

BARNES GROUP INC
Form 10-K
February 21, 2017
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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, 2016
 TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the transition period from _____ to _____
Commission file number 1-4801

BARNES GROUP INC.

(Exact name of registrant as specified in its charter)

Delaware 06-0247840
(State of incorporation) (I.R.S. Employer Identification No.)
123 Main Street, Bristol, Connecticut 06010
(Address of Principal Executive Office) (Zip Code)

(860) 583-7070

Registrant's telephone number, including area code

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

Title of each class	Name of each exchange on which registered
Common Stock, \$0.01 Par Value	New York Stock Exchange

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

None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes 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 and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted 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 and post such files). Yes No

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K 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, or a smaller reporting company. See definitions of "large accelerated filer," "accelerated filer," and "smaller reporting company" in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer Accelerated filer

Non-accelerated filer Smaller reporting company

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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 voting stock (Common Stock) held by non-affiliates of the registrant as of the close of business on June 30, 2016 was approximately \$1,661,081,242 based on the closing price of the Common Stock on the New York Stock Exchange on that date. The registrant does not have any non-voting common equity.

The registrant had outstanding 53,823,313 shares of common stock as of February 16, 2017.

Documents Incorporated by Reference

Portions of the registrant's definitive proxy statement to be delivered to stockholders in connection with the Annual Meeting of Stockholders to be held May 5, 2017 are incorporated by reference into Part III.

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FORWARD-LOOKING STATEMENTS

This Annual Report may contain forward-looking statements as defined in the Private Securities Litigation Reform Act of 1995. Forward-looking statements often address our expected future operating and financial performance and financial condition, and often contain words such as "anticipate," "believe," "expect," "plan," "estimate," "project," and similar terms. These forward-looking statements do not constitute guarantees of future performance and are subject to a variety of risks and uncertainties that may cause actual results to differ materially from those expressed in the forward-looking statements. These include, among others: difficulty maintaining relationships with employees, including unionized employees, customers, distributors, suppliers, business partners or governmental entities; failure to successfully negotiate collective bargaining agreements or potential strikes, work stoppages or other similar events; difficulties leveraging market opportunities; changes in market demand for our products and services; rapid technological and market change; the ability to protect intellectual property rights; introduction or development of new products or transfer of work; higher risks in global operations and markets; the impact of intense competition; acts of terrorism, cybersecurity attacks or intrusions that could adversely impact our businesses; uncertainties relating to conditions in financial markets; currency fluctuations and foreign currency exposure; future financial performance

of the industries or customers that we serve; our dependence upon revenues and earnings from a small number of significant customers; a major loss of customers; inability to realize expected sales or profits from existing backlog due to a range of factors, including changes in customer sourcing decisions, material changes, production schedules and volumes of specific programs; the impact of government budget and funding decisions; changes in raw material or product prices and availability; integration of acquired businesses; restructuring costs or savings; the continuing impact of prior acquisitions and

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divestitures; and any other future strategic actions, including acquisitions, divestitures, restructurings, or strategic business realignments, and our ability to achieve the financial and operational targets set in connection with any such actions; the outcome of pending and future legal, governmental, or regulatory proceedings and contingencies and uninsured claims; future repurchases of common stock; future levels of indebtedness; and numerous other matters of a global, regional or national scale, including those of a political, economic, business, competitive, environmental, regulatory and public health nature; and other risks and uncertainties described in this Annual Report. The Company assumes no obligation to update its forward-looking statements.

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PART I

Item 1. Business

BARNES GROUP INC. ⁽¹⁾

Founded in 1857, Barnes Group Inc. (the “Company”) is a global industrial and aerospace manufacturer and service provider, serving a wide range of end markets and customers. The highly engineered products, differentiated industrial technologies, and innovative solutions delivered by Barnes Group are used in far-reaching applications that provide transportation, manufacturing, healthcare products, and technology to the world. Barnes Group’s approximately 5,000 skilled and dedicated employees around the globe are committed to achieving consistent and sustainable profitable growth.

Structure

The Company operates under two global business segments: Industrial and Aerospace. The Industrial segment includes the the Molding Solutions, Nitrogen Gas Products and Engineered Components business units. The Aerospace segment includes the original equipment manufacturer (“OEM”) business and the aftermarket business, which includes maintenance repair and overhaul (“MRO”) services and the manufacture and delivery of aerospace aftermarket spare parts.

In the third quarter of 2016, the Company, through three of its subsidiaries (collectively, the “Purchaser”), completed its acquisition of the molds business of Adval Tech Holding AG and Adval Tech Holdings (Asia) Pte. Ltd. (“FOBOHA”). FOBOHA is headquartered in Haslach, Germany and operates out of three manufacturing facilities located in Germany, Switzerland and China. The Company completed its purchase of the Germany and Switzerland businesses on August 31, 2016. The purchase of the China business required government approval which was granted on September 30, 2016. FOBOHA specializes in the development and manufacture of complex plastic injection molds for packaging, medical, consumer and automotive applications. The Company acquired FOBOHA for an aggregate cash purchase price of CHF 136.3 million (\$138.6 million) which was financed using cash on hand and borrowings under the Company's revolving credit facility. The purchase price includes preliminary adjustments under the terms of the Share Purchase Agreement (“SPA”), including approximately CHF 11.3 million (\$11.5 million) related to cash acquired, and is subject to post closing adjustments under the terms of the SPA. In connection with the acquisition, the Company recorded \$39.8 million of intangible assets and \$73.7 million of goodwill. FOBOHA is being integrated into the Industrial Segment, within our Molding Solutions business unit. See Note 2 and Note 5 to the Consolidated Financial Statements.

In the fourth quarter of 2015, the Company completed the acquisition of privately held Priamus System Technologies AG and two of its subsidiaries (collectively, “Priamus”) from Growth Finance AG. Priamus, which has approximately 40 employees, is headquartered in Schaffhausen, Switzerland and has direct sales and service offices in the U.S. and Germany. Priamus is a technology leader in the development of advanced process control systems for the plastic injection molding industry and services many of the world's highest quality plastic injection molders in the medical, automotive, consumer goods, electronics and packaging markets. Priamus is being integrated into the Industrial Segment, within our Molding Solutions business unit. See Note 2 of the Consolidated Financial Statements.

In the third quarter of 2015, the Company completed the acquisition of the Thermoplay business (“Thermoplay”) by acquiring all of the capital stock of privately held HPE S.p.A., the parent company through which Thermoplay operates. Thermoplay’s headquarters and manufacturing facility are located in Pont-Saint-Martin in Aosta, Italy, with technical service capabilities in China, India, France, Germany, United Kingdom, Portugal, and Brazil. Thermoplay specializes in the design, development, and manufacturing of hot runner systems for plastic injection molding, primarily in the packaging, automotive, and medical end markets. Thermoplay is being integrated into the Industrial Segment, within our Molding Solutions business unit. See Note 2 of the Consolidated Financial Statements.

⁽¹⁾ As used in this annual report, “Company,” “Barnes Group,” “we” and “ours” refer to the registrant and its consolidated subsidiaries except where the context requires otherwise, and “Industrial” and “Aerospace” refer to the registrant’s segments, not to separate corporate entities

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INDUSTRIAL

Industrial is a global manufacturer of highly-engineered, high-quality precision parts, products and systems for critical applications serving a diverse customer base in end-markets such as transportation, industrial equipment, consumer products, packaging, electronics, medical devices, and energy. Focused on innovative custom solutions, Industrial participates in the design phase of components and assemblies whereby customers receive the benefits of application and systems engineering, new product development, testing and evaluation, and the manufacturing of final products. Products are sold primarily through its direct sales force and global distribution channels. Industrial's Molding Solutions businesses design and manufacture customized hot runner systems, advanced mold cavity sensors and process control systems, and precision high cavitation and cube mold assemblies - collectively, the enabling technologies for many complex plastic injection molding applications. Industrial's Nitrogen Gas Products business manufactures nitrogen gas springs and manifold systems used to precisely control stamping presses. Industrial's Engineered Components businesses manufacture and supply precision mechanical products used in transportation and industrial applications, including mechanical springs, high-precision punched and fine-blanked components, and retaining rings. Engineered Components is equipped to produce many types of highly engineered precision springs, from fine hairsprings for electronics and instruments to large heavy-duty springs for machinery.

Industrial competes with a broad base of large and small companies engaged in the manufacture and sale of engineered products, precision molds, hot runner systems and precision components. Industrial competes on the basis of quality, service, reliability of supply, engineering and technical capability, geographic reach, product breadth, innovation, design, and price. Industrial has manufacturing, distribution and assembly operations in the United States, Brazil, China, Germany, Italy, Mexico, Singapore, Sweden and Switzerland. Industrial also has sales and service operations in the United States, Brazil, Canada, Czech Republic, China/Hong Kong, France, Germany, India, Italy, Japan, Mexico, the Netherlands, Portugal, Singapore, Slovakia, South Africa, South Korea, Spain, Switzerland, Thailand and the United Kingdom. Sales by Industrial to its three largest customers accounted for approximately 11% of its sales in 2016.

AEROSPACE

Aerospace is a global provider of complex fabricated and precision machined components and assemblies for OEM turbine engine, airframe and industrial gas turbine builders, and the military. The Aerospace aftermarket business provides jet engine component MRO services, including services performed under our Component Repair Programs ("CRPs"), for many of the world's major turbine engine manufacturers, commercial airlines and the military. The Aerospace aftermarket activities also include the manufacture and delivery of aerospace aftermarket spare parts, including the revenue sharing programs ("RSPs") under which the Company receives an exclusive right to supply designated aftermarket parts over the life of the related aircraft engine programs.

Aerospace's OEM business supplements the leading jet engine OEM capabilities and competes with a large number of fabrication and machining companies. Competition is based mainly on quality, engineering and technical capability, product breadth, new product introduction, timeliness, service and price. Aerospace's fabrication and machining operations, with facilities in Arizona, Connecticut, Michigan, Ohio, Utah and Singapore, produce critical engine and airframe components through technologically advanced manufacturing processes.

The Aerospace aftermarket business supplements jet engine OEMs' maintenance, repair and overhaul capabilities, and competes with the service centers of major commercial airlines and other independent service companies for the repair and overhaul of turbine engine components. The manufacture and supply of aerospace aftermarket spare parts, including those related to the RSPs, are dependent upon the reliable and timely delivery of high-quality components. Aerospace's aftermarket facilities, located in Connecticut, Ohio and Singapore, specialize in the repair and refurbishment of highly engineered components and assemblies such as cases, rotating life limited parts, rotating air seals, turbine shrouds, vanes and honeycomb air seals. Sales by Aerospace to its three largest customers, General Electric, Rolls-Royce and United Technologies Corporation, accounted for approximately 51%, 13% and 11% of its sales in 2016, respectively. Sales to its next four largest customers in 2016 collectively accounted for approximately

10% of its total sales.

FINANCIAL INFORMATION

The backlog of the Company's orders believed to be firm at the end of 2016 was \$886 million as compared with \$764 million at the end of 2015. Of the 2016 year-end backlog, \$636 million was attributable to Aerospace and \$250 million was attributable to Industrial. Approximately 65% of the Company's year-end backlog is scheduled to be shipped during 2017. The remainder of the Company's backlog is scheduled to be shipped after 2017.

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We have a global manufacturing footprint and a technical service network to service our worldwide customer base. The global economies have a significant impact on the financial results of the business as we have significant operations outside of the United States. For an analysis of our revenue from sales to external customers, operating profit and assets by business segment, as well as revenues from sales to external customers and long-lived assets by geographic area, see Note 19 of the Consolidated Financial Statements. For a discussion of risks attendant to the global nature of our operations and assets, see Item 1A. Risk Factors.

RAW MATERIALS

The principal raw materials used to manufacture our products are various grades and forms of steel, from rolled steel bars, plates and sheets, to high-grade valve steel wires and sheets, various grades and forms (bars, sheets, forgings, castings and powders) of stainless steels, aluminum alloys, titanium alloys, copper alloys, graphite, and iron-based, nickel-based (Inconels) and cobalt-based (Hastelloys) superalloys for complex aerospace applications. Prices for steel, titanium, Inconel, Hastelloys, as well as other specialty materials, have periodically increased due to higher demand and, in some cases, reduction of the availability of materials. If this occurs, the availability of certain raw materials used by us or in products sold by us may be negatively impacted.

RESEARCH AND DEVELOPMENT

We conduct research and development activities in our effort to provide a continuous flow of innovative new products, processes and services to our customers. We also focus on continuing efforts aimed at discovering and implementing new knowledge that significantly improves existing products and services, and developing new applications for existing products and services. Our product development strategy is driven by product design teams and collaboration with our customers, particularly within Industrial's Molding Solutions businesses, as well as within our Aerospace and our other Industrial businesses. Many of the products manufactured by us are custom parts made to customers' specifications. Investments in research and development are important to our long-term growth, enabling us to stay ahead of changing customer and marketplace needs. We spent approximately \$13 million, \$13 million and \$16 million in 2016, 2015 and 2014, respectively, on research and development activities.

PATENTS AND TRADEMARKS

Patents and other proprietary rights are critical to certain of our business units, however the Company also holds certain trade secrets and unpatented know-how. We are party to certain licenses of intellectual property and hold numerous patents, trademarks, and trade names that enhance our competitive position. The Company does not believe, however, that any of these licenses, patents, trademarks or trade names is individually significant to the Company or either of our segments. We maintain procedures to protect our intellectual property (including patents and trademarks) both domestically and internationally. Risk factors associated with our intellectual property are discussed in Item 1A. Risk Factors.

EXECUTIVE OFFICERS OF THE COMPANY

For information regarding the Executive Officers of the Company, see Part III, Item 10 of this Annual Report.

ENVIRONMENTAL

Compliance with federal, state, and local laws, as well as those of other countries, which have been enacted or adopted regulating the discharge of materials into the environment or otherwise relating to the protection of the environment has not had a material effect, and is not expected to have a material effect, upon our capital expenditures, earnings, or competitive position.

Our past and present business operations and past and present ownership and operations of real property and the use, sale, storage and handling of chemicals and hazardous products subject us to extensive and changing U.S. federal, state and local environmental laws and regulations, as well as those of other countries, pertaining to the discharge of materials into the environment, enforcement, disposition of wastes (including hazardous wastes), the use, shipping, labeling, and storage of chemicals and hazardous materials, building requirements, or otherwise relating to protection of the environment. We have experienced, and expect to continue to experience, costs to comply with environmental laws and regulations. In addition, new laws and regulations, stricter enforcement of existing laws and regulations, the discovery of previously unknown contamination or the imposition of new clean-up requirements could require us to incur costs or become subject to new or increased liabilities that could have a material adverse effect on our business, financial condition, results of operations and cash flows.

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We use and generate hazardous substances and wastes in our operations. In addition, many of our current and former properties are or have been used for industrial purposes. Accordingly, we monitor hazardous waste management and applicable environmental permitting and reporting for compliance with applicable laws at our locations in the ordinary course of our business. We may be subject to potential material liabilities relating to any investigation and clean-up of our locations or properties where we delivered hazardous waste for handling or disposal that may be contaminated or which may have been contaminated prior to our purchase, and to claims alleging personal injury.

AVAILABLE INFORMATION

Our Internet address is www.BGInc.com. Our annual report on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, and amendments to those reports are available without charge on our website as soon as reasonably practicable after they are filed with, or furnished to, the U.S. Securities and Exchange Commission ("SEC"). In addition, we have posted on our website, and will make available in print to any stockholder who makes a request, our Corporate Governance Guidelines, our Code of Business Ethics and Conduct, and the charters of the Audit Committee, Compensation and Management Development Committee and Corporate Governance Committee (the responsibilities of which include serving as the nominating committee) of the Company's Board of Directors. References to our website addressed in this Annual Report are provided as a convenience and do not constitute, and should not be viewed as, an incorporation by reference of the information contained on, or available through, the website. Therefore, such information should not be considered part of this Annual Report.

Item 1A. Risk Factors

Our business, financial condition or results of operations could be materially adversely affected by any of the following risks. Please note that additional risks not presently known to us may also materially impact our business and operations.

RISKS RELATED TO OUR BUSINESS

We depend on revenues and earnings from a small number of significant customers. Any bankruptcy of or loss of or, cancellation, reduction or delay in purchases by these customers could harm our business. In 2016, our net sales to General Electric and its subsidiaries accounted for 17% of our total sales and approximately 51% of Aerospace's net sales. Aerospace's second and third largest customers, Rolls-Royce and United Technologies Corporation and its subsidiaries, accounted for 13% and 11%, respectively, of Aerospace net sales in 2016. Approximately 10% of Aerospace's sales in 2016 were to its next four largest customers. Approximately 11% of Industrial's sales in 2016 were to its three largest customers. Some of our success will depend on the business strength and viability of those customers. We cannot assure you that we will be able to retain our largest customers. Some of our customers may in the future reduce their purchases due to economic conditions or shift their purchases from us to our competitors, in-house or to other sources. Some of our long-term sales agreements provide that until a firm order is placed by a customer for a particular product, the customer may unilaterally reduce or discontinue its projected purchases without penalty, or terminate for convenience. The loss of one or more of our largest customers, any reduction, cancellation or delay in sales to these customers (including a reduction in aftermarket volume in our RSPs), our inability to successfully develop relationships with new customers, or future price concessions we make to retain customers could significantly reduce our sales and profitability.

The global nature of our business exposes us to foreign currency fluctuations that may affect our future revenues, debt levels and profitability. We have manufacturing facilities and technical service, sales and distribution centers around the world, and the majority of our foreign operations use the local currency as their functional currency. These include, among others, the Brazilian real, British pound sterling, Canadian dollar, Chinese renminbi, Euro, Japanese yen, Korean won, Mexican peso, Singapore dollar, Swedish krona, Swiss franc and Thai baht. Since our financial

statements are denominated in U.S. dollars, changes in currency exchange rates between the U.S. dollar and other currencies expose us to translation risk when the local currency financial statements are translated to U.S. dollars. Changes in currency exchange rates may also expose us to transaction risk. We may buy hedges in certain currencies to reduce or offset our exposure to currency exchange fluctuations; however, these transactions may not be adequate or effective to protect us from the exposure for which they are purchased. We have not engaged in any speculative hedging activities. Currency fluctuations may adversely impact our revenues and profitability in the future.

Our operations depend on our manufacturing, sales, and service facilities and information systems in various parts of the world which are subject to physical, financial, regulatory, environmental, operational and other risks that could disrupt our operations. We have a significant number of manufacturing facilities, technical service, and sales centers both within and outside the U.S. The global scope of our business subjects us to increased risks and uncertainties such as threats

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of war, terrorism and instability of governments; and economic, regulatory and legal systems in countries in which we or our customers conduct business.

Customer, supplier and our facilities are located in areas that may be affected by natural disasters, including earthquakes, windstorms and floods, which could cause significant damage and disruption to the operations of those facilities and, in turn, could have a material adverse effect on our business, financial condition, results of operations and cash flows. Additionally, some of our manufacturing equipment and tooling is custom-made and is not readily replaceable. Loss of such equipment or tooling could have a negative impact on our manufacturing business, financial condition, results of operations and cash flows.

Although we have obtained property damage and business interruption insurance, a major catastrophe such as an earthquake, windstorm, flood or other natural disaster at any of our sites, or significant labor strikes, work stoppages, political unrest, or any of the events described above, in any of the areas where we conduct operations could result in a prolonged interruption of our business. Any disruption resulting from these events could cause significant delays in the manufacture or shipment of products or the provision of repair and other services that may result in our loss of sales and customers. Our insurance will not cover all potential risks, and we cannot assure you that we will have adequate insurance to compensate us for all losses that result from any insured risks. Any material loss not covered by insurance could have a material adverse effect on our financial condition, results of operations and cash flows. We cannot assure you that insurance will be available in the future at a cost acceptable to us or at a cost that will not have a material adverse effect on our profitability, net income and cash flows.

The global nature of our operations and assets subject us to additional financial and regulatory risks. We have operations and assets in various parts of the world. In addition, we sell or may in the future sell our products and services to the U.S. and foreign governments and in foreign countries. As a global business, we are subject to complex laws and regulations in the U.S. and other countries in which we operate, and associated risks, including: U.S. imposed embargoes of sales to specific countries; foreign import controls (which may be arbitrarily imposed or enforced); import regulations and duties; export regulations (which require us to comply with stringent licensing regimes); reporting requirements regarding the use of "conflict" minerals mined from certain countries; anti-dumping regulations; price and currency controls; exchange rate fluctuations; dividend remittance restrictions; expropriation of assets; war, civil uprisings and riots; government instability; government contracting requirements including cost accounting standards, including various procurement, security, and audit requirements, as well as requirements to certify to the government compliance with these requirements; the necessity of obtaining governmental approval for new and continuing products and operations; and legal systems or decrees, laws, taxes, regulations, interpretations and court decisions that are not always fully developed and that may be retroactively or arbitrarily applied. We have experienced inadvertent violations of some of these regulations, including export regulations, safety and environmental regulations, regulations prohibiting sales of certain products and product labeling regulations, in the past, none of which has had or, we believe, will have a material adverse effect on our business. However, any significant violations of these or other regulations in the future could result in civil or criminal sanctions, and the loss of export or other licenses which could have a material adverse effect on our business. We are subject to federal and state unclaimed property laws in the ordinary course of business, and are currently undergoing a multi-state unclaimed property audit, the timing and outcome of which cannot be predicted, and we may incur significant professional fees in conjunction with the audit. We may also be subject to unanticipated income taxes, excise duties, import taxes, export taxes, value added taxes, or other governmental assessments, and taxes may be impacted by changes in legislation in the tax jurisdictions in which we operate. In addition, our organizational and capital structure may limit our ability to transfer funds between countries, particularly into the U.S., without incurring adverse tax consequences. Any of these events could result in a loss of business or other unexpected costs that could reduce sales or profits and have a material adverse effect on our financial condition, results of operations and cash flows.

Any disruption or failure in the operation of our information systems, including from conversions or integrations of information technology or reporting systems, could have a material adverse effect on our business, financial condition, results of operations and cash flows. Our information technology (IT) systems are an integral part of our business. We depend upon our IT systems to help process orders, manage inventory, make payments and collect accounts receivable. Our IT systems also allow us to purchase, sell and ship products efficiently and on a timely basis, to maintain cost-effective operations, and to help provide superior service to our customers. We are currently in the process of implementing enterprise resource planning (ERP) platforms across certain of our businesses, and we expect that we will need to continue to improve and further integrate our IT systems, on an ongoing basis in order to effectively run our business. If we fail to successfully manage and integrate our IT systems, including these ERP platforms, it could adversely affect our business or operating results.

Further, in the ordinary course of our business, we store sensitive data, including intellectual property, our proprietary business information and that of our customers, suppliers and business partners, and personally identifiable information of our employees, in our data centers and on our networks. The secure maintenance and transmission of this information is critical to our business operations. Despite our security measures, our information technology and infrastructure may be vulnerable to attacks by hackers

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or breached due to employee error, malfeasance or other disruptions. Any such breach could compromise our networks and the information stored there could be accessed, publicly disclosed, lost or stolen. Any such access, disclosure or other loss of information could result in legal claims or proceedings, liability under laws that protect the privacy of personal information, and regulatory penalties, disrupt our operations, and damage our reputation, which could adversely affect our business, revenues and competitive position.

We have significant indebtedness that could affect our operations and financial condition, and our failure to meet certain financial covenants required by our debt agreements may materially and adversely affect our assets, financial position and cash flows. At December 31, 2016, we had consolidated debt obligations of \$501.0 million, representing approximately 30% of our total capital (indebtedness plus stockholders' equity) as of that date. Our level of indebtedness, proportion of variable rate debt obligations and the significant debt servicing costs associated with that indebtedness may adversely affect our operations and financial condition. For example, our indebtedness could require us to dedicate a substantial portion of our cash flows from operations to payments on our debt, thereby reducing the amount of our cash flows available for working capital, capital expenditures, investments in technology and research and development, acquisitions, dividends and other general corporate purposes; limit our flexibility in planning for, or reacting to, changes in the industries in which we compete; place us at a competitive disadvantage compared to our competitors, some of whom have lower debt service obligations and greater financial resources than we do; limit our ability to borrow additional funds; or increase our vulnerability to general adverse economic and industry conditions. In addition, a majority of our debt arrangements require us to maintain certain debt and interest coverage ratios and limit our ability to incur debt, make investments or undertake certain other business activities. These requirements could limit our ability to obtain future financing and may prevent us from taking advantage of attractive business opportunities. Our ability to meet the financial covenants or requirements in our debt arrangements may be affected by events beyond our control, and we cannot assure you that we will satisfy such covenants and requirements. A breach of these covenants or our inability to comply with the restrictions could result in an event of default under our debt arrangements which, in turn, could result in an event of default under the terms of our other indebtedness. Upon the occurrence of an event of default under our debt arrangements, after the expiration of any grace periods, our lenders could elect to declare all amounts outstanding under our debt arrangements, together with accrued interest, to be immediately due and payable. If this were to happen, we cannot assure you that our assets would be sufficient to repay in full the payments due under those arrangements or our other indebtedness or that we could find alternative financing to replace that indebtedness.

Conditions in the worldwide credit markets may limit our ability to expand our credit lines beyond current bank commitments. In addition, our profitability may be adversely affected as a result of increases in interest rates. At December 31, 2016, we and our subsidiaries had \$501.0 million aggregate principal amount of consolidated debt obligations outstanding, of which approximately 59% had interest rates that float with the market (not hedged against interest rate fluctuations). A 100 basis point increase in the interest rate on the floating rate debt in effect at December 31, 2016 would result in an approximate \$3.0 million annualized increase in interest expense.

Changes in the availability or price of materials, products and energy resources could adversely affect our costs and profitability. We may be adversely affected by the availability or price of raw materials, products and energy resources, particularly related to certain manufacturing operations that utilize steel, stainless steel, titanium, Inconel, Hastelloys and other specialty materials. The availability and price of raw materials and energy resources may be subject to curtailment or change due to, among other things, new laws or regulations, global economic or political events including strikes, terrorist attacks and war, suppliers' allocations to other purchasers, interruptions in production by suppliers, changes in exchange rates and prevailing price levels. In some instances there are limited sources for raw materials and a limited number of primary suppliers for some of our products for resale. Although we are not dependent upon any single source for any of our principal raw materials or products for resale, and such materials and products have, historically, been readily available, we cannot assure you that such raw materials and products will continue to be readily available. Disruption in the supply of raw materials, products or energy resources or our

inability to come to favorable agreements with our suppliers could impair our ability to manufacture, sell and deliver our products and require us to pay higher prices. Any increase in prices for such raw materials, products or energy resources could materially adversely affect our costs and our profitability.

We maintain pension and other postretirement benefit plans in the U.S. and certain international locations. Our costs of providing defined benefit plans are dependent upon a number of factors, such as the rates of return on the plans' assets, exchange rate fluctuations, future governmental regulation, global fixed income and equity prices, and our required and/or voluntary contributions to the plans. Declines in the stock market, prevailing interest rates, declines in discount rates, improvements in mortality rates and rising medical costs may cause an increase in our pension and other postretirement benefit expenses in the future and result in reductions in our pension fund asset values and increases in our pension and other postretirement benefit obligations. These changes have caused and may continue to cause a significant reduction in our net worth and without sustained growth in the pension investments over time to increase the value of the plans' assets, and

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depending upon the other factors listed above, we could be required to increase funding for some or all of these pension and postretirement plans.

We carry significant inventories and a loss in net realizable value could cause a decline in our net worth. At December 31, 2016, our inventories totaled \$227.8 million. Inventories are valued at the lower of cost or market based on management's judgments and estimates concerning future sales levels, quantities and prices at which such inventories will be sold in the normal course of business. Accelerating the disposal process or incorrect estimates of future sales potential may necessitate future reduction to inventory values. See "Part II - Item 7 - Management's Discussion and Analysis of Financial Condition and Results of Operations - Critical Accounting Policies".

We have significant goodwill and an impairment of our goodwill could cause a decline in our net worth. Our total assets include substantial goodwill. At December 31, 2016, our goodwill totaled \$633.4 million. The goodwill results from our prior acquisitions, representing the excess of the purchase price we paid over the net assets of the companies acquired. We assess whether there has been an impairment in the value of our goodwill during each calendar year or sooner if triggering events warrant. If future operating performance at one or more of our reporting units does not meet expectations or fair values fall due to significant stock market declines, we may be required to reflect a non-cash charge to operating results for goodwill impairment. The recognition of an impairment of a significant portion of goodwill would negatively affect our results of operations and total capitalization, the effect of which could be material. See "Part II - Item 7 - Management's Discussion and Analysis of Financial Condition and Results of Operations - Critical Accounting Policies".

We may not realize all of the sales expected from our existing backlog or anticipated orders. At December 31, 2016, we had \$885.5 million of order backlog, the majority of which related to aerospace OEM customers. There can be no assurances that the revenues projected in our backlog will be realized or, if realized, will result in profits. We consider backlog to be firm customer orders for future delivery. OEM customers may provide projections of components and assemblies that they anticipate purchasing in the future under new and existing programs. Such projections are included in our backlog when they are supported by a long term agreement. Our customers may have the right under certain circumstances or with certain penalties or consequences to terminate, reduce or defer firm orders that we have in backlog. If our customers terminate, reduce or defer firm orders, we may be protected from certain costs and losses, but our sales will nevertheless be adversely affected. Although we strive to maintain ongoing relationships with our customers, there is an ongoing risk that orders may be canceled or rescheduled due to fluctuations in our customers' business needs or purchasing budgets.

Also, our realization of sales from new and existing programs is inherently subject to a number of important risks and uncertainties, including whether our customers execute the launch of product programs on time, or at all, the number of units that our customers actually produce, the timing of production and manufacturing insourcing decisions made by our customers. In addition, until firm orders are placed, our customers may have the right to discontinue a program or replace us with another supplier at any time without penalty. Our failure to realize sales from new and existing programs could have a material adverse effect on our net sales, results of operations and cash flows.

We may not recover all of our up-front costs related to new or existing programs. New programs may require significant up-front investments for capital equipment, engineering, inventory, design and tooling. As OEMs in the transportation and aerospace industries have looked to suppliers to bear increasing responsibility for the design, engineering and manufacture of systems and components, they have increasingly shifted the financial risk associated with those responsibilities to the suppliers as well. This trend may continue and is most evident in the area of engineering cost reimbursement. We cannot assure you that we will have adequate funds to make such up-front investments or to recover such costs from our customers as part of our product pricing. In the event that we are unable to make such investments, or to recover them through sales or direct reimbursement from our customers, our profitability, liquidity and cash flows may be adversely affected. In addition, we incur costs and make capital

expenditures for new program awards based upon certain estimates of production volumes and production complexity. While we attempt to recover such costs and capital expenditures by appropriately pricing our products, the prices of our products are based in part upon planned production volumes. If the actual production is significantly less than planned or significantly more complex than anticipated, we may be unable to recover such costs. In addition, because a significant portion of our overall costs is fixed, declines in our customers' production levels can adversely affect the level of our reported profits even if our up-front investments are recovered.

We may not realize all of the intangible assets related to the Aerospace aftermarket businesses. We participate in aftermarket Revenue Sharing Programs ("RSPs") under which we receive an exclusive right to supply designated aftermarket parts over the life of the related aircraft engine program to our customer, General Electric. As consideration, we pay participation fees, which are recorded as intangible assets and are recognized as a reduction of sales over the estimated life of the related engine programs which range up to 30 years. Our total investments in participation fees under our RSPs as of

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December 31, 2016 equaled \$293.7 million, all of which have been paid. At December 31, 2016, the remaining unamortized balance of these participation fees was \$198.0 million.

We entered into Component Repair Programs ("CRPs"), also with General Electric ("GE"), during the fourth quarter of 2013 ("CRP 1"), the second quarter of 2014 ("CRP 2") and the fourth quarter of 2015 ("CRP 3" and, collectively with CRP 1 and CRP 2, the "CRPs"). The CRPs provide for, among other items, the right to sell certain aftermarket component repair services for CFM56, CF6, CF34 and LM engines directly to other customers as one of a few GE licensed suppliers. In addition, the CRPs extend certain existing contracts under which the Company currently provides these services directly to GE.

We agreed to pay \$26.6 million as consideration for the rights related to CRP 1. Of this balance, we paid \$16.6 million in the fourth quarter of 2013, \$9.1 million in the fourth quarter of 2014 and \$0.9 million in the first quarter of 2016. We agreed to pay \$80.0 million as consideration for the rights related to CRP 2. We paid \$41.0 million in the second quarter of 2014, \$20.0 million in the fourth quarter of 2014 and \$19.0 million in the second quarter of 2015. We agreed to pay \$5.2 million as consideration for the rights related to CRP 3. We paid \$2.0 million in the fourth quarter of 2015 and \$3.2 million was paid in December 2016. We recorded the CRP payments as an intangible asset which is recognized as a reduction of sales over the remaining useful life of these engine programs.

The realizability of each asset is dependent upon future revenues related to the programs' aftermarket parts and services and is subject to impairment testing if circumstances indicate that its carrying amount may not be recoverable. The potential exists that actual revenues will not meet expectations due to a change in market conditions, including, for example, the replacement of older engines with new, more fuel-efficient engines or our ability to maintain market share within the aftermarket business. A shortfall in future revenues may result in the failure to realize the net amount of the investments, which could adversely affect our financial condition and results of operations. In addition, profitability could be impacted by the amortization of the participation fees and licenses, and the expiration of the international tax incentives on these programs. See "Part II - Item 7 - Management's Discussion and Analysis of Financial Condition and Results of Operations - Critical Accounting Policies".

We face risks of cost overruns and losses on fixed-price contracts. We sell certain of our products under firm, fixed-price contracts providing for a fixed price for the products regardless of the production or purchase costs incurred by us. The cost of producing products may be adversely affected by increases in the cost of labor, materials, fuel, outside processing, overhead and other factors, including manufacturing inefficiencies. Increased production costs may result in cost overruns and losses on contracts.

The departure of existing management and key personnel, a shortage of skilled employees or a lack of qualified sales professionals could materially affect our business, operations and prospects. Our executive officers are important to the management and direction of our business. Our future success depends, in large part, on our ability to retain or replace these officers and other capable management personnel. Although we believe we will be able to attract and retain talented personnel and replace key personnel should the need arise, our inability to do so could have a material adverse effect on our business, financial condition, results of operations or cash flows. Because of the complex nature of many of our products and services, we are generally dependent on an educated and highly skilled workforce, including, for example, our engineering talent. In addition, there are significant costs associated with the hiring and training of sales professionals. We could be adversely affected by a shortage of available skilled employees or the loss of a significant number of our sales professionals.

If we are unable to protect our intellectual property rights effectively, our financial condition and results of operations could be adversely affected. We own or are licensed under various intellectual property rights, including patents, trademarks and trade secrets. Our intellectual property rights may not be sufficiently broad or otherwise may not provide us a significant competitive advantage, and patents may not be issued for pending or future patent applications

owned by or licensed to us. In addition, the steps that we have taken to maintain and protect our intellectual property may not prevent it from being challenged, invalidated, circumvented or designed-around, particularly in countries where intellectual property rights are not highly developed or protected. In some circumstances, enforcement may not be available to us because an infringer has a dominant intellectual property position or for other business reasons, or countries may require compulsory licensing of our intellectual property. We also rely on nondisclosure and noncompetition agreements with employees, consultants and other parties to protect, in part, confidential information, trade secrets and other proprietary rights. There can be no assurance that these agreements will adequately protect these intangible assets and will not be breached, that we will have adequate remedies for any breach, or that others will not independently develop substantially equivalent proprietary information. Our failure to obtain or maintain intellectual property rights that convey competitive advantage, adequately protect our intellectual property or detect or prevent circumvention or unauthorized use of such property and the cost of enforcing our intellectual property rights could adversely impact our competitive position, financial condition and results of operations.

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Any product liability, warranty, contractual or other claims in excess of insurance may adversely affect our financial condition. Our operations expose us to potential product liability risks that are inherent in the design, manufacture and sale of our products and the products we buy from third parties and sell to our customers, or to potential warranty, contractual or other claims. For example, we may be exposed to potential liability for personal injury, property damage or death as a result of the failure of an aircraft component designed, manufactured or sold by us, or the failure of an aircraft component that has been serviced by us or of the components themselves. While we have liability insurance for certain risks, our insurance may not cover all liabilities. Additionally, insurance coverage may not be available in the future at a cost acceptable to us. Any material liability not covered by insurance or for which third-party indemnification is not available for the full amount of the loss could have a material adverse effect on our financial condition, results of operations and cash flows.

From time to time, we receive product warranty claims, under which we may be required to bear costs of repair or replacement of certain of our products. Warranty claims may range from individual customer claims to full recalls of all products in the field. We vigorously defend ourselves in connection with these matters. We cannot, however, assure you that the costs, charges and liabilities associated with these matters will not be material, or that those costs, charges and liabilities will not exceed any amounts reserved for them in our consolidated financial statements.

Our business, financial condition, results of operations and cash flows could be adversely impacted by strikes or work stoppages. Approximately 16% of our U.S. employees are covered by collective bargaining agreements and more than 37% of our non-U.S. employees are covered by collective bargaining agreements or statutory trade union agreements. The Company has a national collective bargaining agreement (“CBA”) with certain unionized employees at the Bristol, Connecticut and Corry, Pennsylvania facilities of the Associated Spring business unit, covering approximately 250 employees. The current CBA will expire in August 2017, at which time we will negotiate a successor agreement. The local collective bargaining agreement for the Milwaukee, Wisconsin facility of the Associated Spring business unit will expire on June 30, 2017, at which time we will negotiate a successor agreement. In addition, we have annual negotiations in Brazil and Mexico and, collectively, these negotiations cover approximately 300 employees in those two countries. In 2016, we also completed negotiations resulting in wage increases at four locations in our Industrial segment and one location in our Aerospace segment, collectively covering a total of approximately 900 employees.

Although we believe that our relations with our employees are good, we cannot assure you that we will be successful in negotiating new collective bargaining agreements or that such negotiations will not result in significant increases in the cost of labor, including healthcare, pensions or other benefits. Any potential strikes or work stoppages, and the resulting adverse impact on our relationships with customers, could have a material adverse effect on our business, financial condition, results of operations or cash flows. Similarly, a protracted strike or work stoppage at any of our major customers, suppliers or other vendors could materially adversely affect our business.

Changes in taxation requirements could affect our financial results. Our products are subject to import and excise duties and/or sales or value-added taxes in many jurisdictions in which we operate. Increases in indirect taxes could affect our products’ affordability and therefore reduce our sales. We are also subject to income tax in numerous jurisdictions in which we generate revenues. Changes in tax laws, tax rates or tax rulings may have a significant adverse impact on our effective tax rate. Among other things, our tax liabilities are affected by the mix of pretax income or loss among the tax jurisdictions in which we operate and the repatriation of foreign earnings to the U.S. Further, during the ordinary course of business, we are subject to examination by the various tax authorities of the jurisdictions in which we operate which could result in an unanticipated increase in taxes. Potential tax reform discussed by the new U.S. administration, such as reducing the corporate income tax rate or changing the repatriation and taxation of foreign earnings, may impact income tax expenses, deferred tax assets in the U.S. and tax liability balances.

Changes in accounting guidance could affect our financial results. New accounting guidance that may become applicable to us from time to time, or changes in the interpretations of existing guidance, could have a significant effect on our reported results for the affected periods. For example, the Financial Accounting Standards Board issued a new accounting standard for revenue recognition in May 2014 - Accounting Standards Update (ASU) 2014-09, "Revenue from Contracts with Customers (Topic 606)". Although we are currently in the process of evaluating the impact of ASU 2014-09 on our consolidated financial statements, it is expected to change the way we account for certain of our sales transactions and reported backlog. Adoption of the standard could have a material impact on our financial statements and may retroactively affect the accounting treatment of transactions completed before adoption. See "Part II - Item 7 - Management's Discussion and Analysis of Financial Condition and Results of Operations - Other Matters" for additional disclosure related to the Company's planned adoption of Topic 606.

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RISKS RELATED TO THE INDUSTRIES IN WHICH WE OPERATE

We operate in highly competitive markets. We may not be able to compete effectively with our competitors, and competitive pressures could adversely affect our business, financial condition and results of operations. Our two global business segments compete with a number of larger and smaller companies in the markets we serve. Some of our competitors have greater financial, production, research and development, or other resources than we do. Within Aerospace, certain of our OEM customers compete with our repair and overhaul business. Some of our OEM customers in the aerospace industry also compete with us where they have the ability to manufacture the components and assemblies that we supply to them but have chosen, for capacity limitations, cost considerations or other reasons, to outsource the manufacturing to us. Our customers award business based on, among other things, price, quality, reliability of supply, service, technology and design. Our competitors' efforts to grow market share could exert downward pressure on our product pricing and margins. Our competitors may also develop products or services, or methods of delivering those products or services that are superior to our products, services or methods. Our competitors may adapt more quickly than us to new technologies or evolving customer requirements. We cannot assure you that we will be able to compete successfully with our existing or future competitors. Our ability to compete successfully will depend, in part, on our ability to continue make investments to innovate and manufacture the types of products demanded by our customers, and to reduce costs by such means as reducing excess capacity, leveraging global purchasing, improving productivity, eliminating redundancies and increasing production in low-cost countries. We have invested, and expect to continue to invest, in increasing our manufacturing footprint in low-cost countries. We cannot assure you that we will have sufficient resources to continue to make such investments or that we will be successful in maintaining our competitive position. If we are unable to differentiate our products or maintain a low-cost footprint, we may lose market share or be forced to reduce prices, thereby lowering our margins. Any such occurrences could adversely affect our financial condition, results of operations and cash flows.

The industries in which we operate have been experiencing consolidation, both in our suppliers and the customers we serve. Supplier consolidation is in part attributable to OEMs more frequently awarding long-term sole source or preferred supplier contracts to the most capable suppliers in an effort to reduce the total number of suppliers from whom components and systems are purchased. If consolidation of our existing competitors occurs, we would expect the competitive pressures we face to increase, and we cannot assure you that our business, financial condition, results of operations or cash flows will not be adversely impacted as a result of consolidation by our competitors or customers.

Original equipment manufacturers in the aerospace and transportation industries have significant pricing leverage over suppliers and may be able to achieve price reductions over time. Additionally, we may not be successful in our efforts to raise prices on our customers. There is substantial and continuing pressure from OEMs in the transportation industries, including automotive and aerospace, to reduce the prices they pay to suppliers. We attempt to manage such downward pricing pressure, while trying to preserve our business relationships with our customers, by seeking to reduce our production costs through various measures, including purchasing raw materials and components at lower prices and implementing cost-effective process improvements. Our suppliers have periodically resisted, and in the future may resist, pressure to lower their prices and may seek to impose price increases. If we are unable to offset OEM price reductions, our profitability and cash flows could be adversely affected. In addition, OEMs have substantial leverage in setting purchasing and payment terms, including the terms of accelerated payment programs under which payments are made prior to the account due date in return for an early payment discount. OEMs can unexpectedly change their purchasing policies or payment practices, which could have a negative impact on our short-term working capital.

Demand for our defense-related products depends on government spending. A portion of Aerospace's sales is derived from the military market, including single-sourced and dual-sourced sales. The military market is largely dependent upon government budgets and is subject to governmental appropriations. Although multi-year contracts may be

authorized in connection with major procurements, funds are generally appropriated on a fiscal year basis even though a program may be expected to continue for several years. Consequently, programs are often only partially funded and additional funds are committed only as further appropriations are made. We cannot assure you that maintenance of or increases in defense spending will be allocated to programs that would benefit our business. Moreover, we cannot assure you that new military aircraft programs in which we participate will enter full-scale production as expected. A decrease in levels of defense spending or the government's termination of, or failure to fully fund, one or more of the contracts for the programs in which we participate could have a material adverse effect on our financial position and results of operations.

The aerospace industry is highly regulated. Complications related to aerospace regulations may adversely affect the Company. A substantial portion of our income is derived from our aerospace businesses. The aerospace industry is highly regulated in the U.S. by the Federal Aviation Administration, or FAA, and in other countries by similar regulatory agencies. We must be certified by these agencies and, in some cases, by individual OEMs in order to engineer and service systems and components used in specific aircraft models. If material authorizations or approvals were delayed, revoked or suspended, our

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business could be adversely affected. New or more stringent governmental regulations may be adopted, or industry oversight heightened, in the future, and we may incur significant expenses to comply with any new regulations or any heightened industry oversight.

Fluctuations in jet fuel and other energy prices may impact our operating results. Fuel costs constitute a significant portion of operating expenses for companies in the aerospace industry. Fluctuations in fuel costs could impact levels and frequency of aircraft maintenance and overhaul activities, and airlines' decisions on maintaining, deferring or canceling new aircraft purchases, in part based on the value associated with new fuel efficient technologies.

Widespread disruption to oil production, refinery operations and pipeline capacity in certain areas of the U.S. can impact the price of jet fuel significantly. Conflicts in the Middle East, an important source of oil for the U.S. and other countries where we do business, cause prices for fuel to be volatile. Because we and many of our customers are in the aerospace industry, these fluctuations could have a material adverse effect on our financial condition or results of operations.

Our products and services may be rendered obsolete by new products, technologies and processes. Our manufacturing operations focus on highly engineered components which require extensive engineering and research and development time. Our competitive advantage may be adversely impacted if we cannot continue to introduce new products ahead of our competition, or if our products are rendered obsolete by other products or by new, different technologies and processes. The success of our new products will depend on a number of factors, including innovation, customer acceptance, the efficiency of our suppliers in providing materials and component parts, and the performance and quality of our products relative to those of our competitors. We cannot predict the level of market acceptance or the amount of market share our new products will achieve. Additionally, we may face increased or unexpected costs associated with new product introduction including the use of additional resources such as personnel. We cannot assure that we will not experience new product introduction delays in the future.

RISKS RELATED TO RESTRUCTURING, ACQUISITIONS, JOINT VENTURES AND DIVESTITURES

Our restructuring actions could have long-term adverse effects on our business. From time to time, we have implemented restructuring activities across our businesses to adjust our cost structure, and we may engage in similar restructuring activities in the future. We may not achieve expected cost savings from workforce reductions or restructuring activities and actual charges, costs and adjustments due to these actions may vary materially from our estimates. Our ability to realize anticipated cost savings, synergies and revenue enhancements may be affected by a number of factors, including the following: our ability to effectively eliminate duplicative back office overhead and overlapping sales personnel, rationalize manufacturing capacity, synchronize information technology systems, consolidate warehousing and other facilities and shift production to more economical facilities; significant cash and non-cash integration and implementation costs or charges in order to achieve those cost savings, which could offset any such savings and other synergies resulting from our acquisitions or divestitures; and our ability to avoid labor disruption in connection with these activities. In addition, delays in implementing planned restructuring activities or other productivity improvements may diminish the expected operational or financial benefits.

Our acquisition and other strategic initiatives may not be successful. We have made a number of acquisitions in the past, including most recently the acquisition of the FOBOHA business, and we anticipate that we may, from time to time, acquire additional businesses, assets or securities of companies, and enter into joint ventures and other strategic relationships that we believe would provide a strategic fit with our businesses. These activities expose the Company to a number of risks and uncertainties, the occurrence of any of which could materially adversely affect our business, cash flows, financial condition and results of operations. A portion of the industries that we serve are mature industries. As a result, our future growth may depend in part on the successful acquisition and integration of acquired businesses into our existing operations. We may not be able to identify and successfully negotiate suitable acquisitions, obtain financing for future acquisitions on satisfactory terms, obtain regulatory approvals or otherwise

complete acquisitions in the future.

We could have difficulties integrating acquired businesses with our existing operations. Difficulties of integration can include coordinating and consolidating separate systems, integrating the management of the acquired business, retaining market acceptance of acquired products and services, maintaining employee morale and retaining key employees, and implementing our enterprise resource planning systems and operational procedures and disciplines. Any such difficulties may make it more difficult to maintain relationships with employees, customers, business partners and suppliers. In addition, even if integration is successful, the financial performance of acquired business may not be as expected and there can be no assurance we will realize anticipated benefits from our acquisitions. We cannot assure you that we will effectively assimilate the business or product offerings of acquired companies into our business or product offerings or realize anticipated operational synergies. In connection with the integration of acquired operations or the conduct of our overall business strategies, we may periodically restructure our businesses and/or sell assets or portions of our business. Integrating the operations and personnel of acquired

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companies into our existing operations may result in difficulties, significant expense and accounting charges, disrupt our business or divert management's time and attention.

Acquisitions involve numerous other risks, including potential exposure to unknown liabilities of acquired companies and the possible loss of key employees and customers of the acquired business. Certain of the acquisition agreements by which we have acquired businesses require the former owners to indemnify us against certain liabilities related to the business operations before we acquired it. However, the liability of the former owners is limited and certain former owners may be unable to meet their indemnification responsibilities. We cannot assure you that these indemnification provisions will protect us fully or at all, and as a result we may face unexpected liabilities that adversely affect our financial condition. In connection with acquisitions or joint venture investments outside the U.S., we may enter into derivative contracts to purchase foreign currency in order to hedge against the risk of foreign currency fluctuations in connection with such acquisitions or joint venture investments, which subjects us to the risk of foreign currency fluctuations associated with such derivative contracts. Additionally, our final determinations and appraisals of the fair value of assets acquired and liabilities assumed in our acquisitions may vary materially from earlier estimates. We cannot assure you that the fair value of acquired businesses will remain constant.

We continually assess the strategic fit of our existing businesses and may divest or otherwise dispose of businesses that are deemed not to fit with our strategic plan or are not achieving the desired return on investment, and we cannot be certain that our business, operating results and financial condition will not be materially and adversely affected. A successful divestiture depends on various factors, including our ability to effectively transfer liabilities, contracts, facilities and employees to any purchaser, identify and separate the intellectual property to be divested from the intellectual property that we wish to retain, reduce fixed costs previously associated with the divested assets or business, and collect the proceeds from any divestitures. In addition, if customers of the divested business do not receive the same level of service from the new owners, this may adversely affect our other businesses to the extent that these customers also purchase other products offered by us. All of these efforts require varying levels of management resources, which may divert our attention from other business operations. If we do not realize the expected benefits or synergies of any divestiture transaction, our consolidated financial position, results of operations and cash flows could be negatively impacted. In addition, divestitures of businesses involve a number of risks, including significant costs and expenses, the loss of customer relationships, and a decrease in revenues and earnings associated with the divested business. Furthermore, divestitures potentially involve significant post-closing separation activities, which could involve the expenditure of material financial resources and significant employee resources. Any divestiture may result in a dilutive impact to our future earnings if we are unable to offset the dilutive impact from the loss of revenue associated with the divestiture, as well as significant write-offs, including those related to goodwill and other intangible assets, which could have a material adverse effect on our results of operations and financial condition.

Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

Number of Facilities - Owned

Location	Industrial	Aerospace	Other	Total
Manufacturing:				
North America	6	5	0	11
Europe	9	0	0	9

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Asia	1	0	0	1
Central and Latin America	2	0	0	2
	18	5	0	23
Non-Manufacturing:				
North America	0	0	1*	1
Europe	2	0	0	2
	2	0	1	3

* The Company's Corporate office

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Number of Facilities - Leased

Location	Industrial	Aerospace	Other	Total
Manufacturing:				
North America	2	2	0	4
Europe	3	0	0	3
Asia	5	5	0	10
	10	7	0	17
Non-Manufacturing:				
North America	8	2	1**	11
Europe	13	1	0	14
Asia	22	0	0	22
Central and Latin America	4	0	0	4
	47	3	1	51

** Industrial segment headquarters and certain Shared Services groups.

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Item 3. Legal Proceedings

In November 2016, the Company's previously disclosed arbitration with Triumph Actuation Systems - Yakima, LLC ("Triumph") was concluded. The Company was awarded \$9.2 million, plus interest on the judgment of \$1.4 million, which amounts were received on January 3, 2017. The outcome did not have a material impact on the Company's consolidated financial position, liquidity or consolidated results of operations.

In addition, we are subject to litigation from time to time in the ordinary course of business and various other suits, proceedings and claims are pending against us and our subsidiaries. While it is not possible to determine the ultimate disposition of each of these proceedings and whether they will be resolved consistent with our beliefs, we expect that the outcome of such proceedings, individually or in the aggregate, will not have a material adverse effect on our financial condition or results of operations.

Item 4. Mine Safety Disclosures

Not applicable.

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PART II

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

(a) Market Information

The Company's common stock is traded on the New York Stock Exchange under the symbol "B". The following table sets forth, for the periods indicated, the low and high sales intra-day trading price per share, as reported by the New York Stock Exchange, and dividends declared and paid.

	2016		
	Low	High	Dividends
Quarter ended March 31	\$30.07	\$35.81	\$ 0.12
Quarter ended June 30	31.13	37.75	0.13
Quarter ended September 30	32.55	41.86	0.13
Quarter ended December 31	37.88	49.90	0.13

	2015		
	Low	High	Dividends
Quarter ended March 31	\$33.75	\$41.00	\$ 0.12
Quarter ended June 30	38.75	41.74	0.12
Quarter ended September 30	35.33	41.78	0.12
Quarter ended December 31	33.00	39.74	0.12

Stockholders

As of February 14, 2017, there were approximately 3,239 holders of record of the Company's common stock. A significant number of the outstanding shares of common stock which are beneficially owned by individuals or entities are registered in the name of a nominee of The Depository Trust Company, a securities depository for banks and brokerage firms. The Company believes that there are approximately 18,774 beneficial owners of its common stock.

Dividends

Payment of future dividends will depend upon the Company's financial condition, results of operations and other factors deemed relevant by the Company's Board of Directors, as well as any limitations resulting from financial covenants under the Company's credit facilities or debt indentures. See the table above for dividend information for 2016 and 2015.

Securities Authorized for Issuance Under Equity Compensation Plans

For information regarding Securities Authorized for Issuance Under Equity Compensation Plans, see Part III, Item 12 of this Annual Report.

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Performance Graph

A stock performance graph based on cumulative total returns (price change plus reinvested dividends) for \$100 invested in Barnes Group, Inc. ("BGI") on December 31, 2011 is set forth below.

	2011	2012	2013	2014	2015	2016
BGI	\$100.00	\$94.74	\$163.80	\$160.20	\$155.06	\$210.56
S&P 600	\$100.00	\$116.30	\$164.33	\$173.75	\$170.27	\$215.26
Russell 2000	\$100.00	\$116.37	\$161.53	\$169.43	\$161.96	\$196.38

The performance graph does not include a published industry or line-of-business index or peer group of similar issuers because the Company is in multiple lines of business and does not believe a meaningful published index or peer group can be reasonably identified. Accordingly, as permitted by SEC rules, the graph includes the S&P 600 Small Cap Index and the Russell 2000 Index, which are comprised of issuers with generally similar market capitalizations to that of the Company.

(c) Issuer Purchases of Equity Securities

Period	Total Number of Shares (or Units) Purchased	Average Price Paid Per Share (or Unit)	Total Number of Shares (or Units) Purchased as Part of Publicly Announced Plans or Programs	Maximum Number of Shares (or Units) that May Yet Be Purchased Under the Plans or Programs ⁽²⁾
October 1-31, 2016	100	\$ 40.55	—	4,573,798
November 1-30, 2016	124,792	\$ 38.95	124,792	4,449,006
December 1-31, 2016	—	\$ —	—	4,449,006
Total	124,892	⁽¹⁾ \$ 38.95	124,792	

Other than 124,792 shares purchased in the fourth quarter of 2016, which were purchased as part of the Company's 2011 Program (defined below), all acquisitions of equity securities during the fourth quarter of 2016 were the result (1) of the operation of the terms of the Company's stockholder-approved equity compensation plans and the terms of the equity rights granted pursuant to those plans to pay for the related income tax upon issuance of shares. The purchase price of a share of stock used for tax withholding is the market price on the date of issuance.

The program was publicly announced on October 20, 2011 (the "2011 Program") authorizing repurchase of up to 5.0 million shares of common stock. At December 31, 2015, 1.1 million shares of common stock had not been purchased under the 2011 Program. On February 10, 2016, the Board of Directors of the Company increased the number of shares authorized for repurchase under the 2011 Program by 3.9 million shares of common stock (5.0 million authorized, in total). The 2011 Program permits open market purchases, purchases under a Rule 10b5-1 trading plan and privately negotiated transactions.

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Item 6. Selected Financial Data

	2016 ⁽⁵⁾	2015 ⁽⁶⁾	2014	2013 ⁽⁷⁾⁽⁹⁾	2012 ⁽⁸⁾⁽⁹⁾	
Per common share ⁽¹⁾						
Income from continuing operations						
Basic	\$2.50	\$2.21	\$2.20	\$1.34	\$1.46	
Diluted	2.48	2.19	2.16	1.31	1.44	
Net income						
Basic	2.50	2.21	2.16	5.02	1.74	
Diluted	2.48	2.19	2.12	4.92	1.72	
Dividends declared and paid	0.51	0.48	0.45	0.42	0.40	
Stockholders' equity (at year-end)	21.72	20.94	20.40	21.17	14.76	
Stock price (at year-end)	47.42	35.39	37.01	38.31	22.46	
For the year (in thousands)						
Net sales	\$1,230,754	\$1,193,975	\$1,262,006	\$1,091,566	\$928,780	
Operating income	192,178	168,396	179,974	123,201	107,131	
As a percent of net sales	15.6	% 14.1	% 14.3	% 11.3	% 11.5	%
Income from continuing operations	\$135,601	\$121,380	\$120,541	\$72,321	\$79,830	
As a percent of net sales	11.0	% 10.2	% 9.6	% 6.6	% 8.6	%
Net income	\$135,601	\$121,380	\$118,370	\$270,527	\$95,249	
As a percent of net sales	11.0	% 10.2	% 9.4	% 24.8	% 10.3	%
As a percent of average stockholders' equity ⁽²⁾	11.6	% 10.7	% 10.3	% 28.3	% 12.6	%
Depreciation and amortization	\$80,154	\$78,242	\$81,395	\$65,052	\$57,360	
Capital expenditures	47,577	45,982	57,365	57,304	37,787	
Weighted average common shares outstanding – basic	54,191	55,028	54,791	53,860	54,626	
Weighted average common shares outstanding – diluted	54,631	55,513	55,723	54,973	55,224	
Year-end financial position (in thousands)						
Working capital	\$306,609	\$359,038	\$323,306	\$276,878	\$418,645	
Goodwill	633,436	587,992	594,949	649,697	579,905	
Other intangible assets, net	522,258	528,322	554,694	534,293	383,972	
Property, plant and equipment, net	334,489	308,856	299,435	302,558	233,097	
Total assets	2,137,539	2,061,866	2,073,885	2,123,673	1,868,596	
Long-term debt and notes payable	500,954	509,906	504,734	547,424	646,613	
Stockholders' equity	1,168,358	1,127,753	1,111,793	1,141,414	800,118	
Debt as a percent of total capitalization ⁽³⁾	30.0	% 31.1	% 31.2	% 32.4	% 44.7	%
Statistics						
Employees at year-end ⁽⁴⁾	5,036	4,735	4,515	4,331	3,795	

Income from continuing operations and net income per common share are based on the weighted average common (1) shares outstanding during each year. Stockholders' equity per common share is calculated based on actual common shares outstanding at the end of each year.

(2) Average stockholders' equity is calculated based on the month-end stockholders equity balances between December 31, 2015 and December 31, 2016 (13-month average).

(3) Debt includes all interest-bearing debt and total capitalization includes interest-bearing debt and stockholders' equity.

(4) The number of employees at each year-end includes employees of continuing operations and excludes prior employees of discontinued operations.

(5) During 2016, the Company completed the acquisition of FOBOHA. The results of FOBOHA, from the acquisition on August 31, 2016, have been included within the Company's Consolidated Financial Statements for the period

ended December 31, 2016.

During 2015, the Company completed the acquisitions of Thermoplay and Priamus. The results of Thermoplay and (6) Priamus, from their acquisitions on August 7, 2015 and October 1, 2015, respectively, have been included within the Company's Consolidated Financial Statements for the period ended December 31, 2015.

During 2013, the Company completed the acquisition of the Männer Business. The results of the Männer Business, (7) from the acquisition on October 31, 2013, have been included within the Company's Consolidated Financial Statements for the period ended December 31, 2013.

During 2012, the Company completed the acquisition of Synventive. The results of Synventive, from the (8) acquisition on August 27, 2012, have been included within the Company's Consolidated Financial Statements for the period ended December 31, 2012.

During 2013, the Company sold the BDNA business within the segment formerly referred to as Distribution. The (9) results of the BDNA business, including any (loss) gain on the sale of business, have been reported through discontinued operations during the respective periods.

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

You should read the following discussion in conjunction with our consolidated financial statements and related notes in this Annual Report on Form 10-K. In addition to historical information, this discussion contains forward-looking statements that involve risks, uncertainties, and assumptions that could cause actual results to differ materially from our expectations. Factors that could cause such differences include those described in the section titled "Risk Factors" and elsewhere in this report. We undertake no obligation to update any of the forward-looking statements.

OVERVIEW

2016 Highlights

Barnes Group Inc. (the "Company") achieved sales of \$1,230.8 million in 2016, an increase of \$36.8 million, or 3.1%, from 2015. Acquired businesses contributed incremental sales of \$47.4 million during 2016. Organic sales (net sales excluding both foreign currency and acquisition impacts) decreased by \$1.1 million, or 0.1%, with an increase of 0.5% and a decrease of 1.3% within the Industrial and Aerospace segments, respectively. Sales in the Industrial segment were impacted by changes in foreign currency which decreased sales by approximately \$9.6 million as the U.S. dollar strengthened against foreign currencies.

Operating income increased 14.1% from \$168.4 million in 2015 to \$192.2 million in 2016 and operating margin increased from 14.1% in 2015 to 15.6% in 2016. Operating income was impacted by improved productivity within Industrial and the profit contributions of the incremental sales generated at our recently acquired businesses, partially offset by unfavorable pricing within both segments. Operating income during 2016 and 2015 included \$2.3 million and \$2.6 million of short-term purchase accounting adjustments, respectively, related to recent business acquisitions. Operating income in 2015 included a \$9.9 million lump-sum pension settlement charge and \$4.2 million of charges related to certain workforce reductions and restructuring charges.

The Company focused on profitable sales growth both organically and through acquisition, in addition to productivity improvements, as key strategic objectives in 2016. Management continued its focus on cash flow and working capital management in 2016 and generated \$217.6 million in cash flow from operations.

Business Transformation

Acquisitions and strategic relationships with our customers have been a key growth driver for the Company, and we continue to seek alliances which foster long-term business relationships. These acquisitions have allowed us to extend into new or adjacent markets, expand our geographic reach, and commercialize new products, processes and services. The Company continually evaluates its business portfolio to optimize product offerings and maximize value. We have significantly transformed our business following our entrance into the plastic injection molding market.

In the third quarter of 2016, the Company, through three of its subsidiaries (collectively, the "Purchaser"), completed its acquisition of the molds business of Adval Tech Holding AG and Adval Tech Holdings (Asia) Pte. Ltd. ("FOBOHA"). FOBOHA is headquartered in Haslach, Germany and operates out of three manufacturing facilities located in Germany, Switzerland and China. The Company completed its purchase of the Germany and Switzerland businesses on August 31, 2016. The purchase of the China business required government approval which was granted on September 30, 2016. FOBOHA specializes in the development and manufacture of complex plastic injection molds for packaging, medical, consumer and automotive applications. The Company acquired FOBOHA for an aggregate cash purchase price of CHF 136.3 million (\$138.6 million) which was financed using cash on hand and borrowings under the Company's revolving credit facility. The purchase price includes preliminary adjustments under the terms of the Share Purchase Agreement ("SPA"), including approximately CHF 11.3 million (\$11.5 million) related to cash

acquired, and is subject to post closing adjustments under the terms of the SPA. In connection with the acquisition, the Company recorded \$39.8 million of intangible assets and \$73.7 million of goodwill. See Note 2 and Note 5 to the Consolidated Financial Statements.

In the fourth quarter of 2015, the Company, itself and through two of its subsidiaries, completed the acquisition of privately held Priamus System Technologies AG and two of its subsidiaries (collectively, "Priamus") from Growth Finance AG. Priamus, which has approximately 40 employees, is headquartered in Schaffhausen, Switzerland and has direct sales and service offices in the U.S. and Germany. Priamus is a technology leader in the development of advanced process control systems for the plastic injection molding industry and services many of the world's highest quality plastic injection molders in the medical, automotive, consumer goods, electronics and packaging markets. Priamus has been integrated into our Industrial

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segment. The Company acquired Priamus for an aggregate cash purchase price of CHF 9.9 million (\$10.1 million) which was financed using cash on hand and borrowings under the Company's revolving credit facility. The purchase price includes adjustments under the terms of the Share Purchase Agreement, including CHF 1.6 million (\$1.6 million) related to cash acquired. See Note 2 of the Consolidated Financial Statements.

In the third quarter of 2015, the Company, through one of its subsidiaries, completed the acquisition of the Thermoplay business ("Thermoplay") by acquiring all of the capital stock of privately held HPE S.p.A., the parent company through which Thermoplay operates ("HPE"). Thermoplay's headquarters and manufacturing facility are located in Pont-Saint-Martin in Aosta, Italy, with technical service capabilities in China, India, France, Germany, United Kingdom, Portugal, and Brazil. Thermoplay, which has been integrated into our Industrial segment, specializes in the design, development, and manufacturing of hot runner solutions for plastic injection molding, primarily in the packaging, automotive, and medical end markets. The Company acquired Thermoplay for an aggregate cash purchase price of €58.1 million (\$63.7 million), pursuant to the terms of the Sale and Purchase Agreement ("SPA"), which was financed using cash on hand and borrowings under the Company's revolving credit facility. The purchase price includes adjustments under the terms of the SPA, including €17.1 million (\$18.7 million) related to cash acquired. See Note 2 of the Consolidated Financial Statements.

Management Objectives

Management focused on three key strategic enablers during 2016: deployment of the Barnes Enterprise System, accelerating innovation and maturing the talent management system, which, in combination, are expected to generate long-term value for the Company's stockholders and our customers. The Company's strategies for growth include both organic growth from new products, processes, systems, services, markets and customers, and growth from acquisitions. The Company's strategies for profitability include employee engagement and empowerment to drive productivity and process initiatives, such as the application of new technologies, automation and innovation, intensified focus on intellectual property as a core differentiator. A key component of the Company's culture is the Barnes Enterprise System (BES), the Company's operating system, which drives alignment and fosters continuous improvement, collaboration and innovation throughout the global organization.

Our Business

The Company consists of two operating segments: Industrial and Aerospace.

Key Performance Indicators

Management evaluates the performance of its reportable segments based on the sales, operating profit, operating margins and cash generation of the respective businesses, which includes net sales, cost of sales, selling and administrative expenses and certain components of other income and other expenses, as well as the allocation of corporate overhead expenses. Each segment has standard key performance indicators ("KPIs"), a number of which are focused on customer metrics (on-time-delivery and quality), internal effectiveness and productivity/efficiency metrics (sales effectiveness, global sourcing, operational excellence, functional excellence, sales per employee, cost of quality, and days working capital), employee safety-related metrics (total recordable incident rate and lost time incident rate), and specific KPIs on profitable growth.

Key Industry Data

In both segments, management tracks a variety of economic and industry data as indicators of the health of a particular sector.

At Industrial, key data for the manufacturing operations include the Institute for Supply Management's manufacturing PMI Composite Index (and similar indices for European and Asian-based businesses); the Federal Reserve's Industrial Production Index ("the IPI"); the Global Insight global medical and measuring equipment index; the production of light vehicles, both in the U.S. and globally; worldwide light vehicle new model introductions and existing model refreshes; North American medium and heavy duty vehicle production; and global GDP growth forecasts.

At Aerospace, management of the aftermarket business monitors the number of aircraft in the active fleet, the number of planes temporarily or permanently taken out of service, aircraft utilization rates for the major airlines, engine shop visits, airline profitability, aircraft fuel costs and traffic growth. The Aerospace OEM business regularly tracks orders and deliveries for each of the major aircraft manufacturers, as well as engine purchases made for new aircraft. Management also monitors annual appropriations for the U.S. military related to purchases of new or used aircraft and engine components.

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RESULTS OF OPERATIONS

Sales

(\$ in millions)	2016	2015	\$ Change	% Change	2014
Industrial	\$824.2	\$782.3	\$ 41.9	5.4 %	\$822.1
Aerospace	406.5	411.7	(5.2)	(1.3)%	440.0
Total	\$1,230.8	\$1,194.0	\$ 36.8	3.1 %	\$1,262.0

2016 vs. 2015:

The Company reported net sales of \$1,230.8 million in 2016, an increase of \$36.8 million, or 3.1%, from 2015. Acquired businesses contributed incremental sales of \$47.4 million during the 2016 period. Organic sales within Industrial increased by \$4.1 million, or 0.5%, during 2016, primarily due to strength in our Molding Solutions businesses, slightly offset by continued softness in North American general industrial end-markets. Aerospace recorded sales of \$406.5 million in 2016, a \$5.2 million, or 1.3% decrease from 2015. Lower sales within the OEM and spare parts businesses were partially offset by increased sales within the MRO business. The impact of foreign currency translation decreased sales within Industrial by approximately \$9.6 million as the U.S. dollar strengthened against foreign currencies. Sales within Aerospace were not impacted by changes in foreign currency as these are largely denominated in U.S. dollars. The Company's international sales increased 10.4% year-over-year, while domestic sales decreased 4.7%, largely a result Aerospace sales being primarily U.S.-based. Excluding the impact of foreign currency translation on sales, however, the Company's international sales in 2016 increased 12.0%, inclusive of sales through acquisition, from 2015.

2015 vs. 2014:

The Company reported net sales of \$1,194.0 million in 2015, a decrease of \$68.0 million, or 5.4%, from 2014. The acquisitions of Thermoplay on August 7, 2015 and Priamus on October 1, 2015 provided sales of \$13.6 million and \$2.0 million, respectively, during the 2015 period. Organic sales within Industrial increased by \$13.5 million, or 1.6%, during 2015, primarily due to favorable end-markets served by our tool and die and plastics businesses during the first half of 2015. A softening within our transportation and general industrial end-markets during the second half of 2015 tempered a substantial portion of the organic growth in the first half of the year. Aerospace recorded sales of \$411.7 million in 2015, a \$28.3 million, or 6.4% decrease from 2014. Lower sales within the OEM and MRO businesses were partially offset by increased sales within the spare parts business. The spare parts business benefited from increased demand as a result of higher aircraft utilization and customer restocking of inventory, whereas the MRO business continued to be impacted by deferred maintenance on certain platforms. The timing of customer deliveries and execution, which was partially impacted by new product introduction challenges, in addition to the impact of a contract termination dispute, directly impacted lower sales within the OEM business during the second half of 2015. The impact of foreign currency translation decreased sales within Industrial by approximately \$68.8 million as the U.S. dollar strengthened against foreign currencies. Sales within Aerospace were not impacted by changes in foreign currency as these are largely denominated in U.S. dollars. The Company's international sales decreased 2.4% year-over-year, while domestic sales decreased 4.7%. Excluding the impact of foreign currency translation on sales, however, the Company's international sales in 2015 increased 7.8%, inclusive of sales through acquisition, from 2014.

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Expenses and Operating Income

(\$ in millions)	2016	2015	\$ Change	% Change	2014
Cost of sales	\$790.3	\$782.8	\$ 7.5	1.0	% \$829.6
% sales	64.2	% 65.6	%		65.7 %
Gross profit ⁽¹⁾	\$440.5	\$411.2	\$ 29.3	7.1	% \$432.4
% sales	35.8	% 34.4	%		34.3 %
Selling and administrative expenses	\$248.3	\$242.8	\$ 5.5	2.3	% \$252.4
% sales	20.2	% 20.3	%		20.0 %
Operating income	\$192.2	\$168.4	\$ 23.8	14.1	% \$180.0
% sales	15.6	% 14.1	%		14.3 %

(1) Sales less cost of sales

2016 vs. 2015:

Cost of sales in 2016 increased 1.0% from 2015, while gross profit margin increased from 34.4% in 2015 to 35.8% in 2016. Gross margins improved at Industrial and decreased at Aerospace. Gross margin during the comparable 2015 period included a charge of \$6.4 million related to a lump-sum pension settlement charge (see Note 11 of the Consolidated Financial Statements). At Industrial, gross profit increased during 2016 primarily as a result of favorable productivity and strength within the Molding Solutions businesses. Gross profit during 2016 was negatively impacted by \$2.3 million of short-term purchase accounting adjustments related to the acquisition of FOBOHA, whereas the 2015 period included \$0.9 million of short-term purchase accounting adjustments related to the acquisition of the Männer business and \$0.9 million of short-term purchase accounting adjustments related to the acquisition of Thermoplay. Within Aerospace, a decline in gross profit relates primarily to lower sales volumes and unfavorable productivity. Selling and administrative expenses in 2016 increased 2.3% from the 2015 period, due in part to \$3.0 million of costs related to the contract termination dispute within the Aerospace segment and the incremental operations of the acquired businesses, partially offset by an \$0.8 million reduction in short-term purchase accounting adjustments related to acquisitions. During the 2015 period, selling and administrative expenses included \$4.2 million of charges related to workforce reductions and severance, and \$3.5 million of lump-sum pension settlement charges. Short-term purchase accounting adjustments that impact selling and administrative expenses during 2015 included \$0.6 million and \$0.3 million related to the acquisitions of Männer and Thermoplay, respectively. As a percentage of sales, selling and administrative costs decreased slightly from 20.3% in the 2015 period to 20.2% in the 2016 period. Operating income in the 2016 period increased 14.1% to \$192.2 million from 2015 and operating income margin increased from 14.1% to 15.6%.

2015 vs. 2014:

Cost of sales in 2015 decreased 5.6% from 2014, while gross profit margin increased slightly from 34.3% in 2014 to 34.4% in 2015. Gross margins remained flat at Industrial and improved slightly at Aerospace, however a higher percentage of sales were driven by the Industrial segment in 2015. The gross profit decrease during 2015 includes a charge of \$6.4 million related to a lump-sum pension settlement (see Note 11 of the Consolidated Financial Statements). At Industrial, gross profit during 2014 was partially offset by \$4.5 million of short-term purchase accounting adjustments related to the acquisition of the Männer business and restructuring charges of \$5.4 million related to the closure of the Saline facility, which was completed in 2014. During 2015, short term purchase accounting adjustments of \$0.9 million and \$0.9 million were related to the acquisitions of the Männer business and Thermoplay, respectively. Within Aerospace, gross profit declined as a result lower sales within OEM, partially offset by increased profits within the spare parts business, and a \$2.8 million charge related to a contract termination dispute following a customer decision to re-source. Selling and administrative expenses decreased 3.8% from 2014 due

primarily to foreign exchange translation and a \$3.4 million reduction in the short-term purchase accounting adjustments related to the acquisition of the Männer business. Lower employee related expenses, primarily from incentive compensation, reduced selling and administrative expenses during the 2015 period. The 2014 period also included \$0.6 million of charges related to the closure of the Saline facility. These expense reductions during 2015 were partially offset by \$4.2 million of charges related to workforce reductions and severance, \$3.5 million of lump-sum pension settlement charges and \$0.3 million of short-term purchase accounting adjustments related to the acquisition of Thermoplay. As a percentage of sales, selling and administrative costs increased from 20.0% in 2014 to 20.3% in 2015. Operating margin was 14.1% in 2015 compared to 14.3% in 2014.

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Interest expense

2016 vs. 2015:

Interest expense in 2016 increased \$1.2 million to \$11.9 million from 2015, primarily as a result of higher average interest rates.

2015 vs. 2014:

Interest expense in 2015 decreased \$0.7 million to \$10.7 million from 2014, primarily as a result of lower average borrowings, partially offset by higher average borrowing rates resulting from the 3.97% Senior Notes that were issued under the Note Purchase Agreement executed on October 15, 2014. See Liquidity and Capital Resources within Item 7.

Other expense (income), net

2016 vs. 2015:

Other expense (income), net in 2016 was \$(2.3) million compared to \$(0.2) million in 2015. Foreign currency gains of \$1.9 million in the 2016 period compared with gains of \$0.5 million in the 2015 period. Interest income of \$2.3 million in 2016 compared with interest income of \$1.0 million during 2015, with the increase being primarily attributed to the \$1.4 million of interest income resulting from the Triumph arbitration award. See Note 20 of the Consolidated Financial Statements.

2015 vs. 2014:

Other expense (income), net in 2015 was \$(0.2) million compared to \$2.1 million in 2014. Foreign currency gains of \$0.5 million in the 2015 period compared with foreign currency losses of \$1.5 million in the 2014 period.

Income Taxes

2016 vs. 2015:

The Company's effective tax rate from continuing operations was 25.7% in 2016 compared with 23.2% in 2015. The increase in the 2016 effective tax rate from continuing operations is primarily due to the expiration of certain tax holidays, the absence of the 2015 refund of withholding taxes and the change in the mix of earnings attributable to higher-taxing jurisdictions, partially offset by lower repatriation of a portion of current year foreign earnings to the U.S and the excess tax benefit on stock awards, reflecting the amended guidance related to share-based payments made to employees. See Note 21 of the Consolidated Financial Statements. During 2016, the Company repatriated a dividend from a portion of the current year foreign earnings to the U.S. in the amount of \$8.3 million compared to \$19.5 million in 2015. The decrease in the dividend decreased tax expense by \$3.9 million and decreased the annual effective tax rate by 2.2 percentage points compared to 2015.

In 2017, the Company expects the effective tax rate from continuing operations to increase to between 27% and 28% primarily due to the absence of any excess tax benefit on stock awards and the expiration of certain foreign tax holidays.

2015 vs. 2014:

The Company's effective tax rate from continuing operations was 23.2% in 2015 compared with 27.6% in 2014. The decrease in 2015 is primarily due to a tax refund of withholding taxes, the granting of an extended tax holiday in China as well as a change in the mix of earnings in lower tax jurisdictions offset by an increase in the repatriation of a portion of current year foreign earnings to the U.S. During 2015, the Company repatriated a dividend from a portion of the current year foreign earnings to the U.S. in the amount of \$19.5 million compared to \$12.5 million in 2014. The increase in the dividend increased tax expense by \$2.4 million and increased the annual effective tax rate by 1.5 percentage points compared to 2014.

See Note 13 of the Consolidated Financial Statements for a reconciliation of the U.S. federal statutory income tax rate to the consolidated effective income tax rate.

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Income and Income Per Share

(in millions, except per share)

	2016	2015	Change	% Change	2014
Income from continuing operations	\$135.6	\$121.4	\$14.2	11.7 %	\$120.5
Loss from discontinued operations, net of income taxes	—	—	—		(2.2)
Net income	\$135.6	\$121.4	\$14.2	11.7 %	\$118.4
Per common share:					
Basic:					
Income from continuing operations	\$2.50	\$2.21	\$0.29	13.1 %	\$2.20
Loss from discontinued operations, net of income taxes	—	—	—		(0.04)
Net income	\$2.50	\$2.21	\$0.29	13.1 %	\$2.16
Diluted:					
Income from continuing operations	\$2.48	\$2.19	\$0.29	13.2 %	\$2.16
Loss from discontinued operations, net of income taxes	—	—	—		(0.04)
Net income	\$2.48	\$2.19	\$0.29	13.2 %	\$2.12
Weighted average common shares outstanding:					
Basic	54.2	55.0	(0.8)	(1.5)%	54.8
Diluted	54.6	55.5	(0.9)	(1.6)%	55.7

Basic and diluted income from continuing operations per common share increased for 2016 as compared to 2015, consistent with the changes in income from continuing operations year over year. Basic and diluted weighted average common shares outstanding decreased due to the repurchase of 1,352,596 and 550,994 shares during 2015 and 2016, respectively, as part of the Company's repurchase program. The impact of the repurchased shares was partially offset by the issuance of shares for employee stock plans.

Financial Performance by Business Segment

Industrial

(\$ in millions)	2016	2015	\$ Change	% Change	2014
Sales	\$824.2	\$782.3	\$ 41.9	5.4 %	\$822.1
Operating profit	129.7	103.0	26.7	26.0 %	108.4
Operating margin	15.7 %	13.2 %			13.2 %

2016 vs. 2015:

Sales at Industrial were \$824.2 million in 2016, an increase of \$41.9 million, or 5.4%, from 2015. Acquired businesses contributed incremental sales of \$47.4 million during the 2016 period. Organic sales increased by \$4.1 million, or 0.5%, during 2016, driven primarily by strength in our Molding Solutions businesses, slightly offset by continued softness in North American general industrial end-markets. The impact of foreign currency translation decreased sales by approximately \$9.6 million as the U.S. dollar strengthened against foreign currencies.

Operating profit in 2016 at Industrial was \$129.7 million, an increase of 26.0% from 2015. The increase was driven by favorable productivity, as the Company continued its focus on manufacturing efficiencies and improved supply chain management across multiple units, and the profit contributions of acquired businesses, partially offset by lower pricing. The 2015 period included \$3.6 million of short-term purchase accounting adjustments and transaction costs related to business acquisitions, whereas the acquisition of FOBOHA during the 2016 period resulted in \$3.5 million of such costs. The 2015 period also included lump-sum pension settlement charges of \$7.5 million that were allocated to the segment and \$3.4 million of charges related to certain workforce reductions and restructuring.

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Outlook:

In Industrial, management is focused on generating organic sales growth through the introduction of new products and by leveraging the benefits of the diversified products and industrial end-markets in which its businesses have a global presence. Our ability to generate sales growth is subject to economic conditions in the global markets served by all of our businesses. For general industrial end-markets, manufacturing Purchasing Managers Indexes ("PMIs") above 50 in North America and Europe are positive signs. China, although relatively stable during the first half of 2016, demonstrated strength during the second half of the year. Within China, we have seen a strengthening in orders that began during the second quarter and continued throughout the remainder of 2016, indicating strength within the transportation markets. Global forecasted production for light vehicles is expected to grow nominally in 2017, however production is expected to remain stable within the markets in which the Company operates. Within our Molding Solution businesses, North American and European markets remain healthy, while demand in Asia is more modest. For the Molding Solutions businesses in 2017, we anticipate favorable demand trends to continue within the medical and personal care hot runner markets and the packaging and medical mold markets. As noted above, our sales were negatively impacted by fluctuations in foreign currencies during 2016 of \$9.6 million. To the extent that the U.S. dollar remains strong as compared with the other foreign currencies, our sales may continue to be unfavorably impacted by foreign currency relative to the prior year periods. The relative impact on operating profit is not expected to be as significant as the impact on sales as most of our businesses have expenses primarily denominated in local currencies, where their revenues reside. The Company also remains focused on sales growth through acquisition and expanding geographic reach. Strategic investments in new technologies, manufacturing processes and product development are expected to provide incremental benefits over the long term.

Operating profit is largely dependent on the sales volumes and mix of the businesses in the segment. Management continues to focus on improving profitability and expanding margins through leveraging organic sales growth, acquisitions, pricing initiatives, global sourcing and productivity. Workforce reductions and facility consolidations initiated in 2015, combined with other productivity initiatives during 2016, contributed favorably throughout the year. We continue to evaluate market conditions and remain proactive in managing costs. Costs associated with new product and process introductions, productivity or restructuring initiatives, strategic investments and the integration of acquisitions may negatively impact operating profit.

2015 vs. 2014:

Sales at Industrial were \$782.3 million in 2015, a decrease of \$39.8 million or 4.8% from 2014. The acquisitions of Thermoplay on August 7, 2015 and Priamus on October 1, 2015 provided sales of \$13.6 million and \$2.0 million, respectively, during the 2015 period. Organic sales increased by \$13.5 million, or 1.6%, during 2015, primarily due to favorable end-markets served by our tool and die and plastics businesses during the first half of 2015. A softening within our transportation and general industrial end-markets during the second half of 2015 tempered a substantial portion of organic growth in the first half. The impact of foreign currency translation decreased sales by approximately \$68.8 million as the U.S. dollar strengthened against foreign currencies.

Operating profit in 2015 at Industrial was \$103.0 million, a decrease of 5.0% from 2014. Operating profit benefited primarily from the profit contribution of increased organic sales within our end markets during the first half of 2015, more than offset by lower productivity and the unfavorable impact of foreign exchange during the full year. The 2015 period also included lump-sum pension settlement charges of \$7.5 million that were allocated to the segment, short-term purchase adjustments and transaction costs resulting from the acquisitions of Thermoplay and Priamus of \$1.9 million and \$0.2 million, respectively, and \$3.4 million of charges related to certain workforce reductions and restructuring. Lower sales volumes during the second half of 2015 tapered the benefit of growth in organic sales during the first half of the year. The 2014 period included \$8.5 million of short-term purchase accounting adjustments related to the acquisition of the Männer Business, whereas the 2015 period included \$1.5 million of such adjustments.

The 2014 period also included \$6.0 million of pre-tax restructuring charges related to the closure of production operations at the facility in Saline, Michigan.

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Aerospace

(\$ in millions)	2016	2015	\$ Change	% Change	2014
Sales	\$406.5	\$411.7	\$ (5.2)	(1.3)%	\$440.0
Operating profit	62.5	65.4	(2.9)	(4.5)%	71.6
Operating margin	15.4 %	15.9 %			16.3 %

2016 vs. 2015:

Aerospace recorded sales of \$406.5 million in 2016, a 1.3% decrease from 2015. Lower sales within the original equipment manufacturing ("OEM") and spare parts businesses were partially offset by increased sales within the aftermarket maintenance repair and overhaul ("MRO") business. During the 2016 period, the segment continued to transition from the manufacture of components on legacy engine platforms to newer, more technologically advanced platforms. Lower volumes on the GE90 engine platform, as well as on other mature engine platforms, were partially offset by increased volume generated by newer programs within the OEM business. A decline in aftermarket spare parts was partially offset by a volume increase in the MRO business. Customer inventory management resulted in lower volumes within the spare parts business. Sales within the MRO business, although soft during the first half of the year, improved during the second half of 2016 as we obtained additional sales volume from existing customers. This business, however, continues to be impacted by airlines continuing to closely manage their aftermarket costs and as engine performance and quality has improved. Sales were not impacted by changes in foreign currency as sales within the segment are largely denominated in U.S. dollars.

Operating profit at Aerospace decreased 4.5% from 2015 to \$62.5 million. The operating profit decrease was primarily due to pricing deflation, the profit impact of lower volumes within the highly profitable spare parts business and unfavorable productivity, primarily a result of the transition from legacy engine platforms to newer, more advanced programs. Operating profit included a \$1.4 million benefit from the contract termination arbitration award. Charges related to the contract termination dispute approximated \$3.0 million and \$2.8 million during the 2016 and 2015 periods, respectively. Operating profit in 2015 also included a lump-sum pension settlement charge of \$2.4 million that was allocated to the segment and \$0.8 million in workforce reduction and restructuring charges.

Outlook:

Sales in the Aerospace OEM business are based on the general state of the aerospace market driven by the worldwide economy and are supported by its order backlog through participation in certain strategic commercial and military engine and airframe programs. Over the next several years, the Company expects strength in demand for new engines, driven by an expected increase in commercial aircraft production levels. The Company sees 2016 as having been a transition year for the Aerospace OEM business as it moves from declining production on some of its legacy engine programs onto the ramping of several new engine programs. Backlog at OEM was \$626.3 million at December 31, 2016, an increase of 11.1% since December 31, 2015, at which time backlog was \$563.9 million. Approximately 50% of OEM backlog is expected to ship in the next 12 months. The Aerospace OEM business may be impacted by changes in the content levels on certain platforms, changes in customer sourcing decisions, adjustments to customer inventory levels, commodity availability and pricing, changes in production schedules of specific engine and airframe programs, redesign of parts, quantity of parts per engine, cost schedules agreed to under contract with the engine manufacturers, as well as the pursuit and duration of new programs. Sales in the Aerospace aftermarket business may be impacted by fluctuations in end-market demand, inventory management and changes in customer sourcing, deferred or limited maintenance activity during engine shop visits and the use of surplus (used) material during the engine repair and overhaul process. End markets are expected to grow based on the long term underlying fundamentals of the aerospace industry. Management continues to believe its Aerospace aftermarket business is

competitively positioned based on well-established long-term customer relationships, including maintenance and repair contracts in the MRO business and long-term Revenue Sharing Programs ("RSPs") and Component Repair Programs ("CRPs"), expanded capabilities and current capacity levels. Fluctuations in fuel costs and their impact on airline profitability and behaviors within the aerospace industry could impact levels and frequency of aircraft maintenance and overhaul activities, and airlines' decisions on maintaining, deferring or canceling new aircraft purchases, in part based on the value associated with new fuel efficient technologies.

Management is focused on growing operating profit at Aerospace primarily through leveraging organic sales growth, strategic investments, new product and process introductions, and productivity. Operating profit is expected to be affected by the impact of changes in sales volume, mix and pricing, particularly as they relate to the highly profitable aftermarket RSP

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spare parts business, and investments made in each of its businesses. During 2015, the Company responded to the challenging economic environment affecting certain of our Aerospace businesses. Workforce reductions and restructure charges were recorded following reduced aftermarket volumes and the impact of a customer's in-sourcing decision. Taking these actions supported our productivity initiatives and have begun to favorably impact segment results during 2016. Costs associated with new product and process introductions, the initial physical transfer of work to lower cost manufacturing regions, additional productivity initiatives and restructuring activities may also negatively impact operating profit.

2015 vs. 2014:

Aerospace recorded sales of \$411.7 million in 2015, a 6.4% decrease from 2014. Lower sales within the OEM and MRO businesses were partially offset by increased sales within the spare parts business. The spare parts business benefited from increased demand as a result of higher aircraft utilization and customer restocking of inventory, whereas the MRO business continued to be impacted by deferred maintenance on certain platforms. The timing of customer deliveries and execution, which was partially impacted by new product introduction challenges, in addition to the impact of a contract termination dispute, directly impacted lower sales within the OEM business during the second half of 2015. Sales were not impacted by changes in foreign currency as sales within the segment are largely denominated in U.S. dollars.

Operating profit at Aerospace decreased 8.6% from 2014 to \$65.4 million. The operating profit decrease was primarily due to the profit impact of lower sales within the OEM and MRO businesses, lump-sum pension settlement charges of \$2.4 million that were allocated to the segment, \$0.8 million in workforce reduction and restructuring charges, a \$2.8 million charge that resulted from a contract termination dispute following a customer decision to re-source work and lower productivity. Partially offsetting these items were the higher profit impact of increased sales within the spare parts business and lower employee related costs, primarily incentive compensation, partially offset by higher pension costs.

LIQUIDITY AND CAPITAL RESOURCES

Management assesses the Company's liquidity in terms of its overall ability to generate cash to fund its operating and investing activities. Of particular importance in the management of liquidity are cash flows generated from operating activities, capital expenditure levels, dividends, capital stock transactions, effective utilization of surplus cash positions overseas and adequate lines of credit.

The Company's ability to generate cash from operations in excess of its internal operating needs is one of its financial strengths. Management continues to focus on cash flow and working capital management, and anticipates that operating activities in 2017 will generate sufficient cash to fund operations. The Company closely monitors its cash generation, usage and preservation including the management of working capital to generate cash.

On October 15, 2014, the Company entered into a Note Purchase Agreement (“Note Purchase Agreement”), among the Company and New York Life Insurance Company, New York Life Insurance and Annuity Corporation and New York Life Insurance and Annuity Corporation Institutionally Owned Life Insurance Separate Account (BOLI 30C), as purchasers, for the issuance of \$100.0 million aggregate principal amount of 3.97% senior notes due October 17, 2024 (the “3.97% Senior Notes”). The Company completed funding of the transaction and issued the 3.97% Senior Notes on October 17, 2014. The 3.97% Senior Notes are senior unsecured obligations of the Company and pays interest semi-annually on April 17 and October 17 of each year at an annual rate of 3.97%. The 3.97% Senior Notes will mature on October 17, 2024 unless earlier prepaid in accordance with their terms. Subject to certain conditions, the Company may, at its option, prepay all or any part of the 3.97% Senior Notes in an amount equal to 100% of the principal amount of the 3.97% Senior Notes so prepaid, plus any accrued and unpaid interest to the date of

prepayment, plus the Make-Whole Amount, as defined in the Note Purchase Agreement, with respect to such principal amount being prepaid. The Note Purchase Agreement contains customary affirmative and negative covenants that are similar to the covenants required under the Amended Credit Agreement, as discussed below. At December 31, 2016, the Company was in compliance with all covenants under the Note Purchase Agreement.

During the second quarter of 2014, the 3.375% Convertible Notes (the "3.375% Notes") were eligible for conversion due to meeting their conversion price eligibility requirement. On June 16, 2014, \$0.2 million of the 3.375% Notes (par value) were surrendered for conversion. On June 24, 2014, the Company exercised its right to redeem the remaining \$55.4 million principal amount of the 3.375% Notes, effective July 31, 2014. The Company elected to pay cash to holders of the 3.375% Notes surrendered for conversion, including the value of any residual shares of common stock that might be payable to the holders electing to convert their 3.375% Notes into an equivalent share value. Under the terms of the indenture, the conversion value was measured based upon a 20-day valuation period of the Company's stock price. The Company used borrowings under its Amended Credit Facility to finance the redemption and conversion of the 3.375% Notes. The remaining 3.375% Notes were

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rendered for conversion during the third quarter of 2014 and the Company paid \$70.5 million in cash to the holders, which included a premium of \$14.9 million.

In September 2013, the Company entered into a second amendment to its fifth amended and restated revolving credit agreement (the "Amended Credit Agreement") and retained Bank of America, N.A. as the administrative agent for the lenders. The \$750.0 million Amended Credit Agreement matures in September 2018. The Amended Credit Agreement adds a new foreign subsidiary borrower in Germany, Barnes Group Acquisition GmbH, and includes an accordion feature to increase the borrowing availability of the Company to \$1,000.0 million. The Company may exercise the accordion feature upon request to the Administrative Agent as long as an event of default has not occurred or is continuing. The borrowing availability of \$750.0 million, pursuant to the terms of the Amended Credit Agreement, allows for Euro-denominated borrowings equivalent to \$500.0 million. Borrowings under the Amended Credit Agreement bear interest at LIBOR plus a spread ranging from 1.10% to 1.70% depending on the Company's leverage ratio at prior quarter end. In October 2014, the Company entered into a third amendment to its fifth amended and restated revolving credit agreement, which allowed for the issuance of the Note Purchase Agreement.

The Company's borrowing capacity was limited by various debt covenants in the Amended Credit Agreement and the Note Purchase Agreement (the "Agreements"). The Agreements require the Company to maintain a ratio of Consolidated Senior Debt, as defined in the Agreements, to Consolidated EBITDA, as defined, of not more than 3.25 times at the end of each fiscal quarter ("Senior Debt Ratio"), a ratio of Consolidated Total Debt, as defined, to Consolidated EBITDA of not more than 4.00 times at the end of each fiscal quarter, and a ratio of Consolidated EBITDA to Consolidated Cash Interest Expense, as defined, of not less than 4.25 times at the end of each fiscal quarter. The Agreements also provide that in connection with certain permitted acquisitions with aggregate consideration in excess of \$150.0 million, the Consolidated Senior Debt to EBITDA ratio and the Consolidated Total Debt to EBITDA ratio are permitted to increase to 3.50 times and 4.25 times, respectively, for a period of the four fiscal quarters ending after the closing of the acquisition. At December 31, 2016, the Company was in compliance with all covenants under the Agreements. The Company's most restrictive financial covenant is the Senior Debt Ratio which requires the Company to maintain a ratio of Consolidated Senior Debt to Consolidated EBITDA of not more than 3.25 times at December 31, 2016. The actual ratio at December 31, 2016 was 1.69 times.

In February 2017, the Company entered into the fourth amendment of its fifth amended and restated revolving credit agreement (the "the Fourth Amendment") and retained Bank of America, N.A. as the Administrative Agent for the lenders. The Fourth Amendment increases the facility to \$850.0 million and extends the maturity date to February 2022. The Fourth Amendment also increases the existing accordion feature, allowing the Company to request additional borrowings of up to \$350.0 million. The Company may exercise the accordion feature upon request to the Administrative Agent as long as an event of default has not occurred or is not continuing. The borrowing availability of \$850.0 million, pursuant to the terms of the Fourth Amendment, allow for multi-currency borrowing which includes euro, sterling or Swiss franc borrowing, up to \$600.0 million. Depending on the Company's consolidated leverage ratio, and at the election of the Company, borrowings under the Fourth Amendment will bear interest at either LIBOR plus a margin of between 1.10% and 1.70% or the base rate plus a margin of 0.10% to 0.70%. The Fourth Amendment generally requires the Company to maintain a ratio of Consolidated Senior Debt, as defined, to Consolidated EBITDA of not more than 3.25 times, a ratio of Consolidated Total Debt, as defined, to Consolidated EBITDA, as defined, of not more than 3.75 times, and a ratio of Consolidated EBITDA to Consolidated Cash Interest Expense, as defined, of not less than 4.25 times, in each case at the end of each fiscal quarter; provided that these debt to EBITDA ratios are permitted to increase for a period of four fiscal quarters after the closing of certain permitted acquisitions.

In 2016, 2015 and 2014, the Company acquired 0.6 million shares, 1.4 million shares and 0.2 million shares of the Company's common stock, respectively, at a cost of \$20.5 million, \$52.1 million and \$8.4 million, respectively.

In the third quarter of 2016, the Company, through three of its subsidiaries (collectively, the “Purchaser”), completed its acquisition of the molds business of Adval Tech Holding AG and Adval Tech Holdings (Asia) Pte. Ltd. (“FOBOHA”)(collectively, the “Sellers”). See Note 2 of the Consolidated Financial Statements. The Company acquired FOBOHA for an aggregate cash purchase price of CHF 136.3 million (\$138.6 million) which was financed using cash on hand and borrowings under the Company's revolving credit facility. The purchase price includes preliminary adjustments under the terms of the Sale and Purchase Agreement (“SPA”), including approximately CHF 11.3 million (\$11.5 million) related to cash acquired, and is subject to post closing adjustments under the terms of the SPA. The aggregate purchase was paid using cash on hand of \$68.5 million and borrowings of \$70.1 million under the Company's revolving credit facility. At December 31, 2016, the Company had repaid \$62.0 million of the borrowings under the revolving credit facility using cash generated from its foreign operations. In July 2016, the Company entered into forward contract agreements (CHF 133.0 million in aggregate) to reduce the exposure to foreign currency exchange rates on the purchase price. These forward contract agreements were subsequently settled in August 2016 and did not have a significant impact on the Consolidated Statements of Income.

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Operating cash flow may be supplemented with external borrowings to meet near-term business expansion needs and the Company's current financial commitments. The Company has assessed its credit facilities in conjunction with the Fourth Amendment of the Amended Credit Facility and currently expects that its bank syndicate, comprised of 14 banks, will continue to support its Amended Credit Agreement which matures in February 2022. At December 31, 2016, the Company had \$386.7 million unused and available for borrowings under its then existing \$750.0 million Amended Credit Facility, subject to covenants in the Company's debt agreements. At December 31, 2016, additional borrowings of \$683.2 million of Total Debt and \$461.2 million of Senior Debt would have been allowed under the financial covenants. The Company intends to use borrowings under its Amended Credit Facility to support the Company's ongoing growth initiatives. The Company believes its credit facilities and access to capital markets, coupled with cash generated from operations, are adequate for its anticipated future requirements.

The Company had \$30.7 million in borrowings under short-term bank credit lines at December 31, 2016.

In 2012, the Company entered into five-year interest rate swap agreements transacted with three banks which together convert the interest on the first \$100.0 million of borrowings under the Company's Credit Agreement from a variable rate plus the borrowing spread to a fixed rate of 1.03% plus the borrowing spread for the purpose of mitigating its exposure to variable interest rates. At December 31, 2016 and December 31, 2015, the Company's total borrowings were comprised of 41% fixed rate debt and 59% variable rate debt.

The funded status of the Company's pension plans is dependent upon many factors, including actual rates of return that impact the fair value of pension assets and changes in discount rates that impact projected benefit obligations. The unfunded status of the pension plans increased from \$65.7 million at December 31, 2015 to \$77.0 million at December 31, 2016 as the increase in the projected benefit obligations ("PBOs") exceeded the increase in the fair value of the pension plan assets, following an update of certain actuarial assumptions. The Company recorded a \$8.9 million non-cash after-tax decrease in stockholders equity (through other non-owner changes to equity) to record the current year adjustments for changes in the funded status of its pension and postretirement benefit plans as required under accounting for defined benefit and other postretirement plans. This decrease in stockholders equity resulted primarily from changes in actuarial assumptions, primarily the discount rate, and unfavorable variances between expected and actual returns on pension plan assets, offset by the amortization of actuarial losses recorded earlier. In 2016, as planned, the Company made \$15.0 million in discretionary contributions to the U.S. qualified pension plans. The Company expects to contribute approximately \$4.9 million to its various defined benefit pension plans in 2017. No discretionary contributions to the U.S. Qualified pension plans in 2017 are currently planned. See Note 11 of the Consolidated Financial Statements.

At December 31, 2016, the Company held \$66.4 million in cash and cash equivalents, the majority of which was held by foreign subsidiaries. These amounts have no material regulatory or contractual restrictions and are expected to primarily fund international investments. The Company repatriated \$8.3 million of current year foreign earnings to the U.S. during 2016.

Any future acquisitions are expected to be financed through internal cash, borrowings and equity, or a combination thereof. Additionally, we may from time to time seek to retire or repurchase our outstanding debt through cash purchases and/or exchanges for equity securities, in open market purchases, under a Rule 10b5-1 trading plan, privately negotiated transactions or otherwise. Such repurchases or exchanges, if any, will depend on prevailing market conditions, our liquidity requirements, contractual restrictions and other factors.

Cash Flow

(\$ in millions)	2016	2015	\$ Change	% Change	2014
Operating activities	\$217.6	\$217.5	\$ 0.2	0.1 %	\$196.2

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Investing activities	(179.5)	(115.5)	(64.0)	(55.4)%	(124.2)
Financing activities	(53.3)	(59.2)	5.9	9.9 %	(92.8)
Exchange rate effect	(2.3)	(4.9)	2.6	53.2 %	(3.9)
(Decrease) increase in cash	\$(17.5)	\$37.9	\$(55.4)	NM	\$(24.8)

NM – Not meaningful

Operating activities provided \$217.6 million in 2016 compared to \$217.5 million in 2015. Operating cash flows in the 2016 period were positively impacted by improved operating performance as well as a reduction in outflows of accrued liabilities, including employee incentive compensation payments. Cash inflows in the 2016 period were partially offset by an

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outflow of \$15.0 million related to discretionary contributions to the U.S. Qualified pension plans and were negatively impacted by an increase in receivables resulting from sales growth which generated a use of cash in 2016.

Investing activities used \$179.5 million in cash in 2016 and \$115.5 million in 2015. Investing activities in 2016 include a cash outflow of \$127.1 million used to fund the FOBOHA acquisition compared to \$52.0 million used to fund the Thermoplay and Priamus acquisitions in 2015. Investing activities in 2016 also include a payment of \$1.5 million related to the post-acquisition closing adjustment of Thermoplay. Payments related to the Component Repair Programs ("CRPs") were \$4.1 million in 2016 compared to \$21.0 million in 2015. See Note 5 of the Consolidated Financial Statements. Capital expenditures were \$47.6 million in 2016 compared to \$46.0 million in 2015. The Company expects capital spending in 2017 to approximate \$55 million. Capital expenditures relate to both maintenance needs and support of growth initiatives, which include the purchase of equipment to support new products and services, and will be funded primarily through cash flows from operations.

Cash used by financing activities in 2016 included a net decrease in borrowings of \$9.9 million compared to a net increase of \$2.7 million in 2015. In 2016, the Company borrowed \$100.0 million under the Amended Credit Facility through an international subsidiary. The proceeds were distributed to the Parent Company and subsequently used to pay down U.S. borrowings under the Amended Credit Agreement. Proceeds from the issuance of common stock were \$4.6 million and \$11.4 million in 2016 and 2015, respectively. In 2016, the Company repurchased 0.6 million shares of the Company's stock at a cost of \$20.5 million, compared with the purchase of 1.4 million shares at a cost of \$52.1 million in 2015. Total cash used to pay dividends increased slightly to \$27.4 million in 2016 compared to \$26.2 million in 2015. Withholding taxes paid on stock issuances in the 2016 and 2015 periods were \$4.9 million and \$4.9 million, respectively. Other financing cash flows during 2016 and 2015 include \$5.2 million and \$10.3 million, respectively, of net cash proceeds from the settlement of foreign currency hedges related to intercompany financings.

Debt Covenants

Borrowing capacity is limited by various debt covenants in the Company's debt agreements. As of December 31, 2016, the most restrictive financial covenant is included within the Amended Credit Agreement and the Note Purchase Agreement and requires the Company to maintain a maximum ratio of Consolidated Senior Debt, as defined, to Consolidated EBITDA, as defined, of not more than 3.25 times for the four fiscal quarters then ending. The Agreements also contain other financial covenants that require the maintenance of a certain other debt ratio, Consolidated Total Debt, as defined, to Consolidated EBITDA of not more than 4.00 times and a certain interest coverage ratio, Consolidated EBITDA to Consolidated Cash Interest Expense, as defined, of at least 4.25 times, at December 31, 2016. The Agreements also provide that in connection with certain permitted acquisitions with aggregate consideration in excess of \$150.0 million, the Consolidated Senior Debt to EBITDA ratio and the Consolidated Total Debt to EBITDA ratio are permitted to increase to 3.50 times and 4.25 times, respectively, for a period of the four fiscal quarters ending after the closing of the acquisition. Following is a reconciliation of Consolidated EBITDA to the Company's net income (in millions):

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	2016
Net income	\$135.6
Add back:	
Interest expense	11.9
Income taxes	47.0
Depreciation and amortization	80.2
Adjustment for non-cash stock based compensation	11.1
Adjustment for acquired businesses	7.4
Amortization of FOBOHA acquisition inventory step-up	2.3
Other adjustments	0.6
Consolidated EBITDA, as defined	\$296.0
Consolidated Senior Debt, as defined, as of December 31, 2016	\$501.0
Ratio of Consolidated Senior Debt to Consolidated EBITDA	1.69
Maximum	3.25
Consolidated Total Debt, as defined, as of December 31, 2016	\$501.0
Ratio of Consolidated Total Debt to Consolidated EBITDA	1.69
Maximum	4.00
Consolidated Cash Interest Expense, as defined, as of December 31, 2016	\$13.1
Ratio of Consolidated EBITDA to Consolidated Cash Interest Expense	22.55
Minimum	4.25

The Amended Credit Agreement allows for certain adjustments within the calculation of the financial covenants. The adjustment for acquired businesses reflects the unaudited pre-acquisition operations of FOBOHA for the period from January 1, 2016 through August 31, 2016. Other adjustments consist primarily of net gains on the sale of assets and due diligence and transaction expenses as permitted under the Amended Credit Agreement. The Company's financial covenants are measured as of the end of each fiscal quarter. At December 31, 2016, additional borrowings of \$683.2 million of Total Debt and \$461.2 million of Senior Debt would have been allowed under the covenants. Senior Debt includes primarily the borrowings under the Amended Credit Facility, the 3.97% Senior Notes and the borrowings under the lines of credit. The Company's unused committed credit facilities at December 31, 2016 were \$386.7 million.

Contractual Obligations and Commitments

At December 31, 2016, the Company had the following contractual obligations and commitments:

(\$ in millions)	Total	Less than 1 Year	1-3 Years	3-5 Years	More than 5 Years
Long-term debt obligations ⁽¹⁾	\$470.1	\$ 2.1	\$365.3	\$1.0	\$ 101.8
Estimated interest payments under long-term obligations ⁽²⁾	43.8	11.0	13.3	8.2	11.3
Operating lease obligations	33.5	7.9	10.6	7.2	7.8
Purchase obligations ⁽³⁾	139.9	128.0	9.0	2.5	0.4
Expected pension contributions ⁽⁴⁾	4.9	4.9	—	—	—
Expected benefit payments – other postretirement benefit plans ⁽⁵⁾	29.8	4.0	6.5	6.4	12.9
Total	\$722.0	\$ 157.9	\$404.7	\$25.2	\$ 134.2

(1) Long-term debt obligations represent the required principal payments under such agreements.

(2) Interest payments under long-term debt obligations have been estimated based on the borrowings outstanding and market interest rates as of December 31, 2016.

(3)

The amounts do not include purchase obligations reflected as current liabilities on the consolidated balance sheet. The purchase obligation amount includes all outstanding purchase orders as of the balance sheet date as well as the minimum contractual obligation or termination penalty under other contracts.

- (4) The amount included in "Less Than 1 Year" reflects anticipated contributions to the Company's various pension plans. Anticipated contributions beyond one year are not determinable.

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The amounts reflect anticipated future benefit payments under the Company's various other postretirement benefit (5) plans based on current actuarial assumptions. Expected benefit payments do not extend beyond 2026. See Note 11 of the Consolidated Financial Statements.

The above table does not reflect unrecognized tax benefits as the timing of the potential payments of these amounts cannot be determined. See Note 13 of the Consolidated Financial Statements.

OTHER MATTERS

Inflation

Inflation generally affects the Company through its costs of labor, equipment and raw materials. Increases in the costs of these items have historically been offset by price increases, commodity price escalator provisions, operating improvements, and other cost-saving initiatives.

Critical Accounting Policies

The preparation of financial statements requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. Significant accounting policies are disclosed in Note 1 of the Consolidated Financial Statements. The most significant areas involving management judgments and estimates are described below. Actual results could differ from such estimates.

Inventory Valuation: Inventories are valued at the lower of cost, determined on a first-in, first-out basis, or market. Provisions are made to reduce excess or obsolete inventories to their estimated net realizable value. Loss provisions, if any, on aerospace contracts are established when estimable. Loss provisions are based on the projected excess of manufacturing costs over the net revenues of the products or group of related products under contract or purchase order. The process for evaluating the value of excess and obsolete inventory often requires the Company to make subjective judgments and estimates concerning future sales levels, access to applicable markets, quantities and prices at which such inventory will be sold in the normal course of business. Accelerating the disposal process or incorrect estimates of future sales potential may necessitate future adjustments to these provisions.

Business Acquisitions, Indefinite-Lived Intangible Assets and Goodwill: Assets and liabilities acquired in a business combination are recorded at their estimated fair values at the acquisition date. At December 31, 2016, the Company had \$633.4 million and \$42.8 million of goodwill and indefinite-lived intangible assets, respectively. Goodwill represents the cost of acquisitions in excess of fair values assigned to the underlying net assets of acquired companies. Goodwill and intangible assets deemed to have indefinite lives are not amortized but are subject to impairment testing annually or earlier if an event or change in circumstances indicates that the fair value of a reporting unit may have been reduced below its carrying value. Management completes its annual impairment assessments for goodwill and indefinite-lived intangible assets during the second quarter of each year. The Company uses the option to first assess qualitative factors to determine whether it is necessary to perform the two-step quantitative impairment tests in accordance with applicable accounting standards.

Under the qualitative goodwill assessment, management considers relevant events and circumstances including but not limited to macroeconomic conditions, industry and market considerations, overall unit performance and events directly affecting a unit. If the Company determines that the two-step quantitative impairment test is required, management estimates the fair value of the reporting unit primarily using the income approach, which reflects management's cash flow projections, and also evaluates the fair value using the market approach. Inherent in management's development of cash flow projections are assumptions and estimates, including those related to future

earnings and growth and the weighted average cost of capital. Based on the second quarter 2016 assessment, the estimated fair value of all reporting units significantly exceeded their carrying values and there was no goodwill impairment at any of the reporting units. Many of the factors used in assessing fair value are outside the control of management, and these assumptions and estimates can change in future periods as a result of both Company-specific and overall economic conditions. Management's quantitative assessment during the second quarter of 2016 included a review of the potential impacts of current and projected market conditions from a market participant's perspective on reporting units' projected cash flows, growth rates and cost of capital to assess the likelihood of whether the fair value would be less than the carrying value. While management expects future operating improvements at certain reporting units to result from improving end-market conditions, new product introductions and further market penetration, there can be no assurance that such expectations will be met or that the fair value of the reporting units will continue to exceed their carrying values. If the fair values were to fall below the carrying values, a non-cash impairment charge to income from operations could result. Management also performed its annual impairment testing of its trade names, indefinite-lived intangible assets, during the second quarter of 2016. Based on this assessment, there was no trade name impairment recognized.

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Aerospace Aftermarket Programs: The Company participates in aftermarket RSPs under which the Company receives an exclusive right to supply designated aftermarket parts over the life of the related aircraft engine program. As consideration, the Company has paid participation fees, which are recorded as intangible assets. The carrying value of these intangible assets was \$198.0 million at December 31, 2016. The Company records amortization of the related asset as sales dollars are being earned based on a proportional sales dollar method. Specifically, this method amortizes each asset as a reduction to revenue based on the proportion of sales under a program in a given period to the estimated aggregate sales dollars over the life of that program which reflects the pattern in which economic benefits are realized.

The Company entered into Component Repair Programs ("CRPs") with General Electric ("GE") during the fourth quarter of 2013 ("CRP 1"), the second quarter of 2014 ("CRP 2") and the fourth quarter of 2015 ("CRP 3"). The CRPs provide for, among other items, the right to sell certain aftermarket component repair services for CFM56, CF6, CF34 and LM engines directly to other customers as one of a few GE licensed suppliers. In addition, the CRPs extend certain existing contracts under which the Company currently provides these services directly to GE. The Company agreed to pay \$26.6 million, \$80.0 million and \$5.2 million as consideration for the rights related CRP1, CRP 2 and CRP 3, respectively. The Company recorded the CRP payments as an intangible asset which is recognized as a reduction of sales over the remaining life of these engine programs. This method reflects the pattern in which the economic benefits of the CRPs are realized.

The recoverability of each asset is subject to significant estimates about future revenues related to the programs' aftermarket parts and services. The Company evaluates these intangible assets for recoverability and updates amortization rates on an agreement by agreement basis for the RSPs and on an individual asset basis for the CRPs. The assets are reviewed for recoverability periodically including whenever events or changes in circumstances indicate that their carrying amount may not be recoverable. Annually, the Company evaluates the remaining life of these assets to determine whether events and circumstances warrant a revision to the remaining periods of amortization. Management updates revenue projections, which includes comparing actual experience against projected revenue and industry projections. The potential exists that actual revenues will not meet expectations due to a change in market conditions, including, for example, the replacement of older engines with new, more fuel-efficient engines or the Company's ability to capture additional market share within the aftermarket business. A shortfall in future revenues may indicate a triggering event requiring a write down or further evaluation of the recoverability of the assets or require the Company to accelerate amortization expense prospectively dependent on the level of the shortfall. The Company has not identified any impairment of these assets. See Note 5 of the Consolidated Financial Statements.

Pension and Other Postretirement Benefits: Accounting policies and significant assumptions related to pension and other postretirement benefits are disclosed in Note 11 of the Consolidated Financial Statements. As discussed further below, the significant assumptions that impact pension and other postretirement benefits include discount rates, mortality rates and expected long-term rates of return on invested pension assets.

The following table provides a breakout of the current targeted mix of investments, by asset classification, along with the historical rates of return for each asset class and the long-term projected rates of return for the U.S. plans.

Asset class	Target Asset Mix %	Annual Return %	
		Historical ⁽¹⁾	Long- Term Projection
U.S. large cap growth equity	6	9.8	8.1
U.S. large cap value equity	5	10.3	8.1
U.S. mid cap equity	4	11.7	8.4
U.S. small cap - growth equity	2	8.1	9.2

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U.S. small cap - value equity	2	11.1	9.2
Global equity	13	8.5	8.0
International Developed market equity	20	4.2	9.4
Emerging market equity	13	9.4	12.1
Fixed income - long government credit	15	8.3	3.8
Fixed income - long credit	15	8.2	4.2
Cash	5	3.2	2.6
Weighted average		8.4	7.75

(1) Historical returns based on the life of the respective index, or approximately 30 years.

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The historical rates of return for the Company's defined benefit plans were calculated based upon compounded average rates of return of published indices. The target mix reflects a 65% equity investment target and a 35% target for fixed income and cash investments (in aggregate). The equity investment of 65% is more heavily on global equity investment targets, rather than U.S. targets. Based on the historical and projected rates of return of the weighted target asset mix, management selected a long-term expected rate of return on its U.S. pension assets of 7.75%. The long-term rates of return for non-U.S. plans were selected based on actual historical rates of return of published indices that were used to measure the plans' target asset allocations. Historical rates were then discounted to consider fluctuations in the historical rates as well as potential changes in the investment environment.

The discount rate used for the Company's U.S. pension plans reflects the rate at which the pension benefits could be effectively settled. At December 31, 2016, the Company selected a discount rate of 4.50% based on a bond matching model for its U.S. pension plans. Market interest rates have decreased in 2016 as compared with 2015 and, as a result, the discount rate used to measure pension liabilities decreased from 4.65% at December 31, 2015. The discount rates for non-U.S. plans were selected based on highly rated long-term bond indices and yield curves that match the duration of the plan's benefit obligations.

A one-quarter percentage point change in the assumed long-term rate of return on the Company's U.S. pension plans as of December 31, 2016 would impact the Company's 2017 pre-tax income by approximately \$0.8 million. A one-quarter percentage point decrease in the discount rate on the Company's U.S. pension plans as of December 31, 2016 would decrease the Company's 2017 pre-tax income by approximately \$1.1 million. The Company reviews these and other assumptions at least annually.

The Company recorded a \$8.9 million non-cash after-tax decrease in stockholders equity (through other non-owner changes to equity) to record the current year adjustments for changes in the funded status of its pension and postretirement benefit plans as required under accounting for defined benefit and other postretirement plans. This decrease in stockholders equity resulted primarily from changes in actuarial assumptions, primarily the discount rate, and unfavorable variances between expected and actual returns on pension plan assets, offset by the amortization of actuarial losses recorded earlier. During 2016, the fair value of the Company's pension plan assets increased by \$21.5 million and the projected benefit obligation increased by \$32.9 million. The change in the projected benefit obligation included a \$17.5 million (pre-tax) increase due to actuarial losses resulting primarily from a change in the discount rates used to measure pension liabilities, an annual interest cost of \$19.5 million and a liability transfer of \$26.0 million related to the acquisition of FOBOHA on August 31, 2016. These increases were partially offset by \$31.2 million in benefits paid. Changes to other actuarial assumptions in 2016 did not have a material impact on our stockholders equity or projected benefit obligation. Actual pre-tax gains on total pension plan assets were \$20.3 million compared with an expected pre-tax return on pension assets of \$30.3 million. Pension expense for 2017 is expected to increase from \$5.6 million in 2016 to \$7.7 million in 2017.

Income Taxes: As of December 31, 2016, the Company had recognized \$25.4 million of deferred tax assets, net of valuation reserves. The realization of these benefits is dependent in part on the amount and timing of future taxable income in the jurisdictions where deferred tax assets reside. For those jurisdictions where the expiration date of tax loss carryforwards or the proposed operating results indicate that realization is unlikely, a valuation allowance is provided. Management currently believes that sufficient taxable income should be earned in the future to realize deferred income tax assets, net of valuation allowances recorded.

The valuation of deferred tax assets requires significant judgment. Management's assessment that the deferred tax assets will be realized represents its estimate of future results; however, there can be no assurance that such expectations will be met. Changes in management's assessment of achieving sufficient future taxable income could materially increase the Company's tax expense and could have a material adverse impact on the Company's financial condition and results of operations.

Additionally, the Company is exposed to certain tax contingencies in the ordinary course of business and records those tax liabilities in accordance with the guidance for accounting for uncertain tax positions. For tax positions where the Company believes it is more likely than not that a tax benefit will be sustained, the Company has recorded the largest amount of tax benefit with a greater than 50% likelihood of being realized. For those income tax positions where it is more likely than not that a tax benefit will not be sustained, no tax benefit has been recognized in the financial statements. See Note 13 of the Consolidated Financial Statements.

Stock-Based Compensation: The Company accounts for its stock-based employee compensation plans at fair value on the grant date and recognizes the related cost in its consolidated statement of income in accordance with accounting standards related to share-based payments. The fair values of stock options are estimated using the Black-Scholes option-pricing model based on certain assumptions. The fair values of service and performance based share awards are estimated based on the fair market value of the Company's stock price on the grant date. The fair values of market based performance share awards are estimated using the Monte Carlo valuation method. See Note 12 of the Consolidated Financial Statements.

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Recent Accounting Changes

In May 2014, the Financial Accounting Standards Board ("FASB") amended its guidance related to revenue recognition. The amended guidance establishes a single comprehensive model for companies to use in accounting for revenue arising from contracts with customers and will supersede most of the existing revenue recognition guidance, including industry-specific guidance. The amended guidance clarifies that an entity recognizes revenue to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. In applying the amended guidance, an entity will (1) identify the contract(s) with a customer; (2) identify the performance obligations in the contract; (3) determine the transaction price; (4) allocate the transaction price to the contract's performance obligations; and (5) recognize revenue when (or as) the entity satisfies a performance obligation. The amended guidance applies to all contracts with customers except those that are within the scope of other topics in the FASB Accounting Standards Codification. The amended guidance was initially effective for annual reporting periods (including interim periods within those periods) beginning after December 15, 2016 for public companies. Early adoption is not permitted. On July 9, 2015, the FASB approved a deferral of the effective date by one year to December 15, 2017 for annual reporting periods beginning after that date. The FASB also proposed permitting early adoption of the standard, but not before the original effective date of December 15, 2016. Entities have the option of using either a full retrospective or modified retrospective approach to the amended guidance. The Company currently anticipates adopting the amended guidance using the modified retrospective approach. We currently plan to adopt the amended guidance on January 1, 2018 at which time it becomes effective for the Company.

In 2015, we developed a project plan and established a cross-functional team to implement the amended guidance. We are currently reviewing our contracts and evaluating the impact of the amended guidance on each of our primary revenue streams. We expect to complete our evaluation of contracts in the first half of 2017. While we are continuing to assess all potential impacts of the amended guidance, we currently believe that the most significant impact relates to the timing of revenue recognition. We expect that a substantial portion of our businesses will continue to recognize revenue on a "point-in-time basis". We also expect, however, that a portion of our businesses with customized products will require the use of an "over time" recognition model as certain of our contracts may meet one or more of the mandatory criteria established in the amended guidance. In addition, we are in the process of identifying appropriate changes to our business processes, systems and controls to support recognition and disclosure requirements under the new standard. We expect to design any changes to such business processes, controls and systems by the middle of 2017 and implement the changes over the remainder of 2017.

In July 2015, the FASB amended its guidance related to the measurement of inventory. The amended guidance requires inventory to be measured at the lower of cost and net realizable value and thereby simplifies the current guidance of measuring inventory at the lower of cost or market. The amended guidance is effective prospectively for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2016. Early adoption is permitted. The Company does not anticipate a material impact on its Consolidated Financial Statements.

In February 2016, the FASB amended its guidance related to lease accounting. The amended guidance requires lessees to recognize a majority of its leases on the balance sheet as a right-to-use asset. Lessees are permitted to make an accounting policy election to not recognize an asset and liability for leases with a term of twelve months or less. Lease expense will be recorded in a manner similar to current accounting. The guidance is effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2018. Early adoption is permitted. The Company is currently evaluating the guidance to determine the impact it will have on its Consolidated Financial Statements. The Company anticipates the amended guidance will have a material impact on its assets and liabilities due to the addition of right-of-use assets and lease liabilities to the balance sheet; however, it does not expect the amended guidance to have a material impact on its cash flows or results of operations.

In August 2016, the FASB amended its guidance related to the Statement of Cash Flows. The amended guidance clarifies how certain cash receipts and cash payments should be presented on the statement of cash flows, with focus on eight specific areas in which cash flows have, in practice, been presented inconsistently. The guidance is effective for annual periods beginning after December 15, 2017 and interim periods within those fiscal years. Early adoption is permitted. The Company is currently evaluating the guidance to determine the impact it will have on its Consolidated Financial Statements.

EBITDA

Earnings before interest expense, income taxes, and depreciation and amortization (“EBITDA”) for 2016 was \$274.7 million compared to \$246.9 million in 2015. EBITDA is a measurement not in accordance with generally accepted accounting principles (“GAAP”). The Company defines EBITDA as net income plus interest expense, income taxes, and depreciation and amortization which the Company incurs in the normal course of business. The Company does not intend EBITDA to represent

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cash flows from operations as defined by GAAP, and the reader should not consider it as an alternative to net income, net cash provided by operating activities or any other items calculated in accordance with GAAP, or as an indicator of the Company's operating performance. The Company's definition of EBITDA may not be comparable with EBITDA as defined by other companies. The Company believes EBITDA is commonly used by financial analysts and others in the industries in which the Company operates and, thus, provides useful information to investors. Accordingly, the calculation has limitations depending on its use.

Following is a reconciliation of EBITDA to the Company's net income (in millions):

	2016	2015
Net income	\$135.6	\$121.4
Add back:		
Interest expense	11.9	10.7
Income taxes	47.0	36.6
Depreciation and amortization	80.2	78.2
EBITDA	\$274.7	\$246.9

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Item 7A. Quantitative and Qualitative Disclosures About Market Risk

Market risk is the potential economic loss that may result from adverse changes in the fair value of financial instruments. The Company's financial results could be impacted by changes in interest rates and foreign currency exchange rates, and commodity price changes. The Company uses financial instruments to hedge its exposure to fluctuations in interest rates and foreign currency exchange rates. The Company does not use derivatives for speculative or trading purposes.

The Company's long-term debt portfolio consists of fixed-rate and variable-rate instruments and is managed to reduce the overall cost of borrowing while also minimizing the effect of changes in interest rates on near-term earnings. The Company's primary interest rate risk is derived from its outstanding variable-rate debt obligations. Financial instruments have been used by the Company to hedge its exposures to fluctuations in interest rates. In April 2012, the Company entered into five-year interest rate swap agreements transacted with three banks which together convert the interest on the first \$100.0 million of borrowings under the Company's Amended Credit Agreement from a variable rate plus the borrowing spread to a fixed rate of 1.03% plus the borrowing spread for the purpose of mitigating its exposure to variable interest rates. The result of a hypothetical 100 basis point increase in the interest rate on the average bank borrowings of the Company's variable-rate debt during 2016 would have reduced annual pretax profit by \$3.0 million.

At December 31, 2016, the fair value of the Company's fixed-rate debt was \$108.9 million, compared with its carrying amount of \$106.8 million. The Company estimates that a 100 basis point decrease in market interest rates at December 31, 2016 would have increased the fair value of the Company's fixed rate debt to \$116.1 million.

The Company has manufacturing, sales and distribution facilities around the world and thus makes investments and conducts business transactions denominated in various currencies. The Company is exposed primarily to financial instruments denominated in currencies other than the functional currency at its international locations. A 10% adverse change in foreign currencies relative to the U.S dollar at December 31, 2016 would have resulted in a \$1.4 million loss in the fair value of those financial instruments. At December 31, 2016, the Company held \$66.4 million of cash and cash equivalents, the majority of which is held by foreign subsidiaries.

Foreign currency commitments and transaction exposures are managed at the operating units as an integral part of their businesses in accordance with a corporate policy that addresses acceptable levels of foreign currency exposures.

Additionally, to reduce foreign currency exposure, management generally maintains the majority of foreign cash and short-term investments in functional currency and uses forward currency contracts for non-functional currency denominated monetary assets and liabilities and anticipated transactions in an effort to reduce the effect of the volatility of changes in foreign exchange rates on the income statement. In historically weaker currency countries, such as Brazil and Mexico, management assesses the strength of these currencies relative to the U.S. dollar and may elect during periods of local currency weakness to invest excess cash in U.S. dollar-denominated instruments.

The Company's exposure to commodity price changes relates to certain manufacturing operations that utilize high-grade steel spring wire, stainless steel, titanium, Inconel, Hastelloys and other specialty metals. The Company attempts to manage its exposure to price increases through its procurement and sales practices.

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Item 8. Financial Statements and Supplementary Data

BARNES GROUP INC.

CONSOLIDATED STATEMENTS OF INCOME

(Dollars in thousands, except per share data)

	Years Ended December 31,		
	2016	2015	2014
Net sales	\$1,230,754	\$1,193,975	\$1,262,006
Cost of sales	790,299	782,817	829,648
Selling and administrative expenses	248,277	242,762	252,384
	1,038,576	1,025,579	1,082,032
Operating income	192,178	168,396	179,974
Interest expense	11,883	10,698	11,392
Other expense (income), net	(2,326)) (248) 2,082
Income from continuing operations before income taxes	182,621	157,946	166,500
Income taxes	47,020	36,566	45,959
Income from continuing operations	135,601	121,380	120,541
Loss from discontinued operations, net of income taxes of \$0, \$0 and \$315, respectively	—	—	(2,171)
Net income	\$135,601	\$121,380	\$118,370
Per common share:			
Basic:			
Income from continuing operations	\$2.50	\$2.21	\$2.20
Loss from discontinued operations, net of income taxes	—	—	(0.04)
Net income	\$2.50	\$2.21	\$2.16
Diluted:			
Income from continuing operations	\$2.48	\$2.19	\$2.16
Loss from discontinued operations, net of income taxes	—	—	(0.04)
Net income	\$2.48	\$2.19	\$2.12
Dividends	\$0.51	\$0.48	\$0.45
Weighted average common shares outstanding:			
Basic	54,191,013	55,028,063	54,791,030
Diluted	54,631,313	55,513,219	55,723,267

See accompanying notes.

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BARNES GROUP INC.
 CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME
 (Dollars in thousands)

	Years Ended December 31,		
	2016	2015	2014
Net income	\$135,601	\$121,380	\$118,370
Other comprehensive loss, net of tax			
Unrealized (loss) gain on hedging activities, net of tax (1)	(342)	847	(213)
Foreign currency translation adjustments, net of tax (2)	(48,367)	(54,232)	(83,168)
Defined benefit pension and other postretirement benefits, net of tax (3)	(8,867)	9,586	(42,016)
Total other comprehensive loss, net of tax	(57,576)	(43,799)	(125,397)
Total comprehensive income (loss)	\$78,025	\$77,581	\$(7,027)

(1) Net of tax of \$(42), \$227 and \$(45) for the years ended December 31, 2016, 2015 and 2014, respectively.

(2) Net of tax of \$(833), \$(1,777) and \$(3,292) for the years ended December 31, 2016, 2015 and 2014, respectively.

(3) Net of tax of \$(4,687), \$3,916 and \$(24,799) for the years ended December 31, 2016, 2015 and 2014, respectively.

See accompanying notes.

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BARNES GROUP INC.
CONSOLIDATED BALANCE SHEETS
(Dollars in thousands)

	December 31,	
	2016	2015
Assets		
Current assets		
Cash and cash equivalents	\$66,447	\$83,926
Accounts receivable, less allowances (2016 – \$3,992; 2015 – \$4,085)	287,123	261,757
Inventories	227,759	208,611
Deferred income taxes	—	24,825
Prepaid expenses and other current assets	27,163	32,469
Total current assets	608,492	611,588
Deferred income taxes	25,433	1,139
Property, plant and equipment, net	334,489	308,856
Goodwill	633,436	587,992
Other intangible assets, net	522,258	528,322
Other assets	13,431	23,969
Total assets	\$2,137,539	\$2,061,866
Liabilities and Stockholders' Equity		
Current liabilities		
Notes and overdrafts payable	\$30,825	\$22,680
Accounts payable	112,024	97,035
Accrued liabilities	156,967	131,320
Long-term debt – current	2,067	1,515
Total current liabilities	301,883	252,550
Long-term debt	468,062	485,711
Accrued retirement benefits	109,350	112,888
Deferred income taxes	66,446	62,364
Other liabilities	23,440	20,600
Commitments and contingencies (Note 20)		
Stockholders' equity		
Common stock – par value \$0.01 per share		
Authorized: 150,000,000 shares		
Issued: at par value (2016 – 62,692,403 shares; 2015 – 62,071,144 shares)	627	621
Additional paid-in capital	443,235	427,558
Treasury stock, at cost (2016 – 8,889,947 shares; 2015 – 8,206,683 shares)	(251,827)	(226,421)
Retained earnings	1,177,151	1,069,247
Accumulated other non-owner changes to equity	(200,828)	(143,252)
Total stockholders' equity	1,168,358	1,127,753
Total liabilities and stockholders' equity	\$2,137,539	\$2,061,866

See accompanying notes.

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BARNES GROUP INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS
(Dollars in thousands)

	Years Ended December 31,		
	2016	2015	2014
Operating activities:			
Net income	\$ 135,601	\$ 121,380	\$ 118,370
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation and amortization	80,154	78,242	81,395
Amortization of convertible debt discount	—	—	731
(Gain) loss on disposition of property, plant and equipment	(349)	(1,128)	143
Stock compensation expense	11,493	9,258	7,603
Loss on the sale of businesses	—	—	1,586
Pension lump-sum settlement charge	—	9,856	—
Changes in assets and liabilities, net of the effects of acquisitions:			
Accounts receivable	(23,057)	14,027	(21,367)
Inventories	1,989	(1,190)	(10,092)
Prepaid expenses and other current assets	569	(2,645)	(7,137)
Accounts payable	11,778	(2,936)	8,123
Accrued liabilities	15,825	(14,166)	29,290
Deferred income taxes	(2,210)	3,121	(9,841)
Long-term retirement benefits	(15,492)	1,081	(7,584)
Other	1,345	2,575	4,933
Net cash provided by operating activities	217,646	217,475	196,153
Investing activities:			
Proceeds from disposition of property, plant and equipment	780	3,442	849
Payments for the sale of businesses	—	—	(1,181)
Change in restricted cash	—	—	4,886
Capital expenditures	(47,577)	(45,982)	(57,365)
Business acquisitions, net of cash acquired	(128,613)	(51,954)	—
Component Repair Program payments	(4,100)	(21,000)	(70,100)
Other	—	—	(1,338)
Net cash used in investing activities	(179,510)	(115,494)	(124,249)
Financing activities:			
Net change in other borrowings	8,375	14,680	7,009
Payments on long-term debt	(321,506)	(171,198)	(332,336)
Proceeds from the issuance of long-term debt	303,277	159,264	293,291
Payment of assumed liability to Otto Männer Holding AG	—	—	(19,796)
Premium paid on convertible debt redemption	—	—	(14,868)
Proceeds from the issuance of common stock	4,611	11,425	11,460
Common stock repurchases	(20,520)	(52,103)	(8,389)
Dividends paid	(27,435)	(26,176)	(24,464)
Withholding taxes paid on stock issuances	(4,885)	(4,913)	(4,367)
Other	4,771	9,850	(338)
Net cash used by financing activities	(53,312)	(59,171)	(92,798)
Effect of exchange rate changes on cash flows	(2,303)	(4,923)	(3,923)
(Decrease) increase in cash and cash equivalents	(17,479)	37,887	(24,817)
Cash and cash equivalents at beginning of year	83,926	46,039	70,856
Cash and cash equivalents at end of year	\$ 66,447	\$ 83,926	\$ 46,039

Supplemental Disclosure of Cash Flow Information:

Non-cash investing activities in 2015 and 2014 included the acquisition of \$3,200 and \$19,000, respectively, of intangible assets, and the recognition of the corresponding liabilities, in connection with the Component Repair Programs.

See accompanying notes.

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BARNES GROUP INC.

CONSOLIDATED STATEMENTS OF CHANGES IN STOCKHOLDERS' EQUITY

(Dollars and shares in thousands)

	Common Stock (Number of Shares)	Common Stock (Amount (Number of Shares))	Additional Paid-In Capital	Treasury Stock (Number of Shares)	Treasury Stock	Retained Earnings	Accumulated Other Non-Owner Changes to Equity	Total Stockholders' Equity
January 1, 2014	60,306	\$ 603	\$ 390,347	6,389	\$(156,649)	\$ 881,169	\$ 25,944	\$ 1,141,414
Comprehensive income						118,370	(125,397)	(7,027)
Dividends paid						(24,464)		(24,464)
Common stock repurchases				221	(8,389)			(8,389)
Convertible debt redemption, net of tax			(8,666)	—	—			(8,666)
Employee stock plans	924	9	23,844	119	(4,367)	(561)		18,925
December 31, 2014	61,230	612	405,525	6,729	(169,405)	974,514	(99,453)	1,111,793
Comprehensive income						121,380	(43,799)	77,581
Dividends paid						(26,176)		(26,176)
Common stock repurchases				1,353	(52,103)			(52,103)
Employee stock plans	841	9	22,033	125	(4,913)	(471)		16,658
December 31, 2015	62,071	621	427,558	8,207	(226,421)	1,069,247	(143,252)	1,127,753
Comprehensive income						135,601	(57,576)	78,025
Dividends paid						(27,435)		(27,435)
Common stock repurchases				551	(20,520)			(20,520)
Cumulative effect of change in accounting guidance (Note 12)						198		198
Employee stock plans	621	6	15,677	132	(4,886)	(460)		10,337
December 31, 2016	62,692	\$ 627	\$ 443,235	8,890	\$(251,827)	\$ 1,177,151	\$(200,828)	\$ 1,168,358

See accompanying notes.

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BARNES GROUP INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

(All dollar amounts included in the notes are stated in thousands except per share data and the tables in Note 19)

1. Summary of Significant Accounting Policies

General: The preparation of consolidated financial statements requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates. Certain reclassifications have been made to prior year amounts.

Consolidation: The accompanying consolidated financial statements include the accounts of the Company and all of its subsidiaries. Intercompany transactions and account balances have been eliminated.

Revenue recognition: Sales and related cost of sales are recognized when products are shipped or delivered to customers depending upon when title and risk of loss have passed. Service revenue is recognized when the related services are performed. In the aerospace manufacturing businesses, the Company recognizes revenue based on the units-of-delivery method in accordance with accounting standards related to accounting for performance of construction-type and certain production-type contracts. Management fees related to the aerospace aftermarket Revenue Sharing Programs ("RSPs") are satisfied through an agreed upon reduction from the sales price of each of the related spare parts. These fees recognize our customer's necessary performance of engine program support activities, such as spare parts administration, warehousing and inventory management, and customer support, and are not separable from our sale of products, and accordingly, they are reflected as a reduction to sales, rather than as costs incurred, when revenues are recognized.

Operating expenses: The Company includes manufacturing labor, material, manufacturing overhead and costs of its distribution network within cost of sales. Other costs, including selling personnel costs and commissions, and other general and administrative costs of the Company are included within selling and administrative expenses. Depreciation and amortization expense is allocated between cost of sales and selling and administrative expenses.

Cash and cash equivalents: Cash in excess of operating requirements is invested in short-term, highly liquid, income-producing investments. All highly liquid investments purchased with an original maturity of three months or less are considered cash equivalents. Cash equivalents are carried at cost which approximates fair value.

Inventories: Inventories are valued at the lower of cost, determined on a first-in, first-out basis, or market. Loss provisions, if any, on aerospace contracts are established when estimable. Loss provisions are based on the projected excess of manufacturing costs over the net revenues of the products or group of related products under contract or purchase order.

Property, plant and equipment: Property, plant and equipment is stated at cost. Depreciation is recorded over estimated useful lives, generally ranging from 20 to 50 years for buildings, three to five years for computer equipment and four to 12 years for machinery and equipment. The straight-line method of depreciation was adopted for all property, plant and equipment placed in service after March 31, 1999. For property, plant and equipment placed into service prior to April 1, 1999, depreciation is calculated using accelerated methods. The Company assesses the impairment of property, plant and equipment subject to depreciation whenever events or changes in circumstances indicate the carrying value may not be recoverable.

Goodwill: Goodwill represents the excess purchase cost over the fair value of net assets of companies acquired in business combinations. Goodwill is considered an indefinite-lived asset. Goodwill is subject to impairment testing in accordance with accounting standards governing such on an annual basis, in the second quarter, or more frequently if an event or change in circumstances indicates that the fair value of a reporting unit has been reduced below its carrying value. Based on the assessments performed during 2016, there was no goodwill impairment.

Aerospace Aftermarket Programs: The Company participates in aftermarket RSPs under which the Company receives an exclusive right to supply designated aftermarket parts over the life of the related aircraft engine program. As consideration, the Company has paid participation fees, which are recorded as long-lived intangible assets. The Company records amortization of the related intangible asset as sales dollars are being earned based on a proportional sales dollar method. Specifically, this method amortizes each asset as a reduction to revenue based on the proportion of sales under a program in a given period to the estimated aggregate sales dollars over the life of that program.

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The Company also entered into Component Repair Programs ("CRPs") that provide for, among other items, the right to sell certain aftermarket component repair services for CFM56, CF6, CF34 and LM engines directly to other customers as one of a few GE licensed suppliers. In addition, the CRPs extended certain existing contracts under which the Company currently provides these services directly to GE. The Company recorded the consideration for these rights as an intangible asset that is amortized as a reduction to sales over the remaining life of these engine programs. This method reflects the pattern in which the economic benefits of the RSPs and the CRPs are realized.

The recoverability of each asset is subject to significant estimates about future revenues related to the program's aftermarket parts and services. The Company evaluates these intangible assets for recoverability and updates amortization rates on an agreement by agreement basis for the RSPs and on an individual asset program basis for the CRPs. The assets are reviewed for recoverability periodically including whenever events or changes in circumstances indicate that their carrying amount may not be recoverable. Annually, the Company evaluates the remaining useful life of these assets to determine whether events and circumstances warrant a revision to the remaining periods of amortization. Management updates revenue projections, which includes comparing actual experience against projected revenue and industry projections. The potential exists that actual revenues will not meet expectations due to a change in market conditions including, for example, the replacement of older engines with new, more fuel-efficient engines or the Company's ability to maintain market share within the Aftermarket business. A shortfall in future revenues may indicate a triggering event requiring a write down or further evaluation of the recoverability of the assets or require the Company to accelerate amortization expense prospectively dependent on the level of the shortfall. The Company has not identified any impairment of these assets.

Other Intangible Assets: Other intangible assets consist primarily of the Aerospace Aftermarket Programs, as discussed above, customer relationships, tradenames, patents and proprietary technology. These intangible assets, with the exception of certain tradenames, have finite lives and are amortized over the periods in which they provide benefit. The Company assesses the impairment of long-lived assets, including identifiable intangible assets subject to amortization, whenever significant events or significant changes in circumstances indicate the carrying value may not be recoverable. Tradenames with indefinite lives are subject to impairment testing in accordance with accounting standards governing such on an annual basis, in the second quarter, or more frequently if an event or change in circumstances indicates that the fair value of the asset has been reduced below its carrying value. Based on the assessment performed during 2016, there were no impairments of other intangible assets. See Note 5 of the Consolidated Financial Statements.

Derivatives: Accounting standards related to the accounting for derivative instruments and hedging activities require that all derivative instruments be recorded on the balance sheet at fair value. Foreign currency contracts may qualify as fair value hedges of unrecognized firm commitments, cash flow hedges of recognized assets and liabilities or anticipated transactions, or a hedge of a net investment. Changes in the fair market value of derivatives that qualify as fair value hedges or cash flow hedges are recorded directly to earnings or accumulated other non-owner changes to equity, depending on the designation. Amounts recorded to accumulated other non-owner changes to equity are reclassified to earnings in a manner that matches the earnings impact of the hedged transaction. Any ineffective portion, or amounts related to contracts that are not designated as hedges, are recorded directly to earnings. The Company's policy for classifying cash flows from derivatives is to report the cash flows consistent with the underlying hedged item.

Foreign currency: Assets and liabilities of international operations are translated at year-end rates of exchange; revenues and expenses are translated at average rates of exchange. The resulting translation gains or losses are reflected in accumulated other non-owner changes to equity within stockholders' equity. Net foreign currency transaction gains of \$1,873 and \$505 in 2016 and 2015, respectively, and a loss of \$1,466 in 2014, were included in

other expense (income), net in the Consolidated Statements of Income.

Research and Development: Costs are incurred in connection with efforts aimed at discovering and implementing new knowledge that is critical to developing new products, processes or services, significantly improving existing products or services, and developing new applications for existing products and services. Research and development expenses for the creation of new and improved products and services were \$12,913, \$12,688 and \$15,782, for the years 2016, 2015 and 2014, respectively, and are included in selling and administrative expense.

2. Acquisitions

The Company has acquired a number of businesses during the past two years. The results of operations of these acquired businesses have been included in the consolidated results from the respective acquisition dates. The purchase prices for these

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acquisitions have been allocated to tangible and intangible assets and liabilities of the businesses based upon estimates of their respective fair values.

In the third quarter of 2016, the Company, through three of its subsidiaries (collectively, the “Purchaser”), completed its acquisition of the molds business of Adval Tech Holding AG and Adval Tech Holdings (Asia) Pte. Ltd. (“FOBOHA”). FOBOHA is headquartered in Haslach, Germany and operates out of three manufacturing facilities located in Germany, Switzerland and China. The Company completed its purchase of the Germany and Switzerland businesses on August 31, 2016. The purchase of the China business required government approval which was granted on September 30, 2016. On October 7, 2016, shares of the China operations were subsequently transferred to the Company upon payment, per the terms of the Share Purchase Agreement for these respective operations (“China SPA”). The Company, pursuant to the terms and conditions within the Share Purchase Agreement (“FOBOHA SPA”), assumed economic control of the China business effective August 31, 2016. Having both economic control and the benefits and risks of ownership during the period from August 31, 2016 through September 30, 2016, the Company included the results of the China business within the consolidated results of operations of the Company during this period.

FOBOHA specializes in the development and manufacture of complex plastic injection molds for packaging, medical, consumer and automotive applications. The Company acquired FOBOHA for an aggregate cash purchase price of CHF 136,337 (\$138,596) which was financed using cash on hand and borrowings under the Company's revolving credit facility. The purchase price includes preliminary adjustments under the terms of the FOBOHA SPA, including approximately CHF 11,342 (\$11,530) related to cash acquired and is subject to post closing adjustments under the terms of the FOBOHA SPA. In connection with the acquisition, the Company recorded \$39,800 of intangible assets and \$73,688 of goodwill. See Note 5 to the Consolidated Financial Statements.

The Company incurred \$2,193 of acquisition-related costs during the year ended December 31, 2016 related to the FOBOHA acquisition. These costs include due diligence costs and transaction costs to complete the acquisition and have been recognized in the Company's Consolidated Statements of Income as selling and administrative expenses. Pro forma operating results for the FOBOHA acquisition are not presented as the results would not be significantly different than historical results.

The operating results of FOBOHA have been included in the Consolidated Statements of Income for the period ended December 31, 2016 since the date of acquisition. The Company reported \$18,348 in net sales for FOBOHA for the year ended December 31, 2016. FOBOHA results have been included within the Industrial segment's operating profit.

In the fourth quarter of 2015, the Company, itself and through two of its subsidiaries, completed the acquisition of privately held Priamus System Technologies AG and two of its subsidiaries (collectively, “Priamus”) from Growth Finance AG. Priamus, which has approximately 40 employees, is headquartered in Schaffhausen, Switzerland and has direct sales and service offices in the U.S. and Germany. Priamus is a technology leader in the development of advanced process control systems for the plastic injection molding industry and services many of the world's highest quality plastic injection molders in the medical, automotive, consumer goods, electronics and packaging markets. Priamus is being integrated into our Industrial segment. The Company acquired Priamus for an aggregate cash purchase price of CHF 9,879 (\$10,111) which was financed using cash on hand and borrowings under the Company's revolving credit facility. The purchase price includes adjustments under the terms of the Share Purchase Agreement, including CHF 1,556 (\$1,592) related to cash acquired.

In the third quarter of 2015, the Company, through one of its subsidiaries, completed the acquisition of the Thermoplay business (“Thermoplay”) by acquiring all of the capital stock of privately held HPE S.p.A., the parent

Company through which Thermoplay operates. Thermoplay's headquarters and manufacturing facility are located in Pont-Saint-Martin in Aosta, Italy, with technical service capabilities in China, India, France, Germany, United Kingdom, Portugal, and Brazil. Thermoplay, which is being integrated into our Industrial segment, specializes in the design, development, and manufacturing of hot runner solutions for plastic injection molding, primarily in the packaging, automotive, and medical end markets. The Company acquired Thermoplay for an aggregate cash purchase price of €58,066 (\$63,690), pursuant to the terms of the Sale and Purchase Agreement ("SPA"), which was financed using cash on hand and borrowings under the Company's revolving credit facility. The purchase price includes adjustments under the terms of the SPA, including €17,054 (\$18,706) related to cash acquired.

The Company incurred \$2,195 and \$574 of acquisition-related costs during the year ended December 31, 2015 related to the Thermoplay and Priamus acquisitions, respectively. These costs include due diligence costs and transaction costs to complete the acquisitions, and have been recognized in the Company's Consolidated Statements of Income as selling and

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administrative expenses. Pro forma operating results for the 2015 acquisitions are not presented since the results would not be significantly different than historical results.

The operating results of Thermoplay and Priamus have been included in the Consolidated Statements of Income for the period ended December 31, 2015, since the August 7, 2015 and the October 1, 2015 dates of acquisition, respectively. The Company reported \$13,593 and \$2,028 in net sales for Thermoplay and Priamus, respectively, for the year ended December 31, 2015.

3. Inventories

Inventories at December 31 consisted of:

	2016	2015
Finished goods	\$71,100	\$76,836
Work-in-process	98,246	77,061
Raw materials and supplies	58,413	54,714
	\$227,759	\$208,611

4. Property, Plant and Equipment

Property, plant and equipment at December 31 consisted of:

	2016	2015
Land	\$19,952	\$19,153
Buildings	169,695	156,294
Machinery and equipment	572,540	539,360
	762,187	714,807
Less accumulated depreciation	(427,698)	(405,951)
	\$334,489	\$308,856

Depreciation expense was \$43,165, \$39,654 and \$41,875 during 2016, 2015 and 2014, respectively.

5. Goodwill and Other Intangible Assets

Goodwill: The following table sets forth the change in the carrying amount of goodwill for each reportable segment and the Company:

	Industrial	Aerospace	Total Company
January 1, 2015	\$564,163	\$ 30,786	\$594,949
Acquisition-related	22,798	—	22,798
Foreign currency translation	(29,755)	—	(29,755)
December 31, 2015	557,206	30,786	587,992
Acquisition-related	73,688	—	73,688
Foreign currency translation	(28,244)	—	(28,244)
December 31, 2016	\$602,650	\$ 30,786	\$633,436

Of the \$633,436 of goodwill at December 31, 2016, \$43,860 represents the original tax deductible basis.

The increase in goodwill of \$73,688 during 2016 is due to the acquisition of FOBOHA on August 31, 2016, which is included in the Industrial segment. The amount allocated to goodwill reflects the benefits that the Company expects to realize from synergies created by combining the operations of FOBOHA, future enhancements to technology, geographical expansion and FOBOHA's assembled workforce. None of the recognized goodwill is expected to be deductible for income tax purposes.

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The final purchase price is subject to post-closing adjustments, therefore goodwill acquired may require adjustment accordingly.

Other Intangible Assets: Other intangible assets at December 31 consisted of:

		2016		2015	
	Range of Life-Years	Gross Amount	Accumulated Amortization	Gross Amount	Accumulated Amortization
Amortized intangible assets:					
Revenue Sharing Programs	Up to 30	\$293,700	\$ (95,701)	\$293,700	\$ (84,629)
Component Repair Program	Up to 30	111,839	(10,497)	111,839	(6,054)
Customer lists/relationships	10-16	215,266	(53,198)	194,566	(41,786)
Patents and technology	4-14	84,052	(37,897)	69,352	(29,551)
Trademarks/trade names	10-30	11,950	(9,967)	11,950	(9,412)
Other	Up to 15	20,551	(16,338)	20,551	(15,413)
		737,358	(223,598)	701,958	(186,845)
Unamortized intangible asset:					
Trade names		42,770	—	38,370	—
Foreign currency translation		(34,272)	—	(25,161)	—
Other intangible assets		\$745,856	\$ (223,598)	\$715,167	\$ (186,845)

The Company entered into Component Repair Programs ("CRPs") with General Electric ("GE") during the fourth quarter of 2013 ("CRP 1"), the second quarter of 2014 ("CRP 2") and the fourth quarter of 2015 ("CRP 3"). The CRPs provide for, among other items, the right to sell certain aftermarket component repair services for CFM56, CF6, CF34 and LM engines directly to other customers as one of a few GE licensed suppliers. In addition, the CRPs extend certain existing contracts under which the Company currently provides these services directly to GE.

The Company agreed to pay \$26,639 as consideration for the rights related to CRP 1. Of this balance, the Company paid \$16,639 in the fourth quarter of 2013, \$9,100 in the fourth quarter of 2014 and \$900 in the first quarter of 2016. The Company agreed to pay \$80,000 as consideration for the rights related to CRP 2. The Company paid \$41,000 in the second quarter of 2014, \$20,000 in the fourth quarter of 2014 and \$19,000 in the second quarter of 2015. The Company agreed to pay \$5,200 as consideration for the rights related to CRP 3. The Company paid \$2,000 in the fourth quarter of 2015 and \$3,200 in the fourth quarter of 2016. The Company recorded the CRP consideration as an intangible asset which is recognized as a reduction of sales over the remaining useful life of these engine programs.

In connection with the acquisition of FOBOHA in August 2016, the Company recorded intangible assets of \$39,800, which includes \$20,700 of customer relationships, \$14,700 of patents and technology and \$4,400 of an indefinite life trade name. The weighted-average useful lives of the acquired assets were 16 years and 7 years, respectively. Amortization of intangible assets for the years ended December 31, 2016, 2015 and 2014 was \$36,753, \$38,502 and \$37,125, respectively. Estimated amortization of intangible assets for future periods is as follows: 2017 - \$39,000; 2018 - \$40,000; 2019 - \$39,000; 2020 - \$36,000 and 2021 - \$36,000.

The Company has entered into a number of aftermarket RSP agreements each of which is with GE. See Note 1 of the Consolidated Financial Statements for a further discussion of these Revenue Sharing Programs. As of December 31, 2016, the Company has made all required participation fee payments under the aftermarket RSP agreements.

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6. Accrued Liabilities

Accrued liabilities at December 31 consisted of:

	2016	2015
Payroll and other compensation	\$37,560	\$27,186
Deferred revenue and customer advances	34,812	16,453
CRP Accrual	—	4,100
Pension and other postretirement benefits	8,261	8,444
Accrued income taxes	26,477	25,682
Other	49,857	49,455
	\$156,967	\$131,320

7. Debt and Commitments

Long-term debt and notes and overdrafts payable at December 31 consisted of:

	2016		2015	
	Carrying Amount	Fair Value	Carrying Amount	Fair Value
Revolving credit agreement	363,300	364,775	379,700	375,188
3.97% Senior Notes	100,000	101,598	100,000	102,484
Borrowings under lines of credit and overdrafts	30,825	30,825	22,680	22,680
Capital leases	5,413	5,902	7,105	7,503
Other foreign bank borrowings	1,416	1,428	421	410
	500,954	504,528	509,906	508,265
Less current maturities	(32,892)		(24,195)	
Long-term debt	\$468,062		\$485,711	

The Company's long-term debt portfolio consists of fixed-rate and variable-rate instruments and is managed to reduce the overall cost of borrowing and to mitigate fluctuations in interest rates. Among other things, interest rate fluctuations impact the market value of the Company's fixed-rate debt.

In September 2013, the Company entered into a second amendment to its fifth amended and restated revolving credit agreement (the "Amended Credit Agreement") and retained Bank of America, N.A. as the Administrative Agent for the lenders. The \$750,000 Amended Credit Agreement matures in September 2018. The Amended Credit Agreement adds a new foreign subsidiary borrower in Germany, Barnes Group Acquisition GmbH, and includes an accordion feature to increase the borrowing availability of the Company to \$1,000,000. The Company may exercise the accordion feature upon request to the Administrative Agent as long as an event of default has not occurred or is continuing. The borrowing availability of \$750,000, pursuant to the terms of the Amended Credit Agreement, allows for Euro-denominated borrowings equivalent to \$500,000. Borrowings under the Amended Credit Agreement bear interest at LIBOR plus a spread ranging from 1.10% to 1.70% depending on the Company's leverage ratio at prior quarter end. The Company paid fees and expenses of \$1,261 in conjunction with executing the second amendment in 2013. Such fees were deferred and are being amortized into interest expense over the term of the Agreement.

Borrowings and availability under the Amended Credit Agreement were \$363,300 and \$386,700, respectively, at December 31, 2016 and \$379,700 and \$370,300, respectively, at December 31, 2015. The average interest rate on these borrowings was 1.86% and 1.50% on December 31, 2016 and 2015, respectively. The fair value of the borrowings is based on observable Level 2 inputs. The borrowings were valued using discounted cash flows based

upon the Company's estimated interest costs for similar types of borrowings. In 2016, the Company borrowed \$100,000 under the Amended Credit Facility through an international subsidiary. The proceeds were distributed to the Parent Company and subsequently used to pay down U.S. borrowings under the Amended Credit Agreement.

On October 15, 2014, the Company entered into a Note Purchase Agreement (“Note Purchase Agreement”), among the Company and New York Life Insurance Company, New York Life Insurance and Annuity Corporation and New York Life Insurance and Annuity Corporation Institutionally Owned Life Insurance Separate Account, as purchasers, for the issuance of

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS—(Continued)

\$100,000 aggregate principal amount of 3.97% Senior Notes due October 17, 2024 (the “3.97% Senior Notes”). The Company completed funding of the transaction and issued the 3.97% Notes on October 17, 2014. The Company also entered into a third amendment to its fifth amended and restated revolving credit agreement during October 2014, which allowed for the issuance of the Note Purchase Agreement.

The 3.97% Senior Notes are senior unsecured obligations of the Company and will pay interest semi-annually on April 17 and October 17 of each year at an annual rate of 3.97%. The 3.97% Senior Notes will mature on October 17, 2024 unless earlier prepaid in accordance with their terms. Subject to certain conditions, the Company may, at its option, prepay all or any part of the 3.97% Senior Notes in an amount equal to 100% of the principal amount of the 3.97% Senior Notes so prepaid, plus any accrued and unpaid interest to the date of prepayment, plus the Make-Whole Amount, as defined in the Note Purchase Agreement, with respect to such principal amount being prepaid. The fair value of the 3.97% Senior Notes was determined using the US Treasury yield and a long-term credit spread for similar types of borrowings, that represent Level 2 observable inputs.

The Company's borrowing capacity remains limited by various debt covenants in the Amended Credit Agreement and the Note Purchase Agreement (the "Agreements"). The Agreements contain customary affirmative and negative covenants, including, among others, limitations on indebtedness, liens, investments, restricted payments, dispositions and business activities. The Agreements require the Company to maintain a ratio of Consolidated Senior Debt, as defined, to Consolidated EBITDA, as defined, of not more than 3.25 times at the end of each fiscal quarter, provided that such ratio may increase to 3.50 times following the consummation of certain acquisitions. In addition, the Agreements require the Company to maintain (i) a ratio of Consolidated Total Debt, as defined, to Consolidated EBITDA of not more than 4.00 times at the end of each fiscal quarter, provided that such ratio may increase to 4.25 times following the consummation of certain acquisitions and (ii) a ratio of Consolidated EBITDA to Consolidated Cash Interest Expense, as defined, of not less than 4.25 times at the end of each fiscal quarter. At December 31, 2016, the Company was in compliance with all covenants under the Agreements and continues to monitor its future compliance based on current and future economic conditions.

In February 2017, the Company entered into the fourth amendment of its fifth amended and restated revolving credit agreement (the “the Fourth Amendment”) and retained Bank of America, N.A as the Administrative Agent for the lenders. The Fourth Amendment increases the facility to \$850,000 and extends the maturity date to February 2022. The Fourth Amendment also increases the existing accordion feature, allowing the Company to request additional borrowings of up to \$350,000. The Company may exercise the accordion feature upon request to the Administrative Agent as long as an event of default has not occurred or is not continuing. The borrowing availability of \$850,000, pursuant to the terms of the Fourth Amendment, allow for multi- currency borrowing which includes euro, sterling or Swiss franc borrowing, up to \$600,000. Depending on the Company’s consolidated leverage ratio, and at the election of the Company, borrowings under the Fourth Amendment will bear interest at either LIBOR plus a margin of between 1.10% and 1.70% or the base rate plus a margin of 0.10% to 0.70%. The Fourth Amendment generally requires the Company to maintain a ratio of Consolidated Senior Debt, as defined, to Consolidated EBITDA of not more than 3.25 times, a ratio of Consolidated Total Debt, as defined, to Consolidated EBITDA, as defined, of not more than 3.75 times, and a ratio of Consolidated EBITDA to Consolidated Cash Interest Expense, as defined, of not less than 4.25 times, in each case at the end of each fiscal quarter; provided that these debt to EBITDA ratios are permitted to increase for a period of four fiscal quarters after the closing of certain permitted acquisitions.

In addition, the Company has approximately \$55,000 in uncommitted short-term bank credit lines ("Credit Lines") and overdraft facilities. Under the Credit Lines, \$30,700 was borrowed at December 31, 2016 at an average interest rate of 1.96% and \$22,500 was borrowed at December 31, 2015 at an average interest rate of 1.56%. The Company had also borrowed \$125 and \$180 under the overdraft facilities at December 31, 2016 and 2015, respectively. Repayments under the Credit Lines are due within one month after being borrowed. Repayments of the overdrafts are

generally due within two days after being borrowed. The carrying amounts of the Credit Lines and overdrafts approximate fair value due to the short maturities of these financial instruments.

The Company has capital leases at the Thermoplay and Männer businesses. The fair value of the capital leases are based on observable Level 2 inputs. These instruments are valued using discounted cash flows based upon the Company's estimated interest costs for similar types of borrowings.

At December 31, 2016 and 2015, the Company also had other foreign bank borrowings of \$1,416 and \$421, respectively. The fair value of the foreign bank borrowings was based on observable Level 2 inputs. These instruments were valued using discounted cash flows based upon the Company's estimated interest costs for similar types of borrowings.

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Long-term debt and notes payable as of December 31, 2016 are payable, based on the then current Agreement, as follows: \$32,892 in 2017, \$364,467 in 2018, \$838 in 2019, \$445 in 2020, \$528 in 2021 and \$101,784 thereafter. The 3.97% Senior Notes are due in 2024 according to their maturity date. Based on the execution of the Fourth Amendment, \$363,300 of the \$364,467 due in 2018 will require payment in 2022, consistent with the extension of the maturity date of this Amendment.

In addition, the Company had outstanding letters of credit totaling \$7,320 at December 31, 2016.

Interest paid was \$11,471, \$10,550 and \$10,471 in 2016, 2015 and 2014, respectively. Interest capitalized was \$324, \$422 and \$359 in 2016, 2015 and 2014, respectively, and is being depreciated over the lives of the related fixed assets.

During the second quarter of 2014, the 3.375% Senior Subordinated Convertible Notes ("Notes") were eligible for conversion due to meeting the conversion price eligibility requirement and on March 20, 2014, the Company formally notified the note holders that they were entitled to convert the Notes. On June 16, 2014, \$224 (par value) of the Notes were surrendered for conversion. On June 24, 2014, the Company exercised its right to redeem the remaining \$55,412 principal amount of the Notes, effective July 31, 2014. Of the total \$55,412 principal amount, \$7 of these Notes were redeemed with accrued interest through the redemption date. The remaining \$55,405 of these Notes were surrendered for conversion. The Company elected to pay cash to holders of the Notes surrendered for conversion, including the value of any residual shares of common stock that were payable to the holders electing to convert their notes into an equivalent share value, resulting in a total cash payment of \$70,497 including a premium on conversion of \$14,868 (reducing the equity component by \$9,326, net of tax of \$5,542). As a result of this transaction, the Company recaptured \$23,565 of previously deducted contingent convertible debt interest which resulted in an \$8,784 reduction in short-term deferred tax liabilities and a corresponding increase in current taxes payable included within accrued liabilities. The Company used borrowings under its Amended Credit Facility to finance the conversion of the Notes. The fair value of the Notes was previously determined using quoted market prices that represent Level 2 observable inputs. As of December 31, 2016 and 2015 there were no balances reflected on the balance sheet related to the Company's convertible notes.

The following table sets forth the components of interest expense for the Notes for the year ended December 31, 2014. The effective interest rate on the liability component of the Notes was 8.00% (life of the Notes).

	2014
Interest expense – 3.375% coupon	\$1,046
Interest expense – 3.375% debt discount amortization	731
	\$1,777

8. Business Reorganization

In 2014, the Company authorized the closure of production operations ("Saline operations") at its Associated Spring facility located in Saline, Michigan (the "Closure"). The Saline operations, which included approximately 50 employees, primarily manufactured certain automotive engine valve springs, a highly commoditized product. Based on changing market dynamics and increased customer demands for commodity pricing, several customers advised the Company of their intent to transition these specific springs to other suppliers, which led to the decision of the Closure. The Company recorded restructuring and related costs of \$6,020 during 2014. This included \$2,182 of employee termination costs, primarily employee severance expense and defined benefit pension and other postretirement plan (the "Plans") costs related to the accelerated recognition of actuarial losses and special termination benefits, and \$3,838 of other facility costs, primarily related to asset write-downs and depreciation on assets utilized

through the Closure. See Note 11 for costs associated with the Plans that were impacted by the Closure. The Closure was completed as of December 31, 2014. Closure costs were recorded primarily within Cost of Sales in the accompanying Consolidated Statements of Income and are reflected in the results of the Industrial segment.

9. Derivatives

The Company has manufacturing and sales facilities around the world and thus makes investments and conducts business transactions denominated in various currencies. The Company is also exposed to fluctuations in interest rates and commodity price changes. These financial exposures are monitored and managed by the Company as an integral part of its risk management program.

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Financial instruments have been used by the Company to hedge its exposures to fluctuations in interest rates. In 2012, the Company entered into five-year interest rate swap agreements transacted with three banks which together convert the interest on the first \$100,000 of the Company's one-month LIBOR-based borrowings from a variable rate plus the borrowing spread to a fixed rate of 1.03% plus the borrowing spread. These interest rate swap agreements were accounted for as cash flow hedges and remained in place at December 31, 2016.

The Company uses financial instruments to hedge its exposures to fluctuations in foreign currency exchange rates. The Company has various contracts outstanding which primarily hedge recognized assets or liabilities and anticipated transactions in various currencies including the Euro, British pound sterling, U.S. dollar, Canadian dollar, Japanese yen, Chinese renminbi, Singapore dollar, Korean won, Swedish kroner, Mexican peso and Swiss franc. Certain foreign currency derivative instruments are treated as cash flow hedges of forecasted transactions. All foreign exchange contracts are due within two years.

The Company does not use derivatives for speculative or trading purposes or to manage commodity exposures. Changes in the fair market value of derivatives that qualify as fair value hedges or cash flow hedges are recorded directly to earnings or accumulated other non-owner changes to equity, depending on the designation. Amounts recorded to accumulated other non-owner changes to equity are reclassified to earnings in a manner that matches the earnings impact of the hedged transaction. Any ineffective portion, or amounts related to contracts that are not designated as hedges, are recorded directly to earnings.

The Company's policy for classifying cash flows from derivatives is to report the cash flows consistent with the underlying hedged item. Other financing cash flows during the years ended December 31, 2016 and 2015, as presented on the consolidated statements of cash flows, include \$5,221 and \$10,309, respectively, of net cash proceeds from the settlement of foreign currency hedges related to intercompany financing.

The following table sets forth the fair value amounts of derivative instruments held by the Company as of December 31.

	2016		2015	
	Asset	Liability	Asset	Liability
	Derivatives	Derivatives	Derivatives	Derivatives
Derivatives designated as hedging instruments:				
Interest rate contracts	\$—	\$ (78)	\$—	\$ (357)
Foreign exchange contracts	—	(177)	484	—
	—	(255)	484	(357)
Derivatives not designated as hedging instruments:				
Foreign exchange contracts	397	(1,499)	215	(101)
Total derivatives	\$397	\$ (1,754)	\$699	\$ (458)

Asset derivatives are recorded in prepaid expenses and other current assets in the accompanying consolidated balance sheets. Liability derivatives related to interest rate contracts and foreign exchange contracts are recorded in other liabilities and accrued liabilities, respectively, in the accompanying consolidated balance sheets.

The following table sets forth the (loss) gain recorded in accumulated other comprehensive income (loss), net of tax, for the years ended December 31, 2016 and 2015 for derivatives held by the Company and designated as hedging instruments.

	2016	2015
Cash flow hedges:		
Interest rate contracts	\$ 174	\$(39)
Foreign exchange contracts	(516)	886
	\$(342)	\$847

Amounts included within accumulated other comprehensive income (loss) that were reclassified to expense during the year ended December 31, 2016 and 2015 related to the interest rate swaps resulted in a fixed rate of interest of 1.03% plus the borrowing spread for the first \$100,000 of one-month LIBOR borrowings. Additionally, there were no amounts recognized in income for hedge ineffectiveness during the years ended December 31, 2016 and 2015.

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The following table sets forth the net gains recorded in other expense (income), net in the consolidated statements of income for the years ended December 31, 2016 and 2015 for non-designated derivatives held by the Company. Such gains were substantially offset by losses recorded on the underlying hedged asset or liability.

	2016	2015
Foreign exchange contracts	\$2,297	\$8,215

10. Fair Value Measurements

The provisions of the accounting standard for fair value define fair value 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. This standard classifies the inputs used to measure fair value into the following hierarchy:

Level 1 Unadjusted quoted prices in active markets for identical assets or liabilities.

Level 2 Unadjusted quoted prices in active markets for similar assets or liabilities, or unadjusted quoted prices for identical or similar assets or liabilities in markets that are not active, or inputs other than quoted prices that are observable for the asset or liability.

Level 3 Unobservable inputs for the asset or liability.

The following table provides the assets and liabilities reported at fair value and measured on a recurring basis as of December 31, 2016 and 2015:

Total	Fair Value Measurements Using			
	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Observable Inputs (Level 2)	Other Inputs	Significant Unobservable Inputs (Level 3)
December 31, 2016				
Asset derivatives	\$397	\$—	\$ 397	\$ —
Liability derivatives	(1,754)	—	(1,754)	—
Bank acceptances	9,690	—	9,690	—
Rabbi trust assets	2,216	2,216	—	—
	\$10,549	\$2,216	\$ 8,333	\$ —
December 31, 2015				
Asset derivatives	\$699	\$—	\$ 699	\$ —
Liability derivatives	(458)	—	(458)	—
Bank acceptances	10,823	—	10,823	—
Rabbi trust assets	2,159	2,159	—	—
	\$13,223	\$2,159	\$ 11,064	\$ —

The derivative contracts are valued using observable current market information as of the reporting date such as the prevailing LIBOR-based interest rates and foreign currency spot and forward rates. Bank acceptances represent financial instruments accepted from certain Chinese customers in lieu of cash paid on receivables, generally range from 3 to 6 months in maturity and are guaranteed by banks. The carrying amounts of the bank acceptances, which are included within other current assets, approximate fair value due to their short maturities. The fair values of rabbi trust assets are based on quoted market prices from various financial exchanges. For disclosures of the fair values of the

Company's pension plan assets, see Note 11 of the Consolidated Financial Statements.

11. Pension and Other Postretirement Benefits

The accounting standards related to employers' accounting for defined benefit pension and other postretirement plans requires the Company to recognize the funded status of its defined benefit postretirement plans as assets or liabilities in the accompanying consolidated balance sheets and to recognize changes in the funded status of the plans in comprehensive income.

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The Company has various defined contribution plans, the largest of which is its Retirement Savings Plan. Most U.S. salaried and non-union hourly employees are eligible to participate in this plan. See Note 16 for further discussion of the Retirement Savings Plan. The Company also maintains various other defined contribution plans which cover certain other employees. Company contributions under these plans are based primarily on the performance of the business units and employee compensation. Contribution expense under these other defined contribution plans was \$5,907, \$5,347 and \$5,213 in 2016, 2015 and 2014, respectively.

Defined benefit pension plans in the U.S. cover a majority of the Company's U.S. employees at the Associated Spring and Nitrogen Gas Products businesses of Industrial, the Company's Corporate Office and certain former U.S. employees, including retirees. Plan benefits for salaried and non-union hourly employees are based on years of service and average salary. Plans covering union hourly employees provide benefits based on years of service. In 2012, the Company closed the U.S. salaried defined benefit pension plan (the "U.S. Salaried Plan") to employees hired on or after January 1, 2013, with no impact to the benefits of existing participants. Effective January 1, 2013, the Retirement Savings Plan was amended to provide certain salaried employees hired on or after January 1, 2013 with an additional annual retirement contribution of 4% of eligible earnings, in place of pensionable benefits under the closed U.S. Salaried Plan. The Company funds U.S. pension costs in accordance with the Employee Retirement Income Security Act of 1974, as amended ("ERISA"). Non-U.S. defined benefit pension plans cover certain employees of certain international locations in Europe and Canada.

The Company provides other medical, dental and life insurance postretirement benefits for certain of its retired employees in the U.S. and Canada. It is the Company's practice to fund these benefits as incurred.

The accompanying balance sheets reflect the funded status of the Company's defined benefit pension plans at December 31, 2016 and 2015, respectively. Reconciliations of the obligations and funded status of the plans follow:

	2016			2015		
	U.S.	Non-U.S.	Total	U.S.	Non-U.S.	Total
Benefit obligation, January 1	\$385,629	\$75,406	\$461,035	\$433,079	\$80,305	\$513,384
Service cost	3,892	1,503	5,395	4,160	1,348	5,508
Interest cost	17,523	1,971	19,494	17,967	2,052	20,019
Amendments	2,405	(174)	2,231	—	(463)	(463)
Actuarial loss (gain)	6,661	10,814	17,475	(16,622)	(2,288)	(18,910)
Benefits paid	(26,497)	(4,691)	(31,188)	(52,490)	(4,244)	(56,734)
Transfers in	—	25,968	25,968	—	3,951	3,951
Plan curtailments	—	—	—	(465)	—	(465)
Plan settlements	—	—	—	—	(375)	(375)
Participant contributions	—	1,444	1,444	—	368	368
Foreign exchange rate changes	—	(7,902)	(7,902)	—	(5,248)	(5,248)
Benefit obligation, December 31	389,613	104,339	493,952	385,629	75,406	461,035
Fair value of plan assets, January 1	326,829	68,553	395,382	380,937	71,750	452,687
Actual return on plan assets	13,051	7,276	20,327	(5,045)	1,264	(3,781)
Company contributions	17,877	2,224	20,101	3,427	1,100	4,527
Participant contributions	—	1,444	1,444	—	368	368
Benefits paid	(26,497)	(4,691)	(31,188)	(52,490)	(4,244)	(56,734)
Plan settlements	—	—	—	—	(376)	(376)
Transfers in	—	18,320	18,320	—	3,434	3,434
Foreign exchange rate changes	—	(7,474)	(7,474)	—	(4,743)	(4,743)

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Fair value of plan assets, December 31	331,260	85,652	416,912	326,829	68,553	395,382
Underfunded status, December 31	\$(58,353)	\$(18,687)	\$(77,040)	\$(58,800)	\$(6,853)	\$(65,653)

In September 2015, the Company announced a limited-time program offering (the "Program") to certain eligible, vested, terminated participants ("eligible participants") for a voluntary lump-sum pension payout or reduced annuity option (the "payout") that, if accepted, would settle the Company's pension obligation to them. The Program provided the eligible participants with a limited time opportunity of electing to receive a lump-sum settlement of their remaining pension benefit, or reduced annuity. The scheduled payments of \$27,986 were made in December 2015, and are included within the "Benefits Paid" of \$52,490 above. The payouts were funded by the assets of the Company's pension plan and therefore the Program did not require significant cash outflows by the Company. The resultant pre-tax settlement charge of \$9,856 represents accelerated

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amortization of actuarial losses and was reflected within costs of sales and selling and administrative expenses within the Consolidated Statements of Income.

Projected benefit obligations related to pension plans with benefit obligations in excess of plan assets follow:

	2016			2015		
	U.S.	Non-U.S.	Total	U.S.	Non-U.S.	Total
Projected benefit obligation	\$389,613	\$61,060	\$450,673	\$271,459	\$31,613	\$303,072
Fair value of plan assets	331,260	39,356	370,616	204,270	20,199	224,469

Information related to pension plans with accumulated benefit obligations in excess of plan assets follows:

	2016			2015		
	U.S.	Non-U.S.	Total	U.S.	Non-U.S.	Total
Projected benefit obligation	\$389,613	\$61,014	\$450,627	\$271,459	\$30,560	\$302,019
Accumulated benefit obligation	378,431	59,568	437,999	262,172	26,998	289,170
Fair value of plan assets	331,260	39,356	370,616	204,270	19,256	223,526

The accumulated benefit obligation for all defined benefit pension plans was \$481,241 and \$447,591 at December 31, 2016 and 2015, respectively.

Amounts related to pensions recognized in the accompanying balance sheets consist of:

	2016			2015		
	U.S.	Non-U.S.	Total	U.S.	Non-U.S.	Total
Other assets	\$—	\$3,017	\$3,017	\$8,389	\$4,561	\$12,950
Accrued liabilities	2,867	3,180	2,806	379	3,185	
Accrued retirement benefits	55,240	337	76,877	64,383	11,035	75,418
Accumulated other non-owner changes to equity, net	(91,530)	(19,458)	(110,988)	(83,014)	(16,812)	(99,826)

Amounts related to pensions recognized in accumulated other non-owner changes to equity, net of tax, at December 31, 2016 and 2015, respectively, consist of:

	2016			2015		
	U.S.	Non-U.S.	Total	U.S.	Non-U.S.	Total
Net actuarial loss	\$(89,772)	\$(19,822)	\$(109,594)	\$(82,643)	\$(16,999)	\$(99,642)
Prior service costs	(1,758)	364	(1,394)	(371)	187	(184)
	\$(91,530)	\$(19,458)	\$(110,988)	\$(83,014)	\$(16,812)	\$(99,826)

The accompanying balance sheets reflect the underfunded status of the Company's other postretirement benefit plans at December 31, 2016 and 2015. Reconciliations of the obligations and underfunded status of the plans follow:

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	2016	2015
Benefit obligation, January 1	\$41,706	\$46,814
Service cost	122	145
Interest cost	1,766	1,836
Actuarial gain	(3,495)	(2,521)
Benefits paid	(5,621)	(6,970)
Participant contributions	2,281	2,486
Foreign exchange rate changes	94	(84)
Benefit obligation, December 31	36,853	41,706
Fair value of plan assets, January 1	—	—
Company contributions	3,340	4,484
Participant contributions	2,281	2,486
Benefits paid	(5,621)	(6,970)
Fair value of plan assets, December 31	—	—
Underfunded status, December 31	\$36,853	\$41,706

Amounts related to other postretirement benefits recognized in the accompanying balance sheets consist of:

	2016	2015
Accrued liabilities	\$5,081	\$5,259
Accrued retirement benefits	31,772	36,447
Accumulated other non-owner changes to equity, net	(3,582)	(5,877)

Amounts related to other postretirement benefits recognized in accumulated other non-owner changes to equity, net of tax, at December 31, 2016 and 2015 consist of:

	2016	2015
Net actuarial loss	\$(3,532)	\$(6,061)
Prior service credits	(50)	184
	\$(3,582)	\$(5,877)

The sources of changes in accumulated other non-owner changes to equity, net, during 2016 were:

	Pension	Other Postretirement Benefits
Prior service cost	\$(1,334)	\$ —
Net (loss) gain	(18,378)	2,194
Amortization of prior service costs (credits)	142	(234)
Amortization of actuarial loss	7,030	332
Foreign exchange rate changes	1,378	3
	\$(11,162)	\$ 2,295

Weighted-average assumptions used to determine benefit obligations at December 31, are:

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	2016	2015
U.S. plans:		
Discount rate	4.50%	4.65%
Increase in compensation	2.56%	3.71%
Non-U.S. plans:		
Discount rate	1.60%	2.80%
Increase in compensation	2.29%	2.71%

The investment strategy of the plans is to generate a consistent total investment return sufficient to pay present and future plan benefits to retirees, while minimizing the long-term cost to the Company. Target allocations for asset categories are used to earn a reasonable rate of return, provide required liquidity and minimize the risk of large losses. Targets may be adjusted, as necessary, to reflect trends and developments within the overall investment environment. The weighted-average target investment allocations by asset category were as follows during 2016: 65% in equity securities, 30% in fixed income securities and 5% in other investments, including cash.

The fair values of the Company's pension plan assets at December 31, 2016 and 2015, by asset category are as follows:

Asset Category	Total	Fair Value Measurements Using		
		Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Observable Inputs (Level 2)	Significant Other Unobservable Inputs (Level 3)
December 31, 2016				
Cash and short-term investments	\$3,207	\$3,207	\$ —	\$ —
Equity securities:				
U.S. large-cap	39,162	—	39,162	—
U.S. mid-cap	12,724	12,724	—	—
U.S. small-cap	19,551	19,551	—	—
International equities	135,514	—	135,514	—
Global equity	47,445	47,445	—	—
Fixed income securities:				
U.S. bond funds	103,399	—	103,399	—
International bonds	53,783	—	53,783	—
Other	2,127	—	—	2,127
	\$416,912	\$82,927	\$ 331,858	\$ 2,127
December 31, 2015				
Cash and short-term investments	18,795	18,795	—	—
Equity securities:				
U.S. large-cap	67,274	28,190	39,084	—
U.S. mid-cap	38,790	38,790	—	—
U.S. small-cap	38,248	38,248	—	—
International equities	91,563	—	91,563	—
Global equity	17,928	17,928	—	—
Fixed income securities:				
U.S. bond funds	84,645	—	84,645	—
International bonds	36,282	—	36,282	—

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Other	1,857	—	—	1,857
	\$395,382	\$141,951	\$ 251,574	\$ 1,857

The fair values of the Level 1 assets are based on quoted market prices from various financial exchanges. The fair values of the Level 2 assets are based primarily on quoted prices in active markets for similar assets or liabilities. The Level 2 assets are comprised primarily of commingled funds and fixed income securities. Commingled equity funds are valued at their net

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asset values based on quoted market prices of the underlying assets. Fixed income securities are valued using a market approach which considers observable market data for the underlying asset or securities. The Level 3 assets relate to the defined benefit pension plan at the Synventive business. These pension assets are fully insured and have been estimated based on accrued pension rights and actuarial rates. These pension assets are limited to fulfilling the Company's pension obligations.

The Company expects to contribute approximately \$4,935 to the pension plans in 2017.

The following are the estimated future net benefit payments, which include future service, over the next 10 years:

	Pensions	Other Postretirement Benefits
2017	\$28,703	\$ 3,983
2018	28,577	3,352
2019	28,878	3,176
2020	28,810	3,294
2021	28,994	3,095
Years 2022-2026	144,566	12,906
Total	\$288,528	\$ 29,806

Pension and other postretirement benefit expenses consist of the following:

	Pensions			Other Postretirement Benefits		
	2016	2015	2014	2016	2015	2014
Service cost	\$5,395	\$5,508	\$4,546	\$122	\$145	\$139
Interest cost	19,494	20,019	22,026	1,766	1,836	2,179
Expected return on plan assets	(30,302)	(32,404)	(34,232)	—	—	—
Amortization of prior service cost (credit)	210	305	648	(373)	(564)	(871)
Recognized losses	10,791	15,004	8,617	535	1,011	1,017
Curtailment loss (gain)	—	—	219	—	—	4
Settlement loss	—	9,939	871	—	—	—
Special termination benefits	—	—	715	—	—	—
Net periodic benefit cost	\$5,588	\$18,371	\$3,410	\$2,050	\$2,428	\$2,468

The estimated net actuarial loss and prior service cost for the defined benefit pension plans that will be amortized from accumulated other non-owner changes to equity into net periodic benefit cost in 2017 are \$9,997 and \$441, respectively. The estimated net actuarial loss and prior service credit for other defined benefit postretirement plans that will be amortized from accumulated other non-owner changes to equity into net periodic benefit cost in 2017 are \$276 and \$(68), respectively.

Weighted-average assumptions used to determine net benefit expense for years ended December 31, are:

	2016	2015	2014
U.S. plans:			
Discount rate	4.65%	4.25%	5.20%

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Long-term rate of return	8.25%	8.25%	9.00%
Increase in compensation	3.71%	3.71%	3.72%
Non-U.S. plans:			
Discount rate	2.80%	2.74%	3.93%
Long-term rate of return	4.73%	5.00%	5.07%
Increase in compensation	2.71%	2.72%	2.76%

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The expected long-term rate of return is based on projected rates of return and the historical rates of return of published indices that are used to measure the plans' target asset allocation. The historical rates are then discounted to consider fluctuations in the historical rates as well as potential changes in the investment environment.

The Company's accumulated postretirement benefit obligations, exclusive of pensions, take into account certain cost-sharing provisions. The annual rate of increase in the cost of covered benefits (i.e., health care cost trend rate) is assumed to be 6.44% and 6.65% at December 31, 2016 and 2015, respectively, decreasing gradually to a rate of 4.50% by December 31, 2029. A one percentage point change in the assumed health care cost trend rate would have the following effects:

	One Percentage Point Increase	One Percentage Point Decrease
Effect on postretirement benefit obligation	\$ 319	\$ (295)
Effect on postretirement benefit cost	14	(13)

The Company actively contributes to a Swedish pension plan that supplements the Swedish social insurance system. The pension plan guarantees employees a pension based on a percentage of their salary and represents a multi-employer pension plan, however the pension plan was not significant in any year presented. This pension plan is not underfunded.

Contributions related to the individually insignificant multi-employer plans, as disclosure is required pursuant to the applicable accounting standards, are as follows:

	Contributions by the Company		
Pension Fund:	2016	2015	2014
Swedish Pension Plan (ITP2)	673	\$343	\$379
Total Contributions	\$673	\$343	\$379

12. Stock-Based Compensation

The Company accounts for the cost of all share-based payments, including stock options, by measuring the payments at fair value on the grant date and recognizing the cost in the results of operations. The fair values of stock options are estimated using the Black-Scholes option-pricing model based on certain assumptions. The fair values of service and performance based stock awards are estimated based on the fair market value of the Company's stock price on the grant date. The fair value of market based performance share awards are estimated using the Monte Carlo valuation method. Estimated forfeiture rates are applied to outstanding awards.

Refer to Note 16 for a description of the Company's stock-based compensation plans and their general terms. As of December 31, 2016, incentives have been awarded in the form of performance share awards and restricted stock unit awards (collectively, "Rights") and stock options. The Company has elected to use the straight-line method to recognize compensation costs. Stock options and awards typically vest over a period ranging from six months to five years. The maximum term of stock option awards is 10 years. Upon exercise of a stock option or upon vesting of Rights, shares may be issued from treasury shares held by the Company or from authorized shares.

In March 2016, the FASB amended its guidance related to the accounting for certain aspects of share-based payments to employees. The amended guidance requires that all tax effects related to share-based payments are recorded at settlement (or expiration) through the income statement, rather than through equity. Cash flows related to excess tax

benefits will no longer be separately classified as a financing activity apart from other income tax cash flows. The amended guidance also allows for an employer to repurchase additional employee shares for tax withholding purposes without requiring liability accounting and clarifies that all cash payments made to tax authorities on an employee's behalf for withheld shares should be presented as a financing activity on the Consolidated Statements of Cash Flows. The guidance also allows for a policy election to account for forfeitures as they occur, rather than accounting for them on an estimated basis. The guidance is effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2016. Early adoption is permitted.

The Company elected to early adopt this guidance in the third quarter of 2016. This adoption requires the Company to reflect any adjustments as of January 1, 2016, the beginning of the annual period that includes the interim period of adoption. The most significant impact of adoption was the recognition of excess tax benefits in the provision for income taxes rather than through equity for all periods in fiscal year 2016. This resulted in the recognition of excess tax benefits in the provision for income taxes of \$2,229 for the year ended December 31, 2016. In 2015 and 2014, the Company recorded \$2,667 and \$4,888,

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respectively, of excess tax benefits for current year tax deductions in additional paid-in capital, as was required pursuant to the earlier accounting guidance. In connection with the additional amendments within the amended guidance, the Company recognized state tax loss carryforwards in the amount of \$198, which impacted retained earnings as of January 1, 2016. The cumulative effect of this change is required to be recorded in retained earnings. The Company elected to continue to estimate forfeitures expected to occur to determine the amount of compensation cost to be recognized in each period.

The presentation requirements for cash flows related to excess tax benefits and employee taxes paid for withheld shares were applied retrospectively to all periods presented. This resulted in an increase in both net cash provided by operating activities and net cash used by financing activities of \$1,402, \$2,320, \$7,519 and \$7,580 for the three, six, nine and twelve month periods ended March 31, June 30, September 30 and December 31, 2015, respectively, and \$413 and \$524 for the three and six month periods ended March 31 and June 30, 2016, respectively.

During 2016, 2015 and 2014, the Company recognized \$11,493, \$9,258, and \$7,603 respectively, of stock-based compensation cost and \$4,284, \$3,451, and \$2,834 respectively, of related tax benefits in the accompanying consolidated statements of income. The Company has realized all available tax benefits related to deductions from excess stock awards exercised or issued in earlier periods. At December 31, 2016, the Company had \$12,519 of unrecognized compensation costs related to unvested awards which are expected to be recognized over a weighted average period of 2.01 years.

The following table summarizes information about the Company's stock option awards during 2016:

	Number of Shares	Weighted-Average Exercise Price
Outstanding, January 1, 2016	644,072	\$ 25.63
Granted	167,105	31.34
Exercised	(203,517)	20.56
Forfeited	(18,500)	36.22
Outstanding, December 31, 2016	589,160	28.67

The following table summarizes information about stock options outstanding at December 31, 2016:

Range of Exercise Prices	Options Outstanding			Options Exercisable	
	Number of Shares	Average Remaining Life (Years)	Average Exercise Price	Number of Shares	Average Exercise Price
\$11.45 to \$15.83	87,690	2.58	\$ 13.48	87,690	\$ 13.48
\$20.69 to \$24.24	76,584	5.10	22.65	76,584	22.65
\$26.32 to \$30.71	214,312	7.49	29.27	72,312	26.43
\$33.45 to \$38.96	210,574	7.91	36.57	82,350	36.83

The Company received cash proceeds from the exercise of stock options of \$4,184, \$11,022 and \$11,024 in 2016, 2015 and 2014, respectively. The total intrinsic value (the amount by which the stock price exceeds the exercise price of the option on the date of exercise) of the stock options exercised during 2016, 2015 and 2014 was \$4,464, \$8,331 and \$11,178, respectively.

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The weighted-average grant date fair value of stock options granted in 2016, 2015 and 2014 was \$7.01, \$8.86 and \$12.14, respectively. The fair value of each stock option grant on the date of grant was estimated using the Black-Scholes option-pricing model based on the following weighted average assumptions:

	2016	2015	2014
Risk-free interest rate	1.20%	1.58%	1.68%
Expected life (years)	5.3	5.3	5.3
Expected volatility	29.1%	31.1%	42.6%
Expected dividend yield	1.94%	2.06%	2.24%

The risk-free interest rate is based on the term structure of interest rates at the time of the option grant. The expected life represents an estimate of the period of time that options are expected to remain outstanding. Assumptions of expected volatility

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of the Company's common stock and expected dividend yield are estimates of future volatility and dividend yields based on historical trends.

The following table summarizes information about stock options outstanding that are expected to vest and stock options outstanding that are exercisable at December 31, 2016:

Options Outstanding, Expected to Vest				Options Outstanding, Exercisable			
Shares	Weighted-Average Exercise Price	Aggregate Intrinsic Value	Weighted-Average Remaining Term (Years)	Shares	Weighted-Average Exercise Price	Aggregate Intrinsic Value	Weighted-Average Remaining Term (Years)
568,820	\$ 28.67	\$ 10,667	6.60	318,936	\$ 24.65	\$ 7,263	4.85

The following table summarizes information about the Company's Rights during 2016:

	Service Based Rights		Service and Performance Based Rights		Service and Market Based Rights	
	Number of Units	Weighted-Average Grant Date Fair Value	Number of Units	Weighted-Average Grant Date Fair Value	Number of Units	Weighted-Average Grant Date Fair Value
Outstanding, January 1, 2016	401,706	\$ 30.51	214,426	\$ 31.29	107,213	\$ 48.37
Granted	154,903	32.22	62,070	31.32	62,069	48.84
Forfeited	(16,138)	34.23	(6,333)	37.61	(3,476)	31.46
Additional Earned	—	—	35,653	24.55	29,937	24.18
Issued	(193,167)	34.53	(133,774)	24.55	(78,997)	24.18
Outstanding, December 31, 2016	347,304		172,042		116,746	

The Company granted 154,903 restricted stock unit awards and 124,139 performance share awards in 2016. All of the restricted stock unit awards vest upon meeting certain service conditions. "Additional Earned" reflects performance share awards earned above target that have been issued. The performance share awards are part of the long-term Performance Share Award Program (the "Awards Program"), which is designed to assess the long-term Company performance relative to the performance of companies included in the Russell 2000 Index or to pre-established goals. The performance goals are independent of each other and based on three equally weighted metrics through 2015 and two equally weighted metrics in 2016. Prior to 2015, the metrics included the Company's total shareholder return ("TSR"), basic or diluted earnings per share growth ("EPS Growth") and operating income before depreciation and amortization growth. For awards granted in 2015, the metrics included TSR, operating income before depreciation and amortization growth and return on invested capital ("ROIC"). For awards granted in 2016, the metrics included only TSR and ROIC. The TSR, operating income before depreciation and amortization growth, and EPS Growth metrics are designed to assess the long-term Company performance relative to the performance of companies included in the Russell 2000 Index over a three year period. ROIC is designed to assess the Company's performance compared to pre-established goals over a three year performance period. The participants can earn from zero to 250% of the target award and the award includes a forfeitable right to dividend equivalents, which are not included in the aggregate target award numbers. Compensation expense for the awards is recognized over the three year service period based upon the value determined under the intrinsic value method for the basic or diluted earnings per share growth, operating income before depreciation and amortization growth and ROIC portions of the award and the Monte Carlo simulation valuation model for the TSR portion of the award since it contains a market condition. The weighted-average assumptions used to determine the weighted-average fair values of the market based portion of the 2016 awards include a 0.83% risk-free interest rate and a 22.9% expected volatility rate.

Compensation expense for the TSR portion of the awards is fixed at the date of grant and will not be adjusted in future periods based upon the achievement of the TSR performance goal. Compensation expense for the basic or diluted earnings per share growth or the return on invested capital, and the operating income before depreciation and amortization growth portions of the awards is recorded each period based upon a probability assessment of achieving the goals with a final adjustment at the end of the service period based upon the actual achievement of those performance goals.

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BARNES GROUP INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS—(Continued)

13. Income Taxes

The components of Income from continuing operations before income taxes and Income taxes follow:

	2016	2015	2014
Income from continuing operations before income taxes:			
U.S.	\$34,129	\$11,525	\$33,070
International	148,492	146,421	133,430
Income from continuing operations before income taxes	\$182,621	\$157,946	\$166,500
Income tax provision:			
Current:			
U.S. – federal	\$7,215	\$(210)	\$22,673
U.S. – state	755	2,019	1,236
International	41,516	32,217	35,954
	49,486	34,026	59,863
Deferred:			
U.S. – federal	\$6,091	\$7,670	\$(6,737)
U.S. – state	1,060	(1,137)	1,279
International	(9,617)	(3,993)	(8,446)
	(2,466)	2,540	(13,904)
Income taxes	\$47,020	\$36,566	\$45,959

Deferred income tax assets and liabilities at December 31 consist of the tax effects of temporary differences related to the following:

	2016	2015
Deferred tax assets:		
Pension	\$27,410	\$25,331
Tax loss carryforwards	16,686	15,330
Inventory valuation	15,518	15,938
Other postretirement/postemployment costs	14,071	15,753
Accrued Compensation	10,121	10,242
Other	6,489	5,880
Valuation allowance	(14,957)	(14,401)
Total deferred tax assets	75,338	74,073
Deferred tax liabilities:		
Depreciation and amortization	(89,198)	(81,158)
Goodwill	(14,871)	(14,545)
Other	(12,282)	(16,313)
Total deferred tax liabilities	(116,351)	(112,016)
Net deferred tax liabilities	\$(41,013)	\$(37,943)

In the first quarter of 2016, the Company prospectively adopted the amended guidance related to the balance sheet classification of deferred income taxes. The amended guidance removed the requirement to separate and classify deferred income tax liabilities and assets into current and non-current amounts and required an entity to now classify all deferred tax liabilities and assets as non-current. The provisions of the amended guidance were adopted on a prospective basis during the first quarter of 2016. Amounts related to deferred taxes in the balance sheets as of December 31, 2016 and 2015 are presented as follows:

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BARNES GROUP INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS—(Continued)

	2016	2015
Current deferred tax assets	\$—	\$24,825
Non-current deferred tax assets	25,433	1,139
Current deferred tax liabilities (included in accrued liabilities)	—	(1,543)
Non-current deferred tax liabilities	(66,446)	(62,364)
Net deferred tax liabilities	\$(41,013)	\$(37,943)

The standards related to accounting for income taxes require that deferred tax assets be reduced by a valuation allowance if, based on all available evidence, it is more likely than not that the deferred tax asset will not be realized. Available evidence includes the reversal of existing taxable temporary differences, future taxable income exclusive of temporary differences, taxable income in carryback years and tax planning strategies.

Management believes that sufficient taxable income should be earned in the future to realize the net deferred tax assets principally in the United States. The realization of these assets is dependent in part on the amount and timing of future taxable income in the jurisdictions where deferred tax assets reside. The Company has tax loss carryforwards of \$68,752; \$2,757 which relates to U.S tax loss carryforwards which have carryforward periods up to 18 years for federal purposes and ranging from one to 20 years for state purposes; \$55,882 of which relates to international tax loss carryforwards with carryforward periods ranging from one to 20 years; and \$10,113 of which relates to international tax loss carryforwards with unlimited carryforward periods. In addition, the Company has tax credit carryforwards of \$154 with remaining carryforward periods ranging from one year to 5 years. As the ultimate realization of the remaining net deferred tax assets is dependent upon future taxable income, if such future taxable income is not earned and it becomes necessary to recognize a valuation allowance, it could result in a material increase in the Company's tax expense which could have a material adverse effect on the Company's financial condition and results of operations.

The Company has not recognized a deferred income liability for U.S. taxes on \$1,081,352 of undistributed earnings of its international subsidiaries, since such earnings are considered to be reinvested indefinitely as defined per the indefinite reversal criterion within the accounting guidance for income taxes. If the earnings were distributed in the form of dividends, the Company would be subject, in certain cases, to both U.S. income taxes and foreign income and withholding taxes. Determination of the amount of this unrecognized deferred income tax liability is not practicable. During 2016, the Company repatriated a dividend from a portion of current year foreign earnings to the U.S. in the amount of \$8,328. As a result of the dividend, tax expense increased by \$2,890 and the 2016 annual consolidated effective income tax rate increased by 1.6 percentage points.

A reconciliation of the U.S. federal statutory income tax rate to the consolidated effective income tax rate from continuing operations follows:

	2016	2015	2014
U.S. federal statutory income tax rate	35.0 %	35.0 %	35.0 %
State taxes (net of federal benefit)	0.4	0.2	0.5
Foreign losses without tax benefit	0.7	1.1	1.1
Foreign operations taxed at lower rates	(10.9)	(12.9)	(9.9)
Repatriation from current year foreign earnings	1.6	4.3	2.6
Tax withholding refund	—	(1.9)	—
Tax Holidays	(1.2)	(3.2)	(2.7)
Stock awards excess tax benefit	(1.2)	—	—
Other	1.3	0.6	1.0

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Consolidated effective income tax rate 25.7 % 23.2 % 27.6 %

The Aerospace and Industrial Segments were previously awarded a number of multi-year tax holidays in both Singapore and China. Tax benefits of \$2,245 (\$0.04 per diluted share), \$5,000 (\$0.09 per diluted share) and \$4,513 (\$0.08 per diluted share) were realized in 2016, 2015 and 2014, respectively. These holidays are subject to the Company meeting certain commitments in the respective jurisdictions. The significant tax holidays are due to expire in 2017.

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS—(Continued)

Income taxes paid globally, net of refunds, were \$40,842, \$31,895 and \$33,146 in 2016, 2015 and 2014, respectively.

As of December 31, 2016, 2015 and 2014, the total amount of unrecognized tax benefits recorded in the consolidated balance sheet was \$13,320, \$10,634 and \$8,560, respectively, which, if recognized, would have reduced the effective tax rate in prior years, with the exception of amounts related to acquisitions. A reconciliation of the unrecognized tax benefits for 2016, 2015 and 2014 follows:

	2016	2015	2014
Balance at January 1	\$10,634	\$8,560	\$8,027
Increase (decrease) in unrecognized tax benefits due to:			
Tax positions taken during prior periods	—	1,691	533
Tax positions taken during the current period	117	—	—
Acquisition	2,569	598	—
Lapse of the applicable statute of limitations	—	(215)	—
Balance at December 31	\$13,320	\$10,634	\$8,560

The Company recognizes interest and penalties, if any, related to unrecognized tax benefits in income tax expense. The Company recognized interest and penalties as a component of income taxes of \$(337), \$616, and \$0 in the years 2016, 2015, and 2014 respectively. The liability for unrecognized tax benefits include gross accrued interest and penalties of \$1,838, \$1,923 and \$1,031 at December 31, 2016, 2015 and 2014, respectively.

The Company or its subsidiaries file income tax returns in the U.S. federal jurisdiction, and various state and foreign jurisdictions. In the normal course of business, the Company is subject to examination by various taxing authorities, including the IRS in the U.S. and the taxing authorities in other major jurisdictions including China, Germany, Singapore, Sweden and Switzerland. With a few exceptions, tax years remaining open to examination in significant foreign jurisdictions include tax years 2010 and forward and for the U.S. include tax years 2014 and forward. The Company is under audit in Germany for tax years 2010 to 2014 and is also under audit in several U.S. states for the period 2011 through 2013.

14. Common Stock

There were no shares of common stock issued from treasury in 2016, 2015 or 2014.

In 2016, 2015 and 2014, the Company acquired 550,994 shares, 1,352,596 shares and 220,794 shares, respectively, of the Company's common stock at a cost of \$20,520, \$52,103 and \$8,389, respectively. These amounts exclude shares reacquired to pay for the related income tax upon issuance of shares in accordance with the terms of the Company's stockholder-approved equity compensation plans and the equity rights granted under those plans ("Reacquired Shares"). These Reacquired Shares were placed in treasury.

In 2016, 2015 and 2014, 621,259 shares, 841,164 shares and 923,852 shares of common stock, respectively, were issued from authorized shares for the exercise of stock options, various other incentive awards and purchases by the Company's Employee Stock Purchase Plan.

15. Preferred Stock

At December 31, 2016 and 2015, the Company had 3,000,000 shares of preferred stock authorized, none of which were outstanding.

16. Stock Plans

Most U.S. salaried and non-union hourly employees are eligible to participate in the Company's 401(k) plan (the "Retirement Savings Plan"). The Retirement Savings Plan provides for the investment of employer and employee contributions in various investment alternatives including the Company's common stock, at the employee's direction. The Company contributes an amount equal to 50% of employee contributions up to 6% of eligible compensation. The Company expenses all contributions made to the Retirement Savings Plan. Effective January 1, 2013, the Retirement Savings Plan was amended to provide certain salaried employees hired on or after January 1, 2013 with an additional annual retirement contribution of 4% of eligible earnings. The Company recognized expense of \$3,660, \$3,666 and \$3,278 in 2016, 2015 and 2014, respectively. As of December 31, 2016, the Retirement Savings Plan held 1,226,034 shares of the Company's common stock.

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BARNES GROUP INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS—(Continued)

The Company has an Employee Stock Purchase Plan (“ESPP”) under which eligible employees may elect to have up to the lesser of \$25 or 10% of base compensation deducted from their payroll checks for the purchase of the Company’s common stock at 95% of the average market value on the date of purchase. The maximum number of shares which may be purchased under the ESPP is 4,550,000. The number of shares purchased under the ESPP was 11,804, 11,246 and 12,770 in 2016, 2015 and 2014, respectively. The Company received cash proceeds from the purchase of these shares of \$427, \$403 and \$436 in 2016, 2015 and 2014, respectively. As of December 31, 2016, 285,399 additional shares may be purchased.

The 1991 Barnes Group Stock Incentive Plan (the “1991 Plan”) authorized the granting of incentives to executive officers, directors and key employees in the form of stock options, stock appreciation rights, incentive stock rights and performance unit awards. On May 9, 2014, the 1991 Plan was merged into the 2014 Plan (defined below).

The Barnes Group Inc. Employee Stock and Ownership Program (the “2000 Plan”) was approved on April 12, 2000, and subsequently amended on April 10, 2002 by the Company’s stockholders. The 2000 Plan permitted the granting of incentive stock options, nonqualified stock options, restricted stock awards, performance share or cash unit awards and stock appreciation rights, or any combination of the foregoing, to eligible employees to purchase up to 6,900,000 shares of the Company’s common stock. Such shares were authorized and reserved. On May 9, 2014, the 2000 Plan was merged into the 2014 Plan (defined below).

The Barnes Group Stock and Incentive Award Plan (the “2004 Plan”) was approved on April 14, 2004, and subsequently amended on April 20, 2006 and May 7, 2010 by the Company’s stockholders. The 2004 Plan permits the issuance of incentive awards, stock option grants and stock appreciation rights to eligible participants to purchase up to 5,700,000 shares of common stock. On May 9, 2014, the 2004 Plan was merged into the 2014 Plan (defined below), and the remaining shares available for future grants under the 2004 Plan, as of the merger date, were made available under the 2014 Plan.

The 2014 Barnes Group Stock and Incentive Award Plan (the “2014 Plan”) was approved on May 9, 2014 by the Company's stockholders. The 2014 Plan permits the issuance of incentive awards, stock option grants and stock appreciation rights to eligible participants to purchase up to 6,913,978 shares of common stock. The amount includes shares available for purchase under the 1991, 2000, and 2004 Plans which were merged into the 2014 Plan. The 2014 Plan allows for stock options and stock appreciation rights to be issued at a ratio of 1:1 and other types of incentive awards at a ratio of 2.84:1 from the shares available for future grants. As of December 31, 2016, there were 6,108,925 shares available for future grants under the 2014 Plan, inclusive of Shares Reacquired and shares made available through 2016 forfeitures. As of December 31, 2016, there were 1,256,599 shares of common stock outstanding to be issued upon the exercise of stock options and the vesting of Rights.

Rights under the 2014 Plan entitle the holder to receive, without payment, one share of the Company’s common stock after the expiration of the vesting period. Certain of these Rights are also subject to the satisfaction of established performance goals. Additionally, holders of certain Rights are credited with dividend equivalents, which are converted into additional Rights, and holders of certain restricted stock units are paid dividend equivalents in cash when dividends are paid to other stockholders. All Rights have a vesting period of up to five years.

Under the Non-Employee Director Deferred Stock Plan, as amended, each non-employee director who joined the Board of Directors prior to December 15, 2005 was granted the right to receive 12,000 shares of the Company’s common stock upon retirement. In 2016, 2015 and 2014, \$21, \$26 and \$28, respectively, of dividend equivalents were paid in cash related to these shares. Compensation cost related to this plan was \$28, \$16 and \$16 in 2016, 2015 and

2014, respectively. There are 38,400 shares reserved for issuance under this plan. Each non-employee director who joined the Board of Directors subsequent to December 15, 2005 received restricted stock units under the respective 2004 or 2014 Plans that have a value of \$50 that vest three years after the date of grant.

Total maximum shares reserved for issuance under all stock plans aggregated 7,689,323 at December 31, 2016.

17. Weighted Average Shares Outstanding

Income from continuing operations and net income per common share is computed in accordance with accounting standards related to earnings per share. Basic earnings per share is calculated using the weighted-average number of common shares outstanding during the year. Share-based payment awards that entitle their holders to receive nonforfeitable dividends before vesting should be considered participating securities and, as such, should be included in the calculation of basic earnings

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BARNES GROUP INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS—(Continued)

per share. The Company's restricted stock unit awards which contain nonforfeitable rights to dividends are considered participating securities. Diluted earnings per share reflects the assumed exercise and conversion of all dilutive securities. Shares held by the Retirement Savings Plan are considered outstanding for both basic and diluted earnings per share. There are no significant adjustments to income from continuing operations and net income for purposes of computing income available to common stockholders for the years ended December 31, 2016, 2015 and 2014. A reconciliation of the weighted-average number of common shares outstanding used in the calculation of basic and diluted earnings per share follows:

	Weighted-Average Common Shares Outstanding		
	2016	2015	2014
Basic	54,191,013	55,028,063	54,791,030
Dilutive effect of:			
Stock options	166,986	206,778	355,595
Performance share awards	273,314	278,378	319,704
Convertible senior subordinated debt	—	—	245,230
Non-Employee Director Deferred Stock Plan	—	—	11,708
Diluted	54,631,313	55,513,219	55,723,267

The calculation of weighted-average diluted shares outstanding excludes all anti-dilutive shares. During 2016, 2015 and 2014, the Company excluded 262,336, 214,032 and 89,924 stock awards, respectively, from the calculation of diluted weighted-average shares outstanding as the stock awards were considered anti-dilutive.

On June 16, 2014, \$224 (par value) of the 3.375% Convertible Senior Subordinated Notes due in March 2027 (the "3.375% Convertible Notes") were surrendered for conversion. On June 24, 2014, the Company exercised its right to redeem the remaining \$55,412 principal amount of the Notes, effective July 31, 2014, and elected to pay cash to holders of the Notes surrendered for conversion, including the value of any residual shares of common stock that were payable to the holders electing to convert their notes into an equivalent share value. Accordingly, the potential shares issuable for the 3.375% Convertible Notes were included in diluted average common shares outstanding for the period prior to the June 24, 2014 notification date. Under the net share settlement method, there were 245,230 potential shares issuable under the Notes that were considered dilutive in 2014, respectively.

18. Changes in Accumulated Other Comprehensive Income by Component

The following tables set forth the changes in accumulated other comprehensive income by component for the years ended December 31, 2016 and December 31, 2015:

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	Gains and Losses on Cash Flow Hedges	Pension and Other Postretirement Benefit Items	Foreign Currency Items	Total
January 1, 2016	\$ 115	\$ (105,703)	\$ (37,664)	\$(143,252)
Other comprehensive loss before reclassifications to consolidated statements of income	(739)	(16,137)	(48,367)	(65,243)
Amounts reclassified from accumulated other comprehensive income to the consolidated statements of income	397	7,270	—	7,667
Net current-period other comprehensive loss	(342)	(8,867)	(48,367)	(57,576)
December 31, 2016	\$ (227)	\$ (114,570)	\$ (86,031)	\$(200,828)

	Gains and Losses on Cash Flow Hedges	Pension and Other Postretirement Benefit Items	Foreign Currency Items	Total
January 1, 2015	\$ (732)	\$ (115,289)	\$ 16,568	\$(99,453)
Other comprehensive loss before reclassifications to consolidated statements of income	(70)	(6,921)	(54,232)	(61,223)
Amounts reclassified from accumulated other comprehensive income to the consolidated statements of income	917	16,507	—	17,424
Net current-period other comprehensive income (loss)	847	9,586	(54,232)	(43,799)
December 31, 2015	\$ 115	\$ (105,703)	\$ (37,664)	\$(143,252)

The following table sets forth the reclassifications out of accumulated other comprehensive income by component for the years ended December 31, 2016 and December 31, 2015:

Details about Accumulated Other Comprehensive Income Components	Amount Reclassified from Accumulated Other Comprehensive Income		Affected Line Item in the Consolidated Statements of Income
	2016	2015	
Gains and losses on cash flow hedges			
Interest rate contracts	\$(557)	\$(853)	Interest expense
Foreign exchange contracts	(61)	(490)	Net sales
	(618)	(1,343)	Total before tax
	221	426	Tax benefit
	(397)	(917)	Net of tax
Pension and other postretirement benefit items			
Amortization of prior-service credits, net	\$ 163	\$ 259	(A)
Amortization of actuarial losses	(11,326)	(16,015)	(A)

Settlement loss	—	(9,939)	(A)
	(11,163)	(25,695)	Total before tax
	3,893	9,188	Tax benefit
	(7,270)	(16,507)	Net of tax

Total reclassifications in the period \$(7,667) \$(17,424)

(A) These accumulated other comprehensive income components are included within the computation of net periodic pension cost. See Note 11.

19. Information on Business Segments

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS—(Continued)

Industrial is a global manufacturer of highly-engineered, high-quality precision components, products and systems for critical applications serving a diverse customer base in end-markets such as transportation, industrial equipment, consumer products, packaging, electronics, medical devices, and energy. Focused on innovative custom solutions, Industrial participates in the design phase of components and assemblies whereby customers receive the benefits of application and systems engineering, new product development, testing and evaluation, and the manufacturing of final products. Products are sold primarily through its direct sales force and global distribution channels. Industrial's Molding Solutions businesses design and manufacture customized hot runner systems, advanced mold cavity sensors and process control systems, and precision high cavitation mold and cube mold assemblies - collectively, the enabling technologies for many complex injection molding applications. Industrial's Nitrogen Gas Products business manufactures nitrogen gas springs and manifold systems used to precisely control stamping presses. Industrial's Engineered Components businesses manufacture and supply precision mechanical products used in transportation and industrial applications, including mechanical springs, high-precision punched and fine-blanked components, and retention rings that position parts on a shaft or other axis. Engineered Components is equipped to produce many types of precision engineered springs, from fine hairsprings for electronics and instruments to large heavy-duty springs for machinery.

Industrial has a diverse customer base with products purchased by durable goods manufacturers located around the world in industries including transportation, consumer products, packaging, farm and mining equipment, telecommunications, medical devices, home appliances and electronics.

Industrial competes with a broad base of large and small companies engaged in the manufacture and sale of custom metal components, products and assemblies, precision molds, and hot runner systems. Industrial competes on the basis of quality, service, reliability of supply, engineering and technical capability, geographic reach, product breadth, innovation, design, and price. Industrial has manufacturing, distribution and assembly operations in the United States, Brazil, China, Germany, Italy, Mexico, Singapore, Sweden and Switzerland. Industrial also has sales and service operations in the United States, Brazil, Canada, Czech Republic, China/Hong Kong, France, Germany, India, Italy, Japan, Mexico, the Netherlands, Portugal, Singapore, Slovakia, South Africa, South Korea, Spain, Switzerland, Thailand and the United Kingdom.

Aerospace is a global provider of fabricated and precision-machined components and assemblies for original equipment manufacturer ("OEM") turbine engine, airframe and industrial gas turbine builders, and the military. The Aerospace aftermarket business provides jet engine component maintenance repair and overhaul ("MRO") services, including our Component Repair Programs ("CRPs"), for many of the world's major turbine engine manufacturers, commercial airlines and the military. The Aerospace aftermarket activities also include the manufacture and delivery of aerospace aftermarket spare parts, including the revenue sharing programs ("RSPs") under which the Company receives an exclusive right to supply designated aftermarket parts over the life of the related aircraft engine program. Aerospace's OEM business supplements the leading jet engine OEM capabilities and competes with a large number of fabrication and machining companies. Competition is based mainly on quality, engineering and technical capability, product breadth, new product introduction, timeliness, service and price. Aerospace's fabrication and machining operations, with facilities in Arizona, Connecticut, Michigan, Ohio, Utah and Singapore, produce critical engine and airframe components through technically advanced manufacturing processes.

The Aerospace aftermarket business supplements jet engine OEMs' maintenance, repair and overhaul capabilities, and competes with the service centers of major commercial airlines and other independent service companies for the repair and overhaul of turbine engine components. The manufacture and supply of aerospace aftermarket spare parts, including those related to the RSPs, are dependent upon the reliable and timely delivery of high-quality components. Aerospace's aftermarket facilities, located in Connecticut, Ohio and Singapore, specialize in the repair and refurbishment of highly engineered components and assemblies such as cases, rotating life limited parts, rotating air

seals, turbine shrouds, vanes and honeycomb air seals.

The Company evaluates the performance of its reportable segments based on the operating profit of the respective businesses, which includes net sales, cost of sales, selling and administrative expenses and certain components of other expense (income), net, as well as the allocation of corporate overhead expenses.

Sales between the business segments and between the geographic areas in which the businesses operate are accounted for on the same basis as sales to unaffiliated customers. Additionally, revenues are attributed to countries based on the location of facilities.

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BARNES GROUP INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS—(Continued)

The following table (in millions) sets forth summarized financial information by reportable business segment:

	Industrial	Aerospace	Other	Total Company
Sales				
2016	\$ 824.2	\$ 406.5	\$—	\$ 1,230.8
2015	782.3	411.7	—	1,194.0
2014	822.1	440.0	—	1,262.0
Operating profit				
2016	\$ 129.7	\$ 62.5	\$—	\$ 192.2
2015	103.0	65.4	—	168.4
2014	108.4	71.6	—	180.0
Assets				
2016	\$ 1,356.1	\$ 647.8	\$ 133.7	\$ 2,137.5
2015	1,241.2	654.1	166.5	2,061.9
2014	1,282.0	655.0	136.9	2,073.9
Depreciation and amortization				
2016	\$ 49.5	\$ 30.0	\$ 0.7	\$ 80.2
2015	46.0	30.8	1.3	78.2
2014	54.7	24.9	1.8	81.4
Capital expenditures				
2016	\$ 25.9	\$ 21.1	\$ 0.5	\$ 47.6
2015	28.7	17.2	0.1	46.0
2014	36.1	20.9	0.4	57.4

Notes:

One customer, General Electric, accounted for 17%, 18% and 19% of the Company's total revenues in 2016, 2015 and 2014, respectively.

"Other" assets include corporate-controlled assets, the majority of which are cash and deferred tax assets.

A reconciliation of the total reportable segments' operating profit to income from continuing operations before income taxes follows (in millions):

	2016	2015	2014
Operating profit	\$ 192.2	\$ 168.4	\$ 180.0
Interest expense	11.9	10.7	11.4
Other expense (income), net	(2.3)	(0.2)	2.1
Income from continuing operations before income taxes	\$ 182.6	\$ 157.9	\$ 166.5

The following table (in millions) summarizes total net sales of the Company by products and services:

	2016	2015	2014
Engineered Components Products	\$ 332.6	\$ 342.2	\$ 373.1
Molding Solutions Products	376.6	324.6	322.7
Nitrogen Gas Products	115.0	115.5	126.2
Aerospace Original Equipment Manufacturing Products	288.4	295.7	329.6
Aerospace Aftermarket Products and Services	118.2	116.0	110.4

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Total net sales \$1,230.8 \$1,194.0 \$1,262.0

The following table (in millions) summarizes total net sales of the Company by geographic area:

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS—(Continued)

	Domestic	International	Other	Total Company
Sales				
2016	\$ 562.6	\$ 727.4	\$(59.2)	\$ 1,230.8
2015	589.6	661.7	(57.3)	1,194.0
2014	618.9	677.6	(34.5)	1,262.0
Long-lived assets				
2016	\$ 368.2	\$ 1,135.5	\$—	\$ 1,503.6
2015	379.2	1,069.9	—	1,449.1
2014	380.6	1,094.9	—	1,475.4

Notes:

Germany, with sales of \$238.3 million, \$210.5 million and \$249.9 million in 2016, 2015 and 2014, respectively, represents the only international country with revenues in excess of 10% of the Company's total revenues.

“Other” revenues represent the elimination of intercompany sales between geographic locations, of which approximately 82% were sales from international locations to domestic locations.

Germany, with long-lived assets of \$449.9 million, \$362.7 million and \$410.0 million in 2016, 2015 and 2014, respectively, Singapore, with long-lived assets of \$238.3 million, \$246.4 million and \$255.3 million in 2016, 2015 and 2014, respectively, Switzerland, with long-lived assets of \$169.3 million, \$167.0 million and \$165.7 million in 2016, 2015 and 2014, respectively and China with long-lived assets of \$151.7 million in 2014, represent the only international countries that exceeded 10% of the Company's total long-lived assets in those years.

20. Commitments and Contingencies

Leases

The Company has various noncancellable operating leases for buildings, office space and equipment. Rent expense was \$12,939, \$11,166 and \$12,745 for 2016, 2015 and 2014, respectively. Minimum rental commitments under noncancellable leases in years 2017 through 2021 are \$7,882, \$6,321, \$4,271, \$3,740 and \$3,430, respectively, and \$7,811 thereafter. The rental expense and minimum rental commitments of leases with step rent provisions are recognized on a straight-line basis over the lease term.

Product Warranties

The Company provides product warranties in connection with the sale of certain products. From time to time, the Company is subject to customer claims with respect to product warranties. Liabilities related to product warranties and extended warranties were not material as of December 31, 2016 or 2015.

Contract Matters

In November 2016, the Company's previously disclosed arbitration with Triumph Actuation Systems - Yakima, LLC ("Triumph") was concluded. The Company was awarded \$9,212, plus interest on the judgment of \$1,415, which amounts were received on January 3, 2017. The outcome did not have a material impact on the Company's consolidated financial position, liquidity or consolidated results of operations.

21. Accounting Changes

In March 2016, the FASB amended its guidance related to the accounting for certain aspects of share-based payments to employees. The amended guidance requires that all tax effects related to share-based payments are recorded at settlement (or expiration) through the income statement, rather than through equity. Cash flows related to excess tax benefits will no longer be separately classified as a financing activity apart from other income tax cash flows. The amended guidance also allows for an employer to repurchase additional employee shares for tax withholding purposes without requiring liability accounting and clarifies that all cash payments made to tax authorities on an employee's behalf for withheld shares should be presented as a financing activity on the Consolidated Statements of Cash Flows. The guidance is effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2016. Early adoption is permitted, and the Company elected to early adopt in the third quarter of 2016. See Note 12 of the Consolidated Financial Statements for additional details related to the Company's adoption of this amended guidance.

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BARNES GROUP INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS—(Continued)

In November 2015, the FASB amended its guidance related to the balance sheet classification of deferred income taxes. The amended guidance removes the requirement to separate and classify deferred income tax liabilities and assets into current and non-current amounts and requires an entity to now classify all deferred tax liabilities and assets as non-current. The amended guidance can be adopted either on a prospective or retrospective basis and is effective for interim and annual periods beginning after December 15, 2016. Early adoption is permitted. The provisions of the amended guidance were adopted on a prospective basis during the first quarter of 2016. The provisions resulted in the classification of \$26,639 and \$1,290 of current deferred income tax assets and liabilities, respectively, into non-current deferred income tax assets and liabilities on the Consolidated Balance Sheet as of December 31, 2016.

In April 2015, the FASB amended its guidance related to the presentation of debt issuance costs. The amended guidance specifies that debt issuance costs related to notes shall be reported in the balance sheet as a direct deduction from the face amount of that note and that amortization of debt issuance costs shall be reported as interest expense. The amended guidance is effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2015 and should be applied retrospectively. The Company adopted the guidance during the first quarter of 2016 and it did not have a material impact on its Consolidated Financial Statements.

22. Subsequent Event

On February 2, 2017, the Company entered into the fourth amendment of its fifth amended and restated revolving credit agreement (the “the Fourth Amendment”) and retained Bank of America, N.A as the Administrative Agent for the lenders. The Fourth Amendment increases the facility to \$850,000 and extends the maturity date to February 2022. The Fourth Amendment also increases the existing accordion feature, allowing the Company to request additional borrowings of up to \$350,000. The Company may exercise the accordion feature upon request to the Administrative Agent as long as an event of default has not occurred or is not continuing. The borrowing availability of \$850,000, pursuant to the terms of the Fourth Amendment, allow for multi- currency borrowing which includes euro, sterling or Swiss franc borrowing, up to \$600,000. Depending on the Company’s consolidated leverage ratio, and at the election of the Company, borrowings under the Fourth Amendment will bear interest at either LIBOR plus a margin of between 1.10% and 1.70% or the base rate plus a margin of 0.10% to 0.70%. See Footnote 7 of the Consolidated Financial Statements.

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Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of Barnes Group Inc.:

In our opinion, the accompanying consolidated balance sheets and the related consolidated statements of income, of comprehensive income, of changes in stockholders' equity and of cash flows present fairly, in all material respects, the financial position of Barnes Group Inc. and its subsidiaries (the "Company") at December 31, 2016 and 2015, and the results of their operations and their cash flows for each of the three years in the period ended December 31, 2016 in conformity with accounting principles generally accepted in the United States of America. In addition, in our opinion, the financial statement schedule listed in the accompanying index appearing under item 15(a)(2) presents fairly, in all material respects, the information set forth therein when read in conjunction with the related consolidated financial statements. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2016, based on criteria established in Internal Control - Integrated Framework 2013 issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). The Company's management is responsible for these financial statements and financial statement schedule, 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 these financial statements, on the financial statement schedule, and on the Company's internal control over financial reporting based on our integrated audits. We conducted our audits in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the financial statements are free of material misstatement and whether effective internal control over financial reporting was maintained in all material respects. Our audits of the financial statements included examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements, assessing the accounting principles used and significant estimates made by management, and evaluating the overall financial statement presentation. 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.

As discussed in Note 12 and Note 21 to the consolidated financial statements, the Company changed the manner in which it accounts for share based compensation due to the adoption of ASU 2016-09, Improvements to Employee Share Based Payment Accounting in 2016. As discussed in Note 13 and Note 21 to the consolidated financial statements, the Company changed the manner in which it accounts for the classification of deferred taxes due to the adoption of ASU 2015-17, Balance Sheet Classification of Deferred Taxes in 2016.

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.

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As described in Management's Report on Internal Control over Financial Reporting appearing under item 9A, management has excluded FOBOHA from its assessment of internal control over financial reporting as of December 31, 2016 because it was acquired by the Company in a purchase business combination during 2016. We have also excluded FOBOHA from our audit of internal control over financial reporting. FOBOHA is a wholly-owned subsidiary whose total assets and total net sales represent 3% and 1%, respectively, of the related consolidated financial statement amounts as of and for the year ended December 31, 2016.

/s/ PRICEWATERHOUSECOOPERS LLP

Hartford, Connecticut

February 21, 2017

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QUARTERLY DATA (UNAUDITED)

(Dollars in millions, except per share data)

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Full Year
2016					
Net sales	\$ 288.3	\$ 306.7	\$ 311.6	\$ 324.2	\$ 1,230.8
Gross profit ⁽¹⁾	102.1	109.5	113.0	115.9	440.5
Operating income	41.5	47.5	51.8	51.4	192.2
Net income	28.8	33.2	36.8	36.7	135.6
Per common share:					
Basic	0.53	0.61	0.68	0.68	2.50
Diluted	0.53	0.61	0.67	0.67	2.48
Dividends	0.12	0.13	0.13	0.13	0.51
Market prices (high - low)	\$35.81-30.07	\$37.75-31.13	\$41.86-32.55	\$49.90-37.88	\$49.90-30.07
2015					
Net sales	\$ 300.6	\$ 314.9	\$ 291.4	\$ 287.0	\$ 1,194.0
Gross profit ⁽¹⁾	102.2	110.8	100.3	97.8	411.2
Operating income	43.9	50.6	43.7	30.1	168.4
Net income	29.1	34.2	33.7	24.4	121.4
Per common share:					
Basic	0.53	0.62	0.61	0.45	2.21
Diluted	0.52	0.61	0.61	0.44	2.19
Dividends	0.12	0.12	0.12	0.12	0.48
Market prices (high - low)	\$41.00-33.75	\$41.74-38.75	\$41.78-35.33	\$39.74-33.00	\$41.78-33.00

⁽¹⁾Sales less cost of sales.

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

None.

Item 9A. Controls and Procedures

Disclosure Controls and Procedures

Management, including the Company's President and Chief Executive Officer and Chief Financial Officer, has evaluated the effectiveness of the design and operation of the Company's disclosure controls and procedures as of the end of the period covered by this report. We completed the acquisition of FOBOHA on August 31, 2016 and it represented approximately 3% and 1% of our total assets and total net sales, respectively, as of and for the year ended December 31, 2016. In accordance with applicable SEC guidance, the scope of our assessment of the effectiveness of disclosure controls and procedures does not include FOBOHA as it was not practical to do so given the date of acquisition. Based upon, and as of the date of, our evaluation, the President and Chief Executive Officer and Chief Financial Officer concluded that the disclosure controls and procedures were effective, in all material respects and designed to provide reasonable assurance that information required to be disclosed in the reports the Company files and submits under the Securities Exchange Act of 1934, as amended, is (i) recorded, processed, summarized and reported as and when required and (ii) is accumulated and communicated to the Company's management, including our President and Chief Executive Officer and Chief Financial Officer, as appropriate to allow timely decisions

regarding required disclosure.

Management's Report on Internal Control Over Financial Reporting

Management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Exchange Act Rule 13a-15(f). We completed the acquisition of FOBOHA on August 31, 2016 and it represented approximately 3% and 1% of our total assets and total net sales, respectively, as of and for the year ended December 31, 2016. In accordance with applicable SEC guidance, the scope of our assessment of the effectiveness of internal control over financial reporting does not include FOBOHA as it was not practical to do so given the date of acquisition. Under

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the supervision and with the participation of management, including the principal executive officer and principal financial officer, the Company conducted an assessment of the effectiveness of its internal control over financial reporting based on the framework in the “Internal Control - Integrated Framework 2013” issued by the Committee of Sponsoring Organizations of the Treadway Commission. Based on the assessment under this framework, management concluded that the Company’s internal control over financial reporting was effective as of December 31, 2016.

PricewaterhouseCoopers LLP, the independent registered public accounting firm that audited the financial statements included in this Annual Report, has issued an attestation report on the Company’s internal control over financial reporting as of December 31, 2016, which appears on page 70 of this Annual Report on Form 10-K.

Changes in Internal Control Over Financial Reporting

There has been no change to our internal control over financial reporting during the Company’s fourth fiscal quarter that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

Item 9B. Other Information

None.

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PART III

Item 10. Directors, Executive Officers and Corporate Governance

Information with respect to our directors and corporate governance may be found in the “Governance” and “Stock Ownership” sections of our definitive proxy statement to be delivered to stockholders in connection with the Annual Meeting of Stockholders to be held on May 5, 2017 (the “Proxy Statement”). Such information is incorporated herein by reference.

EXECUTIVE OFFICERS

The Company’s executive officers as of the date of this Annual Report are as follows:

Executive Officer	Position	Age as of December 31, 2016
Patrick J. Dempsey	President and Chief Executive Officer	52
Michael A. Beck	Senior Vice President, Barnes Group Inc., and President, Barnes Aerospace	56
James P. Berklas, Jr.	Senior Vice President, General Counsel and Secretary	45
Dawn N. Edwards	Senior Vice President, Human Resources	48
Scott A. Mayo	Senior Vice President, Barnes Group Inc., and President, Barnes Industrial	49
Christopher J. Stephens, Jr.	Senior Vice President, Finance and Chief Financial Officer	52

Each officer holds office until his or her successor is appointed and qualified or otherwise as provided in the Company’s Amended and Restated By-Laws. No family relationships exist among the executive officers of the Company. Except for Messrs. Beck, Berklas and Mayo, each of the Company’s executive officers has been employed by the Company or its subsidiaries in an executive or managerial capacity for at least the past five years.

Mr. Dempsey was appointed President and Chief Executive Officer effective March 1, 2013. From February 2012 until such appointment, he served as Senior Vice President and Chief Operating Officer. From October 2008 until February 2012, he served as Vice President, Barnes Group Inc. and President, Logistics and Manufacturing Services. Prior to that, he held a series of roles of increasing responsibility since joining the Company in October 2000. In October 2007, he was appointed Vice President, Barnes Group Inc. and President, Barnes Distribution. In November 2004, he was promoted to Vice President, Barnes Group Inc. and President, Barnes Aerospace. Mr. Dempsey is currently a director of Nucor Corporation, having been appointed as of December 1, 2016.

Mr. Beck was appointed Senior Vice President, Barnes Group Inc. and President, Barnes Aerospace effective March 1, 2016. Mr. Beck came to Barnes Group with over 27 years of global aerospace experience. Prior to joining Barnes Group, Mr. Beck was the Senior Vice President & General Manager, Fuel and Motion Control, a \$1B division of Eaton’s Aerospace Group. Prior to this, he was the Chief Executive Officer of GKN’s Aerospace Engine Systems business, where he led the due diligence, business synergies and integration of a significant acquisition. Prior to that,

he was the President and Chief Executive Officer of GKN's global Propulsion Systems and Special Products business. Earlier in his career, Mr. Beck was the Chief Operating Officer and Site Executive for GKN's St. Louis, Missouri business.

Mr. Berklas was appointed Senior Vice President, General Counsel and Secretary, effective August 1, 2015. Before joining the Company, from 2008 to 2015, Mr. Berklas served in a variety of positions at the global nutrition company, Herbalife Ltd, most recently as Senior Vice President, Associate General Counsel, Chief Compliance Officer and Associate Corporate Secretary. Prior to that, from 2005 to 2008, Mr. Berklas served as General Counsel and Corporate Secretary for Marietta Corporation, a personal care products company. From 2006 to 2008, he also served as the Senior Vice President and Hotel Division General Manager for Marietta's hotel product division.

Ms. Edwards was appointed Senior Vice President, Human Resources effective August 2009. From December 2008 until August 2009, she served as Vice President of Human Resources - Global Operations. From September 1998

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until December 2008, Ms. Edwards served as Group Director, Human Resources for Barnes Aerospace, Associated Spring and Barnes Industrial. Ms. Edwards joined the Company in September 1998.

Mr. Mayo was appointed Senior Vice President, Barnes Group Inc. and President, Barnes Industrial effective March 17, 2014. Before joining the Company, from 2012 to 2014, Mr. Mayo served as Vice President and General Manager, Power Sector, Flow Control, a division of Flowserve Corporation. From 2010 to 2012, he served as Vice President and General Manager, General Industries Sector, Flow Control Division. From 2009 to 2010, he served as Vice President, Marketing for the Flow Control Division. Prior to that, from 2002 to 2008, Mr. Mayo held a series of roles including General Manager, Flow Control Division China based in Shanghai, China; Director, Marketing, Flow Control Division, based in Raleigh, NC; Director and General Manager, Aftermarket, Raleigh, NC; and Director, Strategic Planning and Business Development, also based in Raleigh, NC.

Mr. Stephens was appointed Senior Vice President, Finance and Chief Financial Officer, Barnes Group Inc. effective January 2009. Prior to joining the Company, Mr. Stephens held key leadership roles at Honeywell International, serving as President of the Consumer Products Group from 2007 to 2008, and Vice President and Chief Financial Officer of Honeywell Transportation Systems from 2003 to 2007. Prior to Honeywell, he held roles with increasing responsibility at The Boeing Company, serving as Vice President and General Manager, Boeing Electron Dynamic Devices; Vice President, Business Operations, Boeing Space and Communications; and Vice President and Chief Financial Officer, Boeing Satellite Systems.

Items 11-14.

The information called for by Items 11-14 is incorporated by reference to the "Governance," "Stock Ownership," "Executive Compensation," "Director Compensation in 2016," "Securities Authorized for Issuance Under Equity Compensation Plans," "Related Person Transactions," and "Principal Accountant Fees and Services" sections in our Proxy Statement.

PART IV

Item 15. Exhibits, Financial Statement Schedule

(a)(1) The following Financial Statements and Supplementary Data of the Company are set forth herein under Item 8 of this Annual Report:

Consolidated Statements of Income for the years ended December 31, 2016, 2015 and 2014

Consolidated Balance Sheets as of December 31, 2016 and 2015

Consolidated Statements of Comprehensive Income for the years ended December 31, 2016, 2015 and 2014

Consolidated Statements of Cash Flows for the years ended December 31, 2016, 2015 and 2014

Consolidated Statements of Changes in Stockholders' Equity for the years ended December 31, 2016, 2015 and 2014

Notes to Consolidated Financial Statements

Report of Independent Registered Public Accounting Firm

(a)(2) See Financial Statement Schedule under Item 15(c).

(a)(3) See Item 15(b) below.

(b) The Exhibits required by Item 601 of Regulation S-K are filed as Exhibits to this Annual Report and indexed at pages 81 through 85 of this Annual Report, which index is incorporated herein by reference.

(c) Financial Statement Schedule.

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Item 16. Form 10-K Summary

None.

Schedule II—Valuation and Qualifying Accounts
 Years Ended December 31, 2016, 2015 and 2014
 (In thousands)

Allowances for Doubtful Accounts:

Balance January 1, 2014	\$3,438
Provision charged to income	1,523
Doubtful accounts written off	(493)
Other adjustments ⁽¹⁾	(595)
Balance December 31, 2014	3,873
Provision charged to income	1,248
Doubtful accounts written off	(404)
Other adjustments ⁽¹⁾	(632)
Balance December 31, 2015	4,085
Provision charged to income	863
Doubtful accounts written off	(910)
Other adjustments ⁽¹⁾	(46)
Balance December 31, 2016	\$3,992

(1) These amounts are comprised primarily of foreign currency translation and other reclassifications.

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Schedule II—Valuation and Qualifying Accounts
 Years Ended December 31, 2016, 2015 and 2014
 (In thousands)

Valuation Allowance on Deferred Tax Assets:	
Balance January 1, 2014	\$18,873
Additions charged to income tax expense	1,049
Additions charged to other comprehensive income	(30)
Reductions credited to income tax expense	(2,303)
Changes due to foreign currency translation	(1,733)
Balance December 31, 2014	15,856
Additions charged to income tax expense	1,043
Reductions charged to other comprehensive income	(59)
Reductions credited to income tax expense	(1,216)
Changes due to foreign currency translation	(2,204)
Acquisitions ⁽¹⁾	981
Balance December 31, 2015	14,401
Additions charged to income tax expense	759
Reductions charged to other comprehensive income	(17)
Reductions credited to income tax expense ⁽²⁾	(5,638)
Changes due to foreign currency translation	(133)
Acquisition ⁽³⁾	5,585
Balance December 31, 2016	\$14,957

(1) The increase in 2015 reflects the valuation allowances recorded at the Thermoplay and Priamus businesses which were acquired in the third and fourth quarters of 2015, respectively.

(2) The reductions in 2016 relate primarily to net operating losses that were fully valued. These net operating losses have subsequently expired during 2016 (lapse of applicable carry forward periods) and the corresponding valuation allowance was reduced accordingly.

(3) The increase in 2016 reflects the valuation allowance recorded at the FOBOHA business, which was acquired in the third quarter of 2016.

SIGNATURES

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

Date: February 21, 2017

BARNES GROUP INC.

By /S/ PATRICK J. DEMPSEY
Patrick J. Dempsey
President and Chief Executive Officer

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below as of the above date by the following persons on behalf of the Company in the capacities indicated.

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/S/ PATRICK J. DEMPSEY

Patrick J. Dempsey
President and Chief Executive Officer
(Principal Executive Officer), and Director

/S/ CHRISTOPHER J. STEPHENS, JR.

Christopher J. Stephens, Jr.
Senior Vice President, Finance
Chief Financial Officer
(Principal Financial Officer)

/S/ MARIAN ACKER

Marian Acker
Vice President, Controller
(Principal Accounting Officer)

/S/ THOMAS O. BARNES

Thomas O. Barnes
Director

/S/ ELIJAH K. BARNES

Elijah K. Barnes
Director

/S/ GARY G. BENANAV

Gary G. Benanav
Director

/S/ THOMAS J. HOOK

Thomas J. Hook
Director

/S/ MYLLE H. MANGUM

Mylle H. Mangum
Director

/S/ HANS-PETER MÄNNER

Hans-Peter Männer
Director

/S/ HASSELL H. MCCLELLAN

Hassell H. McClellan

Director

/S/ WILLIAM J. MORGAN

William J. Morgan

Director

/S/ JOANNA L. SOHOVICH

JoAnna L. Sohovich

Director

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EXHIBIT INDEX

Barnes Group Inc.

Annual Report on Form 10-K
for the Year ended December 31, 2016

Exhibit No.	Description	Reference
2.1*	Asset Purchase Agreement dated February 22, 2013 between the Company and MSC Industrial Direct Co., Inc.	Incorporated by reference to Exhibit 2.1 to the Company's report on Form 10-Q for the quarter ended March 31, 2013.
2.2*	Share Purchase and Assignment Agreement dated September 30, 2013 among the Company, two of its subsidiaries, Otto Männer Holding AG (the "Seller"), and the three shareholders of Seller.	Incorporated by reference to Exhibit 2.1 to Form 8-K filed by the Company on October 4, 2013.
3.1	Restated Certificate of Incorporation; Certificate of Designation, Preferences and Rights of Series A Junior Participating Preferred Stock; Certificate of Change of Location of registered office and of registered agent, dated December 13, 2002; Certificate of Merger of domestic limited liability company into a domestic company, dated May 19, 2004; Certificate of Amendment of Restated Certificate of Incorporation, dated April 20, 2006; and Certificate of Amendment of Restated Certificate of Incorporation, dated as of May 3, 2013.	Incorporated by reference to Exhibit 3.1 to the Company's report on Form 10-Q for the quarter ended June 30, 2013.
3.2	Amended and Restated By-Laws.	Incorporated by reference to Exhibit 3.1 to Form 8-K filed by the Company on February 11, 2016.
10.1	(i) Fifth Amended and Restated Senior Unsecured Revolving Credit Agreement, dated September 27, 2011.	Incorporated by reference to Exhibit 4.1 to the Company's report on Form 10-Q for the quarter ended June 30, 2013.
	(ii) Amendment No. 2 and Joinder to Credit Agreement dated as of September 27, 2013 (amending Fifth Amended and Restated Senior Unsecured Revolving Credit Agreement, dated as of September 27, 2011).	Incorporated by reference to Exhibit 4.1 to the Company's report on Form 10-Q for the quarter ended September 30, 2013.

	(iii) Amendment No. 3 to Credit Agreement dated as of October 15, 2014.	Incorporated by reference to Exhibit 10.1(iii) to the Company's report on Form 10-K for the year ended December 31, 2014.
10.2	Note Purchase Agreement, dated as of October 15, 2014, among the Company and New York Life Insurance Company, New York Life Insurance and Annuity Corporation and New York Life Insurance and Annuity Corporation Institutionally Owned Life Insurance Separate Account (BOLI 30C).	Incorporated by reference to Exhibit 10.1 to Form 8-K filed by the Company on October 17, 2014.
10.3**	Barnes Group Inc. Management Incentive Compensation Plan, amended October 22, 2008.	Filed with this report.
10.4**	Barnes Group Inc. Performance-Linked Bonus Plan for Selected Executive Officers, as amended February 8, 2011.	Filed with this report.
10.5**	(i) Offer Letter between the Company and Patrick Dempsey, dated February 22, 2013.	Incorporated by reference to Exhibit 10.3 to the Company's report on Form 10-Q for the quarter ended March 31, 2013.

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Exhibit No.	Description	Reference
	(ii) Amendment to Offer Letter to Patrick Dempsey, dated January 6, 2015.	Incorporated by reference to Exhibit 10.6(ii) to the Company's report on Form 10-K for the year ended December 31, 2014.
	(iii) Employee Non-Disclosure, Non-Competition, Non-Solicitation and Non-Disparagement Agreement between the Company and Patrick J. Dempsey, dated February 27, 2013.	Incorporated by reference to Exhibit 10.4 to the Company's report on Form 10-Q for the quarter ended March 31, 2013.
10.6**	(i) Amendment to Offer Letter to Christopher J. Stephens, Jr., dated June 7, 2013.	Incorporated by reference to Exhibit 10.2 to the Company's report on Form 10-Q for the quarter ended June 30, 2013.
	(ii) Amendment to Amended Offer Letter to Christopher J. Stephens, Jr., dated February 12, 2014.	Incorporated by reference to Exhibit 10.6(ii) to the Company's report on Form 10-K for the year ended December 31, 2013.
10.7**	Offer Letter to Scott A. Mayo, dated January 28, 2014.	Incorporated by reference to Exhibit 10.2 to the Company's report on Form 10-Q for the quarter ended March 31, 2014.
10.8**	Offer Letter to James P. Berklas, Jr., dated June 5, 2015.	Incorporated by reference to Exhibit 10.1 to the Company's report on Form 10-Q for the quarter ended September 30, 2015.
10.9**	(i) Barnes Group Inc. Retirement Benefit Equalization Plan, as amended and restated effective January 1, 2013.	Incorporated by reference to Exhibit 10.39(ii) to the Company's report on Form 10-K for the year ended December 31, 2012.
	(ii) First Amendment to the Barnes Group Inc. Retirement Benefit Equalization Plan dated December 12, 2014.	Incorporated by reference to Exhibit 10.9(ii) to the Company's report on Form 10-K for the year ended December 31, 2014.
10.10**	(i) Barnes Group Inc. Supplemental Senior Officer Retirement Plan, as amended and restated effective January 1, 2009.	Filed with this report.
	(ii) Amendment to the Barnes Group Inc. Supplemental Senior Officer Retirement Plan dated December 30, 2009.	Filed with this report.
	(iii) Second Amendment to the Barnes Group Inc. Supplemental Senior Officer Retirement Plan dated December 12, 2014.	Incorporated by reference to Exhibit 10.10(iii) to the Company's report on Form 10-K for the year ended December 31,

2014.

- 10.11** (i) Amended and Restated Supplemental Executive Retirement Plan effective April 1, 2012. Filed with this report.
- (ii) Amendment 2013-1 to the Barnes Group Inc. Supplemental Executive Retirement Plan dated July 23, 2013. Incorporated by reference to Exhibit 10.3 to the Company's report on Form 10-Q for the quarter ended June 30, 2013.
- (iii) Amendment 2014-1 to the Barnes Group Inc. Supplemental Executive Retirement Plan dated December 12, 2014. Incorporated by reference to Exhibit 10.11(iii) to the Company's report on Form 10-K for the year ended December 31, 2014.
- 10.12** Barnes Group Inc. Senior Executive Enhanced Life Insurance Program, as amended and restated effective April 1, 2011. Filed with this report.
- 10.13** Barnes Group Inc. Enhanced Life Insurance Program, as amended and restated effective April 1, 2011. Filed with this report.
- 10.14** Barnes Group Inc. Executive Group Term Life Insurance Program effective April 1, 2011. Filed with this report.

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Exhibit No.	Description	Reference
10.15**	Form of Barnes Group Inc. Executive Officer Severance Agreement, as amended March 31, 2010.	Filed with this report.
10.16**	Form of Barnes Group Inc. Executive Officer Severance Agreement, effective February 19, 2014.	Incorporated by reference to Exhibit 10.1 to the Company's report on Form 10-Q for the quarter ended March 31, 2014.
10.17**	Barnes Group Inc. Executive Separation Pay Plan, as amended and restated effective January 1, 2012.	Filed with this report.
10.18**	(i) Trust Agreement between the Company and Fidelity Management Trust Company (Barnes Group 2009 Deferred Compensation Plan) dated September 1, 2009.	Filed with this report.
	(ii) Amended and Restated Barnes Group 2009 Deferred Compensation Plan effective as of April 1, 2012.	Filed with this report.
	(iii) First Amendment to the Barnes Group 2009 Deferred Compensation Plan dated December 12, 2014.	Incorporated by reference to Exhibit 10.18(iii) to the Company's report on Form 10-K for the year ended December 31, 2014.
10.19**	Barnes Group Inc. Non-Employee Director Deferred Stock Plan, as amended and restated December 31, 2008.	Filed with this report.
10.20**	Barnes Group Inc. Directors' Deferred Compensation Plan, as amended and restated December 31, 2008.	Filed with this report.
10.21**	Form of Amended and Restated Contingent Dividend Equivalent Rights Agreement for Officers.	Filed with this report.
10.22**	Barnes Group Inc. Trust Agreement for Specified Plans.	Filed with this report.
10.23**	Form of Incentive Compensation Reimbursement Agreement between the Company and certain Officers.	Filed with this report.
10.24**	Form of Indemnification Agreement between the Company and its Officers and Directors.	Filed with this report.
10.25**	(i) Barnes Group Inc. Stock and Incentive Award Plan, as amended December 31, 2008.	Filed with this report.
	(ii) Barnes Group Inc. Stock and Incentive Award Plan, as amended March 15, 2010.	Filed with this report.

(iii) Exercise of Authority Relating to the Stock and Incentive Award Plan, dated March 3, 2009. Filed with this report.

(iv) Amendment 2010-1 approved on December 9, 2010 to the Barnes Group Inc. Stock and Incentive Award Plan as amended March 15, 2010. Filed with this report.

10.26** 2014 Barnes Group Inc. Stock and Incentive Award Plan. Incorporated by reference to Annex A to the Company's definitive proxy statement filed with the Securities and Exchange Commission on March 25, 2014.

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Exhibit No.	Description	Reference
10.27**	Form of Barnes Group Inc. Stock and Incentive Award Plan Restricted Stock Unit Summary of Grant and Restricted Stock Unit Agreement for Directors dated February 8, 2012 (for non-management directors).	Filed with this report.
10.28**	Form of Barnes Group Inc. Stock and Incentive Award Plan Restricted Stock Unit Summary of Grant and Restricted Stock Unit Agreement for Directors dated May 9, 2014 (for non-management directors).	Incorporated by reference to Exhibit 10.2 to the Company's report on Form 10-Q for the quarter ended June 30, 2014.
10.29**	Form of Barnes Group Inc. Stock and Incentive Award Plan Restricted Stock Unit Summary of Grant and Restricted Stock Unit Agreement for Directors dated February 9, 2016 (for non-management directors).	Filed with this report.
10.30**	Form of Non-Qualified Stock Option Agreement for employees grade 21 and up.	Filed with this report.
10.31**	Form of Barnes Group Inc. Stock and Incentive Award Plan Stock Option Summary of Grant and Stock Option Agreement for employees in grade 21 and up dated as of February 8, 2011.	Filed with this report.
10.32**	Form of Barnes Group Inc. Stock and Incentive Award Plan Stock Option Summary of Grant and Stock Option Agreement for Employees in Grade 21 and up dated May 9, 2014.	Incorporated by reference to Exhibit 10.4 to the Company's report on Form 10-Q for the quarter ended June 30, 2014.
10.33**	Form of Barnes Group Inc. Stock and Incentive Award Plan Stock Option Summary of Grant and Stock Option Agreement for Employees in Grade 21 and up dated February 9, 2016.	Filed with this report.
10.34**	Form of Barnes Group Inc. Stock and Incentive Award Plan Restricted Stock Unit Summary of Grant and Restricted Stock Unit Agreement for employees grade 21 and up dated as of February 8, 2011.	Filed with this report.
10.35**	Form of Barnes Group Inc. Stock and Incentive Award Plan Restricted Stock Unit Summary of Grant for Employees and Restricted Stock Unit Agreement dated February 8, 2012.	Filed with this report.
10.36**	Form of Barnes Group Inc. Stock and Incentive Award Plan Restricted Stock Unit Summary of Grant for Employees and Restricted Stock Unit Agreement dated May 9, 2014.	Incorporated by reference to Exhibit 10.3 to the Company's report on Form 10-Q for the quarter ended June 30, 2014.
10.37**	Form of Barnes Group Inc. Stock and Incentive Award Plan Restricted Stock Unit Summary of Grant for Employees and Restricted Stock Unit Agreement dated February 9, 2016.	Filed with this report.
10.38**		

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Form of Barnes Group Inc. Stock and Incentive Award Plan
Performance Share Award Summary of Grant and Performance Share
Award Agreement for Officers and Other Individuals as Designated by
the Compensation and Management Development Committee dated as
of February 11, 2014.

Incorporated by reference to
Exhibit 10.36 to the Company's
report on Form 10-K for the year
ended December 31, 2013.

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Exhibit No.	Description	Reference
10.39**	Form of Barnes Group Inc. Stock and Incentive Award Plan Performance Share Award Summary of Grant and Performance Share Award Agreement for Officers and Other Individuals as Designated by the Compensation and Management Development Committee dated July 21, 2014.	Incorporated by reference to Exhibit 10.5 to the Company's report on Form 10-Q for the quarter ended June 30, 2014.
10.40**	Form of Barnes Group Inc. Stock and Incentive Award Plan Performance Share Award Summary of Grant and Performance Share Award Agreement for Officers and Other Individuals as Designated by the Compensation and Management Development Committee dated as of February 11, 2015.	Incorporated by reference to Exhibit 10.40 to the Company's report on Form 10-K for the year ended December 31, 2014.
10.41**	Form of Barnes Group Inc. Stock and Incentive Award Plan Performance Share Award Summary of Grant and Performance Share Award Agreement for Officers and Other Individuals as Designated by the Compensation and Management Development Committee dated as of February 9, 2016.	Incorporated by reference to Exhibit 10.42 to the Company's report on Form 10-K for the year ended December 31, 2015.
10.42**	Performance-Linked Bonus Plan for Selected Executive Officers dated as of May 6, 2016.	Filed with this report.
21	List of Subsidiaries.	Filed with this report.
23	Consent of Independent Registered Public Accounting Firm.	Filed with this report.
31.1	Certification pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.	Filed with this report.
31.2	Certification pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.	Filed with this report.
32	Certification pursuant to 18 U.S.C. Section 1350 as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.	Furnished with this report.
101.INS	XBRL Instance Document.	Filed with this report.
101.SCH	XBRL Taxonomy Extension Schema Document.	Filed with this report.
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document.	Filed with this report.
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document.	Filed with this report.
101.LAB	XBRL Taxonomy Extension Label Linkbase Document.	Filed with this report.
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document.	Filed with this report.

* The Company hereby agrees to provide the Commission upon request copies of any omitted exhibits or schedules to this exhibit required by Item 601(b)(2) of Regulation S-K.

** Management contract or compensatory plan or arrangement.

The Company agrees to furnish to the Commission, upon request, a copy of each instrument with respect to which there are outstanding issues of unregistered long-term debt of the Company and its subsidiaries, the authorized principal amount of which does not exceed 10% of the total assets of the Company and its subsidiaries on a consolidated basis.

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