MOOG INC.
Form 10-K
November 14, 2017
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UNITED STATES SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549
FORM 10-K
(Mark One)
ý ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended September 30, 2017
OR
¨ TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the transition period from to Commission file number 1-05129

Inc.

(Exact Name of Registrant as Specified in its Charter)

New York	16-0757636
(State or Other Jurisdiction of Incorporation or Organization)	(I.R.S. Employer Identification No.)
East Aurora, New York	14052-0018
(Address of Principal Executive Offices)	(Zip Code)

Registrant’s Telephone Number, Including Area Code: (716) 652-2000
Securities registered pursuant to Section 12(b) of the Act:

Title of Each Class	Name of Each Exchange on Which Registered
Class A Common Stock, $1.00 Par Value	New York Stock Exchange
Class B Common Stock, $1.00 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 ý 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 ý
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 ý No ¨

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Website, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulations 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 ý 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 the 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.ý

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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,” “smaller reporting company” and "emerging growth company" in Rule 12b-2 of the Exchange Act. (Check one):
Large accelerated filer ý Accelerated filer ¨ Non-accelerated filer ¨ (Do not check if smaller reporting company)
Smaller reporting company ¨ Emerging growth company ¨

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for the complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ¨

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

The aggregate market value of the common stock outstanding and held by non-affiliates (as defined in Rule 405 under the Securities Act of 1933) of the registrant, based upon the closing sale price of the common stock on the New York Stock Exchange on April 1, 2017, the last business day of the registrant’s most recently completed second fiscal quarter, was approximately $2,212 million.

The number of shares of common stock outstanding as of the close of business on November 7, 2017 was: Class A 32,356,526; Class B 3,404,976.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the Moog Inc. Proxy Statement for the Annual Meeting of Shareholders to be held on February 14, 2018 (“2017 Proxy”) are incorporated by reference into Part III of this Form 10-K.

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PART I

PART II

PART III

PART IV

Disclosure Regarding Forward-Looking Statements

Information included or incorporated by reference in this report that does not consist of historical facts, including statements accompanied by or containing words such as “may,” “will,” “should,” “believes,” “expects,” “expected,” “intends,” “projects,” “approximate,” “estimates,” “predicts,” “potential,” “outlook,” “forecast,” “anticipates,” “presume” and “assume,” a forward-looking statements. Such forward-looking statements are made pursuant to the safe harbor provisions of the Private Securities Litigation Reform Act of 1995. These statements are not guarantees of future performance and are subject to several factors, risks and uncertainties, the impact or occurrence of which could cause actual results to differ materially from the expected results described in the forward-looking statements. Certain of these factors, risks and uncertainties are discussed in the sections of this report entitled “Risk Factors” and “Management’s Discussion and Analysis of Financial Condition and Results of Operations.” New factors, risks and uncertainties may emerge from time to time that may affect the forward-looking statements made herein. Given these factors, risks and uncertainties, investors should not place undue reliance on forward-looking statements as predictive of future results. We disclaim any obligation to update the forward-looking statements made in this report.

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PART I

The Registrant, Moog Inc., a New York corporation formed in 1951, is referred to in this report as “Moog” or in the nominative “we” or the possessive “our.”

Unless otherwise noted or the context otherwise requires, all references to years in this report are to fiscal years.

Item 1. Business.

Description of the Business. Moog is a worldwide designer, manufacturer and systems integrator of high performance precision motion and fluid controls and controls systems for a broad range of applications in aerospace and defense and industrial markets. We have four operating segments: Aircraft Controls, Space and Defense Controls, Industrial Systems and Components.

Additional information describing the business and comparative segment revenues, operating profits and related financial information for 2017, 2016 and 2015 are provided in Note 17 of Item 8, Financial Statements and Supplementary Data of this report.

Distribution. Our sales and marketing organization consists of individuals possessing highly specialized technical expertise. This expertise is required in order to effectively evaluate a customer’s precision control requirements and to facilitate communication between the customer and our engineering staff. Our sales staff is the primary contact with customers. Manufacturers’ representatives are used to cover certain domestic aerospace markets. Distributors are used selectively to cover certain industrial and medical markets.

Industry and Competitive Conditions. We experience considerable competition in our aerospace and defense and industrial markets. We believe that the principal points of competition in our markets are product quality, reliability, price, design and engineering capabilities, product development, conformity to customer specifications, timeliness of delivery, effectiveness of the distribution organization and quality of support after the sale. We believe we compete effectively on all of these bases. Competitors in our four operating segments include:

- Aircraft Controls: Curtiss-Wright, Liebherr, Nabtesco, Parker Hannifin, UTC and Woodward.
- Space and Defense Controls: Airbus, ATA Engineering, BAE Systems, Bradford Engineering, Chess Dynamics, Cobham, Cohu, Curtiss-Wright, Dotworkz, ESW, FLIR, Flowserve Limitorque, Honeywell, Kongsberg, L3 Technologies, Leonardo DRS, LORD, Marotta, RUAG, Pelco, PVP Advanced EO Systems, RVision, SABCA, Sargent Aerospace & Defense, SEAKR, Silent Sentinel, SwRI, UTC, Vacco, Valcor, Videotec, ValveTech and Woodward.
- Industrial Systems: Atos, Allen-Bradley, Bosch Rexroth, Danaher, DEIF Wind Power, E2M Technologies, Eaton, KEB, MTS Systems Corp., Parker Hannifin, Siemens and SSB Wind Systems.
- Components: Allied Motion Technologies, Ametek, Cardinal Health, Cobham, General Dynamics Mission Systems, ICU Medical, Kearfott, Kollmorgen, Schleifring, Smiths Medical, Stemmann-Technik, UEA, Woodward and Whippany Actuation Systems.

Government Contracts. All U.S. Government contracts are subject to termination by the U.S. Government. In 2017, sales under U.S. Government contracts represented 31% of total sales and were primarily within our Aircraft Controls, Space and Defense Controls and Components segments.

Backlog. Our twelve-month backlog represents confirmed orders we believe will be recognized as revenue within the next twelve months. As noted in Item 6, Selected Financial Data of this report, as of September 30, 2017, our twelve-month backlog was $1.2 billion, a decline of 1% compared to October 1, 2016. See Item 7, Management’s Discussion and Analysis of Financial Condition and Results of Operations of this report for a discussion on the various business drivers and conditions contributing to the twelve-month backlog change.

Raw Materials. Materials, supplies and components are purchased from numerous suppliers. We believe the loss of any one supplier, although potentially disruptive in the short-term, would not materially affect our operations in the long-term.

Working Capital. See the discussion on operating cycle in Note 1 of Item 8, Financial Statements and Supplementary Data of this report.

Seasonality. Our business is generally not seasonal; however, certain products and systems, such as those in the energy market of our Industrial Systems segment, do experience seasonal variations in sales levels.

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Patents. We maintain a patent portfolio of issued or pending patents and patent applications worldwide that generally includes the U.S., Europe, China, Japan and India. The portfolio includes patents that relate to electrohydraulic, electromechanical, electronics, hydraulics, components and methods of operation and manufacture as related to motion control and actuation systems. The portfolio also includes patents related to wind turbines, robotics, surveillance/security, vibration control and medical devices. We do not consider any one or more of these patents or patent applications to be material in relation to our business as a whole. The patent portfolio related to certain medical devices is significant to our position in this market as several of these products work exclusively together, and provide us future revenue opportunities.

Research Activities. Research and development activity has been, and continues to be, significant for us. Research and development expense was at least $140 million in each of the last three years and represented approximately 6% of sales in 2017.

Employees. On September 30, 2017, we employed 10,675 full-time employees.

Customers. Our principal customers are Original Equipment Manufacturers, or OEMs, and end users for whom we provide aftermarket support. Aerospace and defense OEM customers collectively represented 54% of 2017 sales. The majority of these sales are to a small number of large companies. Due to the long-term nature of many of the programs, many of our relationships with aerospace and defense OEM customers are based on long-term agreements. Our industrial OEM sales, which represented 30% of 2017 sales, are to a wide range of global customers and are normally based on lead times of 90 days or less. We also provide aftermarket support, consisting of spare and replacement parts and repair and overhaul services, for all of our products. Our major aftermarket customers are the U.S. Government and commercial airlines. In 2017, aftermarket sales accounted for 16% of total sales.

Significant customers in our four operating segments include:

- Aircraft Controls: Boeing, Airbus, Lockheed Martin, Northrup Grumman, United Technologies, Gulfstream, Japan Aerospace, Honeywell, Embraer and the U.S. Government.
- Space and Defense Controls: Lockheed Martin, Raytheon, Aerojet Rocketdyne, Orbital ATK, Boeing, United Launch Alliance, Airbus, General Dynamics, BAE Systems, Thales Alenia Space and the U.S. Government.
- Industrial Systems: CAE, FlightSafety, Husky Energy, MHPS, Arburg, Rockwell Automation, Senvion, Nordex, RAAF and Schlumberger.
- Components: Northrup Grumman, Philips Healthcare, Lockheed Martin, Raytheon, Turbo Chef Technologies, Becton Dickinson, Nestle, Honeywell, Bausch & Lomb, Boeing and the U.S. Government.

International Operations. Our operations outside the United States are conducted through wholly-owned foreign subsidiaries and are located predominantly in Europe and the Asia-Pacific region. See Note 17 of Item 8, Financial Statements and Supplementary Data of this report for information regarding sales by geographic area and Exhibit 21 of Item 15, Exhibits and Financial Statement Schedules of this report for a list of subsidiaries. Our international operations are subject to the usual risks inherent in international trade, including currency fluctuations, local government contracting regulations, local governmental restrictions on foreign investment and repatriation of profits, exchange controls, regulation of the import and distribution of foreign goods, as well as changing economic and social conditions in countries in which our operations are conducted.

Environmental Matters. See the discussion in Note 18 of Item 8, Financial Statements and Supplementary Data of this report.

Website Access to Information. Our internet address is www.moog.com. We make our annual reports on Form 10 K, quarterly reports on Form 10-Q, current reports on Form 8-K and, if applicable, amendments to those reports, available on the investor relations portion of our website. The reports are free of charge and are available as soon as reasonably practicable after they are filed with the Securities and Exchange Commission. We have posted our corporate governance guidelines, Board committee charters and code of ethics to the investor relations portion of our website. This information is available in print to any shareholder upon request. All requests for these documents should be made to Moog’s Manager of Investor Relations by calling 716-687-4225.

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Executive Officers of the Registrant. Other than the changes noted below, the principal occupations of our executive officers for the past five years have been their employment with us in the same positions they currently hold.

On August 11, 2015, Maureen M. Athoe was named Vice President and President, Space and Defense Group. Previously, she was a Group Vice President, Group General Manager and Site Manager.

On August 11, 2015, R. Eric Burghardt was named Vice President and President, Aircraft Group. Previously, he was a Group Vice President and Financial Director.

On August 11, 2015, Mark J. Trabert was named Vice President and President, Aircraft Group. Previously, he was a Group Vice President and Deputy General Manager.

Executive Officers	Age	Year First Elected Officer
John R. Scannell Chairman of the Board; Chief Executive Officer Director	54	2006
Richard A. Aubrecht Vice Chairman of the Board; Vice President - Strategy and Technology; Director	73	1980
Donald R. Fishback Director; Vice President; Chief Financial Officer	61	1985
Lawrence J. Ball Vice President	63	2004
Gary A. Szakmary Vice President	66	2011
Patrick J. Roche Vice President	54	2012
Maureen M. Athoe Vice President	59	2015
R. Eric Burghardt Vice President	58	2015
Mark J. Trabert Vice President	58	2015
Jennifer Walter Controller; Principal Accounting Officer	46	2008
Timothy P. Balkin Treasurer; Assistant Secretary	58	2000

In addition to the executive officers noted above, Robert J. Olivieri, 67, was elected Secretary in 2014. Mr. Olivieri's principal occupation is partner in the law firm of Hodgson Russ LLP.

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Item 1A. Risk Factors.

The markets we serve are cyclical and sensitive to domestic and foreign economic conditions and events, which may cause our operating results to fluctuate. The markets we serve are sensitive to fluctuations in general business cycles as well as domestic and foreign economic conditions and events. For example, our defense programs are largely contingent on U.S. Department of Defense funding. In addition, our space programs rely on the same governmental funding as well as investment for commercial and exploration activities. Our aerospace programs are dependent on the highly cyclical commercial airline industry, driven by fuel price increases, demand for travel and economic conditions. Demand for our industrial products is dependent upon several factors, including capital investment, product innovations, economic growth, the price of oil and natural gas, cost-reduction efforts and technology upgrades. Our sales and operating profit have been affected by the continued low rates of recovery in the economies in which we conduct business. If global economic uncertainties continue or deteriorates, our operations could be negatively impacted through declines in our sales, profitability and cash flows due to lower orders, payment delays and price pressures for our products.

We operate in highly competitive markets with competitors who may have greater resources than we possess. Many of our products are sold in highly competitive markets. Some of our competitors, especially in our industrial markets and medical markets, are larger, more diversified and have greater financial, marketing, production and research and development resources. As a result, they may be better able to withstand the effects of periodic economic downturns. Our sales and operating margins will be negatively impacted if our competitors:

- develop products that are superior to our products,
- develop products of comparable quality and performance that are more competitively priced than our products,
- develop methods of more efficiently and effectively providing products and services, or
- adapt more quickly than we do to new technologies or evolving customer requirements.

We believe that the principal points of competition in our markets are product quality, reliability, price, design and engineering capabilities, product development, conformity to customer specifications, timeliness of delivery, effectiveness of the distribution organization and quality of support after the sale. Maintaining or improving our competitive position requires continued investment in manufacturing, engineering, quality standards, marketing, customer service and support and our distribution networks. If we do not maintain sufficient resources to make these investments or are not successful in maintaining our competitive position, we could face pricing pressures or loss in market share, causing our operations and financial performance to suffer.

We depend heavily on government contracts that may not be fully funded or may be terminated, and the failure to receive funding or the termination of one or more of these contracts could reduce our sales and increase our costs. Sales to the U.S. Government and its prime contractors and subcontractors represent a significant portion of our business. In 2017, sales under U.S. Government contracts represented 31% of our total sales, primarily within Aircraft Controls, Space and Defense Controls and Components. Sales to foreign governments represented 5% of our total sales. Funding for government programs can be structured into a series of individual contracts and depend on annual congressional appropriations, which are subject to change. Additionally, the 2011 Budget Control Act reduced the Department of Defense spending (or sequestration) by approximately $500 billion. The Bipartisan Budget Act of 2013 and the Bipartisan Budget Act of 2015 provided stability and modest growth in the Department of Defense spending through 2017. However, future budgets beyond 2017 are uncertain with respect to the overall levels of defense spending. As a result of this uncertainty, we expect discretionary government spending levels will face pressure, leading to procurement cost reductions. Any reduction in future Department of Defense spending levels could adversely impact our sales, operating profit and our cash flow. We have resources applied to specific government contracts and if any of those contracts are rescheduled or terminated, we may incur substantial costs redeploying those resources.

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We make estimates in accounting for long-term contracts, and changes in these estimates may have significant impacts on our earnings. We have long-term contracts with some of our customers. These contracts are predominantly within Aircraft Controls and Space and Defense Controls. Revenue representing 38% of 2017 sales was accounted for using the percentage of completion, cost-to-cost method of accounting. Under this method, we recognize revenue as work progresses toward completion as determined by the ratio of cumulative costs incurred to date to estimated total contract costs at completion, multiplied by the total estimated contract revenue, less cumulative revenue recognized in prior periods. Changes in these required estimates could have a material adverse effect on sales and profits. Any adjustments are recognized in the period in which the change becomes known using the cumulative catch-up method of accounting. For contracts with anticipated losses at completion, we establish a provision for the entire amount of the estimated remaining loss and charge it against income in the period in which the loss becomes known. Amounts representing performance incentives, penalties, contract claims or impacts of scope change negotiations are considered in estimating revenues, costs and profits when they can be reliably estimated and realization is considered probable. Due to the substantial judgments involved with this process, our actual results could differ materially or could be settled unfavorably from our estimates.

We enter into fixed-price contracts, which could subject us to losses if we have cost overruns. In 2017, fixed-price contracts represented 92% of our sales that were accounted for using the percentage of completion, cost-to-cost method of accounting. On fixed-price contracts, we agree to perform the scope of work specified in the contract for a predetermined price. Depending on the fixed price negotiated, these contracts may provide us with an opportunity to achieve higher profits based on the relationship between our total contract costs and the contract's fixed price. However, we bear the risk that increased or unexpected costs may reduce our profit or cause us to incur a loss on the contract, which would reduce our net earnings. Loss reserves are most commonly associated with fixed-price contracts that involve the design and development of new and unique controls or control systems to meet the customer's specifications.

We may not realize the full amounts reflected in our backlog as revenue, which could adversely affect our future revenue and growth prospects. As of September 30, 2017, our twelve-month backlog was $1.2 billion, which represents confirmed orders we believe will be recognized as revenue within the next twelve months. There is no assurance that our customers will purchase all the orders represented in our backlog, due in part to the U.S. Government's ability not to exercise contract options or to modify, curtail or terminate major programs. Due to the uncertain nature of our contracts with the U.S. Government, we may never realize revenue from some of the orders that are included in our backlog. A portion of our backlog also relates to commercial aircraft programs, and if there are entry into service delays or lower than anticipated deliveries due to production issues, we may never realize the full amounts included in our backlog. If this occurs, our future revenue and growth prospects may be adversely affected.

If our subcontractors or suppliers fail to perform their contractual obligations, our prime contract performance and our ability to obtain future business could be materially and adversely impacted. We rely on subcontracts with other companies to perform a portion of the service we provide to our customers on many of our contracts. There is a risk that we may have disputes with our subcontractors, including disputes regarding the quality and timeliness of work performed by the subcontractor, customer concerns about the subcontractor, our failure to extend existing task orders or issue new task orders under a subcontract or our hiring of personnel of a subcontractor. Failure by our subcontractors to satisfactorily provide on a timely basis the agreed-upon supplies, or perform the agreed-upon services, may materially and adversely impact our ability to perform our obligations as the prime contractor. Subcontractor performance deficiencies could result in a customer terminating our contract for default. A default termination could expose us to liability and substantially impair our ability to compete for future contracts and orders. In addition, a delay or failure in our ability to obtain components and equipment parts from our suppliers may adversely affect our ability to perform our obligations to our customers.

Contracting on government programs is subject to significant regulation, including rules related to bidding, billing and accounting kickbacks and false claims, and any non-compliance could subject us to fines and penalties or possible debarment. Like all government contractors, we are subject to risks associated with this contracting, including substantial civil and criminal fines and penalties. These fines and penalties could be imposed for failing to follow procurement integrity and bidding rules, employing improper billing practices or otherwise failing to follow cost accounting standards, receiving or paying kickbacks or filing false claims. We have been, and expect to continue to be, subjected to audits and investigations by U.S. and foreign government agencies and authorities. The failure to comply with the terms of our government contracts could harm our business reputation. It could also result in our progress payments being withheld or our suspension or debarment from future government contracts, which could have a material affect on our operational and financial results.

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The loss of The Boeing Company as a customer or a significant reduction in sales to The Boeing Company could adversely impact our operating results. We provide The Boeing Company, or Boeing, with controls for both military and commercial applications, which, in total, were 13% of our 2017 sales. Sales to Boeing's commercial airplane group are generally made under a long-term supply agreement through 2021 for the Boeing 787 and through 2019 for other commercial airplanes. Boeing operates in a competitive environment, and any detrimental impact to Boeing's production could reduce our orders to Boeing. A reduction in sales or the loss of Boeing as a customer could reduce our sales and earnings.

Our new product research and development efforts may not be successful which could reduce our sales and earnings. Technologies related to our products have undergone, and in the future may undergo, significant changes. We have incurred, and we expect to continue to incur, expenses associated with lengthy research and development activities and the introduction of new products in order to succeed in the future. Our technology has been developed through customer-funded and internally-funded research and development, as well as through business acquisitions. If we fail to predict customers' preferences or fail to provide viable technological solutions, we may experience difficulties that could delay or prevent the acceptance of new products or product enhancements. Also, the research and development expenses we incur may exceed our cost estimates and new products we develop may not generate sales sufficient to offset our costs. Additionally, our competitors may develop technologies and products that have more competitive advantages than ours and render our technology uncompetitive or obsolete.

Our inability to adequately enforce and protect our intellectual property or defend against assertions of infringement could prevent or restrict our ability to compete. Protecting our intellectual property is critical in order to maintain a competitive advantage. We therefore rely on internally developed and acquired patents, trademarks and proprietary knowledge and technologies. Our inability to defend against the unauthorized use of these rights and assets could have an adverse effect on our competitive position and on our results of operations and financial condition. Litigation may be necessary to protect our intellectual property rights or defend against claims of infringement. This litigation could result in significant costs and divert management's focus away from operations.

Our business operations may be adversely affected by information systems interruptions, intrusions or new software implementations. We are dependent on various information technologies throughout our company to administer, store and support multiple business activities. Disruptions, equipment failures or cybersecurity attacks, such as unauthorized access, malicious software and other intrusions, may lead to potential data corruption and exposure of proprietary and confidential information. Any intrusion may cause operational stoppages, diminished competitive advantages through reputational damages and increased operational costs. In addition, we are in the early stages of a multi-year business information system transformation and standardization project. This endeavor will occupy additional resources, diverting attention from other operational activities, and may cause our information systems to perform unexpectedly. While we expect to invest significant resources throughout the planning and project management process, unanticipated delays could occur.

Our indebtedness and restrictive covenants under our credit facilities could limit our operational and financial flexibility. We have incurred significant indebtedness, and may incur additional debt for acquisitions, operations, research and development and capital expenditures. Our ability to make interest and scheduled principal payments and meet restrictive covenants could be adversely impacted by changes in the availability, terms and cost of capital, changes in interest rates or changes in our credit ratings or our outlook. These changes could increase our cost of business, limiting our ability to pursue acquisition opportunities, react to market conditions and meet operational and capital needs, thereby placing us at a competitive disadvantage.

Significant changes in discount rates, rates of return on pension assets, mortality tables and other factors could adversely affect our earnings and equity and increase our pension funding requirements. Pension costs and obligations are determined using actual results as well as actuarial valuations that involve several assumptions. The most critical assumptions are the discount rate, the long-term expected return on assets and mortality tables. Other assumptions include salary increases and retirement age. Some of these assumptions, such as the discount rate and return on pension assets, are reflective of economic conditions and largely out of our control. Changes in the pension assumptions could adversely affect our earnings, equity and funding requirements.

A write-off of all or part of our goodwill or other intangible assets could adversely affect our operating results and net worth. Goodwill and other intangible assets are a substantial portion of our assets. At September 30, 2017, goodwill was $774 million and other intangible assets were $109 million of our total assets of $3.1 billion. Our goodwill and other intangible assets may increase in the future since our growth strategy includes acquisitions. However, we may have to write off all or part of our goodwill or other intangible assets if their value becomes impaired. Although this write-off would be a non-cash charge, it could reduce our earnings and our financial condition significantly.

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Our sales and earnings may be affected if we cannot identify, acquire or integrate strategic acquisitions, or if we engage in divesting activities. Acquisitions are a key part of our growth strategy. Our historical growth has depended, and our future growth is likely to depend, in part, on our ability to successfully identify, acquire and integrate acquired businesses. We intend to continue to seek additional acquisition opportunities, both to expand into new markets and to enhance our position in existing markets throughout the world. Growth by acquisition involves risk that could adversely affect our financial condition and operating results. We may not know the potential exposure to unanticipated liabilities. Additionally, the expected benefits or synergies might not be fully realized, integrating operations and personnel may be slowed and key employees, suppliers or customers of the acquired business may depart. We may also continue to engage in divesting activities if we deem the operations as non-strategic or underperforming. Divestitures could adversely affect our profitability and, under certain circumstances, require us to record impairment charges or a loss as a result of a transaction. In pursuing acquisition opportunities, integrating acquired businesses, or divesting business operations, management's time and attention may be diverted from our core business, while consuming resources and incurring expenses for these activities.
Our operations in foreign countries expose us to political and currency risks and adverse changes in local legal and regulatory environments. We have significant manufacturing and sales operations in foreign countries. In addition, our domestic operations sell to foreign customers. In 2017, 42% of our net sales were to customers outside of the United States. Our financial results may be adversely affected by fluctuations in foreign currencies and by the translation of the financial statements of our foreign subsidiaries from local currencies into U.S. dollars. We expect international operations and export sales to contribute to our earnings for the foreseeable future. Both the sales from international operations and export sales are subject in varying degrees to risks inherent in doing business outside of the United States. Such risks include the possibility of unfavorable circumstances arising from host country laws or regulations, changes in tariff and trade barriers and import or export licensing requirements. In addition, any local or global health issue or uncertain political climates, international hostilities, natural disasters, or any other terrorist activities could adversely affect customer demand, our operations and our ability to source and deliver products and services to our customers.
Unforeseen exposure to additional income tax liabilities may affect our operating results. Our distribution of taxable income is subject to domestic and, as a result of our significant manufacturing and sales presence in foreign countries, foreign tax jurisdictions. Our effective tax rate and earnings may be affected by shifts in our mix of earnings in countries with varying statutory tax rates, changes in reinvested foreign earnings, changes in the valuation of deferred tax assets and outcomes of any audits performed on previous tax returns. Additionally, any alterations to tax regulations or interpretations could have significant impacts on our effective tax rates and on our deferred tax assets and liabilities.
Government regulations could limit our ability to sell our products outside the United States and otherwise adversely affect our business. In 2017, approximately 20% of our sales were subject to compliance with the United States export regulations. Our failure to obtain, or fully adhere to the limitations contained in the requisite licenses, meet registration standards or comply with other government export regulations would hinder our ability to generate revenues from the sale of our products outside the United States. In addition, the U.S. Government has established, and from time to time, revises, sanctions that restrict or prohibit U.S. companies and their subsidiaries from doing business with certain foreign countries, entities and individuals. The absence of comparable restrictions on competitors in other countries may adversely affect our competitive position. In order to sell our products in European Union countries, we must satisfy certain technical requirements. If we are unable to comply with those requirements with respect to a significant quantity of our products, our sales in Europe would be restricted. Doing business internationally also subjects us to numerous U.S. and foreign laws and regulations, including regulations relating to import-export control, technology transfer restrictions, foreign corrupt practices and anti-boycott provisions. From time to time, we may file voluntary disclosure reports with the U.S. Department of State and the Department of Commerce regarding certain violations of U.S. export laws and regulations discovered by us in the course of our business activities, employee training or internal reviews and audits. To date, our voluntary disclosures have not resulted in a fine, penalty, or export privilege denial or restriction that has had a material adverse impact on our financial condition or ability to export. Our failure, or failure by an authorized agent or representative that is

attributable to us, to comply with these laws and regulations could result in administrative, civil or criminal liabilities. In the extreme case, these failures could result in financial penalties, suspension or debarment from government contracts or suspension of our export privileges, which could have a material adverse effect on us.

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The failure or misuse of our products may damage our reputation, necessitate a product recall or result in claims against us that exceed our insurance coverage, thereby requiring us to pay significant damages. Defects in the design and manufacture of our products may necessitate a product recall. We include complex system designs and components in our products that could contain errors or defects, particularly when we incorporate new technologies into our products. If any of our products are defective, we could be required to redesign or recall those products, pay substantial damages or warranty claims and face actions by regulatory bodies and government authorities. Such an event could result in significant expenses, disrupt sales, affect our reputation and that of our products and cause us to withdraw from certain markets. We are also exposed to product liability claims. Many of our products are used in applications where their failure or misuse could result in significant property loss and serious personal injury or death. We carry product liability insurance consistent with industry norms. However, these insurance coverages may not be sufficient to fully cover the payment of any potential claim. A product recall or a product liability claim not covered by insurance could have a material adverse effect on our business, financial condition and results of operations.

We are involved in various legal proceedings, the outcome of which may be unfavorable to us. Our business may be adversely impacted by the outcome of legal proceedings and other contingencies that cannot be predicted with certainty. We estimate loss contingencies and establish reserves based on our assessment where liability is deemed probable and reasonably estimable given the facts and circumstances known to us at a particular point in time. Subsequent developments may affect our assessment and estimates of the loss contingencies recorded as liabilities.

Future terror attacks, war, natural disasters or other catastrophic events beyond our control could negatively impact our business. Terror attacks, war or other civil disturbances, natural disasters and other catastrophic events could lead to economic instability and decreased demand for commercial products, which could negatively impact our business, financial condition, results of operations and cash flows. From time to time, terrorist attacks worldwide have caused instability in global financial markets and the aviation industry. In 2017, 25% of our net sales were in the commercial aircraft market. Also, our facilities and suppliers are located throughout the world and could be subject to damage from fires, floods, earthquakes or other natural or man-made disasters. Although we carry third party property insurance covering these and other risks, our inability to meet customers' schedules as a result of a catastrophe may result in the loss of customers or significantly increase costs, including penalty claims under customer contracts.

Our operations are subject to environmental laws, and complying with those laws may cause us to incur significant costs. Our operations and facilities are subject to numerous stringent environmental laws and regulations. Although we believe that we are in material compliance with these laws and regulations, future changes in these laws, regulations or interpretations of them, or changes in the nature of our operations may require us to make significant capital expenditures to ensure compliance. We have been and are currently involved in environmental remediation activities. The cost of these activities may become significant depending on the discovery of additional environmental exposures at sites that we currently own or operate, at sites that we formerly owned or operated, or at sites to which we have sent hazardous substances or wastes for treatment, recycling or disposal.

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Item 1B. Unresolved Staff Comments.

None.

Item 2. Properties.

On September 30, 2017, we occupied 5,068,000 square feet of space, distributed by segment as follows:

	Square Feet		
	Owned	Leased	Total
Aircraft Controls	1,452,000	387,000	1,839,000
Space and Defense Controls	462,000	373,000	835,000
Industrial Systems	737,000	521,000	1,258,000
Components	932,000	182,000	1,114,000
Corporate Headquarters	20,000	2,000	22,000
Total	3,603,000	1,465,000	5,068,000

We have principal manufacturing facilities in the United States and countries throughout the world in the following locations:

- Aircraft Controls - U.S., Philippines and United Kingdom.
- Space and Defense Controls - U.S., Ireland and Germany.
- Industrial Systems - Germany, Italy, U.S., China, Netherlands, Luxembourg, Philippines, Japan, India, Ireland, Brazil and United Kingdom.
- Components - U.S., United Kingdom, Costa Rica, Canada, Germany and Lithuania.

Our corporate headquarters is located in East Aurora, New York.

We believe that our properties have been adequately maintained and are generally in good condition. Operating leases for our properties expire at various times from 2018 through 2036. Upon the expiration of our current leases, we believe that we will be able to either secure renewal terms or enter into leases for alternative locations at market terms.

Item 3. Legal Proceedings.

From time to time, we are involved in legal proceedings. We are not a party to any pending legal proceedings that management believes will result in a material adverse effect on our financial condition, results of operations or cash flows.

Item 4. Mine Safety Disclosures.

Not applicable.

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PART II

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

Our two classes of common shares, Class A common stock and Class B common stock, are traded on the New York Stock Exchange ("NYSE") under the ticker symbols MOG.A and MOG.B. The following chart sets forth, for the periods indicated, the high and low sales prices of the Class A common stock and Class B common stock on the NYSE.

Quarterly Stock Prices

	Class A		Class B	
Fiscal Year Ended	High	Low	High	Low
September 30, 2017				
1st Quarter	$73.05	$55.35	$71.81	$56.44
2nd Quarter	69.80	60.29	68.49	63.00
3rd Quarter	74.50	64.82	73.23	64.87
4th Quarter	85.30	70.47	83.16	72.70
October 1, 2016				
1st Quarter	$67.92	$54.93	$67.46	$55.35
2nd Quarter	59.66	38.11	59.17	38.32
3rd Quarter	55.96	42.61	55.50	42.90
4th Quarter	61.64	50.96	61.24	51.11

The number of shareholders of record of Class A common stock and Class B common stock was 701 and 309, respectively, as of November 7, 2017.

We did not pay cash dividends on our Class A common stock or Class B common stock in 2016 or 2017 and have no current plans to do so.

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The following table summarizes our purchases of our common stock for the quarter ended September 30, 2017.
Issuer Purchases of Equity Securities

Period	(a) Total Number of Shares Purchased (1)(2)	(b) Average Price Paid Per Share	(c) Total number of Shares Purchased as Part of Publicly Announced Plans or Programs (3)	(d) Maximum Number (or Approx. Dollar Value) of Shares that May Yet Be Purchased Under Plans or Programs (3)
July 2, 2017 - July 31, 2017	39,789	$ 72.56	—	3,349,819
August 1, 2017 - August 31, 2017	65,834	75.12	—	3,349,819
September 1, 2017 - September 30, 2017	19,510	83.04	—	3,349,819
Total	125,133	$ 75.54	—	3,349,819

(1) Reflects purchases by the Moog Inc. Stock Employee Compensation Trust Agreement ("SECT") of shares of Class B common stock from the Moog Inc. Retirement Savings Plan ("RSP") as follows: 27,858 shares at $72.58 per share during July; 39,697 shares at $74.87 per share during August; and 18,397 shares at $83.16 per share during September.

(2) In connection with the exercise of equity-based compensation awards, we accept delivery of shares to pay for the exercise price and withhold shares for tax withholding obligations. In July, we accepted delivery of 11,931 shares at $72.51 per share, in August, we accepted delivery of 26,137 shares at $75.51 per share and in September, we accepted delivery of 1,113 shares at $81.07 per share, in connection with the exercise of equity-based awards.

(3) The Board of Directors has authorized a share repurchase program. This program has been amended from time to time to authorize additional repurchases up to an aggregate 13 million common shares. The program permits the purchase of shares of Class A or Class B common stock in open market or privately negotiated transactions at the discretion of management.

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Performance Graph

The following graph and tables show the performance of the Company's Class A common stock compared to the NYSE Composite-Total Return Index and the S&P Aerospace & Defense Index for a $100 investment made on September 30, 2012, including reinvestment of any dividends.

	9/12	9/13	9/14	9/15	9/16	9/17
Moog Inc. - Class A Common Stock	$100.00	$154.92	$180.62	$142.78	$157.22	$220.31
NYSE Composite - Total Return Index	100.00	119.62	136.26	127.85	143.64	167.69
S&P Aerospace & Defense Index	100.00	145.05	171.42	177.86	209.64	300.91

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Item 6. Selected Financial Data.

For a more detailed discussion of 2015 through 2017, refer to Item 7, Management's Discussion and Analysis of Financial Condition and Results of Operations of this report and Item 8, Financial Statements and Supplementary Data of this report.

(dollars in thousands, except per share data)	2017(1)(3)	2016(1)(2)(3)	2015(1)	2014(1)	2013(2)(3)
RESULTS FROM OPERATIONS					
Net sales	$2,497,524	$2,411,937	$2,525,532	$2,648,385	$2,610,311
Net earnings (4)	141,280	126,745	131,883	158,198	120,497
Net earnings per share (4)					
Basic	$3.94	$3.49	$3.39	$3.57	$2.66
Diluted	$3.90	$3.47	$3.35	$3.52	$2.63
Weighted-average shares outstanding					
Basic	35,852,448	36,277,445	38,945,880	44,362,412	45,335,336
Diluted	36,230,043	36,529,344	39,334,520	44,952,437	45,823,720
FINANCIAL POSITION					
Cash and cash equivalents	$368,073	$325,128	$309,853	$231,292	$157,090
Working capital	997,005	938,295	931,297	849,417	833,631
Total assets	3,090,592	3,004,974	3,036,573	3,140,287	3,150,505
Indebtedness - total	957,037	1,006,393	1,069,643	872,094	706,082
Shareholders' equity	1,214,304	988,411	994,532	1,347,415	1,535,765
Shareholders' equity per common share outstanding	$33.94	$27.56	$27.09	$32.51	$33.86
SUPPLEMENTAL FINANCIAL DATA					
Capital expenditures	$75,798	$67,208	$80,693	$78,771	$93,174
Depreciation and amortization	90,167	98,732	103,609	109,259	108,073
Research and development	144,646	147,336	132,271	139,462	134,652
Twelve-month backlog (5)	1,211,797	1,224,878	1,273,495	1,339,959	1,296,371
RATIOS					
Net return on sales	5.7 %	5.3 %	5.2 %	6.0 %	4.6 %
Return on shareholders' equity	13.3 %	12.6 %	11.3 %	10.4 %	8.6 %
Current ratio	2.6	2.6	2.5	2.2	2.2
Net debt to capitalization (6)	32.7 %	40.8 %	43.3 %	32.2 %	26.3 %

Amounts in the table above have been revised in accordance with the retrospective application of Accounting Standards Update (ASU) 2015-03 and 2015-17 for all years presented. See Note 1 of the Consolidated Financial Statements at Item 8, Financial Statements and Supplementary Data of this report.

(1) Includes the effects of our share repurchase program. See the Consolidated Statements of Shareholders' Equity and Consolidated Statements of Cash Flow at Item 8, Financial Statements and Supplementary Data of this report.

(2) Includes goodwill impairment charge. See Note 6 of the Consolidated Financial Statements at Item 8, Financial Statements and Supplementary Data of this report.

(3) Includes the effects of acquisitions and divestitures. See Note 2 of the Consolidated Financial Statements at Item 8, Financial Statements and Supplementary Data of this report. In 2013, we acquired two businesses, one in our Space and Defense Controls segment and one in our Components segment.

(4) Represents net earnings attributable to common shareholders and net earnings per share attributable to common shareholders.

(5) Twelve-month backlog is defined as confirmed orders we believe will be recognized as revenue within the next twelve months.

(6) Net debt is total debt less cash and cash equivalents. Capitalization is the sum of net debt and shareholders' equity.

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

OVERVIEW

We are a worldwide designer, manufacturer and systems integrator of high performance precision motion and fluid controls and control systems for a broad range of applications in aerospace and defense and industrial markets.

Within the aerospace and defense market, our products and systems include:

- Defense market - primary and secondary flight controls for military aircraft, stabilization and automatic ammunition loading controls for armored combat vehicles, tactical and strategic missile steering controls and gun aiming controls.
- Commercial aircraft market - primary and secondary flight controls for commercial aircraft.
- Commercial space market - satellite positioning controls and thrust vector controls for space launch vehicles.

In the industrial market, our products are used in a wide range of applications including:

- Industrial automation market - injection molding, metal forming, heavy industry, material and automotive testing and pilot training simulators.
- Energy market - power generation, oil and gas exploration and wind energy.
- Medical market - enteral clinical nutrition and infusion therapy pumps, ultrasonic sensors and surgical handpieces and CT scanners.

We operate under four segments, Aircraft Controls, Space and Defense Controls, Industrial Systems and Components. Our principal manufacturing facilities are located in the United States, Philippines, United Kingdom, Germany, Costa Rica, India, China, Japan, Italy, Netherlands, Canada, Ireland and Luxembourg.

We have long-term contracts with some of our customers. These contracts are predominantly within Aircraft Controls and Space and Defense Controls and represent 38%, 34% and 33% of our sales in 2017, 2016 and 2015, respectively. We recognize revenue on these contracts using the percentage of completion, cost-to-cost method of accounting as work progresses toward completion. The remainder of our sales are recognized when the risks and rewards of ownership and title to the product are transferred to the customer, principally as units are delivered or as service obligations are satisfied. This method of revenue recognition is predominantly used within the Industrial Systems and Components segments, as well as with aftermarket activity.

We concentrate on providing our customers with products designed and manufactured to the highest quality standards. Our products are applied in demanding applications, "When Performance Really Matters®." We believe we have achieved a leadership position in the high performance, precision controls market, by capitalizing on our core foundational strengths, which are our technical experts working collaboratively around the world and the capabilities we deliver for mission-critical solutions. These strengths yield a broad control product portfolio, across a diverse base of customers and end markets.

By focusing on customer intimacy and commitment to solving their most demanding technical problems, we have been able to innovate our control product franchise from one market to another, organically growing from a high-performance components supplier to a high-performance systems supplier. In addition, we continue achieving substantial content positions on the platforms on which we currently participate, seeking to be the dominant supplier in the current niche markets we serve. We also look for innovation in all aspects of our business, employing new technologies to improve productivity and to develop innovative business models.

Our fundamental strategies to achieve our goals center around talent, lean and innovation and include:

- a strong leadership team that has positioned the company for growth,
- utilizing our global capabilities and strong engineering heritage to innovate,
- maintaining our technological excellence by solving our customers' most demanding technical problems in applications "When Performance Really Matters®,"
- continuing to invest in talent development to strengthen employee performance
- and maximizing customer value by implementing lean enterprise principles.

These activities will help us achieve our financial objective of increasing shareholder value with sustainable competitive advantages across our segments. In doing so, we expect to maintain a balanced, diversified portfolio in terms of markets served, product applications, customer base and geographic presence.

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We focus on improving shareholder value through strategic revenue growth, both acquired and organic, through improving operating efficiencies and manufacturing initiatives and through utilizing low cost manufacturing facilities without compromising quality. Additionally, we take a balanced approach to capital deployment, which may include strategic acquisitions or further share buyback activity, in order to maximize shareholder returns over the long-term.
We face numerous challenges to improving shareholder value. These include, but are not limited to, adjusting to dynamic global economic conditions that are influenced by governmental, industrial and commercial factors, pricing pressures from customers, strong competition, foreign currency fluctuations and increases in employee benefit costs. We may also engage in restructuring and divesting activities, including reducing overhead, consolidating facilities and exiting some product lines if we deem the operations as non-strategic or underperforming.

Financial Highlights

- Net sales for fiscal 2017 increased 4% to $2.5 billion.
- Total operating profit increased 5% to $250 million.
- Effective tax rate at 22.7%.
- Net earnings attributable to Moog increased 11% to $141 million.
- Diluted earnings per share increased 12% to $3.90.
- Strong cash from operating activities at $218 million.

Acquisitions and Divestitures

All of our acquisitions are accounted for under the purchase method and, accordingly, the operating results for the acquired companies are included in the consolidated statements of earnings from the respective dates of acquisition. Under purchase accounting, we record assets and liabilities at fair value and such amounts are reflected in the respective captions on the consolidated balance sheets. The purchase price described for each acquisition below is net of any cash acquired, includes debt issued or assumed and the fair value of contingent consideration.
In 2017, we acquired Rotary Transfer Systems, a manufacturer of electromechanical systems, located in Germany and France for $43 million. This acquisition is included in our Components segment. We also sold non-core businesses in our Space and Defense Controls segment. We recorded losses in other expense of $13 million and consideration of $7 million related to the sales.

In 2016, we acquired a 70% ownership in Linear Mold and Engineering, a Livonia, Michigan-based company specializing in metal additive manufacturing that provides engineering, manufacturing and production consulting services to customers across a wide range of industries, including aerospace, defense, energy and industrial for $23 million. In 2017, we acquired the remaining 30% redeemable noncontrolling interest for $2 million. This acquisition is included in our Space and Defense Controls segment.

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CRITICAL ACCOUNTING POLICIES

Our financial statements and accompanying notes are prepared in accordance with U.S. generally accepted accounting principles. The preparation of these consolidated financial statements requires us to make estimates, assumptions and judgments that affect the amounts reported. These estimates, assumptions and judgments are affected by our application of accounting policies, which are discussed in Note 1 of Item 8, Financial Statements and Supplementary Data of this report. We believe the accounting policies discussed below are the most critical in understanding and evaluating our financial results. These critical accounting policies have been reviewed with the Audit Committee of our Board of Directors.

Revenue Recognition on Long-Term Contracts

Revenue representing 38% of 2017 sales was accounted for using the percentage of completion, cost-to-cost method of accounting. This method of revenue recognition is predominantly used within the Aircraft Controls and Space and Defense Controls segments due to the contractual nature of the business activities, with the exception of their respective aftermarket activities. The contractual arrangements are either firm fixed-price or cost-plus contracts and are with the U.S. Government or its prime subcontractors, foreign governments or commercial aircraft manufacturers, including Boeing and Airbus. The nature of the contractual arrangements includes customers' requirements for delivery of hardware as well as funded nonrecurring development work in anticipation of follow-on production orders.

We recognize revenue on contracts in the current period using the percentage of completion, cost-to-cost method of accounting as work progresses toward completion as determined by the ratio of cumulative costs incurred to date to estimated total contract costs at completion, multiplied by the total estimated contract revenue, less cumulative revenue recognized in prior periods. Changes in estimates affecting sales, costs and profits are recognized in the period in which the change becomes known using the cumulative catch-up method of accounting, resulting in the cumulative effect of changes reflected in the period. Estimates are reviewed and updated quarterly for substantially all contracts. A significant change in an estimate on one or more contracts could have a material effect on our results of operations.

Occasionally, it is appropriate to combine our segment contracts. Contracts are combined in those limited circumstances when they are negotiated as a package in the same economic environment with an overall profit margin objective and constitute, in essence, an agreement to do a single project. In such cases, we recognize revenue and costs over the performance period of the combined contracts as if they were one. Contracts are segmented in limited circumstances if the customer has the right to accept separate elements of the contract and the total amount of the proposals on the separate components approximate the amount of the proposal on the entire project. For segmented contracts, we recognize revenue and costs as if they were separate contracts over the performance periods of the individual elements or phases.

Contract costs include only allocable, allowable and reasonable costs which are included in cost of sales when incurred. For applicable U.S. Government contracts, contract costs are determined in accordance with the Federal Acquisition Regulations and the related Cost Accounting Standards. The nature of these costs includes development engineering costs and product manufacturing costs such as direct material, direct labor, other direct costs and indirect overhead costs. Contract profit is recorded as a result of the revenue recognized less costs incurred in any reporting period. Amounts representing performance incentives, penalties, contract claims or change orders are considered in estimating revenues, costs and profits when they can be reliably estimated and realization is considered probable. Revenue recognized on contracts for unresolved claims or unapproved contract change orders was not material in 2017, 2016 or 2015.

Contract and Contract-Related Loss Reserves

At September 30, 2017, we had contract and contract-related loss reserves of $43 million. For contracts with anticipated losses at completion, a provision for the entire amount of the estimated remaining loss is charged against income in the period in which the loss becomes known. Contract losses are determined considering all direct and indirect contract costs, exclusive of any selling, general or administrative cost allocations that are treated as period expenses. Loss reserves are more common on firm fixed-price contracts that involve, to varying degrees, the design and development of new and unique controls or control systems to meet the customers' specifications. Contract-related loss reserves are recorded for the additional work needed on completed products in order for them to meet contract specifications.

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Reserves for Inventory Valuation

At September 30, 2017, we had net inventories of $489 million, or 30% of current assets. Reserves for inventory were $109 million, or 18% of gross inventories. Inventories are stated at the lower-of-cost-or-market with cost determined primarily on the first-in, first-out method of valuation.

We record valuation reserves to provide for slow-moving or obsolete inventory by principally using a formula-based method that increases the valuation reserve as the inventory ages. We also take specific circumstances into consideration. We consider overall inventory levels in relation to firm customer backlog in addition to forecasted demand including aftermarket sales. Changes in these and other factors, such as low demand and technological obsolescence, could cause us to increase our reserves for inventory valuation, which would negatively impact our gross margin. As we record provisions within cost of sales to increase inventory valuation reserves, we establish a new, lower cost basis for the inventory.

Reviews for Impairment of Goodwill

At September 30, 2017, we had $774 million of goodwill, or 25% of total assets. We test goodwill for impairment for each of our reporting units at least annually, during our fourth quarter, and whenever events occur or circumstances change, such as changes in the business climate, poor indicators of operating performance or the sale or disposition of a significant portion of a reporting unit. We also test goodwill for impairment when there is a change in reporting units.

We identify our reporting units by assessing whether the components of our operating segments constitute businesses for which discrete financial information is available and segment management regularly reviews the operating results of those components. We aggregate certain components based upon an evaluation of the facts and circumstances, including the nature of products and services and the extent of shared assets and resources. As a result, we have five reporting units.

Companies may perform a qualitative assessment as the initial step in the annual goodwill impairment testing process for all or selected reporting units. Companies are also allowed to bypass the qualitative analysis and perform a quantitative analysis if desired. Economic uncertainties and the length of time from the calculation of a baseline fair value are factors that we consider in determining whether to perform a quantitative test.

When we evaluate the potential for goodwill impairment using a qualitative assessment, we consider factors including, but not limited to, macroeconomic conditions, industry conditions, the competitive environment, changes in the market for our products and services, regulatory and political developments, entity specific factors such as strategy and changes in key personnel and overall financial performance. If, after completing this assessment, it is determined that it is more likely than not that the fair value of a reporting unit is less than its carrying value, we proceed to a quantitative two-step impairment test.

Quantitative testing first requires a comparison of the fair value of each reporting unit to its carrying value. We principally use the discounted cash flow method to estimate the fair value of our reporting units. The discounted cash flow method incorporates various assumptions, the most significant being projected revenue growth rates, operating margins and cash flows, the terminal growth rate and the discount rate. Management projects revenue growth rates, operating margins and cash flows based on each reporting unit's current business, expected developments and operational strategies typically over a five-year period. If the carrying value of the reporting unit exceeds its fair value, goodwill is considered impaired and any loss must be measured.

In measuring the impairment loss, the implied fair value of goodwill is determined by assigning a fair value to all of the reporting unit's assets and liabilities, including any unrecognized intangible assets, as if the reporting unit had been acquired in a business combination at fair value. If the carrying amount of the reporting unit's goodwill exceeds the implied fair value of that goodwill, an impairment loss would be recognized in an amount equal to that excess.

The determination of our assumptions is subjective and requires significant estimates. Changes in these estimates and assumptions could materially affect the results of our reviews for impairment of goodwill.

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For our annual test of goodwill for impairment in 2017, we performed a quantitative assessment for each of our five reporting units.

Annual Test

We determined the fair value of our reporting units using discounted cash flows. We projected sales, operating margins and working capital requirements. We applied a 3% terminal value growth rate, which is supported by our historical growth rate, near-term projections and long-term expected market growth. We then discounted our projected cash flows using weighted-average costs of capital that ranged from 10.0% to 11.0% for our various reporting units. These discount rates reflect management's assumptions of marketplace participants' cost of capital. Based on our tests, the fair value of each reporting unit exceeded its carrying amount. Therefore, we concluded that goodwill was not impaired.

The fair value of each reporting unit exceeded its carrying amount by at least 45%. While any individual assumption could differ from those that we used, we believe the overall fair values of our reporting units are reasonable, as the values are derived from a mix of reasonable assumptions. Had we used discount rates that were 100 basis points higher or a terminal growth rate that was 100 basis points lower than those we assumed, the fair values of each of our reporting units would have continued to exceed their carrying amounts by at least 25%.

We evaluate the reasonableness of the resulting fair values of our reporting units by comparing the aggregate fair value to our market capitalization and assessing the reasonableness of any resulting premium.

Reviews for Impairment of Long-Lived Assets

Long-lived assets held for use, which primarily includes finite-lived intangible assets and property, plant and equipment, are evaluated for impairment whenever events or circumstances indicate that the undiscounted net cash flows to be generated by their use over their expected useful lives and eventual disposition are less than their carrying value. The long-term nature of these assets requires the estimation of their cash inflows and outflows several years into the future and only takes into consideration technological advances known at the time of the impairment test. During 2017, there were no events or circumstances that indicated that the carrying value of the Company's long-lived assets held for use were not recoverable.

Pension Assumptions

We maintain various defined benefit pension plans covering employees at certain locations. Pension expense for all defined benefit plans for 2017 was $43 million. Pension obligations and the related costs are determined using actuarial valuations that involve several assumptions. The most critical assumptions are the discount rate, mortality rates and the long-term expected return on assets. Other assumptions include salary increases and retirement age. Beginning with the 2017 fiscal year, we have elected to use the spot rate approach to estimate the service and interest cost components of the net periodic benefit cost for most of our plans. Under this approach the service cost is determined by applying the discount rates along the yield curve to the specific service cost cash flows to determine the present value. The interest cost component is computed by using each assumed discount rate along the curve. Prior to 2017, we estimated these components using a single weighted-average discount rate derived from the yield curve used to measure the benefit obligation at the beginning of the period. This change provides a more precise measurement of service and interest costs and favorably impacted expense by $7 million. The discount rates used in determining expense for the U.S. Employees' Retirement Plan, our largest plan, in 2017 were a 4.0% service cost discount rate and a 3.2% interest cost discount rate, compared to a single discount rate of 4.5% in 2016. The change in discount rates increased expense $9 million for fiscal year 2017, or a net impact of $2 million after considering the impact of the refined approach. The discount rates are used to state expected future cash flows at present value. Using a higher discount rate decreases the present value of pension obligations and decreases pension expense. We use the Aon Hewitt AA Above Median yield curve to determine the discount rate for our U.S. defined benefit plans at year end. We believe that the Aon Hewitt AA Above Median Discount Yield Curve best mirrors the yields of bonds that would be selected by management if actions were taken to settle our obligation.

Mortality rates are used to estimate the life expectancy of plan participants during which they are expected to receive benefit payments. We use a modified version of the mortality table and projection scale published by the Society of Actuaries (SOA), which reflects improvements consistent with the Social Security Administration, as a basis for our mortality assumptions for our U.S. plans. We believe the use of this modified table and projection scale best reflects our demographics and anticipated plan outcomes.

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The long-term expected return on assets assumption reflects the average rate of return expected on funds invested or to be invested to provide for the benefits included in the projected benefit obligation. In determining the long-term expected return on assets assumption, we consider our current and target asset allocations. We consider the relative weighting of plan assets, the historical performance of total plan assets and individual asset classes and economic and other indicators of future performance. Asset management objectives include maintaining an adequate level of diversification to reduce interest rate and market risk and to provide adequate liquidity to meet immediate and future benefit payment requirements. In determining the 2017 expense for our largest plan, we used a 7.50% return on assets assumption, compared to 7.75% for 2016. A 25 basis point decrease in the long-term expected return on assets assumption would increase our annual pension expense by $2 million.

Income Taxes

Our annual tax rate is based on our earnings before tax by jurisdiction, applicable statutory tax rates, the impacts of permanent differences, tax incentives and tax planning opportunities in the various jurisdictions in which we operate. Significant judgment is required in determining our annual tax rate and in evaluating our tax positions.

An estimated annual effective tax rate is applied to our quarterly ordinary operating results. For certain significant, unusual or infrequent events, we recognize the tax impact. The financial impacts of the divestitures of the European space business and related tax consequences were recorded as discrete items during the first and third quarters of 2017.

We record reserves against tax benefits when it’s more likely than not that we will not sustain a position if the appropriate taxing jurisdiction had full information and examined our position. We adjust these reserves when facts and circumstances change, such as when progress is made by taxing authorities in their review of our position. There is a considerable amount of judgement in making these assessments. During 2017, we had two situations that had a significant impact on our results, including the timing of recognizing tax benefits. The largest benefit related to the European space businesses that we either sold during Q1 or held for sale as of the end of Q1. The other benefit was derived from our conversion of our additive manufacturing business from a corporation to an LLC.

Valuation allowances associated with deferred tax assets is another area that requires judgment. We record a valuation allowance to reduce deferred tax assets to the amount of future tax benefit that we believe is more likely than not to be realized. We consider recent earnings projections, allowable tax carryforward periods, tax planning strategies and historical earnings performance to determine the amount of the valuation allowance. Changes in these factors could cause us to adjust our valuation allowance, which would impact our income tax expense when we determine that these factors have changed.

At September 30, 2017, we had gross deferred tax assets of $281 million and deferred tax asset valuation allowances of $5 million. The deferred tax assets principally relate to benefit accruals, inventory obsolescence, tax benefit carryforwards and contract loss reserves. The deferred tax assets include $10 million related to tax benefit carryforwards associated with net operating losses and tax credits, for which $5 million of deferred tax asset valuation allowances are recorded.

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CONSOLIDATED RESULTS OF OPERATIONS AND OUTLOOK

(dollars and shares in millions, except per share data)	2017	2016	2015	2017 vs. 2016 $ Variance	2017 vs. 2016 % Variance	2016 vs. 2015 $ Variance	2016 vs. 2015 % Variance
Net sales	$2,498	$2,412	$2,526	$86	4 %	$(114)	(4 %)
Gross margin	29.3 %	29.5 %	29.2 %				
Research and development expenses	$145	$147	$132	$(3)	(2 %)	$15	11 %
Selling, general and administrative expenses as a percentage of sales	14.3 %	14.1 %	14.7 %				
Interest expense	$35	$35	$29	$—	— %	$6	19 %
Restructuring expense	$—	$15	$15	$(15)	(100 %)	$—	— %
Goodwill impairment	$—	$5	$—	$(5)	(100 %)	$5	n/a
Other	$14	$(3)	$5	$18	n/a	$(8)	(172 %)
Effective tax rate	22.7 %	28.5 %	28.3 %				
Net earnings attributable to Moog and noncontrolling interest	$140	$124	$132	$17	14 %	$(8)	(6 %)
Diluted average common shares outstanding	36	37	39	—	(1 %)	(3)	(7 %)
Diluted earnings per share attributable to Moog	$3.90	$3.47	$3.35	$0.43	12 %	$0.12	4 %

Net sales in 2017 compared to 2016 increased in Aircraft Controls, Components and Space and Defense Controls, while net sales decreased in Industrial Systems. Weaker foreign currencies relative to the U.S. dollar, in particular the British pound, caused sales to decline $19 million in 2017 compared to 2016. Conversely, net sales decreased in each of our segments in 2016 compared to 2015. Weaker foreign currencies, in particular the British pound and the Euro relative to the U.S. dollar, contributed $26 million of the sales decline in 2016.

Gross margin decreased in 2017 compared to 2016. Negative sales mix in Aircraft Controls, driven by lower foreign military sales, as well as lower military aftermarket sales, reduced gross margin. Partly offsetting the decline were favorable sales mixes in Industrial Systems and in Space and Defense Controls. In addition, reduced costs from the restructuring actions taken in 2016 increased profitability $5 million.

Gross margin increased in 2016 compared to 2015. The restructuring benefits from actions taken in 2015 contributed $9 million of reduced costs. We also benefited from the absence of the $7 million correction of an out-of-period accounting adjustment in our Space and Defense Controls segment in 2015. However, the improvements were partly offset by an adverse sales mix in both Components and in Industrial Systems due to lower energy and industrial market sales.

Research and development expenses in 2017 decreased compared to 2016. Within Aircraft Controls, research and development expenses decreased $13 million, as development activities declined on the Embraer E-2 and the Airbus A350 programs. The reduced spend in Aircraft Controls was mostly offset by increases in research and development expenses in Components and Space and Defense Controls. Research and development expenses in 2016 increased compared to 2015. Within Aircraft Controls, research and development expenses increased $16 million as we had higher activity on our major commercial OEM programs.

Selling, general and administrative expenses as a percentage of sales increased in 2017 compared to 2016. Within Space and Defense Controls and Components, we had higher selling activities. Partly offsetting the increases were $7 million of reduced costs from the restructuring actions taken in 2016. Selling, general and administrative expenses as a percentage of sales decreased in 2016 compared to 2015. Most of the declines were due to a focus on expense reduction.

Interest expense in 2017 was comparable to interest expense in 2016. In 2017, higher interest rates increased interest expense $4 million; however, lower levels of debt decreased interest expense $4 million. Interest expense in 2016 increased $3 million due to higher interest rates associated with our revolving credit facility. Additionally, interest expense increased $3 million due to higher levels of debt attributable to the funding of our share repurchase program.

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In 2015 and 2016, we incurred restructuring expenses in response to business conditions. In 2015, we incurred $15 million of restructuring expenses, primarily in Space and Defense Controls, Industrial Systems and Aircraft Controls. Through 2016, the total savings were $20 million, or 95% of our original projected benefits prior to amending our workforce planning. More than half of these savings are in selling, general and administrative expenses. In the second and fourth quarters of 2016, we incurred $15 million of restructuring expenses, primarily in Aircraft Controls and Industrial Systems. Through the fourth quarter of 2017, the total savings were $17 million, in line with our expected return, with approximately 40% in cost of sales and 60% in selling, general and administrative expenses.

In 2016, we recorded a $5 million goodwill impairment charge in Space and Defense Controls related to our recent additive manufacturing acquisition.

Other expense in 2017 includes $13 million of losses associated with the sale of non-core businesses in Space and Defense Controls. Other expense in 2016 includes $2 million of royalty income. Other expense in 2015 includes a $2 million asset impairment write-down in Industrial Systems, $2 million of foreign exchange currency loss and a $1 million loss on the sales of two small operations in our Components segment.

Our effective tax rates in 2017, 2016 and 2015 are lower than the U.S. statutory tax rate. In 2017, our effective tax rate includes the benefits associated with divesting non-core businesses in Space and Defense Controls and the recognition and timing of U.S. tax incentives. In 2016, our effective tax rate included the beneficial timing of the enactment of the U.S. research and development tax credit. In 2015, our effective tax rate benefited from earnings being taxed in foreign jurisdictions with lower statutory tax rates.

Average common shares outstanding decreased over the past three years due to our share buyback program. Since the Board of Directors amended the program in January 2014, we have repurchased 10 million shares. Under the current Board of Directors authorization, we have three million shares available for repurchase.

Other comprehensive income in 2017 includes $69 million of income from retirement liability adjustments and $27 million of positive foreign currency translation adjustments. Other comprehensive loss in 2016 included $54 million of losses from retirement liability adjustments and $38 million of foreign currency translation losses. Other comprehensive loss in 2015 included $82 million of foreign currency translation losses and $51 million of losses from retirement liability adjustments. In 2017 compared to 2016, the retirement liability gain was primarily due to changes in discount rates and return on assets. Also in 2017 compared to 2016, the change in foreign currency translation adjustments was primarily driven by positive impacts of the British pound and the Euro. In 2016 compared to 2015, the change in foreign currency translation adjustments was driven by positive impacts of the Euro and Canadian dollar. These positive impacts were partially offset by a decline in the British pound against the U.S. dollar.

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SEGMENT RESULTS OF OPERATIONS AND OUTLOOK

Operating profit, as presented below, is net sales less cost of sales and other operating expenses, excluding interest expense, equity-based compensation expense and other corporate expenses. Cost of sales and other operating expenses are directly identifiable to the respective segment or allocated on the basis of sales, manpower or profit. Operating profit is reconciled to earnings before income taxes in Note 17 of Item 8, Financial Statements and Supplementary Data of this report.

Aircraft Controls

(dollars in millions)	2017	2016	2015	2017 vs. 2016 $ Variance	2017 vs. 2016 % Variance	2016 vs. 2015 $ Variance	2016 vs. 2015 % Variance
Net sales - military aircraft	$522	$512	$546	$10	2 %	$(34)	(6 %)
Net sales - commercial aircraft	603	551	540	51	9 %	11	2 %
	$1,125	$1,064	$1,087	$61	6 %	$(23)	(2 %)
Operating profit	$114	$99	$100	$16	16 %	$(1)	(1 %)
Operating margin	10.1 %	9.3 %	9.2 %				
Backlog	$571	$632	$678	$(61)	(10 %)	$(46)	(7 %)

Aircraft Controls' net sales growth was primarily driven by commercial programs in 2017 compared to 2016. In 2016 compared to 2015, Aircraft Controls' lower net sales was driven by military program declines, partially offset by commercial program growth. Additionally in 2016 compared to 2015, the British pound relative to the U.S. dollar decreased sales $10 million.

In 2017 compared to 2016, commercial OEM and aftermarket sales increased $46 million and $5 million, respectively. OEM sales for the Airbus A350 increased $40 million due to the program's production ramp up. The increase in commercial aftermarket sales was due to higher repair activity on legacy Boeing programs. In addition, military OEM sales increased $26 million in 2017 compared to 2016. While classified military OEM development jobs increased $23 million and higher production volume on the F-35 program increased sales $17 million, lower foreign military sales decreased $19 million. Also, military aftermarket sales decreased $16 million in 2017, due to lower repair activity for the B1-B and C-5 programs.

In 2016 compared to 2015, military OEM sales decreased $24 million and military aftermarket sales decreased $10 million. OEM sales on the V-22 program decreased $15 million and sales on the FA-18 program decreased $12 million due to lower sales volumes. These declines were partially offset by $5 million of increased sales for the F-35 program. The decline in military aftermarket sales in 2016 is largely due to work on the C-5 refurbishment program winding down, partially offset by increased activity on the F-35 aftermarket program. In 2016 compared to 2015, commercial OEM sales increased $16 million while commercial aftermarket sales decreased $5 million. Commercial OEM sales to Airbus increased $28 million driven by the A350 program, and sales for the Boeing 787 program increased $9 million. These increases were partially offset by lower sales on various business jet and other commercial programs. The commercial aftermarket sales decline was driven by lower levels of Boeing 787 initial provisioning and business jet aftermarket sales.

Operating margins in 2016 and 2015 were affected by restructuring activities. In 2015, we incurred $3 million of restructuring expenses, of which we realized $5 million of benefits in 2016. Also, in 2016, we incurred $7 million of restructuring expenses. During the successive quarters through the fourth quarter of 2017, our total savings were $7 million, and were in line with our expectations.

Operating margin increased in 2017 compared to 2016. Research and development expenses decreased $13 million due to lower development activities on the Embraer E-2 and the Airbus A350 programs. Operating margin also benefited $7 million due to the absence of last year's restructuring expense and an incremental $4 million of associated restructuring benefits. Partly offsetting these benefits was $10 million of higher additions to contract loss reserves in 2017 compared to 2016.

Operating margin increased marginally in 2016 compared to 2015. In 2016, improvements in the costs on our major commercial OEM programs and operational cost containment activities contributed to higher margin. However, offsetting the margin expansion was an increase of $16 million in research and development expenses, as we had higher activity across all of our major commercial programs. Additionally, we incurred $4 million of higher restructuring charges.

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The twelve-month backlog for Aircraft Controls at September 30, 2017 declined compared to October 1, 2016. Half of the decline is in military aircraft, driven primarily due to order timing on the F-35 program. The remaining reduction is due to declining production rates on legacy commercial programs. Twelve-month backlog for Aircraft Controls at October 1, 2016 declined compared to October 3, 2015. Almost half of the decline was due to the weaker British pound relative to the U.S. dollar. In addition, changes in commercial OEM order patterns, as well as work completed on military programs, reduced the level of twelve-month backlog.

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Space and Defense Controls

(dollars in millions)	2017	2016	2015	2017 vs. 2016 $ Variance	2017 vs. 2016 % Variance	2016 vs. 2015 $ Variance	2016 vs. 2015 % Variance
Net sales	$394	$366	$381	$28	8 %	$ (15)	(4 %)
Operating profit	$38	$41	$33	$(4)	(9 %)	$ 8	25 %
Operating margin	9.5 %	11.3 %	8.7 %				
Backlog	$282	$277	$250	$5	2 %	$ 27	11 %

Space and Defense Controls' net sales increased in 2017 compared to 2016 driven by growth in our defense market. Space and Defense Controls' net sales decreased in 2016 compared to 2015 as sales declined in both our space and our defense markets.

Sales in our defense market increased $28 million in 2017 compared to 2016, driven by higher sales of controls for domestic and European defense vehicles, as well as higher naval sales. Additionally in our space market in 2017, higher orders for satellite avionics and controls were offset by contracts continuing to wind down on launch vehicles and lost sales associated with the divestitures in the first half of 2017.

Sales in our space market decreased $10 million in 2016 compared to 2015. Sales declined $19 million due primarily to satellite and launch vehicle contracts winding down. However, this decline was offset by $9 million of additional sales from our additive manufacturing acquisition. Sales in our defense market decreased $5 million. Within defense, sales decreased $11 million due to the unfavorable timing of orders on products for European defense vehicles and due to lower sales volumes on missile systems. Partially offsetting these declines was $6 million of higher sales for products on U.S. defense vehicles.

Operating margin decreased in 2017 compared to 2016 due primarily to $13 million of charges associated with selling non-core businesses. Also, operating margin was affected by $5 million of higher research and development expenses and by a $4 million charge on a satellite program related to an engineering issue. Partly offsetting these margin pressures was a favorable sales mix in our defense markets.

Operating margins in 2015 were affected by restructuring activities. In 2015, we incurred $6 million of restructuring expenses, and we realized $6 million of cost savings in 2016. More than half of the total restructuring expense in 2015 relates to the termination of a selling and marketing contractual relationship, and did not carry the same ratio of benefits as our previous restructuring activities.

Operating margin increased in 2016 compared to 2015. The absences of the $8 million out-of-period adjustment in 2015 and the $6 million restructuring expense in 2015 contributed to the increase in operating profit. Additionally, improved sales mix, primarily in our satellite business, and cost containment activities contributed incremental operating profit. Partially offsetting the margin improvement was a $5 million goodwill impairment charge related to our recent additive manufacturing acquisition and $2 million more of additions to contract loss reserves in 2016 compared to 2015.

Twelve-month backlog for Space and Defense Controls at September 30, 2017 increased slightly compared to October 1, 2016 as order growth in satellite avionics, as well as launch vehicles, was mostly offset by defense controls programs completing. The higher level of twelve-month backlog for Space and Defense Controls at October 1, 2016 compared to October 3, 2015 was due to higher orders for defense controls and naval programs.

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Industrial Systems

(dollars in millions)	2017	2016	2015	2017 vs. 2016 $ Variance	2017 vs. 2016 % Variance	2016 vs. 2015 $ Variance	2016 vs. 2015 % Variance
Net sales	$477	$515	$522	$(38)	(7 %)	$(7)	(1 %)
Operating profit	$46	$49	$45	$(2)	(5 %)	$4	8 %
Operating margin	9.7 %	9.4 %	8.6 %				
Backlog	$164	$145	$178	$18	13 %	$(32)	(18 %)

Industrial Systems' net sales decreased both in 2017 compared to 2016 and in 2016 compared to 2015. Weaker foreign currencies relative to the U.S. dollar, in particular the British pound, caused sales to decline $5 million in 2017 compared to 2016. Similarly, weaker foreign currencies relative to the U.S. dollar in 2016 compared to 2015 caused sales to decline $11 million, caused mostly by the Euro and the Brazilian real.

Sales in our industrial automation market decreased $27 million in 2017 compared to 2016 across our broad range of industrial markets. Also, sales decreased $14 million in our energy market. Within our wind energy products, sales decreased due to lost sales to a key customer in Brazil who was acquired and by lower sales from additional wind customers. Sales increased $4 million in our simulation and test market due to higher product deliveries.

Excluding the currency effects on sales in 2016 compared to 2015, sales increased $9 million in our simulation and test market due to higher sales to flight simulation customers. Also in our energy market, sales increased $6 million due to stronger wind product sales in China. Partially offsetting the increases were declines across our industrial automation products due to economic weakness in our markets resulting in lower demand for our metal forming, steel production and aftermarket products and services.

Operating margins in 2016 and 2015 were affected by restructuring activities. In 2015, we incurred $5 million of restructuring expenses, and realized $7 million in cost savings in 2016. In 2016, we incurred $5 million of restructuring expenses. During the successive quarters through the fourth quarter of 2017, our total savings were $6 million, and were in line with our expectations.

Operating margin increased marginally in 2017 compared to 2016. In 2017, the absence of the prior year's restructuring expense and incremental benefits were offset by lower sales volumes across our major markets.

Operating margin increased in 2016 compared to 2015 due to the realized restructuring benefits from the 2015 restructuring actions, additional cost containment activities and $4 million of lower research and development expenses. Partially offsetting the margin improvement was a negative sales mix due in part to lower industrial automation sales.

The increased level of twelve-month backlog in Industrial Systems at September 30, 2017 compared to October 1, 2016 is in part due to higher orders for non-renewable energy customers, as well as higher test and simulation orders. The lower level of twelve-month backlog in Industrial Systems at October 1, 2016 compared to October 3, 2015 was due to canceled wind energy orders with a key customer who was acquired, as well as the completion of simulation orders.

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Components

(dollars in millions)	2017	2016	2015	2017 vs. 2016 $ Variance	2017 vs. 2016 % Variance	2016 vs. 2015 $ Variance	2016 vs. 2015 % Variance
Net sales	$501	$467	$536	$34	7 %	$(69)	(13 %)
Operating profit	$52	$50	$67	$3	5 %	$(17)	(26 %)
Operating margin	10.5 %	10.7 %	12.5 %				
Backlog	$195	$170	$168	$25	15 %	$2	1 %

Components' net sales increased across all of our markets in 2017 compared to 2016. The recent acquisition of Rotary Transfer Systems increased sales $12 million. Conversely, in 2016 compared to 2015, net sales decreased across all of our Components' markets.

Sales in our medical market increased $14 million in 2017 compared to 2016 due primarily to higher sales volumes on our sets and pumps. Additionally, sales in our industrial market increased $14 million due primarily to the Rotary Transfer Systems acquisition as well as increased demand for cooling equipment. Also, sales increased $5 million in our aerospace and defense market, primarily related to higher shipments on the Guardian program as well as various space components programs.

Sales in our industrial market decreased $41 million in 2016 compared to 2015. Approximately two-thirds of the decline was in our energy market where the macro-economic conditions centered around the significant decline in the price of crude oil resulted in lower demand for our marine products. The remaining decline in our industrial market was due to unfavorable order timing. Within our aerospace and defense market, sales declined $20 million due primarily to lower demand for aftermarket products. Sales also declined $8 million in our medical market, as lower sales for our sleep apnea products were partially offset by higher sales for medical pump products.

Operating margin decreased marginally in 2017 compared to 2016. In 2017, we had $5 million of higher research and development investments. In addition, selling general and administrative expenses increased $4 million in part due to higher selling expenses in support of our medical business. Mostly offsetting these declines was an improved sales mix in our defense and medical markets.

Operating margin decreased in 2016 compared to 2015. The decreases are due, in part, to lower demand for our marine energy products resulting from the significant decline in the price of crude oil, as well as lower sales in our military markets. We also incurred $2 million of higher research and development expenses in 2016.

The twelve-month backlog at September 30, 2017 increased compared to the twelve-month backlog at October 1, 2016 due to higher orders for multiple aerospace and defense products, as well as the Rotary Transfer Systems acquisition in industrial products. The twelve-month backlog at October 1, 2016 is comparable to the level at October 3, 2015 as higher industrial orders were mostly offset by completed aerospace and defense orders.

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Effective October 1, 2017, we changed our segment reporting structure to three reporting segments. Our former Components segment has been separated and merged into Space and Defense Controls and Industrial Systems. We expect this will result in one less reporting unit in 2018. The following table reflects the 2018 outlook and 2017 actuals, whose amounts have been reclassified to conform with the 2018 presentation.

			2018 vs. 2017	
(dollars in millions)	2018	2017	$ Variance	% Variance
Net sales:				
Aircraft Controls	$1,175	$1,125	$50	4 %
Space and Defense Controls	547	529	18	3 %
Industrial Systems	894	843	51	6 %
	$2,617	$2,498	$119	5 %
Operating profit:				
Aircraft Controls	$125	$114	$11	9 %
Space and Defense Controls	63	49	14	30 %
Industrial Systems	100	88	13	14 %
	$288	$250	$38	15 %
Operating margin:				
Aircraft Controls	10.6 %	10.1 %		
Space and Defense Controls	11.5 %	9.2 %		
Industrial Systems	11.2 %	10.4 %		
	11.0 %	10.0 %		

2018 Outlook – We expect the increase in 2018 sales to be primarily driven by higher military OEM sales for the F-35 program in Aircraft Controls. We also expect sales increases across our major markets both in Industrial as well as Space and Defense Controls. We expect 2018 operating margin will increase due to the absence of 2017's losses associated with divesting non-core businesses, as well as incremental margin from higher sales. However, we expect that a higher effective tax rate of 31% will partially offset the higher level of operating profit. We expect net earnings attributable to common shareholders to increase 5% in 2018 to $148 million, and diluted earnings per share will range between $3.90 and $4.30, with a midpoint of $4.10, an increase of 5% compared to 2017.

2018 Outlook for Aircraft Controls – We expect 2018 sales in Aircraft Controls will increase primarily due to the continued ramp ups of the F-35 program and the Airbus A350 program. Partially offsetting the increases is an expected sales decline of legacy commercial OEM programs. We expect 2018 operating margin will increase compared to 2017. We expect that research and development costs will decrease $6 million and that we will continue to realize the benefits of cost saving activities. However, we expect a negative sales mix, as sales on our mature commercial programs are replaced with sales growth on newer commercial programs.

2018 Outlook for Space and Defense Controls – We expect 2018 sales in Space and Defense Controls will increase due to sales growth from launch vehicles and satellite programs. Also within our defense market, we expect higher missile systems and security sales will offset a decline in defense controls sales. We expect 2018 operating margin will increase, as the losses associated with divesting non-core businesses do not repeat.

2018 Outlook for Industrial Systems – We expect 2018 sales in Industrial Systems to increase across all of our major markets. We expect 2018 operating margin will increase as we benefit from incremental margin on higher sales volumes.

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FINANCIAL CONDITION AND LIQUIDITY

(dollars in millions)	2017	2016	2015	2017 vs. 2016 $ Variance	2017 vs. 2016 % Variance	2016 vs. 2015 $ Variance	2016 vs. 2015 % Variance
Net cash provided (used) by:							
Operating activities	$218	$216	$335	$2	1 %	$(119)	(35 %)
Investing activities	(110)	(77)	(68)	(33)	42 %	(9)	14 %
Financing activities	(76)	(120)	(166)	44	(37 %)	46	(28 %)

Our available borrowing capacity and our cash flow from operations provide us with the financial resources needed to run our operations, reinvest in our business and make strategic acquisitions.

At September 30, 2017, our cash balance was $368 million, and was primarily held outside of the U.S. Cash flow from our U.S. operations, together with borrowings on our credit facility, fund on-going activities, debt service requirements and future growth investments. We reinvest the cash generated from foreign operations locally and such international balances are not available to pay down debt in the U.S. unless we decide to repatriate such amounts. During 2016, we repatriated $91 million of earnings from various foreign subsidiaries and used the funds to pay down our U.S. revolving credit facility. If we determine further repatriation of foreign funds is necessary, we would then be required to pay U.S. income taxes on those funds.

Operating activities

Net cash provided by operating activities in 2017 was comparable to 2016, as net earnings increased $17 million, but was offset by lower cash provided by working capital accounts. Unfavorable timing of receivables and increases in inventory within Aircraft Controls, Space and Defense Controls and Industrial Systems used $65 million more of cash compared to a year ago. Also, customer advances used $10 million more of cash due to milestones met primarily in Space and Defense Controls. Partially offsetting the decline was $48 million of cash provided by accounts payable due to favorable timing and $18 million of cash provided by accrued expenses.

Net cash provided by operating activities decreased in 2016 compared to 2015. Unfavorable timing of payments and collections across all of our segments used $89 million more of cash compared to a year ago. Additionally, we contributed an additional $19 million in pension contributions in 2016.

Investing activities

Net cash used by investing activities in 2017 includes $76 million for capital expenditures and $41 million for the acquisition of Rotary Transfer Systems.

Net cash used by investing activities in 2016 included $67 million for capital expenditures and $11 million for the 70% ownership for the Linear Mold and Engineering acquisition.

Net cash used by investing activities in 2015 included $81 million for capital expenditures. In 2015, investment activities provided $7 million of cash as we liquidated retirement plan investments in order to purchase our stock, and $3 million of proceeds from the sale of two medical operations in our Components segment.

We expect our 2018 capital expenditures to be approximately $95 million, due to facilities investments supporting the increased production of the F-35 program, as well as engine propulsion testing.

Financing activities

Net cash used by financing activities in 2017 included net payments on our credit facility.

Net cash used by financing activities in 2016 included $39 million to fund our stock repurchase program. We repurchased approximately 850,000 shares, averaging $46 per share, and used our credit facility for funding.

Net cash used by financing activities in 2015 included $344 million to fund our stock repurchase program. Additionally, net cash used by financing activities in 2015 included the net proceeds of issuing our $300 million aggregate principal 5.25% senior notes, which were used to pay down our U.S. revolving credit facility borrowings.

CAPITAL STRUCTURE AND RESOURCES

We maintain bank credit facilities to fund our short and long-term capital requirements, including acquisitions. From time to time, we also sell debt and equity securities to fund acquisitions or take advantage of favorable market conditions.

Our U.S. revolving credit facility matures on June 28, 2021. The U.S. revolving credit facility has a capacity of $1.1 billion and also provides an expansion option, which permits us to request an increase of up to $200 million to the credit facility upon satisfaction of certain conditions. The U.S. revolving credit facility had an outstanding balance of $540 million at September 30, 2017. The weighted-average interest rate on primarily all of the outstanding credit facility borrowings is 2.62% and is principally based on LIBOR plus the applicable margin, which was 1.38% at September 30, 2017. The credit facility is secured by substantially all of our U.S. assets.

The U.S. revolving credit facility contains various covenants. The covenant for minimum interest coverage ratio, defined as the ratio of EBITDA to interest expense for the most recent four quarters, is 3.0. The covenant for the maximum leverage ratio, defined as the ratio of net debt, including letters of credit, to EBITDA for the most recent four quarters, is 3.5. We are in compliance with all covenants. EBITDA is defined in the loan agreement as (i) the sum of net income, interest expense, income taxes, depreciation expense, amortization expense, other non-cash items reducing consolidated net income and non-cash equity-based compensation expenses minus (ii) other non-cash items increasing consolidated net income.

We are generally not required to obtain the consent of lenders of the U.S. revolving credit facility before raising significant additional debt financing; however, certain limitations and conditions may apply that would require obtaining consent. In recent years, we have demonstrated our ability to secure consents to access debt markets. We have also been successful in accessing equity markets from time to time. We believe that we will be able to obtain additional debt or equity financing as needed.

At September 30, 2017, we had $548 million of unused capacity, including $535 million from the U.S. revolving credit facility after considering standby letters of credit.

We have $300 million aggregate principal amount of 5.25% senior notes due December 1, 2022 with interest paid semiannually on June 1 and December 1 of each year. The senior notes are unsecured obligations, guaranteed on a senior unsecured basis by certain subsidiaries and contain normal incurrence-based covenants and limitations such as the ability to incur additional indebtedness, pay dividends, make other restricted payments and investments, create liens and certain corporate acts such as mergers and consolidations. The effective interest rate for these notes after considering the amortization of deferred debt issuance costs is 5.73%.

We have a trade receivables securitization facility (the "Securitization Program"), which was extended on October 23, 2017 and now matures on October 23, 2019. The Securitization Program will now effectively increase our borrowing capacity by up to $130 million and will lower our cost to borrow funds as compared to the U.S. revolving credit facility. Under the Securitization Program, we sell certain trade receivables and related rights to an affiliate, which in turn sells an undivided variable percentage ownership interest in the trade receivables to a financial institution, while maintaining a subordinated interest in a portion of the pool of trade receivables. We had an outstanding balance of $120 million at September 30, 2017. The Securitization Program has a minimum borrowing requirement, which was $96 million at September 30, 2017. Interest on the secured borrowings under the Securitization Program was 2.11% at September 30, 2017 and is based on 30-day LIBOR plus an applicable margin.

Net debt to capitalization was 33% at September 30, 2017 and 41% at October 1, 2016. The decrease in net debt to capitalization is primarily due to our net earnings and positive cash flow.

We believe that our cash on hand, cash flows from operations and available borrowings under short and long-term arrangements will continue to be sufficient to meet our operating needs.

The Board of Directors authorized a share repurchase program beginning in January 2014 that includes both Class A and Class B common shares, and allows us to buy up to an aggregate 13 million common shares. Under this program, we have purchased approximately 9.7 million shares for $650 million as of September 30, 2017.

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Off Balance Sheet Arrangements

We do not have any material off balance sheet arrangements that have or are reasonably likely to have a material future effect on our financial condition, results of operations or cash flows.

Contractual Obligations and Commercial Commitments

Our significant contractual obligations and commercial commitments at September 30, 2017 are as follows:

(dollars in millions)	Payments due by period				
Contractual Obligations	Total	2018	2019-2020	2021-2022	After 2022
Long-term debt	$960	$—	$120	$540	$300
Interest on long-term debt	81	16	32	32	1
Operating leases	124	22	35	23	44
Purchase obligations	756	598	135	5	18
Total contractual obligations	$1,921	$636	$322	$600	$363

In addition to the obligations in the table above, we have $1 million recorded for unrecognized tax benefits in current liabilities, which includes related accrued interest. We are unable to determine if and when any of those amounts will be settled, nor can we estimate any potential changes to the unrecognized tax benefits.

The table above excludes interest on variable-rate debt from our U.S. revolving credit facility and Securitization Program, as we are unable to determine the rate and average balance outstanding for the periods presented in the above table. Interest on variable-rate long-term debt, assuming the rate and outstanding balances do not change from those at September 30, 2017, would be approximately $18 million annually.

Total contractual obligations exclude pension obligations. In 2017, we have no minimum funding requirements. However, we anticipate making contributions to defined benefit pension plans of $72 million, of which approximately $64 million are for our U.S. plans. We are unable to determine minimum funding requirements beyond 2018.

We have made discretionary incremental contributions to our defined benefit plans in excess of minimum funding requirements in 2017 and expect to continue to do the same in 2018. These additional contributions are being made in an effort to migrate toward fully funded status and reduce the volatility to our consolidated financial statements.

(dollars in millions)	Commitments expiring by period				
Other Commercial Commitments	Total	2018	2019-2020	2021-2022	After 2022
Standby letters of credit	$25	$ 17	$ 4	$ 4	$ —

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ECONOMIC CONDITIONS AND MARKET TRENDS

We operate within the aerospace and defense and industrial markets. Our aerospace and defense markets are affected by market conditions and program funding levels, while our industrial markets are influenced by general capital investment trends and economic conditions. A common factor throughout our markets is the continuing demand for technologically advanced products.

Aerospace and Defense

Approximately two-thirds of our 2017 sales were generated in aerospace and defense markets. Within aerospace and defense, we serve three end markets: defense, commercial aircraft and space.

The defense market is dependent on military spending for development and production programs. Aircraft production programs are typically long-term in nature, offering predictability as to capacity needs and future revenues. We maintain positions on numerous high priority programs, including the Lockheed Martin F-35 Joint Strike Fighter, FA-18E/F Super Hornet and V-22 Osprey. The large installed base of our products leads to attractive aftermarket sales and service opportunities. The tactical and strategic missile, missile defense and defense controls markets are dependent on many of the same market conditions as military aircraft, including overall military spending and program funding levels. Our security and surveillance product line is dependent on government funding at federal and local levels, as well as private sector demand.

Reductions in the U.S. Department of Defense's mandatory and discretionary budgeted spending, which became effective on March 1, 2013, resulting from the Budget Control Act of 2011, has had ramifications for the domestic aerospace and defense market. As originally passed, the Budget Control Act provided that, in addition to an initial significant reduction in future domestic defense spending, further automatic cuts to defense spending authorization (which is generally referred to as sequestration) of approximately $500 billion through the Federal Government's 2021 fiscal year would be triggered by the failure of Congress to produce a deficit reduction bill. The sequestration spending cuts were intended to be uniform by category for programs, projects and activities within accounts. The Bipartisan Budget Act of 2013 and the Bipartisan Budget Act of 2015 provided stability and modest growth in Department of Defense spending through 2017. However, future budgets beyond 2017 are uncertain with respect to the overall levels of defense spending. Currently, we expect approximately $730 million of U.S. defense sales in 2018.

The commercial aircraft market is dependent on a number of factors, including global demand for air travel, which generally follows underlying economic growth. As such, the commercial aircraft market has historically exhibited cyclical swings which tend to track the overall economy. In recent years, the development of new, more fuel-efficient commercial air transports has helped drive increased demand in the commercial aircraft market, as airlines replace older, less fuel-efficient aircraft with newer models in an effort to reduce operating costs. The aftermarket is driven by usage of the existing aircraft fleet and the age of the installed fleet, and is impacted by fleet re-sizing programs for passenger and cargo aircraft. Changes in aircraft utilization rates affect the need for maintenance and spare parts impacting aftermarket sales. Boeing and Airbus have historically adjusted production in line with air traffic volume. Demand for our commercial aircraft products is in large part dependent on new aircraft production, which is increasing as Boeing and Airbus work to fulfill large backlogs of unfilled orders.

The commercial space market is comprised of large satellite customers, traditionally communications companies. Trends for this market, as well as for commercial launch vehicles, follow demand for increased capacity. This, in turn tends to track with underlying demand for increased consumption of telecommunication services, satellite replacement and global navigation needs. The space market is also partially dependent on the governmental-authorized levels of funding for satellite communications, as well as investment for commercial and exploration activities.

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Industrial

Approximately one-third of our 2017 sales were generated in industrial markets. Within industrial, we serve three end markets: industrial automation, energy and medical.

The industrial automation market we serve is influenced by several factors including capital investment, product innovation, economic growth, cost-reduction efforts and technology upgrades. We experience challenges from the need to react to the demands of our customers, who are in large part sensitive to international and domestic economic conditions.

The energy market we serve is affected by changing oil and natural gas prices, global urbanization, the resulting change in supply and demand for global energy and the political climate and corresponding public support for investments in renewable energy generation capacity. Historically, drivers for global growth include investments in power generation infrastructure, including renewable energy, and exploration in search of new oil and gas resources. However, the significant decline in the price of crude oil has reduced investment in exploration activities. This reduced investment has directly affected our energy business. Currently, we expect approximately $34 million of oil exploration-related sales in 2018, down from approximately $100 million in 2014.

The medical market we serve is influenced by economic conditions, regulatory environments, hospital and outpatient clinic spending on equipment, population demographics, medical advances, patient demands and the need for precision control components and systems. Advances in medical technology and medical treatments have had the effect of extending average life spans, in turn resulting in greater need for medical services. These same technology and treatment advances also drive increased demand from the general population as a means to improve quality of life. Access to medical insurance, whether through government funded health care plans or private insurance, also affects the demand for medical services.

Foreign Currencies

We are affected by the movement of foreign currencies compared to the U.S. dollar, particularly in Aircraft Controls and Industrial Systems. About one-quarter of our 2017 sales were denominated in foreign currencies. During 2017, average foreign currency rates generally weakened against the U.S. dollar compared to 2016. The translation of the results of our foreign subsidiaries into U.S. dollars decreased sales by $19 million compared to one year ago. During 2016, average foreign currency rates generally weakened against the U.S. dollar compared to 2015. The translation of the results of our foreign subsidiaries into U.S. dollars decreased 2016 sales by $26 million compared to 2015.

RECENT ACCOUNTING PRONOUNCEMENTS

See Note 1 of the Consolidated Financial Statements included in Item 8, Financial Statements and Supplementary Data of this report for further information regarding Financial Accounting Standards Board issued Accounting Standards Updates ("ASU").

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Item 7A. Quantitative and Qualitative Disclosures about Market Risk.

In the normal course of business, we are exposed to interest rate risk from our long-term debt and foreign exchange rate risk related to our foreign operations and foreign currency transactions. To manage these risks, we may enter into derivative instruments such as interest rate swaps and foreign currency contracts. We do not hold or issue financial instruments for trading purposes. In 2017, our derivative instruments consisted of interest rate swaps designated as cash flow hedges and foreign currency contracts.

At September 30, 2017, we had $660 million of borrowings subject to variable interest rates. At September 30, 2017, we had interest rate swaps with notional amounts totaling $150 million. The interest rate swaps effectively convert this amount of variable-rate debt to fixed-rate debt at 2.62%, including the applicable margin of 1.38% as of September 30, 2017. The interest will revert back to variable rates based on LIBOR plus the applicable margin upon the maturity of the interest rate swaps. These interest rate swaps mature at various times through June 23, 2020. During 2017, our average borrowings subject to variable interest rates, after adjusting for interest rate swaps, were $521 million and, therefore, if interest rates had been one percentage point higher during 2017, our interest expense would have been $5 million higher.

We also enter into forward contracts to reduce fluctuations in foreign currency cash flows related to third party purchases, intercompany product shipments and to reduce exposure on intercompany balances that are denominated in foreign currencies. We have foreign currency contracts with notional amounts of $154 million outstanding at September 30, 2017 that mature at various times through August 30, 2019. These include notional amounts of $94 million outstanding where the U.S. dollar is one side of the trade. The net fair value of all of our foreign currency contracts involving the U.S. dollar was a $1 million net liability at September 30, 2017. A hypothetical 10 percent increase in the value of the U.S. dollar against all currencies would decrease the fair value of our foreign currency contracts at September 30, 2017 by approximately $5 million, while a hypothetical 10 percent decrease in the value of the U.S. dollar against all currencies would increase the fair value of our foreign currency contracts at September 30, 2017 by approximately $6 million. It is important to note that gains and losses indicated in the sensitivity analysis would often be offset by gains and losses on the underlying receivables and payables.

Although the majority of our sales, expenses and cash flows are transacted in U.S. dollars, we have exposure to changes in foreign currency exchange rates such as the Euro, British pound and Japanese yen. If average annual foreign exchange rates collectively weakened or strengthened against the U.S. dollar by 10%, our net earnings in 2017 would have decreased or increased by $8 million from foreign currency translation. This sensitivity analysis assumed that each exchange rate would change in the same direction relative to the U.S. dollar and excludes the potential effects that changes in foreign currency exchange rates may have on actual transactions.

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Item 8. Financial Statements and Supplementary Data.
Inc.
Consolidated Statements of Earnings

(dollars in thousands, except per share data)	Fiscal Years Ended September 30, 2017	October 1, 2016	October 3, 2015
Net sales	$2,497,524	$2,411,937	$2,525,532
Cost of sales	1,766,002	1,700,354	1,788,828
Gross profit	731,522	711,583	736,704
Research and development	144,646	147,336	132,271
Selling, general and administrative	356,141	339,961	371,498
Interest	34,551	34,605	28,967
Restructuring	—	15,393	15,449
Goodwill impairment	—	4,800	—
Other	14,473	(3,372)	4,685
Earnings before income taxes	181,711	172,860	183,834
Income taxes	41,301	49,227	51,951
Net earnings attributable to Moog and noncontrolling interest	$140,410	$123,633	$131,883
Net earnings (loss) attributable to noncontrolling interest	(870)	(3,112)	—
Net earnings attributable to Moog	$141,280	$126,745	$131,883
Net earnings per share attributable to Moog			
Basic	$3.94	$3.49	$3.39
Diluted	$3.90	$3.47	$3.35
Average common shares outstanding			
Basic	35,852,448	36,277,445	38,945,880
Diluted	36,230,043	36,529,344	39,334,520

See accompanying Notes to Consolidated Financial Statements.

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Inc.
Consolidated Statements of Comprehensive Income (Loss)

(dollars in thousands)	Fiscal Years Ended September 30, 2017	October 1, 2016	October 3, 2015
Net earnings attributable to Moog and noncontrolling interest	$140,410	$123,633	$131,883
Other comprehensive income (loss), net of tax:			
Foreign currency translation adjustment	27,460	(37,838)	(82,042)
Retirement liability adjustment	69,229	(54,184)	(51,926)
Change in accumulated income (loss) on derivatives	2,881	(1,304)	(929)
Other comprehensive income (loss), net of tax	99,570	(93,326)	(134,897)
Comprehensive income (loss)	239,980	30,307	(3,014)
Comprehensive income (loss) attributable to noncontrolling interest	(870)	(3,112)	—
Comprehensive income (loss) attributable to Moog	$240,850	$33,419	$(3,014)

See accompanying Notes to Consolidated Financial Statements.

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Inc.
Consolidated Balance Sheets

(dollars in thousands, except per share data)	September 30, 2017	October 1, 2016
ASSETS		
Current assets		
Cash and cash equivalents	$ 368,073	$ 325,128
Receivables	727,740	688,388
Inventories	489,127	479,040
Prepaid expenses and other current assets	41,499	34,688
Total current assets	1,626,439	1,527,244
Property, plant and equipment, net	522,991	522,369
Goodwill	774,268	740,162
Intangible assets, net	108,818	113,560
Deferred income taxes	26,558	75,800
Other assets	31,518	25,839
Total assets	$ 3,090,592	$ 3,004,974
LIABILITIES AND SHAREHOLDERS' EQUITY		
Current liabilities		
Short-term borrowings	$ 89	$ 1,379
Current installments of long-term debt	295	167
Accounts payable	170,878	144,450
Accrued compensation	148,406	126,319
Customer advances	159,274	167,514
Contract loss reserves	43,214	32,543
Other accrued liabilities	107,278	116,577
Total current liabilities	629,434	588,949
Long-term debt, excluding current installments	956,653	1,004,847
Long-term pension and retirement obligations	271,272	401,747
Deferred income taxes	13,320	11,026
Other long-term liabilities	5,609	4,343
Total liabilities	1,876,288	2,010,912
Commitments and contingencies (Note 18)	—	—
Redeemable noncontrolling interest	—	5,651
Shareholders' equity		
Common stock - par value $1.00		
Class A - Authorized 100,000,000 shares	43,704	43,667
Issued 43,704,286 and outstanding 32,346,135 shares at September 30, 2017		
Issued 43,666,801 and outstanding 32,131,566 shares at October 1, 2016		
Class B - Authorized 20,000,000 shares. Convertible to Class A on a one-for-one basis	7,576	7,613
Issued 7,575,427 and outstanding 3,436,747 shares at September 30, 2017		
Issued 7,612,912 and outstanding 3,734,067 shares at October 1, 2016		
Additional paid-in capital	492,246	465,762
Retained earnings	1,847,819	1,706,539
Treasury shares	(739,157)	(741,700)
Stock Employee Compensation Trust	(89,919)	(49,463)
Supplemental Retirement Plan Trust	(12,474)	(8,946)
Accumulated other comprehensive loss	(335,491)	(435,061)
Total Moog shareholders' equity	1,214,304	988,411

Total liabilities and shareholders' equity	$ 3,090,592	$ 3,004,974

See accompanying Notes to Consolidated Financial Statements.

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Inc.
Consolidated Statements of Shareholders' Equity

(dollars in thousands)	Fiscal Years Ended September 30, 2017	October 1, 2016	October 3, 2015
COMMON STOCK			
Beginning and end of period	$51,280	$51,280	$51,280
ADDITIONAL PAID-IN CAPITAL			
Beginning of year	465,762	456,512	463,965
Issuance of treasury shares	(7,390)	(429)	(4,529)
Equity-based compensation expense	4,582	3,271	5,074
Redemption of noncontrolling interest	3,125	—	—
Adjustment to market - SECT, SERP and other	26,167	6,408	(7,998)
End of year	492,246	465,762	456,512
RETAINED EARNINGS			
Beginning of year	1,706,539	1,579,794	1,447,911
Net earnings attributable to Moog	141,280	126,745	131,883
End of year	1,847,819	1,706,539	1,579,794
TREASURY SHARES AT COST			
Beginning of year	(741,700)	(701,771)	(360,445)
Class A and B shares issued related to equity awards	11,186	5,003	15,965
Class A and B shares purchased	(8,643)	(44,932)	(357,291)
End of year	(739,157)	(741,700)	(701,771)
STOCK EMPLOYEE COMPENSATION TRUST (SECT)			
Beginning of year	(49,463)	(44,211)	(48,458)
Issuance of shares	867	28,048	7,395
Purchase of shares	(18,685)	(28,799)	(15,151)
Adjustment to market	(22,638)	(4,501)	12,003
End of year	(89,919)	(49,463)	(44,211)
SUPPLEMENTAL RETIREMENT PLAN (SERP) TRUST			
Beginning of year	(8,946)	(5,337)	—
Purchase of shares	—	(2,300)	(7,328)
Adjustment to market	(3,528)	(1,309)	1,991
End of year	(12,474)	(8,946)	(5,337)
ACCUMULATED OTHER COMPREHENSIVE LOSS			
Beginning of year	(435,061)	(341,735)	(206,838)
Other comprehensive income (loss)	99,570	(93,326)	(134,897)
End of year	(335,491)	(435,061)	(341,735)
TOTAL MOOG SHAREHOLDERS' EQUITY	$1,214,304	$988,411	$994,532
REDEEMABLE NONCONTROLLING INTEREST			
Beginning of year	$5,651	$—	$—
Redeemable noncontrolling interest of acquired entity	—	8,763	—
Net loss attributable to redeemable noncontrolling interest	(870)	(3,112)	—
Acquisition of noncontrolling interest	(4,781)	—	—
End of year	$—	$5,651	$—

(Continued on next page)

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Inc.
Consolidated Statements of Shareholders' Equity, Continued

(share data)	Fiscal Years Ended September 30, 2017	October 1, 2016	October 3, 2015
COMMON STOCK - CLASS A			
Beginning of year	43,666,801	43,638,618	43,627,531
Conversion of Class B to Class A	37,485	28,183	11,087
End of year	43,704,286	43,666,801	43,638,618
COMMON STOCK - CLASS B			
Beginning of year	7,612,912	7,641,095	7,652,182
Conversion of Class B to Class A	(37,485)	(28,183)	(11,087)
End of year	7,575,427	7,612,912	7,641,095
TREASURY SHARES - CLASS A COMMON STOCK			
Beginning of year	(11,110,087)	(10,318,431)	(5,806,702)
Class A shares issued related to equity awards	284,048	152,099	543,923
Class A shares purchased	(106,964)	(943,755)	(5,055,652)
End of year	(10,933,003)	(11,110,087)	(10,318,431)
TREASURY SHARES - CLASS B COMMON STOCK			
Beginning of year	(3,323,926)	(3,323,926)	(3,319,038)
Class B shares issued related to equity awards	7,380	—	—
Class B shares purchased	(17,381)	—	(4,888)
End of year	(3,333,927)	(3,323,926)	(3,323,926)
SECT SHARES - CLASS A COMMON STOCK			
Beginning of year	(425,148)	—	—
Purchase of shares	—	(425,148)	—
End of year	(425,148)	(425,148)	—
SECT SHARES - CLASS B COMMON STOCK			
Beginning of year	(404,919)	(828,381)	(710,841)
Issuance of shares	15,000	487,678	101,000
Purchase of shares	(264,834)	(64,216)	(218,540)
End of year	(654,753)	(404,919)	(828,381)
SERP TRUST SHARES - CLASS B COMMON STOCK			
Beginning of year	(150,000)	(100,000)	—
Purchase of shares	—	(50,000)	(100,000)
End of year	(150,000)	(150,000)	(100,000)

See accompanying Notes to Consolidated Financial Statements.

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Inc.
Consolidated Statements of Cash Flows

(dollars in thousands)	Fiscal Years Ended September 30, 2017	October 1, 2016	October 3, 2015
CASH FLOWS FROM OPERATING ACTIVITIES			
Net earnings attributable to Moog and noncontrolling interest	$140,410	$123,633	$131,883
Adjustments to reconcile net earnings to net cash provided (used) by operating activities:			
Depreciation	71,363	77,407	78,610
Amortization	18,804	21,325	24,999
Deferred income taxes	10,758	4,248	12,991
Equity-based compensation expense	4,582	3,271	5,074
Other	17,898	13,440	7,826
Changes in assets and liabilities providing (using) cash:			
Receivables	(44,558)	1,672	60,616
Inventories	(5,999)	12,644	3,821
Accounts payable	25,740	(21,821)	8,107
Customer advances	(7,054)	2,903	24,112
Accrued expenses	16,901	(727)	(6,525)
Accrued income taxes	(4,686)	4,481	(9,986)
Net pension and post retirement liabilities	(29,029)	(29,708)	(15,048)
Other assets and liabilities	2,650	3,086	8,066
Net cash provided by operating activities	217,780	215,854	334,546
CASH FLOWS FROM INVESTING ACTIVITIES			
Acquisitions of businesses, net of cash acquired	(40,545)	(11,016)	—
Purchase of property, plant and equipment	(75,798)	(67,208)	(80,693)
Other investing transactions	6,733	1,256	13,095
Net cash (used) by investing activities	(109,610)	(76,968)	(67,598)
CASH FLOWS FROM FINANCING ACTIVITIES			
Net short-term repayments	(1,280)	—	(3,570)
Proceeds from revolving lines of credit	255,622	324,670	428,130
Payments on revolving lines of credit	(305,512)	(409,670)	(518,130)
Proceeds from long-term debt	—	20,000	—
Payments on long-term debt	(168)	(10,098)	(5,259)
Proceeds from senior notes, net of issuance costs	—	—	294,430
Proceeds from sale of treasury stock	3,797	4,574	11,436
Purchase of outstanding shares for treasury	(8,643)	(44,933)	(363,848)
Proceeds from sale of stock held by SECT	867	28,048	7,395
Purchase of stock held by SECT	(18,685)	(28,799)	(15,151)
Purchase of stock held by SERP Trust	—	(2,300)	(7,328)
Excess tax benefits from equity-based payment arrangements	—	598	5,996
Other financing transactions	(1,656)	(1,950)	(100)
Net cash (used) by financing activities	(75,658)	(119,860)	(165,999)
Effect of exchange rate changes on cash	10,433	(3,751)	(22,388)
Increase in cash and cash equivalents	42,945	15,275	78,561
Cash and cash equivalents at beginning of year	325,128	309,853	231,292
Cash and cash equivalents at end of year	$368,073	$325,128	$309,853
SUPPLEMENTAL CASH FLOW INFORMATION			

Interest paid	$33,801	$34,150	$23,718
Income taxes paid, net of refunds	44,205	41,517	39,890
Unsecured notes issued for acquisitions	—	1,280	—

See accompanying Notes to Consolidated Financial Statements.

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Notes to Consolidated Financial Statements (dollars in thousands, except per share data)

Note 1 - Summary of Significant Accounting Policies

Consolidation: The consolidated financial statements include the accounts of Moog Inc. and all of our U.S. and foreign subsidiaries. All intercompany balances and transactions have been eliminated in consolidation.

Fiscal Year: Our fiscal year ends on the Saturday that is closest to September 30. The consolidated financial statements include 52 weeks for the years ended September 30, 2017 and October 1, 2016 and 53 weeks for the year ended October 3, 2015.

Operating Cycle: Consistent with industry practice, aerospace and defense related inventories, unbilled recoverable costs and profits on long-term contract receivables, customer advances and contract loss reserves include amounts relating to contracts having long production and procurement cycles, portions of which are not expected to be realized or settled within one year.

Foreign Currency Translation: Assets and liabilities of subsidiaries that prepare financial statements in currencies other than the U.S. dollar are translated using rates of exchange as of the balance sheet date and the statements of earnings are translated at the average rates of exchange for each reporting period.

Use of Estimates: The preparation of financial statements in conformity with U.S. generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting periods. Actual results could differ from those estimates and assumptions.

Revenue Recognition: We recognize revenue using either the percentage of completion method for contracts or as units are delivered or services are performed.

Percentage of completion method for contracts: Revenue representing 38%, 34% and 33% of 2017, 2016 and 2015 sales, respectively, was accounted for using the percentage of completion, cost-to-cost method of accounting. This method of revenue recognition is predominantly used within the Aircraft Controls and Space and Defense Controls segments due to the contractual nature of the business activities, with the exception of their respective aftermarket activities. The contractual arrangements are either firm fixed-price or cost-plus contracts and are primarily with the U.S. Government or its prime subcontractors, foreign governments or commercial aircraft manufacturers, including Boeing and Airbus. The nature of the contractual arrangements includes customers' requirements for delivery of hardware as well as funded nonrecurring development work in anticipation of follow-on production orders.

Revenue on contracts using the percentage of completion, cost-to-cost method of accounting is recognized as work progresses toward completion as determined by the ratio of cumulative costs incurred to date to estimated total contract costs at completion, multiplied by the total estimated contract revenue, less cumulative revenue recognized in prior periods. Changes in estimates affecting sales, costs and profits are recognized in the period in which the change becomes known using the cumulative catch-up method of accounting, resulting in the cumulative effect of changes reflected in the period. Estimates are reviewed and updated quarterly for substantially all contracts. A significant change in an estimate on one or more contracts could have a material effect on our results of operations.

Occasionally, it is appropriate to combine or segment contracts. Contracts are combined in those limited circumstances when they are negotiated as a package in the same economic environment with an overall profit margin objective and constitute, in essence, an agreement to do a single project. In such cases, revenue and costs are recognized over the performance period of the combined contracts as if they were one. Contracts are segmented in limited circumstances if the customer had the right to accept separate elements of the contract and the total amount of the proposals on the separate components approximated the amount of the proposal on the entire project. For segmented contracts, revenue and costs are recognized as if they were separate contracts over the performance periods of the individual elements or phases.

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Contract costs include only allocable, allowable and reasonable costs, as determined in accordance with the Federal Acquisition Regulations and the related Cost Accounting Standards for applicable U.S. Government contracts, and are included in cost of sales when incurred. The nature of these costs includes development engineering costs and product manufacturing costs including direct material, direct labor, other direct costs and indirect overhead costs. Contract profit is recorded as a result of the revenue recognized less costs incurred in any reporting period. Amounts representing performance incentives, penalties, contract claims or change orders are considered in estimating revenues, costs and profits when they can be reliably estimated and realization is considered probable. Revenue recognized on contracts for unresolved claims or unapproved contract change orders was not material for 2017, 2016 or 2015.

For contracts with anticipated losses at completion, a provision for the entire amount of the estimated remaining loss is charged against income in the period in which the loss becomes known. Contract losses are determined considering all direct and indirect contract costs, exclusive of any selling, general or administrative cost allocations that are treated as period expenses. Loss reserves are more common on firm fixed-price contracts that involve, to varying degrees, the design and development of new and unique controls or control systems to meet the customers' specifications.

As units are delivered or services are performed: Revenue representing 62%, 66% and 67% of 2017, 2016 and 2015 sales, respectively, were recognized as units were delivered or as service obligations were satisfied. Revenue is recognized when the risks and rewards of ownership and title to the product are transferred to the customer. When engineering or similar services are performed, revenue is recognized upon completion of the obligation including any delivery of engineering drawings or technical data. This method of revenue recognition is predominantly used within the Industrial Systems and Components segments, as well as with aftermarket activity. Profits are recorded as costs are relieved from inventory and charged to cost of sales and as revenue is recognized. Inventory costs include all product manufacturing costs such as direct material, direct labor, other direct costs and indirect overhead cost allocations.

Shipping and Handling Costs: Shipping and handling costs are included in cost of sales.

Research and Development: Research and development costs are expensed as incurred and include salaries, benefits, consulting, material costs and depreciation.

Bid and Proposal Costs: Bid and proposal costs are expensed as incurred and classified as selling, general and administrative expenses.

Equity-Based Compensation: Our stock-based compensation plans allow for various types of stock-based incentive awards. The types and mix of stock-based incentive awards are evaluated on an on-going basis and may vary based on our overall strategy regarding compensation. Equity-based compensation expense is based on share-based payment awards that are ultimately expected to vest over the requisite services periods and are based on the fair value of the award measured on the grant date. Vesting requirements vary for directors, officers and key employees. In general, awards granted to officers and key employees principally vest over three years, in equal annual installments for time-based awards and in three years cliff vest for performance-based awards. Equity-based compensation expense is included in selling, general and administrative expenses.

Earnings Per Share: Basic and diluted weighted-average shares outstanding are as follows:

	2017	2016	2015
Basic weighted-average shares outstanding	35,852,448	36,277,445	38,945,880
Dilutive effect of equity-based awards	377,595	251,899	388,640
Diluted weighted-average shares outstanding	36,230,043	36,529,344	39,334,520

Cash and Cash Equivalents: All highly liquid investments with an original maturity of three months or less are considered cash equivalents.

Allowance for Doubtful Accounts: The allowance for doubtful accounts is based on our assessment of the collectibility of customer accounts. The allowance is determined by considering factors such as historical experience, credit quality, age of the accounts receivable balances and current economic conditions that may affect a customer's ability to pay.

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Inventories: Inventories are stated at the lower-of-cost-or-market with cost determined primarily on the first-in, first-out (FIFO) method of valuation.

Property, Plant and Equipment: Property, plant and equipment are stated at cost. Plant and equipment are depreciated principally using the straight-line method over the estimated useful lives of the assets, generally ranging from 15 to 40 years for buildings and improvements, 5 to 15 years for machinery and equipment and 3 to 7 years for computer equipment and software. Leasehold improvements are amortized on a straight-line basis over the term of the lease or the estimated useful life of the asset, whichever is shorter.

Goodwill: We test goodwill for impairment at the reporting unit level on an annual basis or more frequently if an event occurs or circumstances change that indicate that the fair value of a reporting unit is likely to be below its carrying amount. We also test goodwill for impairment when there is a change in reporting units.

We may elect to perform a qualitative assessment that considers economic, industry and company-specific factors for all or selected reporting units. If, after completing this assessment, it is determined that it is more likely than not that the fair value of a reporting unit is less than its carrying value, we proceed to a quantitative test. We may also elect to perform a quantitative test instead of a qualitative test for any or all of our reporting units.

Quantitative testing requires a comparison of the fair value of each reporting unit to its carrying value. We typically use the discounted cash flow method to estimate the fair value of our reporting units. The discounted cash flow method incorporates various assumptions, the most significant being projected revenue growth rates, operating margins and cash flows, the terminal growth rate and the weighted-average cost of capital. If the carrying value of the reporting unit exceeds its fair value, goodwill is considered impaired and any loss must be measured. To determine the amount of the impairment loss, the implied fair value of goodwill is determined by assigning a fair value to all of the reporting unit's assets and liabilities, including any unrecognized intangible assets, as if the reporting unit had been acquired in a business combination at fair value. If the carrying amount of the reporting unit goodwill exceeds the implied fair value of that goodwill, an impairment loss would be recognized in an amount equal to that excess.

We recorded a $4,800 goodwill impairment charge in 2016 in the additive manufacturing reporting unit within our Space and Defense Controls segment. There were no impairment charges recorded in 2017 or 2015.

Acquired Intangible Assets: Acquired identifiable intangible assets are recorded at cost and are amortized over their estimated useful lives.

Impairment of Long-Lived Assets: Long-lived assets, including acquired identifiable intangible assets, are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of those assets may not be recoverable. We use undiscounted cash flows to determine whether impairment exists and measure any impairment loss using discounted cash flows.

In 2017, we recorded $1,378 of impairment charges in our Space and Defense Controls segment. These charges relate to a write down on the value of equipment that no longer meets production requirements and is held for sale. These charges are included as other expense in the consolidated statement of earnings.

In 2016, we recorded $4,913 of impairment charges in our Aircraft Controls segment. These charges primarily related to intangible assets as a result of restructuring actions taken for a product line we are no longer pursuing. These charges are included in restructuring in the consolidated statements of earnings.

In 2015, we recorded $2,432 of impairment charges in our Industrial Systems segment. These charges primarily related to intangible assets from a wind energy product line and are included as other expense. We also recorded an additional $472 impairment charge related to intangible assets on the product line we decided to exit in 2014, included as restructuring in the consolidated statements of earnings.

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Product Warranties: In the ordinary course of business, we warrant our products against defect in design, materials and workmanship typically over periods ranging from twelve to sixty months. We determine warranty reserves needed by product line based on historical experience and current facts and circumstances. Activity in the warranty accrual is summarized as follows:

	2017	2016	2015
Warranty accrual at beginning of year	$21,363	$18,660	$19,953
Additions from acquisitions	448	—	—
Warranties issued during current year	17,021	13,272	9,666
Adjustments to pre-existing warranties	(509)	(1,463)	(2,416)
Reductions for settling warranties	(12,747)	(8,486)	(7,448)
Foreign currency translation	272	(620)	(1,095)
Warranty accrual at end of year	$25,848	$21,363	$18,660

Financial Instruments: Our financial instruments consist primarily of cash and cash equivalents, receivables, notes payable, accounts payable, long-term debt, interest rate swaps and foreign currency contracts. The carrying values for our financial instruments approximate fair value with the exception at times of long-term debt. We do not hold or issue financial instruments for trading purposes.

We carry derivative instruments on the consolidated balance sheets at fair value, determined by reference to quoted market prices. The accounting for changes in the fair value of a derivative instrument depends on whether it has been designated and qualifies as part of a hedging relationship and, if so, the reason for holding it. Our use of derivative instruments is generally limited to cash flow hedges of certain interest rate risks and minimizing foreign currency exposure on foreign currency transactions, which are typically designated in hedging relationships, and intercompany balances, which are not designated as hedging instruments. Cash flows resulting from forward contracts are accounted for as hedges of identifiable transactions or events and classified in the same category as the cash flows from the items being hedged.

Reclassifications: Certain prior year amounts have been reclassified to conform to current year's presentation. Refer to the following table for a summary of ASUs we adopted during 2017 and the related financial statement impact. The Consolidated Balance Sheets and Indebtedness, Employee Benefit Plans, Income Taxes and Segment footnotes have been restated to reflect these changes.

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Recent Accounting Pronouncements:

Recent Accounting Pronouncements Adopted

Standard	Description	Financial Statement Effect or Other Significant Matters
ASU no. 2015-03 Presentation of Debt Issuance Costs (And All Related ASUs)	This standard requires that debt issuance costs related to a recognized debt liability be presented in the balance sheet as a direct deduction from the carrying amount of that debt liability, consistent with debt discounts. The provisions of this standard and all subsequently issued guidance are effective for fiscal years beginning after December 15, 2015 and interim periods within those fiscal years. Early adoption is permitted and retrospective application is required.	We adopted this standard on a retrospective basis, resulting in the reclassification of $5,457 of debt issuance costs as of October 1, 2016 previously reported as Other Assets in our balance sheet to Long Term Debt, excluding current installments. Date adopted: Q1 2017
ASU no. 2015-07 Disclosures for Investments in Certain Entities that Calculate Net Asset Value per Share	This standard eliminates the requirement to classify investments valued using the net asset value per share practical expedient and instead requires these investments to be disclosed separately. The provisions of this standard are effective for fiscal years beginning after December 15, 2015 and all interim periods within those fiscal years. Early adoption is permitted and retrospective application is required.	We adopted this standard on a retrospective basis, resulting in the reclassification of $302,713 of investments measured at fair value using the net asset value per share approach and previously reported in the fair value hierarchy as of October 1, 2016 to be reported separately from the fair value hierarchy. Date adopted: Q1 2017
ASU no. 2015-17 Balance Sheet Classification of Deferred Taxes	The standard amends existing guidance to require presentation of deferred tax assets and liabilities as noncurrent within the balance sheet. The provisions of the standard are effective for fiscal years beginning after December 15, 2016 and interim periods within those fiscal years. Early adoption is permitted and may be applied either prospectively or retrospectively.	We adopted this standard on a retrospective basis, resulting in the reclassification of a net $92,620 of previously reported current deferred income tax assets and liabilities as of October 1, 2016 to the appropriate long term deferred income tax classification based upon the net tax position within each of our relevant taxing jurisdictions. Date early adopted: Q1 2017
ASU no. 2016-09 Improvements to Employee Share-Based Payment Accounting	This standard simplifies several aspects of the accounting for share-based payment transactions, including income tax consequences, statement of cash flows classifications, share repurchases relating to tax withholdings and forfeiture accounting. The provisions of this standard are effective for fiscal years beginning after December 15, 2016 and interim periods within those fiscal years.	We adopted this standard on a prospective basis and as a result prior periods have not been adjusted. Going forward, recognized excess tax benefits previously reported as part of additional paid-in capital in our balance sheet will be included as part of income tax expense in our income statement. Additionally, cash flow relating to these excess tax benefits previously reported as a financing activity will be included as an operating activity. Date early adopted: Q1 2017
ASU no. 2016-18 Statement of Cash Flows Restricted	This standard amends existing guidance to require that the Statement of Cash Flows explain the change during the period in cash, cash equivalents and	We adopted this standard on a retrospective basis, resulting in restricted cash of $37,366 as of April 1, 2017 being included, along

Cash	restricted cash. Amounts described as restricted cash are now included, along with cash and cash equivalents, when reconciling beginning-of-period and end-of-period amounts shown on the Statement of Cash Flows. The provisions of the standard are effective for fiscal years beginning after December 15, 2017 and interim periods within those fiscal years. Early adoption is permitted, but requires retrospective application in the fiscal year adopted.	with cash and cash equivalents, when reconciling beginning-of-period and end-of-period amounts shown on the Statement of Cash Flows. There were no changes required to prior periods. Restricted cash as of September 30, 2017 was not material. Date early adopted: Q2 2017

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Recent Accounting Pronouncements Not Yet Adopted

Standard	Description	Financial Statement Effect or Other Significant Matters
ASU no. 2014-09 Revenue from Contracts with Customers (And All Related ASUs)	The standard requires revenue recognition to depict the transfer of 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. The standard also requires additional disclosures about the nature, amount, timing and uncertainty of revenue and cash flows arising from customer contracts, including significant judgments and assets recognized from costs incurred to obtain or fulfill a contract. The provisions of the standard, as well as all subsequently issued clarifications to the standard, are effective for fiscal years beginning after December 15, 2017 and interim periods within those fiscal years. The standard can be adopted using either a full retrospective or modified retrospective approach.	We expect to adopt the standard using the modified retrospective method, under which prior years' results are not restated, but supplemental information will be provided in our disclosures that will present fiscal 2019 results before adoption of the standard. In addition, a cumulative adjustment may be necessary to Shareholder's Equity at the beginning of fiscal 2019. We are assessing the impact of the standard on our financial statements and related disclosures, internal controls and financial policies and information technology systems. We have not yet quantified the impact on our financial statements and related disclosures. Planned date of adoption: Q1 2019
ASU no. 2016-01 Recognition and Measurement of Financial Assets and Financial Liabilities	The standard requires most equity investments to be measured at fair value, with subsequent changes in fair value recognized in net income. The amendment also impacts the measurement of financial liabilities under the fair value option as well as certain presentation and disclosure requirements for financial instruments. The provisions of the standard are effective for fiscal years beginning after December 15, 2017 and interim periods within those fiscal years. Early adoption is permitted for some, but not all, provisions. The amendment requires certain provisions to be applied prospectively and others to be applied by means of a cumulative-effect adjustment.	We are currently evaluating the effect on our financial statements and related disclosures. Planned date of adoption: Q1 2019
ASU no. 2016-02 Leases (And All Related ASUs)	The standard requires most lease arrangements to be recognized in the balance sheet as lease assets and lease liabilities. The standard also requires additional disclosures about the leasing arrangements. The provisions of the standard are effective for fiscal years beginning after December 15, 2018 and interim periods within those years. Early adoption is permitted.	We are currently evaluating the effect on our financial statements and related disclosures. Planned date of adoption: Q1 2020
ASU no. 2017-07 Presentation of Net Periodic Pension Cost and Net Periodic	The standard amends existing guidance on the presentation of net periodic benefit cost in the income statement and what qualifies for capitalization on the balance sheet. The provisions of the standard are effective for fiscal years beginning after December 15,	We are currently evaluating the effect on our financial statements and related disclosures. Planned date of adoption:

Postretirement Benefit Cost	2017 and interim periods within those fiscal years. Early adoption is permitted as of the beginning of an annual period. The amendment requires income statement presentation provisions to be applied retrospectively and capitalization in assets provisions to be applied prospectively.	Q1 2019
ASU no. 2017-12 Targeted Improvements to Accounting for Hedging Activities	The standard expands the hedging strategies eligible for hedge accounting, while simplifying presentation and disclosure by eliminating separate measurement and reporting of hedge ineffectiveness. The provisions of the standard are effective for fiscal years beginning after December 15, 2018 and interim periods within those fiscal years. Early adoption is permitted.	We are currently evaluating the effect on our financial statements and related disclosures. Planned date of adoption: Q1 2020

We consider the applicability and impact of all ASUs. ASUs not listed above were assessed and determined to be either not applicable, or had or are expected to have minimal impact on our financial statements and related disclosures.

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Note 2 - Acquisitions and Divestitures

In 2017, we sold non-core businesses of our Space and Defense Controls segment. We recorded losses in other expense of $13,191 and consideration of $7,105 related to the sales.

On April 2, 2017, we acquired Rotary Transfer Systems, a manufacturer of electromechanical systems, located in Germany and France for a purchase price, net of acquired cash, of $42,593, consisting of $40,545 in cash and $2,048 in assumed pension obligations. This operation is included in our Components segment. The purchase price allocation is subject to adjustments as we obtain additional information for our estimates during the measurement period.

In 2016, we acquired a 70% ownership in Linear Mold and Engineering, a Livonia, Michigan-based company specializing in metal additive manufacturing that provides engineering, manufacturing and production consulting services to customers across a wide range of industries, including aerospace, defense, energy and industrial. The purchase price, net of acquired cash, was $22,765 consisting of $11,016 in cash, issuance of a $1,280 unsecured note and assumption of $10,469 of debt. This acquisition is included in our Space and Defense Controls segment. On January 25, 2017, we acquired the remaining 30% redeemable noncontrolling interest for $1,656 in cash, which is reflected in additional paid-in capital.

Note 3 - Receivables

Receivables consist of:

	September 30, 2017	October 1, 2016
Accounts receivable	$ 286,773	$306,469
Long-term contract receivables:		
Amounts billed	148,087	130,429
Unbilled recoverable costs and accrued profits	282,154	245,376
Total long-term contract receivables	430,241	375,805
Other	15,077	10,652
Total receivables	732,091	692,926
Less allowance for doubtful accounts	(4,351)	(4,538)
Receivables	$ 727,740	$688,388

Under our trade receivables securitization facility (the "Securitization Program"), we securitize certain trade receivables in transactions that are accounted for as secured borrowings. We maintain a subordinated interest in a portion of the pool of trade receivables that are securitized. The retained interest, which is included in receivables in the consolidated balance sheets, is recorded at fair value, which approximates the total amount of the designated pool of accounts receivable. See Note 7, Indebtedness, for additional disclosures related to the Securitization Program.

Long-term contract receivables are primarily associated with prime contractors and subcontractors in connection with U.S. Government contracts, as well as commercial aircraft and satellite manufacturers. Amounts billed under long-term contracts to the U.S. Government were $2,966 at September 30, 2017 and $2,535 at October 1, 2016. Unbilled recoverable costs and accrued profits under long-term contracts to be billed to the U.S. Government were $16,720 at September 30, 2017 and $12,195 at October 1, 2016. Unbilled recoverable costs and accrued profits principally represent revenues recognized on contracts that were not billable on the balance sheet date. These amounts will be billed in accordance with contract terms, generally as certain milestones are reached or upon shipment. Approximately 96% of unbilled amounts are expected to be collected within one year. In situations where billings exceed revenues recognized, the excess is included in customer advances.

There are no material amounts of claims or unapproved change orders included in the consolidated balance sheets. There are no material balances billed but not paid by customers under retainage provisions.

Concentrations of credit risk on receivables are limited to those from significant customers who are believed to be financially sound. Receivables from Boeing were $142,876 at September 30, 2017 and $169,199 at October 1, 2016. We perform periodic credit evaluations of our customers’ financial condition and generally do not require collateral.

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Note 4 - Inventories

Inventories, net of reserves, consist of:

	September 30, 2017	October 1, 2016
Raw materials and purchased parts	$ 189,517	$ 174,331
Work in progress	229,202	235,258
Finished goods	70,408	69,451
Inventories	$ 489,127	$ 479,040

There are no material inventoried costs relating to long-term contracts where revenue is accounted for using the percentage of completion, cost-to-cost method of accounting as of September 30, 2017 and October 1, 2016.

Note 5 - Property, Plant and Equipment

Property, plant and equipment consists of:

	September 30, 2017	October 1, 2016
Land	$ 29,191	$ 28,932
Buildings and improvements	421,879	408,107
Machinery and equipment	709,382	684,995
Computer equipment and software	133,699	126,144
Property, plant and equipment, at cost	1,294,151	1,248,178
Less accumulated depreciation and amortization	(771,160)	(725,809)
Property, plant and equipment, net	$ 522,991	$ 522,369

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Note 6 - Goodwill and Intangible Assets

The changes in the carrying amount of goodwill are as follows:

	Aircraft Controls	Space and Defense Controls	Industrial Systems	Components	Total
Balance at September 27, 2014	$192,852	$159,607	$118,009	$287,384	$757,852
Divestiture	—	—	—	(1,715)	(1,715)
Foreign currency translation	(4,327)	(1,394)	(7,166)	(6,038)	(18,925)
Balance at October 3, 2015	188,525	158,213	110,843	279,631	737,212
Acquisition	—	21,076	—	—	21,076
Impairment	—	(4,800)	—	—	(4,800)
Foreign currency translation	(8,831)	25	(4,525)	5	(13,326)
Balance at October 1, 2016	179,694	174,514	106,318	279,636	740,162
Acquisition	—	—	—	26,566	26,566
Divestitures	—	(1,804)	—	—	(1,804)
Foreign currency translation	1,681	246	2,430	4,987	9,344
Balance at September 30, 2017	$181,375	$172,956	$108,748	$311,189	$774,268

Goodwill in our Space and Defense Controls segment is net of a $4,800 accumulated impairment loss at September 30, 2017.

Goodwill in our Medical Devices reporting unit, included in our Components segment, is net of a $38,200 accumulated impairment loss at September 30, 2017.

The components of intangible assets are as follows:

		September 30, 2017		October 1, 2016	
	Weighted-Average Life (years)	Gross Carrying Amount	Accumulated Amortization	Gross Carrying Amount	Accumulated Amortization
Customer-related	11	$175,872	$(128,019)	$165,445	$(117,434)
Technology-related	9	71,924	(55,069)	70,277	(52,060)
Program-related	19	66,458	(30,675)	64,774	(26,018)
Marketing-related	9	26,552	(19,251)	25,031	(17,649)
Other	10	4,379	(3,353)	4,269	(3,075)
Intangible assets	12	$345,185	$(236,367)	$329,796	$(216,236)

Substantially all acquired intangible assets other than goodwill are being amortized. Customer-related intangible assets primarily consist of customer relationships. Technology-related intangible assets primarily consist of technology, patents, intellectual property and software. Program-related intangible assets consist of long-term programs represented by current contracts and probable follow on work. Marketing-related intangible assets primarily consist of trademarks, trade names and non-compete agreements.

Amortization of acquired intangible assets was $18,518 in 2017, $21,058 in 2016 and $24,708 in 2015. Based on acquired intangible assets recorded at September 30, 2017, amortization is estimated to be approximately $18,300 in 2018, $17,200 in 2019, $14,900 in 2020, $9,400 in 2021 and $7,100 in 2022.

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Note 7 - Indebtedness

Short-term borrowings consist of:

	September 30, 2017	October 1, 2016
Lines of credit	$ 89	$ 99
Other short-term debt	—	1,280
Short-term borrowings	$ 89	$ 1,379

We maintain short-term line of credit facilities with banks throughout the world that are principally demand lines subject to revision by the banks. Interest on outstanding lines of credit is 0.92% at September 30, 2017.

Long-term debt consists of:

	September 30, 2017	October 1, 2016
U.S. revolving credit facility	$ 540,110	$ 590,000
Senior notes	300,000	300,000
Securitization program	120,000	120,000
Obligations under capital leases	306	471
Senior debt	960,416	1,010,471
Less deferred debt issuance cost	(3,468)	(5,457)
Less current installments	(295)	(167)
Long-term debt	$ 956,653	$ 1,004,847

Our U.S. revolving credit facility matures on June 28, 2021. Our U.S. revolving credit facility has a capacity of $1,100,000 and provides an expansion option, which permits us to request an increase of up to $200,000 to the credit facility upon satisfaction of certain conditions. The credit facility is secured by substantially all of our U.S. assets. The loan agreement contains various covenants which, among others, specify interest coverage and maximum leverage and capital expenditures. We are in compliance with all covenants. The weighted-average interest rate on primarily all of the outstanding credit facility borrowings is 2.62% and is principally based on LIBOR plus the applicable margin, which was 1.38% at September 30, 2017.

At September 30, 2017, we had $300,000 aggregate principal amount of 5.25% senior notes due December 1, 2022 with interest paid semiannually on June 1 and December 1 of each year. The senior notes are unsecured obligations, guaranteed on a senior unsecured basis by certain subsidiaries and contain normal incurrence-based covenants and limitations such as the ability to incur additional indebtedness, pay dividends, make other restricted payments and investments, create liens and certain corporate acts such as mergers and consolidations. The effective interest rate for these notes after considering the amortization of deferred debt issuance costs is 5.73%.

The Securitization Program was extended on October 23, 2017 and now matures on October 23, 2019. The Securitization Program will now effectively increase our borrowing capacity by up to $130,000. Under the Securitization Program, we sell certain trade receivables and related rights to an affiliate, which in turn sells an undivided variable percentage ownership interest in the trade receivables to a financial institution, while maintaining a subordinated interest in a portion of the pool of trade receivables. Interest for the Securitization Program is 2.11% at September 30, 2017 and is based on 30-day LIBOR plus an applicable margin. A commitment fee is also charged based on a percentage of the unused amounts available and is not material. The agreement governing the Securitization Program contains restrictions and covenants which include limitations on the making of certain restricted payments, creation of certain liens, and certain corporate acts such as mergers, consolidations and sale of substantially all assets. The Securitization Program has a minimum borrowing requirement equal to the lesser of either 80% of our borrowing capacity or 100% of our borrowing base, which is a subset of the trade receivables sold under this agreement. As of September 30, 2017, our minimum borrowing requirement was $96,000.

Maturities of long-term debt are $295 in 2018, $11 in 2019, $120,000 in 2020, $540,110 in 2021, $0 in 2022 and $300,000 thereafter.

At September 30, 2017, we had pledged assets with a net book value of $1,569,527 as security for long-term debt.

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At September 30, 2017, we had $547,746 of unused short and long-term borrowing capacity, including $535,182 from the U.S. revolving credit facility.

Commitment fees are charged on some of these arrangements and on the U.S. revolving credit facility based on a percentage of the unused amounts available and are not material.

Note 8 - Derivative Financial Instruments

We principally use derivative financial instruments to manage interest rate risk associated with long-term debt and foreign exchange risk related to foreign operations and foreign currency transactions. We enter into derivative financial instruments with a number of major financial institutions to minimize counterparty credit risk.

Derivatives designated as hedging instruments

Interest rate swaps are used to adjust the proportion of total debt that is subject to variable and fixed interest rates. The interest rate swaps are designated as hedges of the amount of future cash flows related to interest payments on variable-rate debt that, in combination with the interest payments on the debt, convert a portion of the variable-rate debt to fixed-rate debt. At September 30, 2017, we had interest rate swaps with notional amounts totaling $150,000. The interest rate swaps effectively convert this amount of variable-rate debt to fixed-rate debt at 2.62%, including the applicable margin of 1.38% as of September 30, 2017. The interest will revert back to variable rates based on LIBOR plus the applicable margin upon the maturity of the interest rate swaps. These interest rate swaps mature at various times through June 23, 2020.

We use foreign currency contracts as cash flow hedges to effectively fix the exchange rates on future payments and revenue. To mitigate exposure in movements between various currencies, including the Philippine peso and the British pound, we had outstanding foreign currency contracts with notional amounts of $48,955 at September 30, 2017. These contracts mature at various times through August 30, 2019.

These interest rate swaps and foreign currency contracts are recorded on the consolidated balance sheet at fair value and the related gains or losses are deferred in shareholders' equity as a component of Accumulated Other Comprehensive Income (Loss) (AOCIL). These deferred gains and losses are reclassified into the consolidated statements of earnings during the periods in which the related payments or receipts affect earnings. However, to the extent the interest rate swaps and foreign currency contracts are not perfectly effective in offsetting the change in the value of the payments being hedged, the ineffective portion of these contracts is recognized in earnings immediately. Ineffectiveness was not material in 2017, 2016 or 2015.

Derivatives not designated as hedging instruments

We also have foreign currency exposure on balances, primarily intercompany, that are denominated in a foreign currency and are adjusted to current values using period-end exchange rates. The resulting gains or losses are recorded in the consolidated statements of earnings. To minimize foreign currency exposure, we have foreign currency contracts with notional amounts of $104,796 at September 30, 2017. The foreign currency contracts are recorded in the consolidated balance sheets at fair value and resulting gains or losses are recorded in the consolidated statements of earnings. We recorded a net loss of $566 in 2017 and a net loss of $6,089 in 2016 on the foreign currency contracts. These losses are included in other expense and generally offset the gains and losses from the foreign currency adjustments on the intercompany balances that are also included in other income or expense.

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Summary of derivatives

The fair value and classification of derivatives is summarized as follows:

		September 30, 2017	October 1, 2016
Derivatives designated as hedging instruments:			
Foreign currency contracts	Other current assets	$ 551	$ 379
Foreign currency contracts	Other assets	50	56
Interest rate swaps	Other current assets	552	52
Interest rate swaps	Other assets	314	69
	Total asset derivatives	$ 1,467	$ 556
Foreign currency contracts	Other accrued liabilities	$ 1,434	$ 4,080
Foreign currency contracts	Other long-term liabilities	244	448
Interest rate swaps	Other accrued liabilities	10	201
Interest rate swaps	Other long-term liabilities	15	—
	Total liability derivatives	$ 1,703	$ 4,729
Derivatives not designated as hedging instruments:			
Foreign currency contracts	Other current assets	$ 95	$ 422
Foreign currency contracts	Other accrued liabilities	$ 383	$ 76

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Note 9 - Fair Value

Fair value is defined as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. Depending on the nature of the asset or liability, various techniques and assumptions can be used to estimate fair value. The definition of the fair value hierarchy is as follows:

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

Level 2 – Observable inputs other than quoted prices in active markets for similar assets and liabilities.

Level 3 – Inputs for which significant valuation assumptions are unobservable in a market and therefore value is based on the best available data, some of which is internally developed and considers risk premiums that a market participant would require.

Our derivatives are valued using various pricing models or discounted cash flow analyses that incorporate observable market data, such as interest rate yield curves and currency rates, and are classified as Level 2 within the valuation hierarchy.

The following table presents the fair values and classification of our financial assets and liabilities measured on a recurring basis, all of which are classified as Level 2:

	Classification	September 30, 2017	October 1, 2016
Foreign currency contracts	Other current assets	$ 646	$ 801
Foreign currency contracts	Other assets	50	56
Interest rate swaps	Other current assets	552	52
Interest rate swaps	Other assets	314	69
	Total assets	$ 1,562	$ 978
Foreign currency contracts	Other accrued liabilities	$ 1,817	$ 4,156
Foreign currency contracts	Other long-term liabilities	244	448
Interest rate swaps	Other accrued liabilities	10	201
Interest rate swaps	Other long-term liabilities	15	—
	Total liabilities	$ 2,086	$ 4,805

Our only financial instrument for which the carrying value differs from its fair value is long-term debt. At September 30, 2017, the fair value of long-term debt was $967,346 compared to its carrying value of $960,416. The fair value of long-term debt is classified as Level 2 within the fair value hierarchy and was estimated based on quoted market prices.

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Note 10 - Restructuring

In 2016, we initiated restructuring actions in conjunction with exiting a product line within Aircraft Controls in the U.S. and a facility in the U.K. We also took actions as a result of the business outlook in specific markets and locations in Components and Industrial Systems. Those actions have resulted in workforce reductions in Canada, Europe and the U.S. for Components and primarily Europe for Industrial Systems.

In 2015, we initiated additional restructuring plans as a result of ongoing reviews of our lines of business and operations. The restructuring actions taken resulted in workforce reductions, primarily in the U.S., Europe and Asia.

The restructuring charge in 2016 consists of $9,117 for severance, $4,913 of non-cash charges for the impairment of long-lived assets in our Aircraft Controls segment and $1,363 for facility closure. The restructuring charge in 2015 principally relates to severance, but also includes $3,773 related to the termination of a sales and marketing contract and $472 for the impairment of long-lived assets in our Industrial Systems segment.

Restructuring activity for severance and other costs by segment and reconciliation to consolidated amounts is as follows:

	Aircraft Controls	Space and Defense Controls	Industrial Systems	Components	Corporate	Total
Balance at September 27, 2014	$5,439	$5,764	$186	$—	$—	$11,389
Charged to expense - 2015 plan	2,955	6,324	5,150	1,020	—	15,449
Adjustments to provision	(407)	(309)	—	—	—	(716)
Cash payments - 2013 plan	—	(490)	—	—	—	(490)
Cash payments - 2014 plan	(4,833)	(3,822)	(178)	—	—	(8,833)
Cash payments - 2015 plan	(80)	(167)	(679)	(761)	—	(1,687)
Non-cash charges - 2015 plan	—	—	(472)	—	—	(472)
Foreign currency translation	(27)	(63)	(4)	—	—	(94)
Balance at October 3, 2015	3,047	7,237	4,003	259	—	14,546
Charged to expense - 2016 plan	7,317	—	4,824	1,525	1,727	15,393
Adjustments to provision	(275)	(328)	(243)	(5)	—	(851)
Cash payments - 2014 plan	(72)	(776)	—	—	—	(848)
Cash payments - 2015 plan	(2,342)	(5,455)	(3,088)	(234)	—	(11,119)
Cash payments - 2016 plan	(1,244)	—	(2,015)	(1,176)	—	(4,435)
Non-cash charges - 2016 plan	(4,913)	—	—	—	—	(4,913)
Foreign currency translation	(44)	(13)	130	—	—	73
Balance at October 1, 2016	1,474	665	3,611	369	1,727	7,846
Adjustments to provision	(852)	(72)	(816)	(3)	—	(1,743)
Cash payments - 2014 plan	(116)	(417)	—	—	—	(533)
Cash payments - 2015 plan	(210)	(176)	(20)	(20)	—	(426)
Cash payments - 2016 plan	(162)	—	(2,822)	(346)	(689)	(4,019)
Foreign currency translation	(4)	—	47	—	—	43
Balance at September 30, 2017	$130	$—	$—	$—	$1,038	$1,168

As of September 30, 2017, the restructuring accrual consists of $1,168 for the 2016 plan. Restructuring for all plans is expected to be paid by December 30, 2017, except portions classified as long-term liabilities based on payment arrangements.

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Note 11 - Employee Benefit Plans

We maintain multiple employee benefit plans, covering employees at certain locations.

Our qualified U.S. defined benefit pension plan is not open to new entrants. New employees are not eligible to participate in the pension plan. Instead, we make contributions for those employees to an employee-directed investment fund in the Moog Inc. Retirement Savings Plan ("RSP"). The Company's contributions are based on a percentage of the employee's eligible compensation and age. These contributions are in addition to the employer match on voluntary employee contributions.

The RSP includes an Employee Stock Ownership Plan. As one of the investment alternatives, participants in the RSP can acquire our stock at market value. We match 25% of the first 2% of eligible compensation contributed to any investment selection. Shares are allocated and compensation expense is recognized as the employer share match is earned. At September 30, 2017, the participants in the RSP owned 1,575,347 Class B shares.

The changes in projected benefit obligations and plan assets and the funded status of the U.S. and non-U.S. defined benefit plans are as follows:

	U.S. Plans		Non-U.S. Plans	
	2017	2016	2017	2016
Change in projected benefit obligation:				
Projected benefit obligation at prior year measurement date	$979,055	$850,991	$219,308	$180,111
Service cost	24,115	23,637	6,105	5,204
Interest cost	30,573	37,659	3,121	4,928
Contributions by plan participants	—	—	844	863
Actuarial (gains) losses	(30,339)	96,107	(18,881)	38,265
Foreign currency exchange impact	—	—	6,222	(4,063)
Benefits paid	(60,891)	(27,464)	(4,703)	(4,061)
Curtailments	—	—	(262)	—
Other	(747)	(1,875)	2,720	(1,939)
Projected benefit obligation at measurement date	$941,766	$979,055	$214,474	$219,308
Change in plan assets:				
Fair value of assets at prior year measurement date	$675,018	$578,783	$135,439	$117,693
Actual return on plan assets	79,419	57,646	(214)	19,926
Employer contributions	63,597	67,928	7,655	6,155
Contributions by plan participants	—	—	844	863
Benefits paid	(60,891)	(27,464)	(4,703)	(4,061)
Foreign currency exchange impact	—	—	2,919	(3,801)
Other	(869)	(1,875)	(34)	(1,336)
Fair value of assets at measurement date	$756,274	$675,018	$141,906	$135,439
Funded status and amount recognized in assets and liabilities	$(185,492)	$(304,037)	$(72,568)	$(83,869)
Amount recognized in assets and liabilities:				
Other assets - non-current	$—	$—	$1,672	$108
Accrued and long-term pension liabilities	(185,492)	(304,037)	(74,240)	(83,977)
Amount recognized in assets and liabilities	$(185,492)	$(304,037)	$(72,568)	$(83,869)
Amount recognized in AOCIL, before taxes:				
Prior service cost (credit)	$507	$694	$(83)	$(1,269)
Actuarial losses	360,391	449,377	40,075	57,926
Amount recognized in AOCIL, before taxes	$360,898	$450,071	$39,992	$56,657

U.S. plan assets included 1,001,034 shares of Class B common stock. Our funding policy is to contribute at least the amount required by law in the respective countries.

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The total accumulated benefit obligation as of the measurement date for all defined benefit pension plans was $1,064,195 in 2017 and $1,105,973 in 2016. At the measurement date in 2017, our plans had fair values of plan assets totaling $898,180. The following table provides aggregate information for the other pension plans, which have projected benefit obligations or accumulated benefit obligations in excess of plan assets:

	September 30, 2017	October 1, 2016
Projected benefit obligation	$ 1,047,605	$ 1,128,524
Accumulated benefit obligation	969,161	1,045,034
Fair value of plan assets	793,167	744,751

Weighted-average assumptions used to determine benefit obligations as of the measurement dates and weighted-average assumptions used to determine net periodic benefit cost are as follows:

	U.S. Plans			Non-U.S. Plans		
	2017	2016	2015	2017	2016	2015
Assumptions for net periodic benefit cost:						
Discount rate	n/a	4.5%	4.4%	n/a	3.0%	3.1%
Service cost discount rate	4.0%	n/a	n/a	2.0%	n/a	n/a
Interest cost discount rate	3.2%	n/a	n/a	1.7%	n/a	n/a
Return on assets	7.5%	7.7%	8.0%	3.6%	4.1%	4.5%
Rate of compensation increase	3.5%	4.1%	4.1%	2.3%	2.6%	3.0%
Assumptions for benefit obligations:						
Discount rate	4.0%	3.8%	4.5%	2.5%	1.9%	3.0%
Rate of compensation increase	3.5%	3.5%	4.1%	2.5%	2.3%	3.0%

Beginning in 2017, we changed the method used to estimate the service and interest cost components of net periodic pension cost. The new method uses the spot yield curve approach to estimate the service and interest costs by applying the specific spot rates along the yield curve used to determine the benefit obligation to the relevant projected cash outflows. Previously, these cost components were determined using a single-weighted average discount rate. This change does not affect the measurement of the projected benefit obligation.

We have made this change to provide a more precise measurement of service and interest costs by improving the correlation between projected benefit cash flows to the corresponding spot yield curve rates. We have accounted for this change as a change in accounting estimate and accordingly have accounted for it prospectively. The more granular application of the spot rates reduced the service and interest cost for the annual net periodic pension expense in 2017 by approximately $7,000.

Pension plan investment policies and strategies are developed on a plan specific basis, which varies by country. The overall objective for the long-term expected return on both domestic and international plan assets is to earn a rate of return over time to meet anticipated benefit payments in accordance with plan provisions. The long-term investment objective of both the domestic and international retirement plans is to maintain the economic value of plan assets and future contributions by producing positive rates of investment return after subtracting inflation, benefit payments and expenses. Each of the plan's strategic asset allocations is based on this long-term perspective and short-term fluctuations are viewed with appropriate perspective.

The U.S. qualified defined benefit plan's assets are invested for long-term investment results. To accommodate the long-term investment horizon while providing appropriate liquidity, the plan maintains a liquid cash reserve sufficient to allow the plan to meet its benefit payment, fee and expense obligations. Its assets are broadly diversified to help alleviate the risk of adverse returns in any one security or investment class. The international plans' assets are invested in both low-risk and high-risk investments in order to achieve the long-term investment strategy objective. Investment risks for both domestic and international plans are considered within the context of the entire asset allocation, rather than on a security-by-security basis.

The U.S. qualified defined benefit plan and certain international plans have investment committees that are responsible for formulating investment policies, developing manager guidelines and objectives and approving and managing qualified advisors and investment managers. The guidelines established for each of the plans define permitted investments within each asset class and apply certain restrictions such as limits on concentrated holdings in order to meet overall investment objectives.

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Pension obligations and the related costs are determined using actuarial valuations that involve several assumptions. The return on assets assumption reflects the average rate of return expected on funds invested or to be invested to provide for the benefits included in the projected benefit obligation. In determining the return on assets assumption, we consider the relative weighting of plan assets, the historical performance of total plan assets and individual asset classes and economic and other indicators of future performance. Asset management objectives include maintaining an adequate level of diversification to reduce interest rate and market risk and to provide adequate liquidity to meet immediate and future benefit payment requirements.

In determining our U.S. pension expense for 2017, we assumed an average rate of return on U.S. pension assets of approximately 7.5% measured over a planning horizon with reasonable and acceptable levels of risk. The rate of return assumed an average of 55% in equity securities and 45% in fixed income securities. In determining our non-U.S. pension expense for 2017, we assumed an average rate of return on non-U.S. pension assets of approximately 3.6% measured over a planning horizon with reasonable and acceptable levels of risk. The rate of return assumed an average asset allocation of 30% in equity securities and 70% in fixed income securities.

The weighted average asset allocations by asset category for the pension plans as of September 30, 2017 and October 1, 2016 are as follows:

	U.S. Plans			Non-U.S. Plans		
	Target	2017 Actual	2016 Actual	Target	2017 Actual	2016 Actual
Asset category:						
Equity	50%-60%	57%	55%	20%-45%	32%	32%
Debt	40%-50%	43%	36%	30%-45%	36%	36%
Real estate and other	—%	—%	9%	25%-35%	32%	32%

The valuation methodologies used for pension plan assets measured at fair value have been applied consistently.

Cash and cash equivalents: Direct cash holdings valued at cost, which approximates fair value.

Money market funds: Institutional short-term investment vehicles valued daily.

Shares of registered investment companies: Consists of both equity and fixed income mutual funds. Valued at quoted market prices that represent the net asset value of shares held by the plan at year end.

Fixed income securities: Valued using methods, such as dealer quotes, available trade information, spreads, bids and offers provided by a pricing vendor.

Equity securities: Traded on national exchanges are valued at the last reported sales price. Investments denominated in foreign currencies are translated into U.S. dollars using the last reported exchange rate.

Employer securities: Valued at the closing price reported on the New York Stock Exchange.

Interest in common collective trusts: The net asset value is used as a practical expedient to estimate fair value. This practical expedient would not be used if it is determined to be probable that the common collective trust will sell the investment for an amount different from the reported NAV.

Investment in insurance contracts: Valued at contract value, which is the fair value of the underlying investment of the insurance company.

Limited partnerships and hedge funds: Valued at net asset value of units held. The NAV is used as a practical expedient to estimate fair value. The NAV is based on the fair value of the underlying investments held by the fund less its liability. This practical expedient is not used when it is determined to be probable that the fund will sell the investment for an amount different from the reported NAV.

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Securities or other assets for which market quotations are not readily available or for which market quotations do not represent the value at the time of pricing (including certain illiquid securities) are fair valued in accordance with procedures established under the supervision and responsibility of the Trustee of that investment. Such procedures may include the use of independent pricing services or affiliated advisor pricing, which use prices based upon yields or prices of securities of comparable quality, coupon, maturity and type, indications as to values from dealers, operating data and general market conditions.
The following tables present the consolidated plan assets using the fair value hierarchy, which is described in Note 9 - Fair Value, as of September 30, 2017 and October 1, 2016.

U.S. Plans, September 30, 2017	Level 1	Level 2	Level 3	Total
Investments at fair value:				
Shares of registered investment companies:				
Equity funds	$302,652	$—	$ —	$302,652
Fixed income funds	323,008	—	—	323,008
Employer securities	83,246	—	—	83,246
Money market funds	—	7,372	—	7,372
Cash and cash equivalents	1,260	—	—	1,260
Insurance contract	—	—	464	464
Total investments in fair value hierarchy	710,166	7,372	464	718,002
Investments measured at NAV practical expedient (1)				38,272
Total investments at fair value	$710,166	$7,372	$ 464	$756,274

Non-U.S. Plans, September 30, 2017	Level 1	Level 2	Level 3	Total
Investments at fair value:				
Mutual funds:				
Equity funds	$—	$15,529	$—	$15,529
Fixed income funds	—	16,440	—	16,440
Equity securities	8,080	—	—	8,080
Fixed income securities	—	14,488	—	14,488
Unit linked life insurance funds	—	41,054	—	41,054
Money market funds	—	814	—	814
Cash and cash equivalents	48	—	—	48
Insurance contracts and other	—	5,492	39,961	45,453
Total investments in fair value hierarchy	8,128	93,817	39,961	141,906
Investments measured at NAV practical expedient (1)				—
Total investments at fair value	$8,128	$93,817	$39,961	$141,906

U.S. Plans, October 1, 2016	Level 1	Level 2	Level 3	Total
Investments at fair value:				
Shares of registered investment companies:				
Equity funds	$—	$214,374	$ —	$214,374
Fixed income funds	—	45,709	—	45,709
Fixed income securities	—	24,097	—	24,097
Employer securities	68,574	—	—	68,574
Money market funds	—	18,962	—	18,962
Cash and cash equivalents	—	—	—	—
Insurance contract	—	—	589	589
Total investments in fair value hierarchy	68,574	303,142	589	372,305
Investments measured at NAV practical expedient (1)				302,713
Total investments at fair value	$68,574	$303,142	$ 589	$675,018

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Non-U.S. Plans, October 1, 2016	Level 1	Level 2	Level 3	Total
Investments at fair value:				
Mutual funds:				
Equity funds	$—	$15,698	$—	$15,698
Fixed income funds	—	17,187	—	17,187
Equity securities	4,931	—	—	4,931
Fixed income securities	—	12,633	—	12,633
Unit linked life insurance funds	—	36,889	—	36,889
Money market funds	—	553	—	553
Cash and cash equivalents	73	—	—	73
Insurance contracts and other	—	4,861	42,614	47,475
Total investments in fair value hierarchy	5,004	87,821	42,614	135,439
Investments measured at NAV practical expedient (1)				—
Total investments at fair value	$5,004	$87,821	$42,614	$135,439

(1) Per adoption of ASU 2015-07, certain investments that are measured at fair value using the net asset value per share (or its equivalent) practical expedient have not been classified in the fair value hierarchy. Prior year amounts have been reclassified to conform to the current year presentation. The fair value amounts presented in this table are intended to permit reconciliation of the fair value hierarchy to the total retirement plan assets.

The following is a roll forward of the consolidated plan assets classified as Level 3 within the fair value hierarchy:

	U.S. Plans	Non-U.S. Plans	Total
Balance at October 3, 2015	$ 866	$ 28,936	$29,802
Return on assets	32	11,723	11,755
Purchases from contributions to Plans	—	3,472	3,472
Settlements paid in cash	(309)	(2,231)	(2,540)
Foreign currency translation	—	714	714
Balance at October 1, 2016	589	42,614	43,203
Return on assets	23	(5,437)	(5,414)
Purchases from contributions to Plans	—	2,848	2,848
Settlements paid in cash	(148)	(1,492)	(1,640)
Foreign currency translation	—	1,428	1,428
Balance at September 30, 2017	$ 464	$ 39,961	$40,425

The following table summarizes investments measured at fair value based on net asset value (NAV) per share as of September 30, 2017:

	Fair Value September 30, 2017	Fair Value October 1, 2016	Unfunded Commitments	Redemption Frequency	Redemption Notice Period
Limited partnerships (1)	$35,821	$44,003	$ 5,738	Varies	10-45 days
Hedge funds (2)	2,451	21,678	—	Quarterly	60 days
Interest in common collective trusts	—	237,032	—	Daily, Weekly	0-5 days
Total	$38,272	$302,713	$ 5,738		

(1) Investments in limited partnerships held by us invest primarily in emerging markets, equity and equity related securities. The strategy for the partnerships is to have exposure to certain markets or to securities that are judged to achieve superior earnings growth and/or judged undervalued relative to intrinsic value.

(2) Hedge fund which invests primarily in global equity long and short positions. The primary strategy for the hedge funds is to seek risk-adjusted returns with volatility lower than the broad equity markets primarily through long and short investment opportunities in the global markets.

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The preceding methods may produce a fair value calculation that may not be indicative of net realizable value or reflective of future fair values. Furthermore, although we believe the valuation methods are appropriate and consistent with other market participants, the use of different methodologies or assumptions to determine the fair value of certain financial instruments could result in a different fair value measurement at the reporting date.