. We will continue to evaluate and update the reserves as necessary and appropriate.

14. WARRANTY RESERVE

We have recorded reserves for product warranty claims that are included in current liabilities. The following is a summary of the activity in the warranty reserve:

	2018	2017	2016
	(Amounts in thousands)		
Balance — January 1	\$33,601	\$30,459	\$34,574
Accruals for warranty expense, net of adjustments	28,454	35,001	28,364
Settlements made	(30,022)	(31,859)	(32,479)
Balance — December 31	\$32,033	\$33,601	\$30,459

15. SHAREHOLDERS’ EQUITY

Dividends - Generally, our dividend date-of-record is in the last month of the quarter and the dividend is paid the following month. Any subsequent dividends will be reviewed by our Board of Directors and declared at its discretion dependent on its assessment of our financial situation and business outlook at the applicable time. Dividends per share were \$0.76 for the years ending December 31, 2018, 2017 and 2016.

On February 15, 2016, our Board of Directors authorized an increase in the payment of quarterly dividends on our common stock from \$0.18 per share to \$0.19 per share payable beginning on April 8, 2016.

Share Repurchase Program – On November 13, 2014, our Board of Directors approved a \$500.0 million share repurchase authorization. Our share repurchase program does not have an expiration date, and we reserve the right to limit or terminate the repurchase program at any time without notice.

We had no repurchases of shares of our outstanding common stock for the year ended December 31, 2018, 2017 and 2016. As of December 31, 2018, we have \$160.7 million of remaining capacity under our current share repurchase program.

16. INCOME TAXES

On December 22, 2017, the U.S. enacted the Tax Cuts and Jobs Act of 2017 (the “Tax Reform Act”), which significantly changed U.S. tax law. The Tax Reform Act, among other things, lowered the Company’s U.S. statutory federal income tax rate from 35% to 21% effective January 1, 2018, while imposing a deemed repatriation tax on deferred foreign income and implementing a modified territorial tax system. The Tax Reform Act also provides for a one-time transition tax (“Transition Tax”) on certain foreign earnings as well as prospective changes which began in 2018, including repeal of the domestic manufacturing deduction, capitalization of research and development expenditures, additional limitations on executive compensation and limitations on the deductibility of interest.

The Company recognized provisional income tax effects of the Tax Reform Act in its previously issued financial statements in accordance with Staff Accounting Bulletin (SAB) No. 118, which provides SEC staff guidance for the application of ASC Topic 740, Income Taxes with respect to recording certain tax impacts of the Tax Reform Act. The Company finalized its accounting for the income tax effects of the Tax Reform Act in the fourth quarter of 2018 with no material adjustments to previously recorded provisional amounts. The impacts of these changes are reflected in the 2017 provisional tax expense of \$115.3 million and the 2018 tax benefit of \$5.7 million.

The provision for income taxes consists of the following:

	Year Ended December 31,		
	2018	2017	2016
	(Amounts in thousands)		
Current:			
U.S. federal	\$5,150	\$59,292	\$20,569
Non-U.S.	36,897	22,442	75,227
State and local	2,647	5,537	2,612
Total current	44,694	87,271	98,408
Deferred:			
U.S. federal	11,242	135,294	22,249
Non-U.S.	(4,585)	34,626	(45,577)
State and local	(127)	1,488	2,300
Total deferred	6,530	171,408	(21,028)
Total provision	\$51,224	\$258,679	\$77,380

The provision for income taxes differs from the statutory corporate rate due to the following:

	Year Ended December 31,		
	2018	2017	2016
	(Amounts in millions)		
Statutory federal income tax at 21% (35% for 2017 and 2016)	\$37.0	\$92.1	\$74.5
Foreign impact, net	(5.9)	(36.4)	(13.9)
Impact of U.S. Tax Reform Act	(5.7)	115.3	—
Change in valuation allowances	15.7	73.6	14.2
State and local income taxes, net	3.7	4.9	4.9
Other, net	6.4	9.2	(2.3)
Total	\$51.2	\$258.7	\$77.4
Effective tax rate	29.1 %	98.4 %	36.3 %

The 2017 tax rate differed from the federal statutory rate of 35% primarily due to the impacts pursuant to enactment of the Tax Reform Act, the net impact of foreign operations, the establishment of a valuation allowance against our deferred tax assets in various foreign jurisdictions, primarily Germany and Mexico, and taxes related to the sale of the Gestra and Vogt businesses.

For the years ended December 31, 2016 and prior, the company asserted permanent reinvestment on the majority of invested capital and unremitted foreign earnings in our foreign subsidiaries. For the year ended December 31, 2017, we did not assert permanent reinvestment on any of our foreign subsidiaries and as a result recorded deferred taxes of approximately \$75.4 million on cumulative unrepatriated earnings in connection with the Tax Reform Act. For the year ended December 31, 2018, the Company has asserted permanent reinvestment on earnings of certain of our foreign subsidiaries. At the end of December 31, 2018, the Company still has recorded \$70.3 million of deferred tax liabilities associated with the earnings previously deemed available for repatriation as referenced above. These deferred tax liabilities primarily relate to foreign withholding taxes that would be due upon repatriation of the designated earnings to the U.S.

Deferred income taxes reflect the net tax effects of temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes and the amounts used for income tax purposes. Significant components of the consolidated deferred tax assets and liabilities were:

	December 31,	
	2018	2017
	(Amounts in thousands)	
Deferred tax assets related to:		
Retirement benefits	\$26,496	\$28,519
Net operating loss carryforwards	92,630	73,465
Compensation accruals	25,993	24,030
Inventories	25,553	30,870
Credit carryforwards	16,056	8,910
Warranty and accrued liabilities	2,763	16,005
Bad debt reserve	28,194	30,698
Other	32,253	40,859
Total deferred tax assets	249,938	253,356
Valuation allowances	(133,929)	(119,309)
Net deferred tax assets	116,009	134,047
Deferred tax liabilities related to:		
Property, plant and equipment	(18,773)	(24,204)
Goodwill and intangibles	(123,692)	(123,036)
Non-U.S. undistributed earnings taxes	(70,331)	(75,442)
Other	(17,935)	(15,667)
Total deferred tax liabilities	(230,731)	(238,349)
Deferred tax liabilities, net	\$(114,722)	\$(104,302)

We have \$394.0 million of U.S. and foreign net operating loss carryforwards at December 31, 2018. Of this total, \$42.4 million are state net operating losses. Net operating losses generated in the U.S., if unused, will expire in 2024 through 2026 tax years. The majority of our non-U.S. net operating losses carry forward without expiration. Additionally, we have \$16.1 million of foreign tax credit carryforwards at December 31, 2018, expiring in 2026 and 2028 tax years, for which a valuation allowance of \$16.1 million has been recorded.

Earnings before income taxes comprised:

	Year Ended December 31,		
	2018	2017	2016
	(Amounts in thousands)		
U.S.	\$88,674	\$102,372	\$170,681
Non-U.S.	87,600	160,635	42,231
Total	\$176,274	\$263,007	\$212,912

A tabular reconciliation of the total gross amount of unrecognized tax benefits, excluding interest and penalties, is as follows (in millions):

	2018	2017	2016
Balance — January 1	\$51.5	\$59.3	\$56.1
Gross amount of (decrease) increase in unrecognized tax benefits resulting from tax positions taken:			
During a prior year	(6.6)	(3.5)	1.9
During the current period	4.0	5.5	14.3
Decreases in unrecognized tax benefits relating to:			
Settlements with taxing authorities	(2.7)	(10.8)	(4.0)
Lapse of the applicable statute of limitations	(3.7)	(3.1)	(7.3)
Increase (decrease) in unrecognized tax benefits relating to foreign currency translation adjustments	(1.3)	4.1	(1.7)
Balance — December 31	\$41.2	\$51.5	\$59.3

The amount of gross unrecognized tax benefits at December 31, 2018 was \$54.1 million, which includes \$12.9 million of accrued interest and penalties. Of this amount \$53.6 million, if recognized, would favorably impact our effective tax rate.

With limited exception, we are no longer subject to U.S. federal income tax audits for years through 2016, state and local income tax audits for years through 2012 or non-U.S. income tax audits for years through 2011. We are currently under examination for various years in Austria, Canada, France, Germany, India, Indonesia, Italy, Japan, Mexico, Philippines, Saudi Arabia, Singapore, Thailand, the U.S. and Venezuela.

It is reasonably possible that within the next 12 months the effective tax rate will be impacted by the resolution of some or all of the matters audited by various taxing authorities. It is also reasonably possible that we will have the statute of limitations close in various taxing jurisdictions within the next 12 months. As such, we estimate we could record a reduction in our tax expense up to approximately \$16 million within the next 12 months.

17. BUSINESS SEGMENT INFORMATION

Our business segments share a focus on industrial flow control technology and have a high number of common customers. These segments also have complementary product offerings and technologies that are often combined in applications that provide us a net competitive advantage. Our segments also benefit from our global footprint and our economies of scale in reducing administrative and overhead costs to serve customers more cost effectively.

We conduct our operations through these three business segments based on type of product and how we manage the business:

• EPD for long lead time, custom and other highly-engineered pumps and pump systems, mechanical seals, auxiliary systems and replacement parts and related services;

• IPD for engineered and pre-configured industrial pumps and pump systems and related products and services; and

• FCD for engineered and industrial valves, control valves, actuators and controls and related services.

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For decision-making purposes, our Chief Executive Officer ("CEO") and other members of senior executive management use financial information generated and reported at the reportable segment level. Our corporate headquarters does not constitute a separate division or business segment. We evaluate segment performance and allocate resources based on each reportable segment's operating income. Amounts classified as "Eliminations and All Other" include corporate headquarters costs and other minor entities that do not constitute separate segments. Intersegment sales and transfers are recorded at cost plus a profit margin, with the sales and related margin on such sales eliminated in consolidation.

The following is a summary of the financial information of our reportable segments as of and for the years ended December 31, 2018, 2017 and 2016 reconciled to the amounts reported in the consolidated financial statements.

	EPD	IPD	FCD	Subtotal—Reportable Segments	Eliminations and All Other	Consolidated Total
(Amounts in thousands)						
Year Ended December 31, 2018:						
Sales to external customers	\$1,860,489	\$759,999	\$1,212,178	\$ 3,832,666	\$ —	\$ 3,832,666
Intersegment sales	38,724	39,416	3,637	81,777	(81,777)	—
Segment operating income (loss)	206,894	(6,238)	201,216	401,872	(154,334)	247,538
Depreciation and amortization	42,442	25,706	26,585	94,733	17,740	112,473
Identifiable assets	1,841,132	930,433	1,268,717	4,040,282	575,995	4,616,277
Capital expenditures	34,127	6,521	14,458	55,106	28,887	83,993
	EPD	IPD	FCD	Subtotal—Reportable Segments	Eliminations and All Other	Consolidated Total
(Amounts in thousands)						
Year Ended December 31, 2017:						
Sales to external customers	\$1,738,082	\$739,656	\$1,183,093	\$ 3,660,831	\$ —	\$ 3,660,831
Intersegment sales	37,347	35,552	5,018	77,917	(77,917)	—
Segment operating income (loss)	159,060	(48,766)	323,682	433,976	(92,841)	341,135
Depreciation and amortization	48,659	28,864	27,278	104,801	13,653	118,454
Identifiable assets	1,956,638	1,028,255	1,317,944	4,302,837	607,637	4,910,474
Capital expenditures	19,790	8,368	16,626	44,784	16,818	61,602
	EPD	IPD	FCD	Subtotal—Reportable Segments	Eliminations and All Other	Consolidated Total
(Amounts in thousands)						
Year Ended December 31, 2016:						
Sales to external customers	\$1,963,086	\$799,923	\$1,227,478	\$ 3,990,487	\$ —	\$ 3,990,487
Intersegment sales	32,873	35,156	6,234	74,263	(74,263)	—
Segment operating income	171,142	(5,184)	202,571	368,529	(91,845)	276,684
Depreciation and amortization	48,957	28,824	28,189	105,970	10,782	116,752
Identifiable assets	2,082,729	1,010,107	1,310,273	4,403,109	305,814	4,708,923
Capital expenditures	29,426	17,336	26,467	73,229	16,470	89,699

During the latter part of 2018 and in connection with the Flowserve 2.0 Transformation, we have determined that there are meaningful operational synergies and benefits to combining our EPD and IPD reportable segments into one reportable segment, Flowserve Pump Division ("FPD"). The reorganization is effective as of January 1, 2019 and as a result, beginning in 2019 we will report a two operating segment structure, FPD and FCD, and prior periods will be

retrospectively adjusted

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to reflect the new reportable segment structure. For further discussion of Flowserve 2.0 Transformation program refer to Note 19.

Geographic Information — We attribute sales to different geographic areas based on our facilities' locations. Long-lived assets are classified based on the geographic area in which the assets are located and exclude deferred taxes, goodwill and intangible assets. Prior period information has been updated to conform to current year presentation. Sales and long-lived assets by geographic area are as follows:

Year Ended December 31, 2018

	Sales	Percentage	Long-Lived Assets	Percentage	
(Amounts in thousands, except percentages)					
United States	\$ 1,525,930	39.8 %	\$ 323,883	40.5 %	
EMA(1)	1,424,498	37.2 %	280,549	35.1 %	
Asia(2)	539,898	14.1 %	132,667	16.6 %	
Other(3)	342,340	8.9 %	63,161	7.8 %	
Consolidated total	\$ 3,832,666	100.0 %	\$ 800,260	100.0 %	

Year Ended December 31, 2017

	Sales	Percentage	Long-Lived Assets	Percentage	
(Amounts in thousands, except percentages)					
United States	\$ 1,460,899	40.0 %	\$ 333,126	38.2 %	
EMA(1)	1,434,506	39.2 %	321,256	36.9 %	
Asia(2)	471,054	12.9 %	148,757	17.1 %	
Other(3)	294,372	7.9 %	68,379	7.8 %	
Consolidated total	\$ 3,660,831	100.0 %	\$ 871,518	100.0 %	

Year Ended December 31, 2016

	Sales	Percentage	Long-Lived Assets	Percentage	
(Amounts in thousands, except percentages)					
United States	\$ 1,537,779	38.5 %	\$ 338,038	37.2 %	
EMA(1)	1,541,984	38.6 %	288,903	31.8 %	
Asia(2)	500,424	12.5 %	144,599	15.9 %	
Other(3)	410,300	10.4 %	136,391	15.1 %	
Consolidated total	\$ 3,990,487	100.0 %	\$ 907,931	100.0 %	

"EMA" includes Europe, the Middle East and Africa. In 2018, 2017 and 2016, Germany accounted for (1) approximately 7%, 10% and 10%, respectively, of consolidated long-lived assets. No other individual country within this group represents 10% or more of consolidated totals for any period presented.

(2) "Asia" includes Asia and Australia. No individual country within this group represents 10% or more of consolidated totals for any period presented.

(3) "Other" includes Canada and Latin America. No individual country within this group represents 10% or more of consolidated totals for any period presented.

Net sales to international customers, including export sales from the U.S., represented approximately 63% of total sales in 2018 and 2017, and 64% in 2016.

Major Customer Information — We have a large number of customers across a large number of manufacturing and service facilities and do not have sales to any individual customer that represent 10% or more of consolidated sales for any of the years presented.

18. ACCUMULATED OTHER COMPREHENSIVE LOSS

The following presents the components of accumulated other comprehensive loss (AOCL), net of related tax effects:

(Amounts in thousands)	2018				2017			
	Foreign currency translation items(1)	Pension and other post-retirement effects	Cash flow hedging activity	Total(1)	Foreign currency translation items(1)	Pension and other post-retirement effects	Cash flow hedging activity	Total(1)
Balance - January 1	\$(384,779)	\$(115,755)	\$(1,090)	\$(501,624)	\$(483,609)	\$(136,530)	\$(1,238)	\$(621,377)
Other comprehensive (loss) income before reclassifications	(63,146)	(12,022)	232	(74,936)	98,308	12,557	125	110,990
Amounts reclassified from AOCL	—	7,130	—	7,130	522	8,218	23	8,763
Net current-period other comprehensive (loss) income	(63,146)	(4,892)	232	(67,806)	98,830	20,775	148	119,753
Balance - December 31	\$(447,925)	\$(120,647)	\$(858)	\$(569,430)	\$(384,779)	\$(115,755)	\$(1,090)	\$(501,624)

Includes foreign currency translation adjustments attributable to noncontrolling interests of \$4.5 million, \$3.8 million and \$3.4 million for December 31, 2018, 2017 and 2016, respectively. For the year ended December 31, 2018, foreign currency translation impacts primarily represented the weakening of the Euro, Argentinian peso, Indian rupee and British pound exchange rates versus the U.S. dollar for the period. For the year ended (1) December 31, 2017, foreign currency translation impacts primarily represented the weakening of the Euro, British pound and Indian rupee exchange rates versus the U.S. dollar for the period. Includes net investment hedge cumulative losses of \$17.2 million and \$22.5 million, net of deferred taxes, at December 31, 2018 and 2017, respectively. Amounts in parentheses indicate debits.

The following table presents the reclassifications out of AOCL:

(Amounts in thousands)	Affected line item in the statement of income	2018(1)	2017(1)
Foreign currency translation items			
Release of cumulative translation adjustments due to sale of business	Gain on sale of businesses	\$—	\$(522)
	Tax benefit	—	—
	Net of tax	\$—	\$(522)
Pension and other postretirement effects			
Amortization of actuarial losses(2)	Other expense, net	\$(9,140)	\$(9,761)
Prior service costs(2)	Other expense, net	(197)	(108)
Settlements and other(2)	Other expense, net	983	(2,113)
	Tax benefit	1,224	3,764
	Net of tax	\$(7,130)	\$(8,218)

(1) Amounts in parentheses indicate decreases to income. None of the reclassification amounts have a noncontrolling interest component.

(2) These accumulated other comprehensive loss components are included in the computation of net periodic pension cost. See Note 12 for additional details.

19. REALIGNMENT AND TRANSFORMATION PROGRAMS

In the second quarter of 2018, we launched and committed resources to our Flowserve 2.0 Transformation ("Flowserve 2.0 Transformation"), a program designed to transform our business model to drive operational excellence, reduce complexity, accelerate growth, expand margins, increase capital efficiency and improve organizational health. We anticipate that the Flowserve 2.0 Transformation will result in restructuring charges, non-restructuring charges and other related transformation expenses (primarily professional services, project management and related travel expenses). For the year ended December 31, 2018, we incurred Flowserve 2.0 Transformation related expenses of \$41.2 million, primarily consisting of professional services and project management costs recorded in SG&A. We are currently evaluating the total investment in the various initiatives associated with this program.

In 2015 we initiated realignment programs consisting of R1 Realignment Program related to the SIHI acquisition and R2 Realignment Program to better align costs and improve long-term efficiency, including manufacturing optimization through the consolidation of facilities, reduction in our workforce and divestiture of certain non-strategic assets (the "Realignment Programs"). These Realignment Programs have been substantially completed. We estimate total investment in these programs of approximately \$360 million. The Realignment Programs consist of both restructuring and non-restructuring charges. Restructuring charges represent costs associated with the relocation or reorganization of certain business activities and facility closures and include related severance costs. Non-restructuring charges are primarily employee severance associated with workforce reductions to reduce redundancies. Expenses are primarily reported in COS or SG&A, as applicable, in our consolidated statements of income.

Generally, the aforementioned charges were paid in cash, except for asset write-downs, which are non-cash charges. The following is a summary of total charges, net of adjustments, related to the Realignment Programs and Flowserve 2.0 Transformation charges:

(Amounts in thousands)	December 31, 2018			Subtotal—Reportable Segments	Eliminations and All Other	Consolidated Total
	Engineered Product Division	Industrial Product Division	Flow Control Division			
Restructuring Charges						
COS	\$ 14,742	\$ 3,663	\$ 4,370	\$ 22,775	\$ —	\$ 22,775
SG&A	1,050	803	358	2,211	38	2,249
Income tax expense(1)	(1,000)	—	—	(1,000)	—	(1,000)
	\$ 14,792	\$ 4,466	\$ 4,728	\$ 23,986	\$ 38	\$ 24,024
Non-Restructuring Charges						
COS	\$ 19,308	\$ 1,764	\$ (1,149)	\$ 19,923	\$ —	\$ 19,923
SG&A	3,139	918	(652)	3,405	5,580	8,985
	\$ 22,447	\$ 2,682	\$ (1,801)	\$ 23,328	\$ 5,580	\$ 28,908
Transformation Charges						
SG&A	\$ —	\$ —	\$ —	\$ —	\$ 41,168	\$ 41,168
	\$ —	\$ —	\$ —	\$ —	\$ 41,168	\$ 41,168
Total Realignment and Transformation Charges						
COS	\$ 34,050	\$ 5,427	\$ 3,221	\$ 42,698	\$ —	\$ 42,698
SG&A	4,189	1,721	(294)	5,616	46,786	52,402
Income tax benefit(1)	(1,000)	—	—	(1,000)	—	(1,000)
Total	\$ 37,239	\$ 7,148	\$ 2,927	\$ 47,314	\$ 46,786	\$ 94,100

	December 31, 2017					
(Amounts in thousands)	Engineered Product Division	Industrial Product Division	Flow Control Division	Subtotal—Reportable Segments	Eliminations and All Other	Consolidated Total
Restructuring Charges						
COS	\$8,101	\$7,177	\$8,666	\$ 23,944	\$ —	\$ 23,944
SG&A	523	1,120	(455)	1,188	261	1,449
Income tax expense(1)	1,000	—	—	1,000	—	1,000
	\$9,624	\$8,297	\$8,211	\$ 26,132	\$ 261	\$ 26,393
Non-Restructuring Charges						
COS	10,263	6,806	\$2,934	\$ 20,003	\$ —	\$ 20,003
SG&A	6,853	10,191	3,325	20,369	5,490	25,859
	\$17,116	\$16,997	\$6,259	\$ 40,372	\$ 5,490	\$ 45,862
Total Realignment Charges						
COS	\$18,364	\$13,983	\$11,600	\$ 43,947	\$ —	\$ 43,947
SG&A	7,376	11,311	2,870	21,557	5,751	27,308
Income tax expense(1)	1,000	—	—	1,000	—	1,000
Total	\$26,740	\$25,294	\$14,470	\$ 66,504	\$ 5,751	\$ 72,255

(1) Income tax (benefit) expense includes exit taxes as well as non-deductible costs.

The following is a summary of total inception to date charges, net of adjustments, related to the Realignment Programs:

	Inception to Date			Subtotal—Reportable Segments	Eliminations and All Other	Consolidated Total
(Amounts in thousands)	Engineered Product Division	Industrial Product Division	Flow Control Division			
Restructuring Charges						
COS	\$57,554	\$51,488	\$27,025	\$ 136,067	\$ —	\$ 136,067
SG&A	19,390	17,520	9,455	46,365	317	46,682
Income tax expense(1)	9,400	9,300	1,800	20,500	—	20,500
	\$86,344	\$78,308	\$38,280	\$ 202,932	\$ 317	\$ 203,249
Non-Restructuring Charges						
COS	\$45,731	\$22,753	\$13,718	\$ 82,202	\$ 8	\$ 82,210
SG&A	19,985	19,319	7,512	46,816	15,502	62,318
	\$65,716	\$42,072	\$21,230	\$ 129,018	\$ 15,510	\$ 144,528
Total Realignment Charges						
COS	\$103,285	\$74,241	\$40,743	\$ 218,269	\$ 8	\$ 218,277
SG&A	39,375	36,839	16,967	93,181	15,819	109,000
Income tax expense(1)	9,400	9,300	1,800	20,500	—	20,500
Total	\$152,060	\$120,380	\$59,510	\$ 331,950	\$ 15,827	\$ 347,777

(1) Income tax expense includes exit taxes as well as non-deductible costs.

Restructuring charges represent costs associated with the relocation or reorganization of certain business activities and facility closures and include costs related to employee severance at closed facilities, contract termination costs, asset write-downs and other costs. Severance costs primarily include costs associated with involuntary termination benefits. Contract termination costs include costs related to termination of operating leases or other contract termination costs. Asset write-downs include accelerated depreciation of fixed assets, accelerated amortization of intangible assets, divestiture of certain non-strategic assets and inventory write-downs. Other costs generally include costs related to employee relocation, asset relocation, vacant facility costs (i.e., taxes and insurance) and other charges.

The following is a summary of restructuring charges, net of adjustments, for the Realignment Programs:

December 31, 2018					
(Amounts in thousands)	Severance	Contract Termination	Asset Write-Downs	Other	Total
COS	\$2,975	\$ 5	\$ 9,018	\$10,777	\$22,775
SG&A	1,875	—	12	362	2,249
Income tax expense(1)	—	—	—	(1,000)	(1,000)
Total	\$4,850	\$ 5	\$ 9,030	\$10,139	\$24,024

December 31, 2017					
(Amounts in thousands)	Severance	Contract Termination	Asset Write-Downs	Other	Total
COS	\$10,241	\$ 293	\$ 6,400	\$7,010	\$23,944
SG&A	(897)	—	249	2,097	1,449
Income tax expense(1)	—	—	—	1,000	1,000
Total	\$9,344	\$ 293	\$ 6,649	\$10,107	\$26,393

(1) Income tax (benefit) expense includes exit taxes as well as non-deductible costs.

The following is a summary of total inception to date restructuring charges, net of adjustments, related to the Realignment Programs:

Inception to Date					
(Amounts in thousands)	Severance	Contract Termination	Asset Write-Downs	Other	Total (1)
COS	\$85,160	\$ 907	\$ 24,335	\$25,665	\$136,067
SG&A	31,745	43	1,689	13,205	46,682
Income tax expense(1)	—	—	—	20,500	20,500
Total	\$116,905	\$ 950	\$ 26,024	\$59,370	\$203,249

(1) Income tax expense includes exit taxes as well as non-deductible costs.

The following represents the activity, primarily severance, related to the restructuring reserve for the Realignment Programs for the years ended December 31, 2018 and 2017:

(Amounts in thousands)	2018	2017
Balance at January 1,	\$39,230	\$60,327 (2)
Charges	15,996	18,743
Cash expenditures	(28,267)	(38,391)
Other non-cash adjustments, including currency(1)	(15,032)	(1,449)
Balance at December 31,	\$11,927	\$39,230

(1) Includes a reduction of severance accruals associated with the divestiture of two IPD locations and associated product lines in 2018. Refer to Note 3 of this Annual Report for further discussion.

(2) The reserve for the R1 Realignment Program was \$12.6 million, which was substantially paid during the period.

20. QUARTERLY FINANCIAL DATA (UNAUDITED)

The following presents a summary of the unaudited quarterly data for 2018 and 2017 (amounts in millions, except per share data):

	2018			
Quarter	4th	3rd	2nd	1st
Sales	\$986.9	\$952.7	\$973.1	\$920.0
Gross profit	321.8	308.5	286.1	271.4
Earnings before income taxes	78.6	44.4	28.3	25.0
Net earnings attributable to Flowserve Corporation	63.1	28.2	13.2	15.1
Earnings per share(1):				
Basic	\$0.48	\$0.22	\$0.10	\$0.12
Diluted	0.48	0.21	0.10	0.12
	2017			
Quarter	4th	3rd	2nd	1st
Sales	\$1,034.1	\$883.4	\$877.1	\$866.3
Gross profit	304.4	267.5	245.0	268.4
Earnings before income taxes	67.0	68.4	103.0	24.6
Net (loss) earnings attributable to Flowserve Corporation	(105.9)	47.6	41.9	19.1
(Loss) earnings per share(1):				
Basic	\$(0.81)	\$0.36	\$0.32	\$0.15
Diluted	(0.81)	0.36	0.32	0.15

(1) Earnings per share is computed independently for each of the quarters presented. The sum of the quarters may not equal the total year amount due to the impact of changes in weighted average quarterly shares outstanding.

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

None.

ITEM 9A. CONTROLS AND PROCEDURES

Disclosure Controls and Procedures

Our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended (the "Exchange Act") are designed to provide reasonable assurance that the information, which we are required to disclose in the reports that we file or submit under the Exchange Act, is recorded, processed, summarized and reported within the time periods specified in the U.S. SEC rules and forms, and that such information is accumulated and communicated to our management, including our Principal Executive Officer and Principal Financial Officer, as appropriate to allow timely decisions regarding required disclosure.

In connection with the preparation of this Annual Report on Form 10-K for the year ended December 31, 2018, our management, under the supervision and with the participation of our Principal Executive Officer and our Principal Financial Officer, carried out an evaluation of the effectiveness of the design and operation of our disclosure controls and procedures as of December 31, 2018. Based on this evaluation, our Principal Executive Officer and Principal Financial Officer concluded that our disclosure controls and procedures were effective at the reasonable assurance level as of December 31, 2018.

Management's Report on Internal Control Over Financial Reporting

Our management, under the supervision and with the participation of our Principal Executive Officer and Principal Financial Officer, is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act. 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 in the United States ("U.S. GAAP"). Internal control over financial reporting includes policies and procedures that: (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of our assets; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with U.S. GAAP, and that our receipts and expenditures are being made only in accordance with authorizations of our management and directors; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of our assets that could have a material effect on the financial statements.

Under the supervision and with the participation of our Principal Executive Officer and Principal Financial Officer, our management conducted an assessment of our internal control over financial reporting as of December 31, 2018, based on the criteria established in Internal Control - Integrated Framework (2013), issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). Based on this evaluation, our management concluded our internal control over financial reporting was effective as of December 31, 2018 based on criteria in Internal Control - Integrated Framework (2013) issued by the COSO.

The effectiveness of our internal control over financial reporting as of December 31, 2018, has been audited by PricewaterhouseCoopers LLP, our independent registered public accounting firm, as stated in their report, which is included herein.

Changes in Internal Control Over Financial Reporting

There were no changes in our internal control over financial reporting (as defined in Rules 13a-15(f) and 15d-15(f) of the Exchange Act) during the quarter ended December 31, 2018 that have materially affected, or are reasonably likely to materially affect our internal control over financial reporting.

Other

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 existing policies or procedures may deteriorate.

ITEM 9B. OTHER INFORMATION

None.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

The information required in this Item 10 is incorporated by reference to all information under the captions “Security Ownership of Directors and Certain Executive Officers,” “Security Ownership of Certain Beneficial Owners,” “Proposal One: Election of Directors,” “Executive Officers,” “Shareholder Proposals and Nominations,” “Section 16(a) Beneficial Ownership Reporting Compliance” and “Certain Relationships and Related Transactions” in our definitive Proxy Statement relating to our 2019 annual meeting of shareholders to be held on May 23, 2019. The Proxy Statement will be filed with the SEC no later than April 12, 2019.

ITEM 11. EXECUTIVE
COMPENSATION

The information required in this Item 11 is incorporated by reference to all information under the captions “Executive Compensation,” “Proposal Two: Advisory Vote on Executive Compensation,” “Section 16(a) Beneficial Ownership Reporting Compliance,” “Security Ownership of Directors and Certain Executive Officers,” “Compensation Committee Interlocks and Insider Participation” and “Certain Relationships and Related Transactions” in our definitive Proxy Statement relating to our 2019 annual meeting of shareholders to be held on May 23, 2019. The Proxy Statement will be filed with the SEC no later than April 12, 2019.

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND
RELATED STOCKHOLDER MATTERS

The information required in this Item 12 is incorporated by reference to all information under the captions “Security Ownership of Directors and Certain Executive Officers,” “Security Ownership of Certain Beneficial Owners,” “Equity Compensation Plan Information” and “Executive Compensation” in our definitive Proxy Statement relating to our 2019 annual meeting of shareholders to be held on May 23, 2019. The Proxy Statement will be filed with the SEC no later than April 12, 2019.

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

The information required in this Item 13 is incorporated by reference to all information under the captions “Role of the Board; Corporate Governance Matters,” “Committees of the Board” and “Certain Relationships and Related Transactions” in our definitive Proxy Statement relating to our 2019 annual meeting of shareholders to be held on May 23, 2019. The Proxy Statement will be filed with the SEC no later than April 12, 2019.

ITEM 14. PRINCIPAL ACCOUNTING FEES AND SERVICES

The information required in this Item 14 is incorporated by reference to all information under the caption “Other Audit Information” in our definitive Proxy Statement relating to our 2019 annual meeting of shareholders to be held on May 23, 2019. The Proxy Statement will be filed with the SEC no later than April 12, 2019.

PART IV

ITEM 15. EXHIBITS, FINANCIAL STATEMENT SCHEDULES

(a) Documents filed as a part of this Annual Report:

1. Consolidated Financial Statements

The following consolidated financial statements and notes thereto are filed as part of this Annual Report:
Report of Independent Registered Public Accounting Firm

Flowserve Corporation Consolidated Financial Statements:

Consolidated Balance Sheets at December 31, 2018 and 2017

For each of the three years in the period ended December 31, 2018:

Consolidated Statements of Income

Consolidated Statements of Comprehensive Income

Consolidated Statements of Shareholders' Equity

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Consolidated Statements of Cash Flows

Notes to Consolidated Financial Statements

2. Consolidated Financial Statement Schedules

The following consolidated financial statement schedule is filed as part of this Annual Report:

Schedule II — Valuation and Qualifying

Accounts.....

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Financial statement schedules not included in this Annual Report have been omitted because they are not applicable or the required information is shown in the consolidated financial statements or notes thereto.

3. Exhibits

Exhibit No.	Description
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- | | |
|-------------|---|
| <u>3.1</u> | Restated Certificate of Incorporation of Flowserve Corporation (incorporated by reference to Exhibit 3.1 to the Registrant's Quarterly Report on Form 10-Q (File No. 001-13179) for the quarter ended June 30, 2013). |
| <u>3.2</u> | Flowserve Corporation By-Laws, as amended and restated effective October 2, 2018 (incorporated by reference to Exhibit 3.1 to the Registrant's Current Report on Form 8-K (File No. 001-13179) dated October 4, 2018). |
| <u>4.1</u> | Senior Indenture, dated September 11, 2012, by and between Flowserve Corporation and U.S. Bank National Association, as trustee (incorporated by reference to Exhibit 4.1 to the Registrant's Current Report on Form 8-K (File No. 001-13179) dated September 11, 2012). |
| <u>4.2</u> | First Supplemental Indenture, dated September 11, 2012, by and among Flowserve Corporation, certain of its subsidiaries and U.S. Bank National Association, as trustee (incorporated by reference to Exhibit 4.2 to the Registrant's Current Report on Form 8-K (File No. 001-13179) dated September 11, 2012). |
| <u>4.3</u> | Second Supplemental Indenture, dated November 1, 2013, by and among Flowserve Corporation, certain of its subsidiaries and U.S. Bank National Association, as trustee (incorporated by reference to Exhibit 4.2 to the Registrant's Current Report on Form 8-K (File No. 001-13179) dated November 1, 2013). |
| <u>4.4</u> | Third Supplemental Indenture, dated March 17, 2015, by and among Flowserve Corporation, certain of its subsidiaries and U.S. Bank National Association, as trustee (incorporated by reference to Exhibit 4.2 to the Registrant's Current Report on Form 8-K dated March 17, 2015). |
| <u>10.1</u> | Credit Agreement, dated August 20, 2012, among Flowserve Corporation, Bank of America, N.A., as swingline lender, letter of credit issuer and administrative agent and the other lenders referred to therein (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K (File No. 001-13179) dated August 20, 2012). |
| <u>10.2</u> | First Amendment to Credit Agreement, dated October 4, 2013, among Flowserve Corporation, Bank of America, N.A., as administrative agent, and the other lenders referred to therein (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K (File No. 001-13179) dated October 4, 2013). |
| <u>10.3</u> | Second Amendment to Credit Agreement, dated October 14, 2015, among Flowserve Corporation, Bank of America, N.A., as administrative agent, and the other lenders referred to therein (incorporated by reference to Exhibit 10.1 to the Registrants' Current Report on Form 8-K (File No. 001-13179) dated October 19, 2015). |
| <u>10.4</u> | Third Amendment to Credit Agreement, dated December 17, 2015, among Flowserve Corporation, Bank of America, N.A., as administrative agent, and the other lenders referred to therein (incorporated by reference to Exhibit 10.4 to the Registrant's Annual Report on Form 10-K (File No. 001-13179) for the year ended December 31, 2017). |
| <u>10.5</u> | Fourth Amendment to Credit Agreement, dated June 30, 2017, among Flowserve Corporation, Bank of America, N.A., as administrative agent, and the other lenders referred to therein (incorporated by reference to Exhibit 10.1 to the Registrants' Current Report on Form 8-K dated June 30, 2017). |
| <u>10.6</u> | Amended and Restated Flowserve Corporation Director Cash Deferral Plan, effective January 1, 2009 (incorporated by reference to Exhibit 10.7 to the Registrant's Annual Report on Form 10-K (File No. 001-13179) for the year ended December 31, 2008).* |
| <u>10.7</u> | |

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Amended and Restated Flowserve Corporation Director Stock Deferral Plan, dated effective January 1, 2009 (incorporated by reference to Exhibit 10.8 to the Registrant's Annual Report on Form 10-K (File No. 001-13179) for the year ended December 31, 2008).*

10.8 Trust for Non-Qualified Deferred Compensation Benefit Plans, dated February 11, 2011 (incorporated by reference to Exhibit 10.8 to the Registrant's Annual Report on Form 10-K (File No. 001-13179) for the year ended December 31, 2010).*

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Exhibit No.	Description
<u>10.9</u>	Flowserve Corporation Deferred Compensation Plan (incorporated by reference to Exhibit 10.23 to the Registrant's Annual Report on Form 10-K (File No. 001-13179) for the year ended December 31, 2000).*
<u>10.10</u>	Amendment No. 1 to the Flowserve Corporation Deferred Compensation Plan, as amended and restated, effective June 1, 2000 (incorporated by reference to Exhibit 10.50 to the Registrant's Annual Report on Form 10-K (File No. 001-13179) for the year ended December 31, 2002).*
<u>10.11</u>	Amendment to the Flowserve Corporation Deferred Compensation Plan, dated December 14, 2005 (incorporated by reference to Exhibit 10.70 to the Registrant's Annual Report on Form 10-K (File No. 001-13179) for the year ended December 31, 2004).*
<u>10.12</u>	Amendment No. 3 to the Flowserve Corporation Deferred Compensation Plan, as amended and restated effective June 1, 2000 (incorporated by reference to Exhibit 10.22 to the Registrant's Annual Report on Form 10-K (File No. 001-13179) for the year ended December 31, 2007).*
<u>10.13+</u>	Flowserve Corporation Senior Management Retirement Plan, amended and restated effective November 2, 2018.*
<u>10.14+</u>	Flowserve Corporation Supplemental Executive Retirement Plan, amended and restated effective November 2, 2018.*
<u>10.15</u>	Flowserve Corporation Equity and Incentive Compensation Plan (incorporated by reference to Appendix A to the Registrant's Proxy Statement on Schedule 14A (File No. 001-13179) dated April 3, 2009).*
<u>10.16</u>	Form of Restrictive Covenants Agreement for Officers (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K (File No. 001-13179) dated as of March 9, 2006).*
<u>10.17</u>	Form of Indemnification Agreement for all Directors and Officers (incorporated by reference to Exhibit 10.47 to the Registrant's Annual Report on Form 10-K (File No. 001-13179) for the year ended December 31, 2015).
<u>10.18</u>	Offer Letter, dated as of February 6, 2017, by and between Flowserve Corporation and R. Scott Rowe (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K (File No. 001-13179) dated as of February 8, 2017).*
<u>10.19</u>	Flowserve Corporation Change In Control Severance Plan, amended and restated effective November 2, 2018 (incorporated by reference to Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q (File No. 001-13179) for the quarter ended September 30, 2018).*
<u>10.20+</u>	Flowserve Corporation Executive Officer Severance Plan, as amended and restated effective November 2, 2018.*
<u>10.21</u>	Flowserve Corporation Annual Incentive Plan, as amended and restated effective February 14, 2017 (incorporated by reference to Exhibit 10.44 to the Registrant's Annual Report on Form 10-K (File No. 001-13179) for the year ended December 31, 2016).*
<u>10.22</u>	2007 Flowserve Corporation Long-Term Stock Incentive Plan, as amended and restated effective February 14, 2017 (incorporated by reference to Exhibit 10.45 to the Registrant's Annual Report on Form 10-K (File No. 001-13179) for the year ended December 31, 2016).*
<u>10.23</u>	Flowserve Financial Management Code of Ethics adopted by the Flowserve Corporation principal executive officer and CEO, principal financial officer and CFO, principal accounting officer and controller, and other senior financial managers (incorporated by reference to Exhibit 14.1 to the Registrant's Annual Report on Form 10-K (File No. 001-13179) for the year ended December 31, 2002).
<u>21.1+</u>	Subsidiaries of the Registrant.
<u>23.1+</u>	Consent of PricewaterhouseCoopers LLP.
<u>31.1+</u>	Certification of Principal Executive Officer pursuant to Exchange Act Rules 13a-14(a) and 15d-14(a), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
<u>31.2+</u>	Certification of Principal Financial Officer pursuant to Exchange Act Rules 13a-14(a) and 15d-14(a), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
<u>32.1++</u>	Certification of Principal Executive Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.

32.2++ Certification of Principal Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted 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

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Exhibit No.	Description
101.LAB	XBRL Taxonomy Extension Label Linkbase Document
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document

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- * Management contracts and compensatory plans and arrangements required to be filed as exhibits to this Annual Report on Form 10-K.
 - + Filed herewith.
 - ++ Furnished herewith.

ITEM 16. FORM 10-K SUMMARY

Not applicable.

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SIGNATURES

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

FLOWSERVE CORPORATION

By: /s/ R. Scott Rowe

R. Scott Rowe

President and Chief Executive Officer

Date: February 20, 2019

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the date indicated.

Signature	Title	Date
/s/ Roger L. Fix Roger L. Fix	Non-Executive Chairman of the Board	February 20, 2019
/s/ R. Scott Rowe R. Scott Rowe	President, Chief Executive Officer and Director (Principal Executive Officer)	February 20, 2019
/s/ Lee S. Eckert Lee S. Eckert	Senior Vice President and Chief Financial Officer (Principal Financial and Accounting Officer)	February 20, 2019
/s/ Leif E. Darner Leif E. Darner	Director	February 20, 2019
/s/ Gayla J. Delly Gayla J. Delly	Director	February 20, 2019
/s/ Ruby R. Chandy Ruby R. Chandy	Director	February 20, 2019
/s/ John R. Friedery John R. Friedery	Director	February 20, 2019
/s/ John L. Garrison John L. Garrison	Director	February 20, 2019
/s/ Joseph E. Harlan Joseph E. Harlan	Director	February 20, 2019
/s/ Michael C. McMurray Michael C. McMurray	Director	February 20, 2019
/s/ Rick J. Mills Rick J. Mills	Director	February 20, 2019
/s/ David E. Roberts David E. Roberts	Director	February 20, 2019

FLOWSERVE CORPORATION

Schedule II — Valuation and Qualifying Accounts

For the Years Ended December 31, 2018, 2017 and 2016

Description	Balance at Beginning of Year	Additions Charged to Cost and Expenses	Additions Charged to Other Accounts— Acquisitions and Related Adjustments	Deductions From Reserve	Balance at End of Year
(Amounts in thousands)					
Year Ended December 31, 2018					
Allowance for doubtful accounts(a):	\$59,113	8,050	—	(15,662)	\$51,501
Deferred tax asset valuation allowance(b):	119,309	32,157	(7,551)	(9,986)	133,929
Year Ended December 31, 2017					
Allowance for doubtful accounts(a):	51,920	14,508	—	(7,315)	59,113
Deferred tax asset valuation allowance(b):	36,191	86,694	2,595	(6,171)	119,309
Year Ended December 31, 2016					
Allowance for doubtful accounts(a):	43,935	12,045	—	(4,060)	51,920
Deferred tax asset valuation allowance(b):	24,725	12,883	(67)	(1,350)	36,191

(a) Deductions from reserve represent accounts written off and recoveries.

(b) Deductions from reserve result from the expiration or utilization of net operating losses and foreign tax credits previously reserved.