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MOOG INC.

Form 10-K

November 13, 2018

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UNITED STATES SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 10-K

(Mark One)

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

For the fiscal year ended September 29, 2018

OR

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

For the transition period from ____ to ____

Commission file number **1-05129**

(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 No

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

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days.

Yes No

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate 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 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.

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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 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

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 March 31, 2018, the last business day of the registrant's most recently completed second fiscal quarter, was approximately \$2,718 million.

The number of shares of common stock outstanding as of the close of business on November 6, 2018 was: Class A 32,496,875; Class B 2,300,417.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the Moog Inc. Proxy Statement for the Annual Meeting of Shareholders to be held on February 12, 2019 ("2018 Proxy") are incorporated by reference into Part III of this Form 10-K.

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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,” “plans,” “projects,” “approximate,” “estimates,” “predicts,” “potential,” “outlook,” “forecast,” “anticipates,” “presume” and “assume,” are 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 three operating segments: Aircraft Controls, Space and Defense Controls and Industrial Systems.

Additional information describing the business and comparative segment revenues, operating profits and related financial information for 2018, 2017 and 2016 are provided in Note 19 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 three operating segments include:

Aircraft Controls: Curtiss-Wright, Liebherr, Nabtesco, Parker Hannifin, UTC and Woodward.

Space and Defense Controls: Airbus, ATA Engineering, Bradford Engineering, Chess Dynamics, Cobham, Curtiss-Wright, ESW, EOS, Fulcrum Concepts LLC, General Dynamics, Glenair, Honeywell, Kearfott, Kollmorgan, Kongsberg, LORD, Marotta, Mission Systems, RUAG, Rafael, PVP Advanced, SABCA, Sargent Aerospace & Defense, Schleifring, SEAKR, Silent Sentinel, SL Montevideo, SwRI, UTC, Vacco, Valcor, ValveTech and Woodward.

Industrial Systems: Atos, Allen-Bradley, Bosch Rexroth, Cardinal Health, Danaher, DEIF Wind Power, E2M Technologies, Eaton, ICU Medical, KEB, MTS Systems Corp., Parker Hannifin, Siemens, Smiths Medical and SSB Wind Systems.

Government Contracts. All U.S. Government contracts are subject to termination by the U.S. Government. In 2018, sales under U.S. Government contracts represented 33% of total sales and were primarily within our Aircraft Controls and Space and Defense Controls 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 29, 2018, our twelve-month backlog was \$1.5 billion, an increase of 22% compared to September 30, 2017. 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 \$130 million in each of the last three years and represented approximately 5% of sales in 2018.

Employees. On September 29, 2018, we employed 11,787 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 53% of 2018 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 34% of 2018 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 2018, aftermarket sales accounted for 13% of total sales.

Significant customers in our three operating segments include:

Aircraft Controls: Boeing, Airbus, Lockheed Martin, Northrup Grumman, Japan Aerospace, General Dynamics, United Technologies, Honeywell, Bombardier, Embraer and the U.S. Government.

Space and Defense Controls: Lockheed Martin, Raytheon, Northrup Grumman, Boeing, General Dynamics, Aerojet Rocketdyne, United Launch Alliance, Rockwell Collins, Airbus, Honeywell and the U.S. Government.

Industrial Systems: McKesson, Phillips Healthcare, CAE, Nutricia, Integrated Medical Systems, TurboChef Technologies, Oceaneering, MacArtney, Flight Safety and Arburg.

International Operations. Our operations outside the United States are conducted primarily through wholly-owned foreign subsidiaries and are located predominantly in Europe and the Asia-Pacific region. See Note 19 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 21 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 January 5, 2018, Jennifer Walter was named Vice President - Finance. She will continue as Controller and Principal Accounting Officer.

On December 1, 2017, Paul Wilkinson was named Vice President and Chief HR Officer. Previously, he was a Group Vice President and Global HR Director, Aircraft Group.

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
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John R. Scannell Chairman of the Board; Chief Executive Officer Director	55	2006
Richard A. Aubrecht Vice President - Strategy and Technology	74	1980
Donald R. Fishback Director; Vice President; Chief Financial Officer	62	1985
Paul Wilkinson Vice President	38	2017
Patrick J. Roche Vice President	55	2012
Maureen M. Athoe Vice President	60	2015
R. Eric Burghardt Vice President	59	2015
Mark J. Trabert Vice President	59	2015
Jennifer Walter Vice President - Finance; Principal Accounting Officer	47	2008
Timothy P. Balkin Treasurer; Assistant Secretary	59	2000

In addition to the executive officers noted above, Robert J. Olivieri, 68, was elected Secretary in 2014. Mr. Olivieri's principal occupation is partner in the law firm of Hodgson Russ LLP.

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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, domestic and foreign governmental tariff and trade policies, and 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 moderate rates of recovery in the economies in which we conduct business. If global economic uncertainties continue or economic conditions deteriorate, 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. Within the aerospace industry, suppliers have consolidated to widen their product offerings and secure long-term sole-source positions. As a result, these competitors may be better able to withstand the effects of periodic economic downturns, and their program wins could reduce the total number of viable suppliers and increase their competitiveness. 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, design and engineering capabilities, price, innovation, conformity to customers' 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, are not successful in meeting our quality or delivery standards 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 2018, sales under U.S. Government contracts represented 33% of our total sales, primarily within Aircraft Controls and Space and Defense Controls. 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. After operating under continuing resolutions, which restrict new program starts, the U.S. Government signed the 2019 defense appropriations budget in September 2018, with moderate growth in defense spending. However, future budgeted levels of defense spending beyond

2019 are uncertain and subject to debate. As a result of this uncertainty, we expect discretionary government spending levels will face pressure, and potentially lead to procurement 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 39% of 2018 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 2018, fixed-price contracts represented 88% 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 29, 2018, our twelve-month backlog was \$1.5 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 14% of our 2018 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 continues to evaluate the size, scope and cost of their supplier base. Any detrimental impact to Boeing's production rates or a reduction in our awarded content could reduce our orders from 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 and third parties to administer, store and support multiple business activities. In addition, we store sensitive data including proprietary business information, intellectual property and confidential employee data on our servers and databases. Furthermore, we may have access to sensitive, confidential or personal information that may be subject to privacy and security laws and controls. Although we continue to review and enhance our computer systems and cybersecurity controls, information system disruptions, equipment failures or cybersecurity attacks, such as unauthorized access, malicious software and other intrusions, could still occur and may lead to potential data corruption and exposure of proprietary and confidential information. Any intrusion may cause operational stoppages, fines, penalties, diminished competitive advantages through reputational damages and increased operational costs. Additionally, we may incur additional costs to comply with our customers', including the U.S. Government's, increased cybersecurity protections and standards in our products. Prior cyberattacks directed at us have not had a material impact on our financial results. 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, may cause our information systems to perform unexpectedly and may increase our exposure to cyber risks. While we expect to invest significant resources throughout the planning and project management process, unanticipated delays could occur and would adversely affect our financial results.

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.

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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. Despite fully funding our largest pension plan, 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 29, 2018, goodwill was \$797 million and other intangible assets were \$96 million of our total assets of \$3.0 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.

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 2018, 41% 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 including privacy laws protecting personal data, 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 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. Specifically, with the enactment of the Tax Cuts and Jobs Act of 2017, we have made a reasonable estimate of the effects of the one-time transition tax based on our current interpretation. This estimate could differ materially from the resulting actual liability due to changes in our calculations and interpretation, as well as additional guidance yet to be issued through U.S. Treasury regulations.

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Government regulations could limit our ability to sell our products outside the United States and otherwise adversely affect our business. In 2018, approximately 18% 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, privacy regulations 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.

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 2018, 24% 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.

Table of Contents**Item 1B. Unresolved Staff Comments.**

None.

Item 2. Properties.

On September 29, 2018, we occupied 5,143,000 square feet of space, distributed by segment as follows:

	Square Feet		
	Owned	Leased	Total
Aircraft Controls	1,468,000	396,000	1,864,000
Space and Defense Controls	828,000	312,000	1,140,000
Industrial Systems	1,588,000	529,000	2,117,000
Corporate Headquarters	20,000	2,000	22,000
Total	3,904,000	1,239,000	5,143,000

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., United Kingdom and Ireland.

• Industrial Systems - U.S., Germany, Czech Republic, Italy, Costa Rica, China, United Kingdom, Netherlands, Luxembourg, Philippines, Japan, Canada, India 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 2019 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.

Table of Contents**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

Fiscal Year Ended	Class A		Class B	
	High	Low	High	Low
September 29, 2018				
1st Quarter	\$89.97	\$78.27	\$88.97	\$78.89
2nd Quarter	93.93	79.58	91.71	79.95
3rd Quarter	88.31	75.62	85.84	77.67
4th Quarter	87.85	71.56	84.00	72.60

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

The number of shareholders of record of Class A common stock and Class B common stock was 641 and 299, respectively, as of November 6, 2018.

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The following table summarizes our purchases of our common stock for the quarter ended September 29, 2018.

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 1, 2018 - July 31, 2018	31,728	\$ 78.24	—	3,349,491
August 1, 2018 - August 31, 2018	1,012,369	75.78	—	3,349,491
September 1, 2018 - September 29, 2018	8,602	83.62	—	3,349,491
Total	1,052,699	\$ 75.92	—	3,349,491

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: 7,106 shares at \$79.23 per share during August; and 6,471 shares at \$82.44 per share during September.

Also reflects purchases by the SECT of shares of Class B common stock from the Moog Inc. Employee (1) Retirement Plan ("ERP") as follows: 274,864 shares at \$75.74 per share during August and purchases by the Moog Inc. Supplemental Retirement Plan Trust ("SERP") of shares of Class B common stock from the ERP as follows: 726,170 shares at \$75.74 per share during August. In connection with the issuance of shares to the Employee Stock Purchase Plan ("ESPP"), we purchased 31,716 Class B shares at \$78.24 per share from the SECT.

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 (2) delivery of 12 shares at \$82.17 per share, in August, we accepted delivery of 4,229 shares at \$80.31 per share and in September, we accepted delivery of 2,131 shares at \$87.20 per share, in connection with the exercise of equity-based awards.

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 (3) 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. The purchases identified in column (a) are not included in this program.

Table of Contents**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, 2013, including reinvestment of any dividends.

	9/13	9/14	9/15	9/16	9/17	9/18
Moog Inc. - Class A Common Stock	\$100.00	\$116.58	\$92.16	\$101.48	\$142.20	\$147.44
NYSE Composite - Total Return Index	100.00	113.92	106.88	120.08	140.19	153.94
S&P Aerospace & Defense Index	100.00	118.18	122.62	144.53	207.46	256.64

Table of Contents**Item 6. Selected Financial Data.**

For a more detailed discussion of 2016 through 2018, 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)	2018(1)(3)	2017(1)(3)	2016(1)(2)(3)	2015(1)	2014(1)	
RESULTS FROM OPERATIONS						
Net sales	\$2,709,468	\$2,497,524	\$2,411,937	\$2,525,532	\$2,648,385	
Net earnings (4)	96,507	141,280	126,745	131,883	158,198	
Net earnings per share (4)						
Basic	\$2.71	\$3.94	\$3.49	\$3.39	\$3.57	
Diluted	\$2.68	\$3.90	\$3.47	\$3.35	\$3.52	
Dividends declared per share	\$0.50	\$—	\$—	\$—	\$—	
Weighted-average shares outstanding						
Basic	35,661,638	35,852,448	36,277,445	38,945,880	44,362,412	
Diluted	36,052,307	36,230,043	36,529,344	39,334,520	44,952,437	
FINANCIAL POSITION						
Cash and cash equivalents	\$125,584	\$368,073	\$325,128	\$309,853	\$231,292	
Working capital	795,797	997,005	938,295	931,297	849,417	
Total assets	2,964,048	3,090,592	3,004,974	3,036,573	3,140,287	
Indebtedness - total	862,824	957,037	1,006,393	1,069,643	872,094	
Shareholders' equity	1,224,986	1,214,304	988,411	994,532	1,347,415	
Shareholders' equity per common share outstanding	\$35.20	\$33.94	\$27.56	\$27.09	\$32.51	
SUPPLEMENTAL FINANCIAL DATA						
Capital expenditures	\$94,517	\$75,798	\$67,208	\$80,693	\$78,771	
Depreciation and amortization	88,572	90,167	98,732	103,609	109,259	
Research and development	130,186	144,646	147,336	132,271	139,462	
Twelve-month backlog (5)	1,481,230	1,211,797	1,224,878	1,273,495	1,339,959	
RATIOS						
Net return on sales	3.6	%5.7	%5.3	%5.2	%6.0	%
Return on shareholders' equity	7.8	%13.3	%12.6	%11.3	%10.4	%
Current ratio	2.2	2.6	2.6	2.5	2.2	
Net debt to capitalization (6)	37.6	%32.7	%40.8	%43.3	%32.2	%

Includes the effects of our share repurchase program. See the Consolidated Statements of (1) 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.

(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 three segments, Aircraft Controls, Space and Defense Controls and Industrial Systems. Our principal manufacturing facilities are located in the United States, Philippines, United Kingdom, Germany, Czech Republic, Italy, Costa Rica, China, Netherlands, Luxembourg, Japan, Canada, India and Lithuania.

We have long-term contracts with some of our customers. These contracts are predominantly within Aircraft Controls and Space and Defense Controls and represent 39%, 38% and 34% of our sales in 2018, 2017 and 2016, 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 segment, 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, where the cost of failure is high and "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, exploring the next generation of opportunities for our capabilities, 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 driving long-term value for our shareholders 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 2018 increased 8% to \$2.7 billion.

Total operating profit increased 3% to \$258 million, and includes \$39 million of charges related to our exit of the wind pitch controls business.

Effective tax rate was 47.4%, and includes the impacts of the Tax Cuts and Jobs Act of 2017.

Net earnings attributable to Moog decreased 32% to \$97 million.

Diluted earnings per share decreased 31% to \$2.68.

Cash from operating activities was \$102 million, and includes \$85 million of accelerated pension funding.

Acquisitions, Divestitures and Equity Method Investments

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.

On April 30, 2018, we acquired Electro-Optical Imaging, a designer and manufacturer of video trackers and imaging products, located in Florida, for \$5 million. This operation is included in our Space and Defense Controls segment.

On March 29, 2018, we acquired a 100% ownership interest in VUES Brno s.r.o located in the Czech Republic, which includes a 74% ownership interest in a subsidiary located in Germany, for \$64 million. VUES designs and manufactures customized electric motors, generators and solutions. This operation is included in our Industrial Systems segment. On September 6, 2018, we acquired the remaining 26% noncontrolling interest for \$2 million in cash.

On October 3, 2017, we, in collaboration with SIA Engineering Company, announced the joint venture company, Moog Aircraft Services Asia ("MASA"), in Singapore, of which we currently hold a 51% ownership. MASA is intended to provide maintenance, repair and overhaul services for our manufactured flight control systems. As we hold a majority ownership in MASA, but share voting control, we are accounting for this investment using the equity method. As of September 29, 2018, we have made total contributions of \$5 million to MASA. This operation is included in our Aircraft Controls segment.

In 2018, we sold a non-core business of our Space and Defense Controls segment for \$5 million in cash, plus a \$1 million note receivable and recorded losses in other expense of \$2 million.

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 Industrial Systems segment. We also sold non-core businesses in our Space and Defense Controls segment for \$7 million and recorded losses in other expense of \$13 million related to the sales.

Table of Contents**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 39% of 2018 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 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, 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, and other direct 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 2018, 2017 or 2016.

Contract and Contract-Related Loss Reserves

At September 29, 2018, we had contract and contract-related loss reserves of \$42 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 and delivered products in order for them to meet contract specifications.

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Reserves for Inventory Valuation

At September 29, 2018, we had net inventories of \$513 million, or 35% of current assets. Reserves for inventory were \$125 million, or 20% of gross inventories. Inventories are stated at the lower of cost or net realizable value 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 29, 2018, we had \$797 million of goodwill, or 27% 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 four 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.

During the first quarter of 2018, we changed our reporting segment structure, which led to a change in our reporting units and an interim test of goodwill using the quantitative method.

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Interim Test

Effective October 1, 2017, we changed our segment reporting structure from four to three reporting segments. The former Components reporting segment has been divided and merged into the Space and Defense Controls and Industrial Systems reporting segments. This modification changed the number of reporting units we use to review goodwill for impairment from five to four - Aircraft Controls, Space and Defense Controls, Industrial Systems and Medical Devices.

We allocated the assets and liabilities of the former Components reporting unit to the new reporting units - Space and Defense Controls and Industrial Systems. As part of this transfer, we allocated the goodwill of the former Components reporting unit to the new reporting units based on the relative fair value of the new reporting units. We then compared the fair values to the carrying values of the new reporting units and the resulting fair values exceeded the carrying values, so we determined that goodwill was not impaired.

The fair value of each of these two reporting units exceeded the carrying amounts by over 100%. While any individual assumption could differ from those that we used, we believe the overall fair values of these 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 these reporting units would have continued to exceed its carrying amount by at least 80%.

Annual Test

For our annual test of goodwill for impairment in 2018, we performed a qualitative assessment for each of our four reporting units.

We evaluated the potential for goodwill impairment by considering macroeconomic conditions, industry and market conditions, cost factors, both current and future expected financial performance, and relevant entity-specific events for each of the reporting units. We also considered our overall market performance discretely as well as in relation to our peers. The results of our qualitative assessment indicated that it is more likely than not that the fair value of each of the reporting units exceed its carrying value; and therefore, a quantitative two-step impairment test was not necessary and goodwill was not impaired.

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 2018, we recorded \$14 million of impairment charges on long-lived assets as a result of our decision to phase out our participation in the wind pitch control business.

Pension Assumptions

We maintain various defined benefit pension plans covering employees at certain locations. Pension expense for all defined benefit plans for 2018 was \$36 million. Pension obligations and the related costs are determined using actuarial valuations that involve several assumptions. The most critical assumptions are the discount rate, long-term expected return on assets and the mortality rates. Other assumptions include salary increases and retirement age.

We 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. The discount rates used in determining expense for the U.S. Employees' Retirement Plan, our largest plan, in 2018 were 4.2% for service cost and 3.5% for interest cost, compared to 4.0% and 3.2%, respectively, in 2017. A 50 basis point decrease in the discount rates would increase our annual pension expense by \$6 million. 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.

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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 2018 expense for our largest plan, we used a 7.0% return on assets assumption, compared to 7.5% for 2017. A 50 basis point decrease in the long-term expected return on assets assumption would increase our annual pension expense by \$4 million.

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.

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 in the quarter in which it occurs. The financial impacts of our decisions to phase out our participation in the wind pitch control business and the related tax consequences were recorded as discrete items during the interim quarters of 2018. In addition, the one-time effects of tax reform have been recorded as discrete items.

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 judgment in making these assessments. There were no significant reserves recorded in 2018.

Valuation allowances associated with deferred tax assets are 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 29, 2018, we had gross deferred tax assets of \$187 million and deferred tax asset valuation allowances of \$15 million. The deferred tax assets principally relate to benefit accruals, inventory obsolescence, tax benefit carryforwards and contract loss reserves. The deferred tax assets include \$16 million related to tax benefit carryforwards associated with net operating losses and tax credits, for which \$15 million of deferred tax asset valuation allowances are recorded.

Table of Contents**CONSOLIDATED RESULTS OF OPERATIONS**

(dollars and shares in millions, except per share data)	2018	2017	2016	2018 vs. 2017		2017 vs. 2016	
				\$	%	\$	%
Net sales	\$2,709	\$2,498	\$2,412	\$212	8 %	\$86	4 %
<i>Gross margin</i>	28.5 %	29.3 %	29.5 %				
Research and development expenses	\$130	\$145	\$147	\$(14)	(10 %)	\$(3)	(2 %)
<i>Selling, general and administrative expenses as a percentage of sales</i>	14.5 %	14.3 %	14.1 %				
Interest expense	\$36	\$35	\$35	\$2	5 %	\$—	— %
Restructuring expense	\$29	\$—	\$15	\$29	— %	\$(15)	(100 %)
Goodwill impairment	\$—	\$—	\$5	\$—	— %	\$(5)	(100 %)
Other	\$—	\$14	\$(3)	\$(14)	(99 %)	\$18	n/a
<i>Effective tax rate</i>	47.4 %	22.7 %	28.5 %				
Net earnings attributable to Moog and noncontrolling interest	\$97	\$140	\$124	\$(44)	(31 %)	\$17	14 %
Diluted average common shares outstanding	36	36	37	—	— %	—	(1 %)
Diluted earnings per share attributable to Moog	\$2.68	\$3.90	\$3.47	\$(1.22)	(31 %)	\$0.43	12 %

Net sales increased across all of our segments in 2018 compared to 2017. Our recent acquisitions in Industrial Systems and Space and Defense Controls contributed an incremental \$32 million and \$7 million of sales, respectively. Additionally in 2018, stronger foreign currencies relative to the U.S. dollar, in particular the Euro, increased sales \$27 million. Also in 2018, Space and Defense Controls was impacted by the absence of \$18

Net sales in 2017 compared to 2016 increased in Aircraft Controls 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, decreased sales \$19 million.

Gross margin decreased in 2018 compared to 2017 due primarily to the \$12 million inventory write-down associated with our exit of the wind pitch control business. Gross margin excluding the inventory write-down decreased slightly. A negative sales mix in Aircraft Controls was mostly offset by incremental profit from higher sales in Industrial Systems and Space and Defense Controls.

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. Research and development expenses in 2018 decreased compared to 2017. Within Aircraft Controls, research and development expenses decreased \$19 million, as we had lower activity across all of our major commercial development programs. The reduced spend was partially offset by increases in research and development activities across our other two segments.

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 activities in our other two segments.

Selling, general and administrative expenses as a percentage of sales increased in 2018 compared to 2017. The increase is due to higher planned selling expense in select growth markets, primarily in Industrial Systems, acquisition-related expenses and higher healthcare costs. Selling, general and administrative expenses as a percentage of sales also increased in 2017 compared to 2016. Within Space and Defense Controls, we had higher selling activities.

Interest expense in 2017 was comparable to interest expense in 2016. In 2017, higher interest rates increased expense \$4 million; however, lower levels of debt decreased expense \$4 million.

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In the second quarter of 2018, we decided to phase out our participation in the wind pitch control business over the remainder of our fiscal year. During 2018, we incurred \$39 million of restructuring expense in Industrial Systems specific to this decision. Of the related restructuring expense, there was \$30 million for non-cash charges, \$6 million for severance and \$3 million for other costs.

In 2016, we incurred restructuring expenses in response to business conditions, primarily in Aircraft Controls and Industrial Systems, 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 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.

The effective tax rate in 2018 was significantly impacted by the enactment of the Tax Cuts and Jobs Act of 2017, as well as limited tax benefits associated with the restructuring charges taken in foreign jurisdictions of our Industrial Systems segment. Excluding the one-time special impacts due to the Act and the restructuring charges, the effective tax rate for 2018 was 25.1%.

Our effective tax rate in 2017 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.

Other comprehensive income in 2018 includes \$27 million of retirement liability adjustments and \$16 million of negative foreign currency translation adjustments. 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. In 2018 compared to 2017,

the change in retirement liability

was primarily due to differences in actual versus expected return on assets, partially offset by changes in discount rates. 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.

Table of Contents**SEGMENT RESULTS OF OPERATIONS**

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 19 of Item 8, Financial Statements and Supplementary Data of this report.

Aircraft Controls

(dollars in millions)	2018	2017	2016	2018 vs. 2017			2017 vs. 2016		
				\$	%		\$	%	
Net sales - military aircraft	\$572	\$522	\$512	\$50	10	%	\$10	2	%
Net sales - commercial aircraft	622	603	551	19	3	%	51	9	%
	\$1,194	\$1,125	\$1,064	\$69	6	%	\$61	6	%
Operating profit	\$129	\$114	\$99	\$15	13	%	\$16	16	%
Operating margin	10.8	% 10.1	% 9.3			%			%
Backlog	\$755	\$571	\$632	\$184	32	%	\$(61)	(10)	%

Aircraft Controls' net sales growth was driven by military OEM programs and by commercial aftermarket programs in 2018 compared to 2017. Net sales growth was primarily driven by commercial programs in 2017 compared to 2016.

In 2018 compared to 2017, military OEM sales increased \$43 million and military aftermarket sales increased \$7 million. Within OEM programs, higher production levels on the F-35 and the KC-46 Tanker increased sales \$22 million and \$6 million, respectively. In addition, contract awards for navigational aides products increased sales \$6 million and higher orders for foreign military programs increased sales \$5 million. Within aftermarket programs, higher spare purchases for multiple programs offset the lower amount of prior year's activity associated with the B-2 program. Also in 2018, commercial aftermarket sales increased \$33 million driven by higher initial provisioning orders for the Airbus A350 program and recapture activities on legacy Boeing programs. Partially offsetting these increases was a \$14 million decline in commercial OEM sales, as declining volumes on legacy Boeing and Airbus programs surpassed volume increases on newer programs.

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.

Operating margin in 2018 increased compared to the operating margin in 2017. Research and development expenses decreased \$19 million due to lower activity on our major commercial development programs. However, we had an unfavorable mix due to lower amounts of mature commercial OEM sales as well as increased costs on a new commercial OEM program, partially offset by higher amounts of commercial aftermarket sales. Also, higher operating expenses, including new business capture activities, reduced operating profit.

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 the prior 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.

The twelve-month backlog for Aircraft Controls at September 29, 2018 increased compared to September 30, 2017 due to the timing and volume of military orders, especially for the F-35 program. The twelve-month backlog for Aircraft Controls at September 30, 2017 declined compared to October 1, 2016. Half of the decline was in military aircraft, driven primarily due to order timing on the F-35 program. The remaining reduction was due to declining production rates on legacy commercial programs.

Table of Contents**Space and Defense Controls**

(dollars in millions)	2018	2017	2016	2018 vs. 2017		2017 vs. 2016	
				\$	%	\$	%
Net sales	\$581	\$529	\$499	\$52	10 %	\$ 30	6 %
Operating profit	\$67	\$49	\$54	\$18	38 %	\$ (5)	(10 %)
Operating margin	11.5 %	9.2 %	10.8 %				
Backlog	\$454	\$385	\$351	\$69	18 %	\$ 34	10 %

compared to 2016.

\$18
\$24

In 2017 compared to 2016, sales in our defense market increased \$28 million due to 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.

Operating margin increased in 2018 compared to 2017 due to the absence of last year's losses associated with selling our non-core businesses. Operating margin excluding the losses would have been 11.7% in 2017. The slight decline in 2018 operating margin compared to an adjusted 2017 operating margin was driven by higher research and development expenses.

Operating margin excluding the losses in 2017 increased compared to 2016 due primarily to a favorable sales mix in our defense markets.

Twelve-month backlog for Space and Defense Controls at September 29, 2018 compared to September 30, 2017 increased due to higher orders for our defense programs. Twelve-month backlog for Space and Defense Controls at September 30, 2017 increased compared to October 1, 2016 due to order growth in satellite avionics, launch vehicles and multiple defense products.

Table of Contents**Industrial Systems**

(dollars in millions)	2018	2017	2016	2018 vs. 2017		2017 vs. 2016	
				\$	%	\$	%
				Variance	Variance	Variance	Variance
Net sales	\$935	\$843	\$849	\$92	11 %	\$(5)	(1 %)
Operating profit	\$62	\$88	\$86	\$(25)	(29 %)	\$2	2 %
Operating margin	6.7 %	10.4 %	10.1 %				
Backlog	\$272	\$256	\$230	\$16	6 %	\$25	11 %

In 2018 compared to 2017, approximately half of Industrial Systems' net sales growth was driven by organic growth within all our markets, and the remaining growth was split between the impacts of acquisitions and foreign currencies. In 2017, Industrial Systems' net sales decreased compared 2016 as weaker foreign currencies relative to the U.S. dollar, in particular the British pound, decreased sales \$5 million.

Excluding the currency effects on sales in 2018 compared to 2017, sales increased \$41 million in our industrial automation market. The increases were primarily driven by our acquisitions, as well as stronger macro economic growth. Sales also increased \$17 million in our medical market driven by higher orders for our components and devices. In addition, sales increased \$14 million in our energy market driven by increased shipments for energy generation and exploration products. Also in 2018 compared to 2017, the recent acquisitions of Vues Brno s.r.o and Rotary Transfer Systems increased sales, primarily in our industrial automation market, \$32 million, and stronger foreign currencies, primarily the Euro relative to the U.S. dollar, increased sales \$19 million.

due to lost sales to a key customer in Brazil who was acquired and by lower sales from additional wind customers. Also, sales decreased slightly for our simulation and test products by \$3 million. Partly offsetting the decreases in 2017 compared to 2016 were higher sales in our medical market and in our industrial automation market. Sales increased \$15 million in our medical market due primarily to higher sales volumes on our sets and pumps. Additionally, sales in our industrial automation market increased \$11 million due primarily to the Rotary Transfer Systems acquisition, as well as increased demand across our industrial markets.

In the second quarter of 2018, we decided to phase out our participation in the wind pitch control business over the remainder of our fiscal year. During 2018, we incurred \$39 million of restructuring expense in Industrial Systems as described in the Consolidated Results of Operations.

Operating margin decreased in 2018 compared to 2017 due to charges associated with exiting the wind pitch control business. Excluding the effect of this expense, operating margin would have been 10.6% in 2018. The increase in an adjusted 2018 operating margin compared to 2017 operating margin was driven by incremental profit from higher sales across all of our markets, but partially offset by higher operating expenses.

Operating margin increased in 2017 compared to 2016, driven primarily by the absence of the prior year's restructuring expense and the incremental associated benefits.

The increased level of twelve-month backlog in Industrial Systems at September 29, 2018 compared to September 30, 2017 is due to higher orders from our recent acquisitions within our industrial automation market and for our industrial components products. The twelve-month backlog at September 30, 2017 increased compared to the twelve-month backlog at October 1, 2016 in part due to higher orders for non-renewable energy customers, as well as higher test and simulation orders.

Table of Contents**SEGMENT OUTLOOK**

(dollars in millions)	2019	2018	2019 vs. 2018		
			\$	%	
			Variance	Variance	
Net sales:					
Aircraft Controls	\$1,265	\$1,194	\$71	6	%
Space and Defense Controls	681	581	100	17	%
Industrial Systems	931	935	(4)	—	%
	\$2,877	\$2,709	\$167	6	%
Operating profit:					
Aircraft Controls	\$144	\$129	\$15	12	%
Space and Defense Controls	81	67	14	21	%
Industrial Systems	112	62	49	79	%
	\$336	\$258	\$78	30	%
Operating margin:					
Aircraft Controls	11.4	% 10.8	%		
Space and Defense Controls	11.8	% 11.5	%		
Industrial Systems	12.0	% 6.7	%		
	11.7	% 9.5	%		

2019 Outlook – We expect higher amounts of defense sales within Space and Defense Controls as well as Aircraft Controls to drive the increase in 2019 sales. We also expect commercial aircraft sales growth driven by major OEM program ramp-ups, and we expect Industrial Systems organic growth will offset the lost sales associated with our wind pitch control business. We expect 2019 operating margin will increase due to the absence of 2018's charges associated with exiting the wind pitch control business, as well as incremental margin from higher sales. We expect net earnings attributable to common shareholders to increase 92% in 2019 to \$185 million, as the unusually high effective tax rate in 2018 due to the Tax Cuts and Jobs Act does not repeat. Excluding the impacts from the wind charge and the special impacts from the Tax Act, we expect net earnings attributable to common shareholders to increase 17% from an adjusted net earnings in 2018 of \$165 million. We expect diluted earnings per share will range between \$5.05 and \$5.45, with a midpoint of \$5.25.

2019 Outlook for Aircraft Controls – We expect 2019 sales in Aircraft Controls will increase primarily due to the continued ramp ups of the Airbus A350, the F-35 and the Boeing 787 programs. Partially offsetting the increases is an expected sales decline of commercial aftermarket programs as the favorable order timing in 2018 does not repeat in 2019. We expect 2019 operating margin will increase compared to 2018 due to a more favorable sales mix from higher military aftermarket sales, as well as improving costs on newer commercial programs.

2019 Outlook for Space and Defense Controls – We expect 2019 sales in Space and Defense Controls will increase due to new product offerings and higher sales volumes on existing defense controls and missile programs. We expect 2019 operating margin will increase slightly due to incremental margin from the higher sales volume.

2019 Outlook for Industrial Systems – We expect 2019 sales in Industrial Systems to increase across our major markets, offsetting the lost sales associated with our wind pitch control business which we exited in 2018. We expect 2019 operating margin will increase due to the absence of 2018's charges associated with exiting the wind pitch control business. Excluding the impact of these charges, 2019 operating margin will increase from an adjusted operating margin of 10.6%, reflecting incremental margin on the higher sales as well as higher operational efficiency.

Table of Contents**FINANCIAL CONDITION AND LIQUIDITY**

(dollars in millions)	2018	2017	2016	2018 vs. 2017		2017 vs. 2016	
				\$	%	\$	%
Net cash provided (used) by:				Variance	Variance	Variance	Variance
Operating activities	\$102	\$218	\$216	\$(115)	(53 %)	\$2	1 %
Investing activities	(142)	(110)	(79)	(32)	29 %	(30)	38 %
Financing activities	(222)	(76)	(120)	(146)	193 %	44	(37 %)

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 29, 2018, our cash, cash equivalents and restricted cash balance was \$128 million, which is 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. Due to provisions in the Tax Cuts and Jobs Act, we plan to continue to repatriate substantial amounts of our existing offshore cash and future earnings back to the U.S. Throughout 2018, we have repatriated approximately \$230 million.

Operating activities

Net cash provided by operating activities decreased in 2018 compared to 2017. Cash used by pension and retirement liabilities increased \$94 million due to incremental pension contributions in 2018. Also, cash used by inventory increased \$26 million, as higher volumes on new programs in Aircraft Controls and delays on shipments in Space and Defense Controls resulted in more inventory.

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 across all of our segments used \$65 million more of cash compared to 2016. 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.

Investing activities

Net cash used by investing activities in 2018 included \$95 million for capital expenditures and \$48 million for the acquisitions in our Industrial Systems and Space and Defense segments.

Net cash used by investing activities in 2017 included \$76 million for capital expenditures and \$41 million for the acquisition in Industrial 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.

We expect our 2019 capital expenditures to be approximately \$95 million, due to facilities investments supporting the increased production of the F-35 program, as well as space engine propulsion testing.

Financing activities

Net cash used by financing activities in 2018 includes \$100 million of net payments on our credit facilities.

Net cash used by financing activities in 2018 also includes \$76 million related to repurchasing approximately 1 million shares, at \$75.74 per share, from the defined benefit pension plan. Additionally, we paid \$21 million to extinguish the debt of our Industrial Systems' acquisition, and we paid \$18 million of cash dividends in 2018.

Net cash used by financing activities in 2017 included

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.

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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 \$430 million at September 29, 2018. The weighted-average interest rate on primarily all of the outstanding credit facility borrowings is 3.80% and is based on LIBOR plus the applicable margin, which was 1.63% at September 29, 2018. 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 consent to be obtained. 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 29, 2018, we had \$638 million of unused capacity, including \$626 million from the U.S. revolving credit facility after considering standby letters of credit. However, our leverage ratio covenant limits our total borrowing capacity to \$440 million as of September 29, 2018.

On July 26, 2018, the SECT entered into a revolving credit facility with a borrowing capacity of \$35 million, maturing on July 26, 2020. Interest for the revolving credit facility is based on LIBOR plus a margin of 2.13%. As of September 29, 2018, there were no outstanding borrowings.

We have \$300 million 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 matures on October 23, 2019. The Securitization Program provides up to \$130 million of borrowing capacity and lowers 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 \$130 million at September 29, 2018. The Securitization Program has a minimum borrowing requirement, which was \$104 million at September 29, 2018. Interest on the secured borrowings under the Securitization Program was 3.07% at September 29, 2018 and is based on 30-day LIBOR plus an applicable margin. Net debt to capitalization was 38% at September 29, 2018 and 33% at September 30, 2017. The increase in net debt to capitalization is due to the share repurchases from our defined benefit plan and the use of cash for incremental pension contributions to fund our primary U.S. defined benefit pension plan and acquisitions, partially offset by our net earnings.

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.

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The Board of Directors authorized a share repurchase program. This program has been amended from time to time to authorize additional repurchases that includes both Class A and Class B common stock, 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 29, 2018.

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 29, 2018 are as follows:

(dollars in millions)	Payments due by period				
	Total	2019	2020- 2021	2022- 2023	After 2023
Contractual Obligations					
Long-term debt	\$861	\$—	\$560	\$300	\$—
Interest on long-term debt	65	16	32	17	—
Operating leases	112	21	33	21	37
Purchase obligations	649	462	165	7	15
Total contractual obligations	\$1,687	\$500	\$790	\$345	\$52

The obligations in the table above exclude unrecognized tax benefits, which are not material. 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, other revolving credit facilities and the 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 29, 2018, would be approximately \$22 million annually.

Total contractual obligations exclude pension obligations. In 2019, we have no minimum funding requirements. However, we anticipate making contributions to defined benefit pension plans of \$12 million, of which approximately \$5 million is for a non-qualified U.S. plan. We are unable to determine minimum funding requirements beyond 2019.

We have made discretionary incremental contributions to our defined benefit plans in excess of minimum funding requirements in 2018. These additional contributions were primarily made to fully fund our qualified U.S. defined benefit pension plan. We do not plan to make additional contributions to this plan for the foreseeable future.

(dollars in millions)	Commitments expiring by period				
	Total	2019	2020- 2021	2022- 2023	After 2023
Other Commercial Commitments					
Standby letters of credit	\$44	\$16	\$4	\$24	\$—

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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 2018 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.

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. After operating under continuing resolutions, which restrict new program starts, the U.S. Government signed the 2019 defense appropriations budget in September 2018, with moderate growth in defense spending. However, future budgeted levels of defense spending beyond 2019 are uncertain and subject to debate. Currently, we expect approximately \$850 million of U.S. defense sales in 2019.

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 2018 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, after the significant decline in the price of crude oil from 2014 through 2016, investments in exploration activities have been reduced.

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-fifth of our 2018 sales were denominated in foreign currencies. During 2018, average foreign currency rates generally strengthened against the U.S. dollar compared to 2017. The translation of the results of our foreign subsidiaries into U.S. dollars increased sales by \$27 million compared to one year ago. 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 2017 sales by \$19 million compared to 2016.

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 2018, our derivative instruments consisted of interest rate swaps designated as cash flow hedges, foreign currency contracts and net investment hedges.

At September 29, 2018, we had \$560 million of borrowings subject to variable interest rates. At September 29, 2018, 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 2.87%, including the applicable margin of 1.63% as of September 29, 2018. 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 2018, our average borrowings subject to variable interest rates, after adjusting for interest rate swaps, were \$476 million and, therefore, if interest rates had been one percentage point higher during 2018, 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 \$145 million outstanding at September 29, 2018 that mature at various times through May 29, 2020. These include notional amounts of \$115 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 \$2 million net liability at September 29, 2018. 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 29, 2018 by approximately \$8 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 29, 2018 by approximately \$10 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 2018 would have decreased or increased by \$4 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.

Table of Contents**Item 8. Financial Statements and Supplementary Data.
Consolidated Statements of Earnings**

(dollars in thousands, except share and per share data)	Fiscal Years Ended		
	September 29, 2018	September 30, 2017	October 1, 2016
Net sales	\$2,709,468	\$ 2,497,524	\$ 2,411,937
Cost of sales	1,924,283	1,766,002	1,700,354
Inventory write-down - restructuring	12,198	—	—
Gross profit	772,987	731,522	711,583
Research and development	130,186	144,646	147,336
Selling, general and administrative	393,759	356,141	339,961
Interest	36,238	34,551	34,605
Restructuring	28,794	—	15,393
Goodwill impairment	—	—	4,800
Other	173	14,473	(3,372)
Earnings before income taxes	183,837	181,711	172,860
Income taxes	87,209	41,301	49,227
Net earnings attributable to Moog and noncontrolling interest	\$96,628	\$ 140,410	\$ 123,633
Net earnings (loss) attributable to noncontrolling interest	121	(870)	(3,112)
Net earnings attributable to Moog	\$96,507	\$ 141,280	\$ 126,745
Net earnings per share attributable to Moog			
Basic	\$2.71	\$ 3.94	\$ 3.49
Diluted	\$2.68	\$ 3.90	\$ 3.47
Dividends declared per share	\$0.50	\$ —	\$ —
Average common shares outstanding			
Basic	35,661,638	35,852,448	36,277,445
Diluted	36,052,307	36,230,043	36,529,344

See accompanying Notes to Consolidated Financial Statements.

Table of Contents**Consolidated Statements of Comprehensive Income (Loss)**

(dollars in thousands)	Fiscal Years Ended		
	September 29, 2018	September 30, 2017	October 1, 2016
Net earnings attributable to Moog and noncontrolling interest	\$96,628	\$ 140,410	\$ 123,633
Other comprehensive income (loss), net of tax:			
Foreign currency translation adjustment	(16,279)	27,460	(37,838)
Retirement liability adjustment	26,757	69,229	(54,184)
Change in accumulated income (loss) on derivatives	(121)	2,881	(1,304)
Other comprehensive income (loss), net of tax	10,357	99,570	(93,326)
Tax Cuts and Jobs Act, reclassification from AOCIL to retained earnings	(47,077)	—	—
Comprehensive income (loss)	59,908	239,980	30,307
Comprehensive income (loss) attributable to noncontrolling interest	91	(870)	(3,112)
Comprehensive income (loss) attributable to Moog	\$59,817	\$ 240,850	\$33,419
See accompanying Notes to Consolidated Financial Statements.			

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(dollars in thousands, except per share data)

	September 29, 2018	September 30, 2017
ASSETS		
Current assets		
Cash and cash equivalents	\$ 125,584	\$ 368,073
Receivables	793,911	727,740
Inventories	512,522	489,127
Prepaid expenses and other current assets	44,404	41,499
Total current assets	1,476,421	1,626,439
Property, plant and equipment, net	552,865	522,991
Goodwill	797,217	774,268
Intangible assets, net	95,537	108,818
Deferred income taxes	17,328	26,558
Other assets	24,680	31,518
Total assets	\$ 2,964,048	\$ 3,090,592
LIABILITIES AND SHAREHOLDERS' EQUITY		
Current liabilities		
Short-term borrowings	\$ 3,623	\$ 89
Current installments of long-term debt	365	295
Accounts payable	213,982	170,878
Accrued compensation	147,765	148,406
Customer advances	151,687	159,274
Contract loss reserves	42,258	43,214
Other accrued liabilities	120,944	107,278
Total current liabilities	680,624	629,434
Long-term debt, excluding current installments	858,836	956,653
Long-term pension and retirement obligations	117,471	271,272
Deferred income taxes	46,477	13,320
Other long-term liabilities	35,654	5,609
Total liabilities	1,739,062	1,876,288
Commitments and contingencies (Note 21)	—	—
Shareholders' equity		
Common stock - par value \$1.00		
Class A - Authorized 100,000,000 shares	43,785	43,704
Issued 43,784,489 and outstanding 32,486,766 shares at September 29, 2018		
Issued 43,704,286 and outstanding 32,346,135 shares at September 30, 2017		
Class B - Authorized 20,000,000 shares. Convertible to Class A on a one-for-one basis	7,495	7,576
Issued 7,495,224 and outstanding 2,311,286 shares at September 29, 2018		
Issued 7,575,427 and outstanding 3,436,747 shares at September 30, 2017		
Additional paid-in capital	502,257	492,246
Retained earnings	1,973,514	1,847,819
Treasury shares	(738,494)	(739,157)
Stock Employee Compensation Trust	(118,449)	(89,919)
Supplemental Retirement Plan Trust	(72,941)	(12,474)
Accumulated other comprehensive loss	(372,181)	(335,491)
Total shareholders' equity	1,224,986	1,214,304
Total liabilities and shareholders' equity	\$ 2,964,048	\$ 3,090,592
See accompanying Notes to Consolidated Financial Statements.		

Table of Contents**Consolidated Statements of Shareholders' Equity**

(dollars in thousands)	Fiscal Years Ended		
	September 28, 2018	September 30, 2017	October 1, 2016
COMMON STOCK			
Beginning and end of year	\$51,280	\$ 51,280	\$51,280
ADDITIONAL PAID-IN CAPITAL			
Beginning of year	492,246	465,762	456,512
Issuance of treasury shares	(4,321)	) (7,390	) (429)
Equity-based compensation expense	5,804	4,582	3,271
Redemption of noncontrolling interest	175	3,125	—
Adjustment to market - SECT, SERP and other	8,353	26,167	6,408
End of year	502,257	492,246	465,762
RETAINED EARNINGS			
Beginning of year	1,847,819	1,706,539	1,579,794
Net earnings attributable to Moog	96,507	141,280	126,745
Dividends	(17,889)) —) —
Tax Cuts and Jobs Act, reclassification from AOCIL to retained earnings	47,077	—	—
End of year	1,973,514	1,847,819	1,706,539
TREASURY SHARES AT COST			
Beginning of year	(739,157)	) (741,700	) (701,771)
Class A and B shares issued related to equity compensation	8,881	11,186	5,003
Class A and B shares purchased	(8,218)	) (8,643	) (44,932)
End of year	(738,494)	) (739,157	) (741,700)
STOCK EMPLOYEE COMPENSATION TRUST (SECT)			
Beginning of year	(89,919)	) (49,463	) (44,211)
Issuance of shares	4,714	867	28,048
Purchase of shares	(30,358)	) (18,685	) (28,799)
Adjustment to market	(2,886)	) (22,638	) (4,501)
End of year	(118,449)	) (89,919	) (49,463)
SUPPLEMENTAL RETIREMENT PLAN (SERP) TRUST			
Beginning of year	(12,474)	) (8,946	) (5,337)
Purchase of shares	(55,000)	) —	) (2,300)
Adjustment to market	(5,467)	) (3,528	) (1,309)
End of year	(72,941)	) (12,474	) (8,946)
ACCUMULATED OTHER COMPREHENSIVE LOSS			
Beginning of year	(335,491)	) (435,061	) (341,735)
Other comprehensive income (loss)	10,387	99,570	(93,326)
Tax Cuts and Jobs Act, reclassification from AOCIL to retained earnings	(47,077)) —) —
End of year	(372,181)	) (335,491	) (435,061)
TOTAL MOOG SHAREHOLDERS' EQUITY	1,224,986	1,214,304	988,411
NONCONTROLLING INTEREST			
Beginning of year	—	—	—
Noncontrolling interest of acquired entity	1,927	—	—
Net earnings attributable to noncontrolling interest	121	—	—
Foreign currency translation adjustment	(30)) —) —
Acquisition of noncontrolling interest	(2,018)) —) —
End of year	—	—	—
TOTAL SHAREHOLDERS' EQUITY	\$1,224,986	\$ 1,214,304	\$988,411

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Consolidated Statements of Shareholders' Equity, continued

	Fiscal Years Ended	
	September 29, 2017	October 1, 2016
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

Consolidated Statements of Shareholders' Equity, Shares

(share data)	Fiscal Years Ended		
	September 29, 2018	September 30, 2017	October 1, 2016
COMMON STOCK - CLASS A			
Beginning of year	43,704,286	43,666,801	43,638,618
Conversion of Class B to Class A	80,203	37,485	28,183
End of year	43,784,489	43,704,286	43,666,801
COMMON STOCK - CLASS B			
Beginning of year	7,575,427	7,612,912	7,641,095
Conversion of Class B to Class A	(80,203)	(37,485)	(28,183)
End of year	7,495,224	7,575,427	7,612,912
TREASURY SHARES - CLASS A COMMON STOCK			
Beginning of year	(10,933,003)	(11,110,087)	(10,318,431)
Class A shares issued related to equity awards	104,842	284,048	152,099
Class A shares purchased	(44,414)	(106,964)	(943,755)
End of year	(10,872,575)	(10,933,003)	(11,110,087)
TREASURY SHARES - CLASS B COMMON STOCK			
Beginning of year	(3,333,927)	(3,323,926)	(3,323,926)
Class B shares issued related to equity awards	64,664	7,380	—
Class B shares purchased	(54,733)	(17,381)	—
End of year	(3,323,996)	(3,333,927)	(3,323,926)
SECT SHARES - CLASS A COMMON STOCK			
Beginning of year	(425,148)	(425,148)	—
Purchase of shares	—	—	(425,148)
End of year	(425,148)	(425,148)	(425,148)
SECT SHARES - CLASS B COMMON STOCK			
Beginning of year	(654,753)	(404,919)	(828,381)
Issuance of shares	57,277	15,000	487,678
Purchase of shares	(386,296)	(264,834)	(64,216)
End of year	(983,772)	(654,753)	(404,919)
SERP TRUST SHARES - CLASS B COMMON STOCK			
Beginning of year	(150,000)	(150,000)	(100,000)
Purchase of shares	(726,170)	—	(50,000)
End of year	(876,170)	(150,000)	(150,000)

See accompanying Notes to Consolidated Financial Statements.

Table of Contents**Consolidated Statements of Cash Flows**

	Fiscal Years Ended		
	September 29, 2018	September 30, 2017	October 1, 2016
(dollars in thousands)			
CASH FLOWS FROM OPERATING ACTIVITIES			
Net earnings attributable to Moog and noncontrolling interest	\$96,628	\$ 140,410	\$123,633
Adjustments to reconcile net earnings to net cash provided (used) by operating activities:			
Depreciation	71,231	71,363	77,407
Amortization	17,341	18,804	21,325
Deferred income taxes	30,613	10,758	4,248
Equity-based compensation expense	5,804	4,582	3,271
Other	34,455	17,898	13,440
Changes in assets and liabilities providing (using) cash:			
Receivables	(67,621)	(44,558)	1,672)
Inventories	(32,451)	(5,999)	12,644)
Accounts payable	39,440	25,740	(21,821)
Customer advances	(10,998)	(7,054)	2,903)
Accrued expenses	11,466	16,901	(727)
Accrued income taxes	4,227	(4,686)	4,481)
Net pension and post retirement liabilities	(123,500)	(29,029)	(29,708)
Other assets and liabilities	25,772	2,650	3,086
Net cash provided by operating activities	102,407	217,780	215,854
CASH FLOWS FROM INVESTING ACTIVITIES			
Acquisitions of businesses, net of cash acquired	(48,382)	(40,545)	(11,016)
Purchase of property, plant and equipment	(94,517)	(75,798)	(67,208)
Other investing transactions	1,257	6,820	(994)
Net cash (used) by investing activities	(141,642)	(109,523)	(79,218)
CASH FLOWS FROM FINANCING ACTIVITIES			
Net short-term borrowings (repayments)	3,618	(1,280)	—
Proceeds from revolving lines of credit	568,550	255,622	324,670
Payments on revolving lines of credit	(678,660)	(305,512)	(409,670)
Proceeds from long-term debt	15,000	—	20,000
Payments on long-term debt	(25,922)	(168)	(10,098)
Payment of dividends	(17,889)	—	—
Proceeds from sale of treasury stock	4,560	3,797	4,574
Purchase of outstanding shares for treasury	(8,218)	(8,643)	(44,933)
Proceeds from sale of stock held by SECT	4,714	867	28,048
Purchase of stock held by SECT	(30,358)	(18,685)	(28,799)
Purchase of stock held by SERP Trust	(55,000)	—	(2,300)
Excess tax benefits from equity-based payment arrangements	—	—	598
Other financing transactions	(1,964)	(1,656)	(1,950)
Net cash (used) by financing activities	(221,569)	(75,658)	(119,860)
Effect of exchange rate changes on cash	1,541	10,433	(3,751)
Increase (decrease) in cash, cash equivalents and restricted cash	(259,263)	43,032	13,025
Cash, cash equivalents and restricted cash at beginning of year	386,969	343,937	330,912
Cash, cash equivalents and restricted cash at end of year	\$127,706	\$ 386,969	\$343,937
SUPPLEMENTAL CASH FLOW INFORMATION			
Interest paid	\$36,689	\$ 33,801	\$34,150
Income taxes paid, net of refunds	34,214	44,205	41,517

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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 29, 2018, September 30, 2017 and October 1, 2016.

Operating Cycle: Consistent with industry practice, aerospace and defense related inventories, unbilled recoverable costs and profits on long-term contract receivables, customer advances, warranties 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 39%, 38% and 34% of 2018, 2017 and 2016 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 2018, 2017 or 2016. 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 and delivered products in order to meet contract specifications.

As units are delivered or services are performed: Revenue representing 61%, 62% and 66% of 2018, 2017 and 2016 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 segment, 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 equity-based compensation plans allow for various types of equity-based incentive awards. The types and mix of these 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 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.

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

Restricted Cash: Restricted cash of \$2,122 and \$18,896 at September 29, 2018 and September 30, 2017 is included in Other assets on the Consolidated Balance Sheets and represents funds held to satisfy long term supplemental retirement obligations.

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.

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.

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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 2018 or 2017.

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 2018, we recorded \$14,382 of impairment charges in our Industrial Systems segment. These charges relate to intangible assets and equipment that will no longer be used as a result of restructuring actions taken for the wind pitch control business we are exiting. These charges are included in restructuring in the consolidated statements of earnings.

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 statements 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.

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.

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Reclassifications: Certain prior year amounts have been reclassified to conform to current year's presentation. Effective October 1, 2017, we made changes to our segment reporting structure that resulted in three reporting segments. Our former Components segment has been separated and merged into Space and Defense Controls and Industrial Systems. The Goodwill, Restructuring and Segment footnotes have been restated to reflect these changes. The Consolidated Statements of Cash Flows has been restated for the classification of restricted cash invested for long term supplemental retirement obligations. This resulted in an increase to net cash from investing activities of \$87 in 2017 and a decrease in net cash from investing activities of \$2,250 in 2016, which management does not consider to be material.

Refer to the following table for a summary of ASUs we adopted during 2018 and the related financial statement impact. The Statement of Comprehensive Income, Statement of Shareholder's Equity and Income Taxes and AOCIL footnotes have been restated to reflect these changes.

Recent Accounting Pronouncements:*Recent Accounting Pronouncements Adopted*

Standard	Description	Financial Statement Effect or Other Significant Matters
ASU no. 2018-02 Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income	The standard amends existing guidance and allows a reclassification from accumulated other comprehensive income (loss) to retained earnings for stranded deferred tax effects resulting from the Tax Cuts and Jobs Act. The standard requires certain disclosures about stranded deferred tax effects. 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 adopted this standard recording the related stranded deferred tax effects in the period of adoption, resulting in \$47,077 being reclassified from accumulated other comprehensive income (loss) to retained earnings as of March 31, 2018. Date early adopted: Q2 2018

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Standard	Description	Financial Statement Effect or Other Significant Matters
ASU no. 2014-09 <i>Revenue from Contracts with Customers (And All Related ASUs)</i>	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. 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 will 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 will be necessary to Shareholders' Equity at the beginning of 2019. We have implemented changes to our financial policies, information technology systems and internal controls and we are prepared to present our financial statements and the related disclosures in compliance with the standard. We have identified four revenue streams - commercial contracts, United States government contracts, repair and overhaul arrangements and foreign government and other contracts. The impact of this standard is significant on our United States government and repair and overhaul revenue streams, but will not significantly impact our commercial or foreign government and other revenue streams. For the revenue streams significantly impacted, more revenue will be recognized over time when compared to prior years, as we are creating or enhancing assets that the customer controls as the assets are being created or enhanced. We estimate the adoption of this standard to result in a cumulative adjustment of approximately \$16,000, which will be an increase to Shareholders' Equity. Planned date of adoption: Q1 2019
ASU no. 2016-02 <i>Leases (And All Related ASUs)</i>	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 <i>Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost</i>	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, 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.	We anticipate the adoption of this standard will decrease operating expenses (Cost of sales, Research and development and Selling, general and administrative) and increase Other expense by \$6,778 for the year ended September 29, 2018 and \$12,595 for the year ended September 30, 2017. The adoption of this standard will not have a material impact on our Consolidated Balance Sheets, Consolidated Statements of Cash Flows and Notes to Consolidated Financial Statements. Planned date of adoption: Q1 2019
ASU no. 2017-12 <i>Targeted Improvements to Accounting for Hedging Activities</i>	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.	We are currently evaluating the effect on our financial statements and related disclosures. Planned date of adoption: Q1 2020

Early adoption is permitted.

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<p>ASU no. 2018-15 <i>Customer's Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement That Is a Service Contract</i></p>	<p>The standard amends ASC 350 to include in its scope implementation costs of a Cloud Computing Arrangement (CCA) that is a service contract and clarifies that a customer should apply ASC 350-40 to determine which implementation costs should be capitalized in a CCA that is considered a service contract. The ASU is effective for fiscal years beginning after December 15, 2019 and interim periods within those fiscal years. Early adoption is permitted. The amendments should be applied either retrospectively or prospectively to all implementation costs incurred after the date of adoption.</p>	<p>We are currently evaluating the effect on our financial statements and related disclosures. Planned date of adoption: Q1 2021</p>
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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.

Note 2 - Acquisitions, Divestitures and Equity Method Investments

On April 30, 2018, we acquired Electro-Optical Imaging, a designer and manufacturer of video trackers and imaging products, located in Florida, for a purchase price net of acquired cash of \$5,442. This operation is included in our Space and Defense Controls segment. The purchase price allocation is subject to adjustments as we obtain additional information for our estimates during the measurement period.

On March 29, 2018, we acquired a 100% ownership interest in VUES Brno s.r.o located in the Czech Republic, which includes a 74% ownership interest in a subsidiary located in Germany. The purchase price, net of acquired cash, was \$64,140, consisting of \$42,961 in cash and \$21,179 of assumed debt. VUES designs and manufactures customized electric motors, generators and solutions. This operation is included in our Industrial Systems segment. The purchase price allocation is subject to adjustments as we obtain additional information for our estimates during the measurement period. On September 6, 2018, we acquired the remaining 26% noncontrolling interest for \$1,843 in cash. The difference between the cash paid and the adjustment to the noncontrolling interest is reflected in additional paid-in capital.

On October 3, 2017, we, in collaboration with SIA Engineering Company, announced the joint venture company, Moog Aircraft Services Asia ("MASA"), in Singapore, of which we currently hold a 51% ownership. MASA is intended to provide maintenance, repair and overhaul services for our manufactured flight control systems. As we hold a majority ownership in MASA, but share voting control, we are accounting for this investment using the equity method. As of September 29, 2018, we have made total contributions of \$5,100. This operation is included in our Aircraft Controls segment.

In 2018, we sold a non-core business of our Space and Defense Controls segment for \$5,486 in cash, plus a \$584 note receivable and recorded losses in other expense of \$1,792.

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 Industrial Systems segment.

In 2017, we sold non-core businesses of our Space and Defense Controls segment for \$7,210 in cash and recorded losses in other expense of \$13,119 related to the sales.

Table of Contents**Note 3 - Receivables**

Receivables consist of:

	September 29, 2018	September 30, 2017
Accounts receivable	\$ 295,180	\$ 286,773
Long-term contract receivables:		
Amounts billed	156,414	148,087
Unbilled recoverable costs and accrued profits	316,489	282,154
Total long-term contract receivables	472,903	430,241
Other	30,787	15,077
Less allowance for doubtful accounts	(4,959)	(4,351)
Receivables	\$ 793,911	\$ 727,740

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 \$6,106 at September 29, 2018 and \$2,966 at September 30, 2017. Unbilled recoverable costs and accrued profits under long-term contracts to be billed to the U.S. Government were \$25,915 at September 29, 2018 and \$16,720 at September 30, 2017. 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 99% 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 \$178,798 at September 29, 2018 and \$142,876 at September 30, 2017. We perform periodic credit evaluations of our customers' financial condition and generally do not require collateral.

Table of Contents**Note 4 - Inventories**

Inventories, net of reserves, consist of:

	September 29, 2018	September 30, 2017
Raw materials and purchased parts	\$ 197,071	\$ 189,517
Work in progress	240,885	229,202
Finished goods	74,566	70,408
Inventories	\$ 512,522	\$ 489,127

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 29, 2018 and September 30, 2017.

Note 5 - Property, Plant and Equipment

Property, plant and equipment consists of:

	September 29, 2018	September 30, 2017
Land	\$ 33,788	\$ 29,191
Buildings and improvements	446,709	421,879
Machinery and equipment	743,388	709,382
Computer equipment and software	145,817	133,699
Property, plant and equipment, at cost	1,369,702	1,294,151
Less accumulated depreciation and amortization	(816,837)	(771,160)
Property, plant and equipment, net	\$ 552,865	\$ 522,991

Table of Contents**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	Total
Balance at October 3, 2015	\$ 188,525	\$ 245,323	\$ 303,364	\$ 737,212
Acquisition	—	21,076	—	21,076
Impairment	—	(4,800)	—	(4,800)
Foreign currency translation	(8,831)	(117)	(4,378)	(13,326)
Balance at October 1, 2016	179,694	261,482	298,986	740,162
Acquisition	—	—	26,566	26,566
Divestitures	—	(1,804)	—	(1,804)
Foreign currency translation	1,681	273	7,390	9,344
Balance at September 30, 2017	181,375	259,951	332,942	774,268
Acquisitions	—	3,769	27,329	31,098
Divestitures	—	(1,836)	—	(1,836)
Foreign currency translation	(1,468)	(152)	(4,693)	(6,313)
Balance at September 29, 2018	\$ 179,907	\$ 261,732	\$ 355,578	\$ 797,217

In 2018, we changed our segment reporting structure as our former Components segment was separated and merged into Space and Defense Controls and Industrial Systems. As a result, all prior period balances for those segments were restated to reflect this change. The goodwill balance at October 3, 2015 for Space and Defense Controls and Industrial Systems increased by \$87,110 and \$192,521, respectively, over amounts previously reported.

Goodwill in our Space and Defense Controls segment is net of a \$4,800 accumulated impairment loss at September 29, 2018.

Goodwill in our Medical Devices reporting unit, included in our Industrial Systems segment, is net of a \$38,200 accumulated impairment loss at September 29, 2018.

The gross carrying amounts, accumulated amortization and amortization expense in the disclosures below reflect the full write off of intangible assets in relation to restructuring actions taken in our Industrial Systems segment. We recorded this charge during the second quarter of 2018 based on the expected cash flows over the remaining life of the assets. Refer to Note 11, Restructuring, for additional disclosures.

The components of intangible assets are as follows:

		September 29, 2018		September 30, 2017	
	Weighted- Average Life (years)	Gross Carrying Amount	Accumulated Amortization	Gross Carrying Amount	Accumulated Amortization
Customer-related	11	\$ 135,379	\$ (96,090)	\$ 175,872	\$ (128,019)
Technology-related	9	69,393	(49,731)	71,924	(55,069)
Program-related	19	64,988	(33,740)	66,458	(30,675)
Marketing-related	8	23,489	(18,868)	26,552	(19,251)
Other	10	4,305	(3,588)	4,379	(3,353)
Intangible assets	12	\$ 297,554	\$ (202,017)	\$ 345,185	\$ (236,367)

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 \$17,037 in 2018, \$18,518 in 2017 and \$21,058 in 2016. Based on acquired intangible assets recorded at September 29, 2018, amortization is estimated to be approximately \$13,400 in 2019, \$11,800 in 2020, \$9,700 in 2021, \$8,200 in 2022 and \$7,400 in 2023.

Table of Contents**Note 7 - Indebtedness**

Short-term borrowings consist of:

	September 29, 2018	September 30, 2017
Lines of credit	\$ 88	\$ 89
Other short-term debt	3,535	—
Short-term borrowings	\$ 3,623	\$ 89

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 0.95% at September 29, 2018.

Long-term debt consists of:

	September 29, 2018	September 30, 2017
U.S. revolving credit facility	\$ 430,000	\$ 540,110
Senior notes	300,000	300,000
Securitization program	130,000	120,000
Obligations under capital leases	918	306
Senior debt	860,918	960,416
Less deferred debt issuance cost	(1,717)	(3,468)
Less current installments	(365)	(295)
Long-term debt	\$ 858,836	\$ 956,653

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. We are in compliance with all covenants. The weighted-average interest rate on all of the outstanding credit facility borrowings is 3.80% and is based on LIBOR plus the applicable margin, which was 1.63% at September 29, 2018.

On July 26, 2018, the SECT entered into a revolving credit facility with a borrowing capacity of \$35,000, maturing on July 26, 2020. Interest for the revolving credit facility is based on LIBOR plus a margin of 2.13%. As of September 29, 2018, there were no outstanding borrowings.

At September 29, 2018, we had \$300,000 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 matures on October 23, 2019 and effectively increases 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 3.07% at September 29, 2018 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 29, 2018, our minimum borrowing requirement was \$104,000.

Maturities of long-term debt are \$365 in 2019, \$130,199 in 2020, \$430,200 in 2021, \$118 in 2022 and \$300,036 in 2023.

At September 29, 2018, we had pledged assets with a net book value of \$1,502,295 as security for long-term debt.

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At September 29, 2018, we had \$638,478 of unused short and long-term borrowing capacity, including \$626,083 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 - 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:

	2018	2017	2016
Warranty accrual at beginning of period	\$25,848	\$21,363	\$18,660
Additions from acquisitions	184	448	—
Warranties issued during current period	15,705	17,021	13,272
Adjustments to pre-existing warranties	(806)	(509)	(1,463)
Reductions for settling warranties	(15,101)	(12,747)	(8,486)
Foreign currency translation	(293)	272	(620)
Warranty accrual at end of period	\$25,537	\$25,848	\$21,363

Note 9 - 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 29, 2018, 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 2.87%, including the applicable margin of 1.63% as of September 29, 2018. 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 \$48,799 at September 29, 2018. These contracts mature at various times through May 29, 2020.

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 2018, 2017 or 2016.

We use forward currency contracts to hedge our net investment in certain foreign subsidiaries. As of September 29, 2018, we had no outstanding net investment hedges.

Table of ContentsDerivatives 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 \$96,267 at September 29, 2018. 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 \$3,104 in 2018 and a net loss of \$566 in 2017 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.

Summary of derivatives

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

		September 29, 2018	September 30, 2017
Derivatives designated as hedging instruments:			
Foreign currency contracts	Other current assets	\$ 659	\$ 551
Foreign currency contracts	Other assets	41	50
Interest rate swaps	Other current assets	1,444	552
Interest rate swaps	Other assets	322	314
	Total asset derivatives	\$ 2,466	\$ 1,467
Foreign currency contracts	Other accrued liabilities	\$ 1,842	\$ 1,434
Foreign currency contracts	Other long-term liabilities	464	244
Interest rate swaps	Other accrued liabilities	—	10
Interest rate swaps	Other long-term liabilities	—	15
	Total liability derivatives	\$ 2,306	\$ 1,703
Derivatives not designated as hedging instruments:			
Foreign currency contracts	Other current assets	\$ 285	\$ 95
Foreign currency contracts	Other accrued liabilities	\$ 87	\$ 383

Table of Contents**Note 10 - 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 29, 2018	September 30, 2017
Foreign currency contracts	Other current assets	\$ 944	\$ 646
Foreign currency contracts	Other assets	41	50
Interest rate swaps	Other current assets	1,444	552
Interest rate swaps	Other assets	322	314
	Total assets	\$ 2,751	\$ 1,562
Foreign currency contracts	Other accrued liabilities	\$ 1,929	\$ 1,817
Foreign currency contracts	Other long-term liabilities	464	244
Interest rate swaps	Other accrued liabilities	—	10
Interest rate swaps	Other long-term liabilities	—	15
	Total liabilities	\$ 2,393	\$ 2,086

Our only financial instrument for which the carrying value differs from its fair value is long-term debt. At September 29, 2018, the fair value of long-term debt was \$857,918 compared to its carrying value of \$860,918. 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.

Table of Contents**Note 11 - Restructuring**

In 2018, we initiated restructuring actions in conjunction with exiting the wind pitch control business within our Industrial Systems segment. These actions have and will result in workforce reductions, principally in Germany and China.

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. The restructuring charge in 2018 consists of \$12,198 of non-cash inventory reserves, \$12,316 of non-cash charges for the impairment of intangible assets, \$2,162 of non-cash charges, primarily for the impairment of other long-lived assets, \$7,969 for severance, \$3,130 for facility closure and \$3,217 for other costs. 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.

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	Corporate	Total
Balance at October 3, 2015	\$ 3,047	\$ 7,237	\$ 4,262	\$ —	\$ 14,546
Charged to expense - 2016 plan	7,317	—	6,349	1,727	15,393
Adjustments to provision	(275)	(328)	(248)	—	(851)
Cash payments - 2014 plan	(72)	(776)	—	—	(848)
Cash payments - 2015 plan	(2,342)	(5,455)	(3,322)	—	(11,119)
Cash payments - 2016 plan	(1,244)	—	(3,191)	—	(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	3,980	1,727	7,846
Adjustments to provision	(852)	(72)	(819)	—	(1,743)
Cash payments - 2014 plan	(116)	(417)	—	—	(533)
Cash payments - 2015 plan	(210)	(176)	(40)	—	(426)
Cash payments - 2016 plan	(162)	—	(3,168)	(689)	(4,019)
Foreign currency translation	(4)	—	47	—	43
Balance at September 30, 2017	130	—	—	1,038	1,168
Charged to expense - 2018 plan	987	46	39,609	350	40,992
Adjustments to provision	—	119	2	(10)	111
Cash payments - 2016 plan	(99)	—	—	(599)	(698)
Cash payments - 2018 plan	(385)	(101)	(5,607)	(350)	(6,443)
Non-cash charges - 2018 plan	—	—	(26,676)	—	(26,676)
Foreign currency translation	(7)	—	(334)	—	(341)
Balance at September 29, 2018	\$ 626	\$ 64	\$ 6,994	\$ 429	\$ 8,113

As of September 29, 2018, the restructuring accrual consists of \$429 for the 2016 plan and \$7,684 for the 2018 plan. Restructuring for all plans is expected to be paid by September 28, 2019, except portions classified as long-term liabilities based on the nature of the reserve.

Table of Contents**Note 12 - 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 29, 2018, the participants in the RSP owned 1,451,069 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	
	2018	2017	2018	2017
Change in projected benefit obligation:				
Projected benefit obligation at prior year measurement date	\$941,766	\$979,055	\$214,474	\$219,308
Service cost	22,535	24,115	5,738	6,105
Interest cost	32,292	30,573	4,241	3,121
Contributions by plan participants	—	—	918	844
Actuarial (gains) losses	(46,526)	(30,339)	(6,679)	(18,881)
Foreign currency exchange impact	—	—	(4,670)	6,222
Benefits paid	(33,941)	(60,891)	(6,302)	(4,703)
Curtailments	—	—	—	(262)
Other	(852)	(747)	(75)	2,720
Projected benefit obligation at measurement date	\$915,274	\$941,766	\$207,645	\$214,474
Change in plan assets:				
Fair value of assets at prior year measurement date	\$756,274	\$675,018	\$141,906	\$135,439
Actual return on plan assets	8,038	79,419	2,740	(214)
Employer contributions	149,464	63,597	9,971	7,655
Contributions by plan participants	—	—	918	844
Benefits paid	(33,941)	(60,891)	(6,302)	(4,703)
Foreign currency exchange impact	—	—	(3,551)	2,919
Other	(852)	(869)	(41)	(34)
Fair value of assets at measurement date	\$878,983	\$756,274	\$145,641	\$141,906
Funded status and amount recognized in assets and liabilities	\$(36,291)	\$(185,492)	\$(62,004)	\$(72,568)
Amount recognized in assets and liabilities:				
Long-term assets	\$49,967	\$—	\$7,874	\$1,672
Current and long-term pension liabilities	(86,258)	(185,492)	(69,878)	(74,240)
Amount recognized in assets and liabilities	\$(36,291)	\$(185,492)	\$(62,004)	\$(72,568)
Amount recognized in AOCIL, before taxes:				
Prior service cost (credit)	\$320	\$507	\$(69)	\$(83)
Actuarial losses	332,520	360,391	32,430	40,075
Amount recognized in AOCIL, before taxes	\$332,840	\$360,898	\$32,361	\$39,992

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 \$1,044,579 in 2018 and \$1,064,195 in 2017. At the measurement date in 2018, our plans had fair values of plan assets totaling \$1,024,624. The following table provides aggregate information for the pension plans, which have projected benefit obligations or accumulated benefit obligations in excess of plan assets:

	September 29, 2018	September 30, 2017
Projected benefit obligation	\$ 234,402	\$ 1,047,605
Accumulated benefit obligation	219,830	969,161
Fair value of plan assets	78,265	793,167

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		
	2018	2017	2016	2018	2017	2016
Assumptions for net periodic benefit cost:						
Discount rate	n/a	n/a	4.5%	n/a	n/a	3.0%
Service cost discount rate	4.2%	4.0%	n/a	2.5%	2.0%	n/a
Interest cost discount rate	3.5%	3.2%	n/a	2.2%	1.7%	n/a
Return on assets	7.0%	7.5%	7.7%	3.5%	3.6%	4.1%
Rate of compensation increase	3.5%	3.5%	4.1%	2.5%	2.3%	2.6%
Assumptions for benefit obligations:						
Discount rate	4.3%	4.0%	3.8%	2.8%	2.5%	1.9%
Rate of compensation increase	3.5%	3.5%	3.5%	2.5%	2.5%	2.3%

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 2018, we assumed an average rate of return on U.S. pension assets of approximately 7.0% measured over a planning horizon with reasonable and acceptable levels of risk. The rate of return was based on the actual asset allocation of 57% in equity securities and 43% in fixed income securities at September 30, 2017. During 2018, we fully funded our U.S. defined benefit plan and changed our asset allocation. In determining our non-U.S. pension expense for 2018, we assumed an average rate of return on non-U.S. pension assets of approximately 3.5% 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 and other investments.

The weighted average asset allocations by asset category for the pension plans as of September 29, 2018 and September 30, 2017 are as follows:

	U.S. Plans			Non-U.S. Plans		
	Target	2018 Actual	2017 Actual	Target	2018 Actual	2017 Actual
Asset category:						
Equity	15%-25%	21%	57%	20%-45%	33%	32%
Debt	75%-85%	79%	43%	30%-45%	39%	36%
Other	—%	—%	—%	25%-35%	28%	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.

Unit investment trust: Net asset value of the fund is calculated daily by the investment manager.

Unit linked life insurance funds: Net asset value of the fund is calculated daily by the investment manager.

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 10 - Fair Value, as of September 29, 2018 and September 30, 2017.

U.S. Plans, September 29, 2018	Level 1	Level 2	Level 3	Total
Investments at fair value:				
Shares of registered investment companies:				
Equity funds	\$141,287	\$—	\$—	\$141,287
Fixed income funds	694,837	—	—	694,837
Money market funds	—	6,309	—	6,309
Insurance contract	—	—	484	484
Total investments in fair value hierarchy	836,124	6,309	484	842,917
Investments measured at NAV practical expedient ⁽¹⁾				36,066
Total investments at fair value	\$836,124	\$6,309	\$484	\$878,983
Non-U.S. Plans, September 29, 2018	Level 1	Level 2	Level 3	Total
Investments at fair value:				
Mutual funds:				
Equity funds	\$—	\$6,223	\$—	\$6,223
Fixed income funds	—	7,630	—	7,630
Equity securities	6,206	—	—	6,206
Fixed income securities	—	16,638	—	16,638
Unit investment trusts	—	17,547	—	17,547
Unit linked life insurance funds	—	50,127	—	50,127
Money market funds	—	560	—	560
Cash and cash equivalents	109	—	—	109
Insurance contracts and other	—	—	40,601	40,601
Total investments in fair value hierarchy	6,315	98,725	40,601	145,641
Investments measured at NAV practical expedient ⁽¹⁾				—
Total investments at fair value	\$6,315	\$98,725	\$40,601	\$145,641
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

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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

(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. 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 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
Return on assets	20	126	146
Purchases from contributions to Plans	—	2,874	2,874
Settlements paid in cash	—	(1,612)	(1,612)
Foreign currency translation	—	(748)	(748)
Balance at September 29, 2018	\$ 484	\$ 40,601	\$41,085

The following table summarizes investments measured at fair value based on net asset value (NAV) per share as of September 29, 2018:

	Fair Value	September 29, 2017	September 29, 2018	Unfunded Commitments	Redemption Frequency	Redemption Notice Period
Limited partnerships ⁽¹⁾	\$35,931	\$ 35,821	\$ 5,219		Varies	10-45 days
Hedge funds ⁽²⁾	135	2,451	—		Quarterly	60 days
Total	\$36,066	\$ 38,272	\$ 5,219			

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.

Pension expense for all defined benefit plans is as follows:

	U.S. Plans			Non-U.S. Plans		
	2018	2017	2016	2018	2017	2016
Service cost	\$22,535	\$24,115	\$23,637	\$5,738	\$6,105	\$5,204
Interest cost	32,292	30,573	37,659	4,241	3,121	4,928
Expected return on plan assets	(54,302)	(54,510)	(50,383)	(5,001)	(4,643)	(4,862)
Amortization of prior service cost (credit)	187	187	187	(60)	(106)	(103)
Amortization of actuarial loss	27,609	33,738	26,168	2,512	4,581	2,600
Curtailement gain	—	—	—	—	(147)	—
Settlement loss	—	—	59	—	—	131
Pension expense for defined benefit plans	\$28,321	\$34,103	\$37,327	\$7,430	\$8,911	\$7,898

The estimated net prior service cost and net actuarial loss that will be amortized from accumulated other comprehensive loss into net periodic benefit cost for pension plans in 2019 are \$168 and \$24,470, respectively.

Benefits expected to be paid to the participants of the plans are:

	U.S. Plans	Non-U.S. Plans
2019	\$ 36,301	\$ 5,992
2020	38,887	5,547
2021	42,157	6,232
2022	45,023	7,194
2023	48,100	7,976
Five years thereafter	282,773	46,000

We presently anticipate contributing approximately \$4,500 to the SERP Trust for the non-qualified plan and \$7,700 to the non-U.S. plans in 2019.

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Pension expense for the defined contribution plans consists of:

	2018	2017	2016
U.S. defined contribution plans	\$16,568	\$15,036	\$14,128
Non-U.S. defined contribution plans	4,821	4,878	4,782
Total pension expense for defined contribution plans	\$21,389	\$19,914	\$18,910

We provide postretirement health care benefits to certain domestic retirees, who were hired prior to October 1, 1989. There are no plan assets. The changes in the accumulated benefit obligation of this unfunded plan for 2018 and 2017 are shown in the following table:

	September 29, 2018	September 30, 2017
Change in Accumulated Postretirement Benefit Obligation (APBO):		
APBO at prior year measurement date	\$ 10,513	\$12,825
Service cost	84	118
Interest cost	281	288
Contributions by plan participants	629	1,699
Benefits paid	(1,402)	(2,448)
Actuarial (gains) losses	(1,248)	(769)
Plan amendment	—	(1,200)
APBO at measurement date	\$ 8,857	\$10,513
Funded status	\$ (8,857)	\$(10,513)
Accrued postretirement benefit liability	\$ 8,857	\$10,513
Amount recognized in AOCIL, before taxes:		
Prior service credit	\$ 729	\$1,200
Actuarial gains	4,915	4,178
Amount recognized in AOCIL, before taxes	\$ 5,644	\$5,378

The cost of the postretirement benefit plan is as follows:

	2018	2017	2016
Service cost	\$84	\$118	\$161
Interest cost	281	288	468
Amortization of prior service credit	(470)	—	—
Amortization of actuarial gain	(511)	(487)	(572)
Net periodic postretirement benefit cost (income)	\$(616)	\$(81)	\$57

As of the measurement date, the assumed discount rate used in the accounting for the postretirement benefit obligation was 4.2% in 2018, 3.6% in 2017 and 3.2% in 2016. The assumed service cost discount rate and interest cost discount rate used in the accounting for the net periodic postretirement benefit cost were 3.7% and 2.8%, respectively, in 2018 and 3.4% and 2.5%, respectively in 2017. The assumed discount rate used in the accounting for the net periodic postretirement benefit cost was 3.9% in 2016. For measurement purposes, a 8.5% annual per capita rate of increase of medical and drug costs were assumed for 2019, gradually decreasing to 5.0% for 2026 and years thereafter. A one percentage point increase in this rate would increase our accumulated postretirement benefit obligation as of the measurement date in 2018 by \$152, while a one percentage point decrease in this rate would decrease our accumulated postretirement benefit obligation by \$144. There would be no material effect on the total service cost and interest cost components of the net periodic postretirement benefit cost given a one percentage point increase or decrease in this rate.

Employee and management profit sharing reflects a discretionary payment based on our financial performance. Profit share expense was \$22,524, \$26,534 and \$16,656 in 2018, 2017 and 2016,

respectively.

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Table of Contents**Note 13 - Income Taxes**

The reconciliation of the provision for income taxes to the amount computed by applying the U.S. federal statutory tax rate to earnings before income taxes is as follows:

	2018	2017	2016	
Earnings before income taxes:				
Domestic	\$ 137,247	\$ 77,007	\$ 82,848	
Foreign	46,590	104,704	90,012	
Total	\$ 183,837	\$ 181,711	\$ 172,860	
Federal statutory income tax rate	24.5	% 35.0	% 35.0	%
Increase (decrease) in income taxes resulting from:				
Transition tax on foreign earnings	16.8	% —	% —	%
Revaluation of deferred taxes	(6.0))% —	% —	%
Withholding taxes	4.0	% —	% —	%
Reversal of indefinite reinvestment assertion	5.6	% —	% —	%
R&D and foreign tax credits	(4.2)	)% (3.8)	)% (30.6))%
Divestiture impacts	—	% (3.2))% —	%
Foreign tax rates	(0.7)	)% (2.4)	)% (2.7))%
Equity-based compensation	(0.7)	)% (1.2))% —	%
Export and manufacturing incentives	(0.3)	)% (0.9)	)% (1.0))%
Change in valuation allowance for deferred taxes	5.7	% (0.4)	)% 0.9	%
Change in enacted tax rates	—	% —	% (0.9))%
Repatriated earnings	—	% —	% 26.8	%
State taxes, net of federal benefit	1.9	% 0.4	% 0.5	%
Other	0.8	% (0.8)	)% 0.5	%
Effective income tax rate	47.4	% 22.7	% 28.5	%

The Tax Cuts and Jobs Act (the "Act") of 2017 was enacted on December 22, 2017. It reduces the U.S. federal corporate tax rate from 35% to 21%, requires companies to pay a one-time transition tax on earnings of certain foreign subsidiaries that were previously tax deferred and creates new taxes on certain foreign sourced earnings. As of September 29, 2018, we have not completed the accounting for the tax effects of enactment of the Act; however, as described below, we have made a reasonable estimate of the effects on the one-time transition tax, withholding taxes on earnings deemed to be repatriated and existing deferred tax balances. These amounts are provisional and subject to change as the determination of the impact of the income tax effects will require additional analysis of historical records, annual data and further interpretation of the Act from yet to be issued U.S. Treasury regulations.

During 2018, we recorded a \$30,795 one-time transition tax on undistributed foreign earnings deemed to be repatriated and a tax charge of \$10,383 as an additional provision for taxes on undistributed earnings not considered to be permanently reinvested. No additional income taxes have been provided for any remaining undistributed foreign earnings not subject to the transition tax, or any additional outside basis difference inherent in these entities, as these amounts continue to be indefinitely reinvested in foreign operations. Determining the amount of unrecognized deferred tax liability related to any remaining undistributed foreign earnings not subject to the transition tax and additional outside basis difference in these entities is not practicable. These charges are partially offset by a \$10,946 benefit due to the remeasurement of deferred tax assets and liabilities arising from a lower U.S. corporate tax rate, which took into account our decision to accelerate pension contributions into our 2017 pension plan year. This allows the pension contribution tax deduction to be taken in our 2017 federal income tax return which is taxed at the 35% federal rate.

At September 29, 2018, foreign tax benefit carryforwards total \$33,479. Domestic benefit carryforwards representing state tax losses total \$11,980. We also have \$4,303 of state tax credit carryforwards. Some of

these tax benefit carryforwards do not expire and can be used to reduce current taxes otherwise due on future earnings of those subsidiaries. The change in the valuation allowance relates to tax benefit carryforwards reflecting recent and projected financial performance, tax planning strategies and statutory tax carryforward periods.

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During 2018, we repatriated \$235,263 of available earnings and profits from various foreign subsidiaries after the enactment of the Act. The tax expense associated with the repatriation was partially offset by foreign tax credits as provided by the Act governing the one-time transition tax. During 2016, we repatriated \$90,937 of earnings from various foreign subsidiaries and the tax expense was completely offset by foreign tax credits.

The components of income taxes are as follows:

	2018	2017	2016
Current:			
Federal	\$20,376	\$6,259	\$12,812
Foreign	35,515	24,162	29,794
State	705	122	2,373
Total current	56,596	30,543	44,979
Deferred:			
Federal	33,612	11,624	10,078
Foreign	(7,029)	(1,986)	(4,734)
State	4,030	1,120	(1,096)
Total deferred	30,613	10,758	4,248
Income taxes	\$87,209	\$41,301	\$49,227

Realization of deferred tax assets is dependent, in part, upon the generation of future taxable income during the periods in which those temporary differences become deductible. Management considers projected future taxable income and tax planning strategies in making its assessment of the recoverability of deferred tax assets.

The tax effects of temporary differences that generated deferred tax assets and liabilities are as follows:

	September 29, 2018	September 30, 2017
Deferred tax assets:		
Benefit accruals	\$ 125,566	\$ 204,017
Inventory reserves	27,678	33,879
Tax benefit carryforwards	16,211	9,598
Contract loss reserves not currently deductible	11,028	15,994
Other accrued expenses	6,670	17,689
Total gross deferred tax assets	187,153	281,177
Less valuation allowance	(15,181)	(4,775)
Total net deferred tax assets	\$ 171,972	\$ 276,402
Deferred tax liabilities:		
Differences in bases and depreciation of property, plant and equipment	\$ 125,132	\$ 169,562
Pension	75,989	93,602
Total gross deferred tax liabilities	201,121	263,164
Net deferred tax assets (liabilities)	\$ (29,149)	\$ 13,238

Deferred tax assets and liabilities are reported in separate captions on the consolidated balance sheets. We have no material unrecognized tax benefits which, if ultimately recognized, will reduce our annual effective tax rate.

We are subject to income taxes in the U.S. and in various states and foreign jurisdictions. Tax regulations within each jurisdiction are subject to the interpretation of the related tax laws and regulations and require the application of significant judgment. With few exceptions, we are no longer subject to U.S. federal, state and local, or non-U.S. income tax examinations by tax authorities in significant jurisdictions for years before 2015. The statute of limitations in several jurisdictions will expire in the next twelve months and we will have

no unrecognized tax benefits recognized if the statute of limitations expires without the relevant taxing authority examining the applicable returns.

We record interest and penalties related to unrecognized tax benefits in income tax expense. We had accrued interest and penalties of \$710 and \$567 at September 29, 2018 and September 30, 2017, respectively. We expensed interest of \$143 and \$106 for 2018 and 2017, respectively.

Table of Contents**Note 14 - Earnings per Share and Dividends**

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

	2018	2017	2016
Basic weighted-average shares outstanding	35,661,638	35,852,448	36,277,445
Dilutive effect of equity-based awards	390,669	377,595	251,899
Diluted weighted-average shares outstanding	36,052,307	36,230,043	36,529,344

There were 22,332, 71,806 and 60,904 common shares from equity-based compensation in 2018, 2017 and 2016, respectively, excluded from the calculation of diluted earnings per share as they would be anti-dilutive.

We paid cash dividends of \$0.25 per share on our Class A and Class B common stock in the third and fourth quarters of 2018.

Note 15 - Shareholders' Equity

Class A and Class B common stock share equally in our earnings and are identical with certain exceptions. Other than on matters relating to the election of directors or as required by law where the holders of Class A and Class B shares vote as separate classes, Class A shares have limited voting rights, with each share of Class A being entitled to one-tenth of a vote on most matters, and each share of Class B being entitled to one vote. Class A shareholders are entitled, subject to certain limitations, to elect at least of the Board of Directors (rounded up to the nearest whole number) with Class B shareholders entitled to elect the balance of the directors. No cash dividend may be paid on Class B shares unless at least an equal cash dividend is paid on Class A shares. Class B shares are convertible at any time into Class A shares on a one-for-one basis at the option of the shareholder.

Class A shares and Class B shares reserved for issuance at September 29, 2018 are as follows:

	Shares
Conversion of Class B to Class A shares	7,495,224
Employee Stock Purchase Plan	1,946,413
2014 Long Term Incentive Plan	1,979,454
2008 Stock Appreciation Rights Plan	1,298,098
Class A and B shares reserved for issuance	12,719,189

We are authorized to issue up to 10,000,000 shares of preferred stock. The Board of Directors may authorize, without further shareholder action, the issuance of additional preferred stock which ranks senior to both classes of our common stock with respect to the payment of dividends and the distribution of assets on liquidation. The preferred stock, when issued, would have such designations relative to voting and conversion rights, preferences, privileges and limitations as determined by the Board of Directors.

We issue common stock under our equity-based compensation plans from treasury stock or from stock held by the SECT. As of September 29, 2018, in addition to the shares reserved for issuance upon the exercise of outstanding equity awards, there were 1,443,577 shares authorized for awards that may be granted in the future under the 2014 Long Term Incentive Plan, assuming performance-based awards currently outstanding are all settled at the targeted payout.

Our Board of Directors has authorized a share repurchase program that has been amended from time to time to authorize additional repurchases. Shares acquired by the SECT or the SERP Trust are not included in this program. During 2018, we repurchased 328 shares of our Class B common stock for \$27. During 2017, we repurchased 2,190 of our Class A and Class B common stock for \$147. During 2016, we repurchased 850,546 of our Class A and Class B common stock for \$39,103. As of September 29, 2018, the total remaining authorization for future common share repurchases under our program is 3,349,491 shares.

Table of Contents**Note 16 - Equity-Based Compensation**

We have equity-based compensation plans that authorize the issuance of equity-based awards for shares of Class A and Class B common stock to directors, officers and key employees. Equity-based compensation grants are designed to reward long-term contributions to Moog and provide incentives for recipients to remain with Moog.

On February 15, 2017, shareholders approved the Employee Stock Purchase Plan ("ESPP"). The ESPP allows for qualified employees (as defined in the plan) to purchase our common stock at a discounted price. The maximum discounted purchase price of a share of our common stock is 85% of the fair market value at the lower of the beginning or the end of the semi-annual offering period. During 2018, we issued 53,587 shares of Class B common stock at a weighted average price per share of \$65.55.

The 2014 Long Term Incentive Plan ("2014 Plan") authorizes the issuance of a total of 2,000,000 shares of either Class A or Class B common stock. The 2014 Plan is intended to provide a flexible framework that permits the development and implementation of a variety of equity-based programs that base awards on key performance metrics as well as align our long term incentive compensation with our peers and shareholder interests.

During 2018, we granted awards in the form of stock appreciations rights (SARs), performance-based restricted stock units (PSUs) and restricted stock awards (RSAs). The compensation cost for employee and non-employee director equity-based compensation programs for all current and prior year awards granted are as follows:

	2018	2017	2016
Stock appreciation rights	\$2,617	\$3,045	\$2,482
Performance-based restricted stock units	1,650	978	755
Restricted stock awards	480	480	—
Employee stock purchase plan	1,057	74	—
Stock options	—	5	34
Total compensation cost before income taxes	\$5,804	\$4,582	\$3,271
Income tax benefit	\$1,136	\$1,567	\$1,184

In 2017, we adopted ASU no. 2016-09, "Improvements to Employee Share-Based Payment Accounting" and, as a result we derive a tax deduction measured by the excess of the market value over the grant price on the date equity-based awards are exercised.

Stock Appreciation Rights and Stock Options

The fair value of SARs granted was estimated on the date of grant using the Black-Scholes option-pricing model. The following table provides the range of assumptions used to value awards and the weighted-average fair value of the awards granted.

	2018	2017	2016
Expected volatility	25% -	27% -	24% -
	26%	29%	29%
Risk-free rate	2.1%	1.7% -	1.4% -
		1.8%	1.8%
Expected dividends	—	%	%
	5-6	5-6	4-6
Expected term	years	years	years
	\$23.03	\$21.20	\$18.24
Weighted-average fair value of awards granted			

To determine expected volatility, we generally use historical volatility based on daily closing prices of our Class A and Class B common stock over periods that correlate with the expected terms of the awards granted. The risk-free rate is based on the United States Treasury yield curve at the time of grant for the appropriate expected term of the awards granted. Expected dividends are based on our history and

expectation of dividend payouts. The expected term of equity-based awards is based on vesting schedules, expected exercise patterns and contractual terms.

The number of shares received upon the exercise of a SAR is equal in value to the difference between the fair market value of the common stock on the exercise date and the exercise price of the SAR. The term of a SAR may not exceed ten years from the grant date. The exercise price of SARs and options, determined by a committee of the Board of Directors, may not be less than the fair value of the common stock on the grant date.

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SARs and options are as follows:

Stock Appreciation Rights	Number of Awards	Weighted-Average Exercise Price	Weighted-Average Remaining Contractual Life	Aggregate Intrinsic Value
Outstanding at September 30, 2017	1,168,292	\$ 53.93		
Granted in 2018	120,622	82.31		
Exercised in 2018	(215,480)	51.18		
Forfeited in 2018	(10,665)	69.14		
Outstanding at September 29, 2018	1,062,769	\$ 57.56	5.5 years	\$ 29,180
Exercisable at September 29, 2018	797,467	\$ 51.67	4.6 years	\$ 27,019

Stock Options

Outstanding at September 30, 2017	24,682	\$ 42.45		
Exercised in 2018	(24,682)	42.45		
Outstanding at September 29, 2018	—	\$ —	0.0 years	\$ —
Exercisable at September 29, 2018	—	\$ —	0.0 years	\$ —

The aggregate intrinsic value in the preceding tables represents the total pre-tax intrinsic value, based on our closing price of Class A common stock of \$85.97 and Class B common stock of \$83.25 as of September 29, 2018. That value would have been effectively received by the SAR holders had all SARs been exercised as of that date.

The intrinsic value of awards exercised and fair value of awards vested are as follows:

	2018	2017	2016
Stock Appreciation Rights			
Intrinsic value of SARs exercised	\$7,268	\$ 13,363	\$ 865
Total fair value of SARs vested	\$3,282	\$ 4,044	\$ 5,876
Stock Options			
Intrinsic value of options exercised	\$932	\$ 2,835	\$ 4,100
Total fair value of options vested	\$51	\$ 66	\$ 947

As of September 29, 2018, total unvested compensation expense associated with SARs amounted to \$2,898 and will be recognized over a weighted-average period of two years.

Table of Contents**Performance-Based Restricted Stock Units**

PSU awards consist of shares of our stock which are payable upon the determination that we achieve certain established performance targets and can range from 0% to 200% of the targeted payout based on the actual results. PSU's granted in 2018 have a performance period of three years. The fair value of each PSU granted is equal to the fair market value of our common stock on the date of grant. PSUs granted generally have a three year period cliff vesting schedule; however, according to the grant agreements, if certain conditions are met, the employee (or beneficiary) will receive a prorated amount of the award based on active employment during the service period.

PSUs are as follows:

Performance-Based Restricted Stock Units	Number of Awards	Weighted-Average Grant Date Fair Value
Nonvested at September 30, 2017	72,750	\$ 68.39
Granted in 2018	33,778	82.31
Vested in 2018	(32,317)	64.95
Forfeited in 2018	(6,225)	69.11
Nonvested at September 29, 2018	67,986	\$ 76.88

As of September 29, 2018, total unvested compensation expense associated with nonvested PSUs amounted to \$2,771 and will be recognized over a weighted-average period of two years.

The number of Class A and B common stock to be issued for PSU awards granted in 2016 that vested based on the achievement of performance targets in 2018, will be approximately 13,600 shares.

Restricted Stock Awards

The fair value of each RSA granted is equal to the fair market value of our common stock on the date of grant. These shares vest and are issued upon grant. There were 5,832 RSAs granted and vested in 2018 at a weighted-average price of \$82.31. As of September 29, 2018, the fair value of the RSAs vested is \$480.

Note 17 - Stock Employee Compensation Trust and Supplemental Retirement Plan Trust

The Stock Employee Compensation Trust (SECT) assists in administering and provides funding for equity-based compensation plans and benefit programs, including the RSP and ESPP. The Supplemental Retirement Plan (SERP) Trust provides funding for benefits under the SERP provisions of the Moog Inc. Plan to Equalize Retirement Income and Supplemental Retirement Income. Both the SECT and the SERP Trust hold shares as investments. The shares in the SECT and SERP Trust are not considered outstanding for purposes of calculating earnings per share. However, in accordance with the trust agreements governing the SECT and SERP Trust, the trustees vote all shares held by the SECT and SERP Trust on all matters submitted to shareholders.

Table of Contents**Note 18 - Accumulated Other Comprehensive Income (Loss)**

The changes in AOCIL, net of tax, by component are as follows:

	Accumulated foreign currency translation ⁽¹⁾	Accumulated retirement liability	Accumulated gain (loss) on derivatives	Total
AOCIL at October 1, 2016	\$(110,626)	\$(321,094)	\$(3,341)	\$(435,061)
Other comprehensive income (loss) before reclassifications	28,301	45,222	(1,078)	72,445
Amounts reclassified from AOCIL	(841)	24,007	3,959	27,125
Other comprehensive income (loss)	27,460	69,229	2,881	99,570
AOCIL at September 30, 2017	(83,166)	(251,865)	(460)	(335,491)
Other comprehensive income (loss) before reclassifications	(17,663)	5,557	(830)	(12,936)
Amounts reclassified from AOCIL	1,414	21,200	709	23,323
Other comprehensive income (loss)	(16,249)	26,757	(121)	10,387
Tax Cuts and Jobs Act, reclassification from AOCIL to retained earnings ⁽²⁾	—	(47,209)	132	(47,077)
AOCIL at September 29, 2018	\$(99,415)	\$(272,317)	\$(449)	\$(372,181)

(1) Net gains and losses on net investment hedges are recorded as cumulative translation adjustments in AOCIL to the extent that the instruments are effective in hedging the designated risk.

(2) In 2018, we early adopted ASU 2018-02 and reclassified the stranded deferred tax effects resulting from the Tax Cuts and Jobs Act to retained earnings.

The amounts reclassified from AOCIL into earnings are as follows:

	Statement of earnings classification	2018	2017
Retirement liability:			
Prior service cost (credit)		\$(344)	\$81
Actuarial losses		29,610	37,831
Curtailment		—	(150)
Reclassification from AOCIL into earnings ⁽¹⁾		29,266	37,762
Tax effect		(8,066)	(13,755)
Net reclassification from AOCIL into earnings		\$21,200	\$24,007
Derivatives:			
Foreign currency contracts Sales		\$(388)	\$3,190
Foreign currency contracts Cost of sales		2,171	2,032
Interest rate swaps Interest		(697)	204
Reclassification from AOCIL into earnings		1,086	5,426
Tax effect		(377)	(1,467)
Net reclassification from AOCIL into earnings		\$709	\$3,959

(1) The reclassifications are included in the computation of periodic pension cost and postretirement benefit cost.

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The amounts deferred in AOCIL are as follows:

	Net deferral in AOCIL - effective portion	
	2018	2017
Retirement liability:		
Net actuarial gain (loss) during period	\$6,544	\$69,984
Tax effect	(987)	(24,762)
Net deferral in AOCIL of retirement liability	\$5,557	\$45,222
Derivatives:		
Foreign currency contracts	\$(2,449)	\$(2,322)
Interest rate swaps	1,579	672
Net gain (loss)	(870)	(1,650)
Tax effect	40	572
Net deferral in AOCIL of derivatives	\$(830)	\$(1,078)

Table of Contents**Note 19 - Segments**

Effective October 1, 2017, we made changes to our segment reporting structure that resulted in three reporting segments. Our former Components segment has been separated and merged into Space and Defense Controls and Industrial Systems. All amounts have been restated to reflect this change.

Aircraft Controls. We design, manufacture and integrate primary and secondary flight controls for military and commercial aircraft and provide aftermarket support. Our systems are used on both development and production programs in large commercial transports, supersonic fighters, multi-role military aircraft, business jets and rotorcraft. We also supply ground-based navigation aids.

We are currently working on the KC-46 military air refueling tanker on the military side, and the COMAC C919 and the Embraer E-Jet E2 family on the commercial side. Typically development programs require concentrated periods of research and development by our engineering teams, while production programs are generally long-term manufacturing efforts that extend for as long as the aircraft builder receives new orders.

In the past few years, a number of significant programs have begun to transition from the development phase to initial low-rate production, including the Lockheed Martin F-35 Joint Strike Fighter on the military side and the Boeing 787 and Airbus A350XWB on the commercial side. In terms of mature production programs, our large military programs include the F/A-18E/F Super Hornet, the V-22 Osprey tiltrotor and the Black Hawk UH-60/Seahawk SH-60 helicopter, while our large commercial production programs include the full line of Boeing 7-series aircraft, Airbus A330 and A380 and a variety of business jets.

Aftermarket sales, which represented 29%, 27% and 29% of 2018, 2017 and 2016 sales, respectively, for this segment consist of the maintenance, repair, overhaul and parts supply for both military and commercial aircraft. Further, we sell spare parts and line replaceable units to both military and commercial customers that they store throughout the world in order to minimize down time.

Space and Defense Controls. We provide controls for satellites, space vehicles, launch vehicles, armored combat vehicles, tactical and strategic missiles, security and surveillance and other defense applications. We design, manufacture and integrate commercial and military satellite positioning controls. Propulsion components and systems accelerate the spacecraft for orbit-insertion, station keeping, and attitude control. Mission specific actuation mechanisms control solar array panels and antennas. We also design, manufacture and integrate steering and propulsion controls for space launch vehicles, such as the Atlas, Delta and Ariane platforms. Additionally, we design and manufacture spaceflight electronics and software. We are also developing new control products and systems for a variety of programs related to manned spaceflight including: NASA's new Space Launch System and Multi-Purpose Crew Vehicle.

In addition, we design controls for gun aiming, stabilization and automatic ammunition loading for armored combat vehicles for a variety of domestic and international customers. We are also developing a new reconfigurable turret system for several military vehicle programs. We also design controls for steering tactical and strategic missiles including: Lockheed Martin's Hellfire[®], the U.S. National Missile Defense Agency's Ballistic Missile Defense initiatives and Raytheon's TOW and Trident missiles. We also design, build and integrate weapons stores management systems for light attack aerial reconnaissance, ground and sea platforms, as well as build high power, quiet controls for naval surface ships and submarines such as the US Virginia Class. Our sensor and surveillance products are used in both military and commercial applications such as electrical grid and other critical infrastructure protection applications.

Also, we design and manufacture a number of component products that serve both the space and defense segments, including slip rings, fiber optic rotary joints and motors. Slip rings and fiber optic rotary joints use sliding contacts and optical technology to allow unimpeded rotation while delivering power and data through a rotating interface. Slip rings, fiber optic rotary joints and motors are used in a broad range of solutions, including satellites, missiles, radar pedestals and gimbals.

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Industrial Systems. We provide customized machine performance components and systems utilizing electrohydraulic, electromechanical and control technologies in applications involving motion control, fluid control and power and data management across a variety of markets.

In the industrial automation market, we design, manufacture and integrate components and systems for applications in injection and blow molding machinery, metal forming presses and heavy industry for steel and aluminum production. Our components and systems allow for precise controls of critical parameters in the industrial manufacturing processes, using both hydraulic and electric technologies. Other industrial automation applications we serve include material handling and paper mills.

In the simulation and test market, we supply electromechanical motion simulation bases for the flight simulation and training applications, as well as medical training simulators. We also supply custom test systems and controls for automotive, structural and fatigue testing.

In the energy market, we supply solutions for power generation applications which allow for precise control and greater safety of fuel metering and guide vane positioning on steam and gas turbines. We also design and manufacture high reliability systems and components for applications in oil and gas exploration and production, including downhole drilling, topside and subsea environments. We supply high-reliability components for wind turbine applications.

In the medical market, we supply components and systems for diagnostic imaging CT scan medical equipment, sleep apnea equipment, oxygen concentrators, infusion therapy and enteral clinical nutrition. Our components product categories include hydraulics, slip rings and fiber optic rotary joints, motors and infusion and enteral pumps and associated sets across similar markets.

Hydraulic components include high-performance servo valves with mechanical or electronic feedback, high-dynamic performance hydraulic servo pumps, energy-efficient electro hydrostatic actuators and complex hydraulic manifold systems.

Slip rings and fiber optic rotary joints use sliding contacts and optical technology to allow unimpeded rotation while delivering power and data through a rotating interface. They come in a range of sizes that allow them to be used in many applications, including diagnostic imaging CT scan medical equipment, remotely operated vehicles and floating platforms for offshore oil exploration, surveillance cameras and wind turbines.

Electric motors are used in an equally broad range of solutions, many of which are the same as for slip rings. We design and manufacture a series of fractional horsepower brushless motors that provide extremely low acoustic noise and reliable long life operation, with the largest program being sleep apnea equipment. Industrial customers use our motors for material handling and electric pumps. We supply ultra high-torque servomotors for servo press applications and high-power, multi-megawatt generators for dynamometer testing and hydropower.

Infusion therapy products include infusion pumps and associated administration sets. They offer IV, intra-arterial, subcutaneous or epidural flow of fluids and precise medicine delivery and can be applied to many applications, including hydration, nutrition, patient-controlled analgesia, local anesthesia, chemotherapy and antibiotics.

Enteral clinical nutrition products include a complete line of portable and stationary pumps along with disposable sets. They are designed for ease of use and mobility. Medical customers use our enteral feeding products in the delivery of enteral nutrition for patients in their own homes, hospitals and long-term care facilities.

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Segment information and reconciliations to consolidated amounts are as follows:

	2018	2017	2016
Net sales:			
Aircraft Controls	\$1,193,505	\$1,124,885	\$1,063,718
Space and Defense Controls	580,877	529,203	499,449
Industrial Systems	935,086	843,436	848,770
Net sales	\$2,709,468	\$2,497,524	\$2,411,937
Operating profit:			
Aircraft Controls	\$128,665	\$114,016	\$98,509
Space and Defense Controls	66,875	48,517	53,823
Industrial Systems	62,312	87,619	85,910
Total operating profit	257,852	250,152	238,242
Deductions from operating profit:			
Interest expense	36,238	34,551	34,605
Equity-based compensation expense	5,804	4,582	3,271
Corporate and other expenses, net	31,973	29,308	27,506
Earnings before income taxes	\$183,837	\$181,711	\$172,860
Depreciation and amortization:			
Aircraft Controls	\$40,795	\$41,977	\$46,541
Space and Defense Controls	17,900	18,980	18,198
Industrial Systems	28,825	28,099	32,744
Corporate	1,052	1,111	1,249
Total depreciation and amortization	\$88,572	\$90,167	\$98,732
Identifiable assets:			
Aircraft Controls	\$1,168,964	\$1,120,099	\$1,114,672
Space and Defense Controls	660,589	575,132	589,629
Industrial Systems	1,077,022	1,124,950	1,058,737
Corporate	57,473	270,411	241,936
Total assets	\$2,964,048	\$3,090,592	\$3,004,974

Operating profit 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.

	2018	2017	2016
Capital expenditures:			
Aircraft Controls	\$46,705	\$36,216	\$28,437
Space and Defense Controls	22,452	15,173	9,336
Industrial Systems	25,156	23,953	29,014
Corporate	204	456	421
Total capital expenditures	\$94,517	\$75,798	\$67,208

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Sales, based on the customer's location, and property, plant and equipment by geographic area are as follows:

	2018	2017	2016
Net sales:			
United States	\$1,592,513	\$1,438,428	\$1,353,398
Germany	202,676	195,328	173,182
Japan	158,686	152,148	164,702
France	138,054	145,627	120,907
Other	617,539	565,993	599,748
Net sales	\$2,709,468	\$2,497,524	\$2,411,937
Property, plant and equipment, net:			
United States	\$325,088	\$303,925	\$302,446
Philippines	63,870	64,260	65,000
United Kingdom	61,438	64,065	64,280
Other	102,469	90,741	90,643
Property, plant and equipment, net	\$552,865	\$522,991	\$522,369

Sales to Boeing were \$382,184, \$321,110 and \$346,596, or 14%, 13% and 14% of sales, in 2018, 2017 and 2016, respectively, including sales to Boeing Commercial Airplanes of \$238,118, \$252,977 and \$251,288 in 2018, 2017 and 2016, respectively. Sales arising from U.S. Government prime or sub-contracts, including military sales to Boeing, were \$897,882, \$775,271 and \$726,562 in 2018, 2017 and 2016, respectively. Sales to Boeing and the U.S. Government and its prime- or sub-contractors are made primarily from our Aircraft Controls and Space and Defense Controls segments.

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Note 20 - Related Party Transactions

On November 20, 2017, John Scannell was elected to the Board of Directors of M&T Bank Corporation and M&T Bank. We currently engage with M&T Bank in the ordinary course of business for various financing activities, all of which were initiated prior to the election of Mr. Scannell to the Board. M&T Bank provides credit extension for routine purchases, which for 2018 totaled \$23,064. At September 29, 2018, we held a \$15,000 interest rate swap with M&T Bank and outstanding leases with a total original cost of \$29,657. M&T Bank also maintains an interest of approximately 12% in our U.S. revolving credit facility. Further details of the U.S. revolving credit facility can be found in Note 7, Indebtedness.

Note 21 - Commitments and Contingencies

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

We are engaged in administrative proceedings with governmental agencies and legal proceedings with governmental agencies and other third parties in the normal course of our business, including litigation under Superfund laws, regarding environmental matters. We believe that adequate reserves have been established for our share of the estimated cost for all currently pending environmental administrative or legal proceedings and do not expect that these environmental matters will have a material adverse effect on our financial condition, results of operations or cash flows.

In the ordinary course of business we could be subject to ongoing claims or disputes from our customers, the ultimate settlement of which could have a material adverse impact on our consolidated results of operations. While the receivables and any loss provisions recorded to date reflect management's best estimate of the projected costs to complete a given project, there is still significant effort required to complete the ultimate deliverable. Future variability in internal cost and as well as future profitability is dependent upon a number of factors including deliveries, performance and government budgetary pressures. The inability to achieve a satisfactory contractual solution, further unplanned delays, additional developmental cost growth or variations in any of the estimates used in the existing contract analysis could lead to further loss provisions. Additional losses could have a material adverse impact on our financial condition, results of operations or cash flows in the period in which the loss may be recognized.

We lease certain facilities and equipment under operating lease arrangements. These arrangements may include fair market renewal or purchase options. Rent expense under operating leases amounted to \$26,594 in 2018, \$25,257 in 2017 and \$28,279 in 2016. Future minimum rental payments required under non-cancellable operating leases are \$21,422 in 2019, \$18,137 in 2020, \$14,803 in 2021, \$11,891 in 2022, \$8,723 in 2023 and \$37,346 thereafter.

We are contingently liable for \$43,917 of standby letters of credit issued by a bank to third parties on our behalf at September 29, 2018. Purchase commitments outstanding at September 29, 2018 are \$649,106, including \$42,923 for property, plant and equipment.

Table of Contents**Note 22 - Quarterly Data - Unaudited**

2018	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Total
Net sales	\$627,535	\$689,049	\$692,018	\$700,866	\$2,709,468
Gross profit	184,109	192,649	197,386	198,843	772,987
Net earnings attributable to Moog	1,299	13,965	40,683	40,560	96,507
Net earnings per share attributable to Moog:					
Basic	\$0.04	\$0.39	\$1.14	\$1.15	\$2.71
Diluted	\$0.04	\$0.39	\$1.13	\$1.14	\$2.68
2017	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Total
Net sales	\$589,670	\$632,403	\$626,183	\$649,268	\$2,497,524
Gross profit	172,506	185,080	182,414	191,522	731,522
Net earnings attributable to Moog	30,564	32,026	40,088	38,602	141,280
Net earnings per share attributable to Moog:					
Basic	\$0.85	\$0.89	\$1.12	\$1.08	\$3.94
Diluted	\$0.84	\$0.88	\$1.11	\$1.07	\$3.90

Note: Quarterly amounts may not add to the total due to rounding.

Note 23 - Subsequent Event

On November 2, 2018, the Board of Directors declared a \$0.25 per share quarterly dividend payable on issued and outstanding shares of our Class A and Class B common stock on December 3, 2018 to shareholders of record at the close of business on November 15, 2018.

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Report of Independent Registered Public Accounting Firm

The Board of Directors and Shareholders of Moog Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Moog Inc. (the Company) as of September 29, 2018 and September 30, 2017, the related consolidated statements of earnings, comprehensive income, shareholders' equity and cash flows for each of the three years in the period ended September 29, 2018, and the related notes and financial statement schedule listed in the Index at Item 15 (2) (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company at September 29, 2018 and September 30, 2017, and the results of its operations and its cash flows for each of the three years in the period ended September 29, 2018, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of September 29, 2018, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission 2013 framework, and our report dated November 13, 2018 expressed an unqualified opinion thereon.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ Ernst & Young LLP

We have served as the Company's auditor since 2003.

Buffalo, New York
November 13, 2018

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MANAGEMENT'S REPORT ON INTERNAL CONTROL OVER FINANCIAL REPORTING

Our management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Rule 13a-15(f) and 15d-15(f) of the Exchange Act. Under the supervision and with the participation of our management, including the Chief Executive Officer and Chief Financial Officer, we conducted an evaluation of the effectiveness of our internal control over financial reporting as of September 29, 2018 based upon the framework in Internal Control - Integrated Framework (2013) by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). Based on that evaluation, our management concluded that our internal control over financial reporting is effective as of September 29, 2018.

We completed one acquisition in 2018, which was excluded from our management's report on internal control over financial reporting as of September 29, 2018. On March 29, 2018, we acquired Moog Brno s.r.o. (formerly VUES Brno s.r.o.), which included a 74% interest in a subsidiary, VSM Antriebstechnik GmbH. The noncontrolling interest was subsequently acquired on September 8, 2018. This acquisition is included in our 2018 consolidated financial statements and constituted \$76 million and \$64 million of total and net assets, respectively, as of September 29, 2018 and \$20.1 million and \$(1.3) million of net sales and net loss attributable to Moog, respectively, for the year then ended.

Ernst & Young LLP, independent registered public accounting firm, has audited our consolidated financial statements included in this Annual Report on Form 10-K and, as part of their audit, has issued their report, included herein, on the effectiveness of our internal control over financial reporting.

/s/ JOHN R. SCANNELL

John R. Scannell

Chief Executive Officer
(Principal Executive Officer)

/s/ DONALD R. FISHBACK

Donald R. Fishback

Vice President,
Chief Financial Officer
(Principal Financial Officer)

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Report of Independent Registered Public Accounting Firm

To the Shareholders and the Board of Directors of Moog Inc.

Opinion on Internal Control over Financial Reporting

We have audited Moog Inc.'s internal control over financial reporting as of September 29, 2018, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework), (the COSO criteria). In our opinion, Moog Inc. (the Company) maintained, in all material respects, effective internal control over financial reporting as of September 29, 2018, based on the COSO criteria.

As indicated in the accompanying Management's Report on Internal Control Over Financial Reporting, management's assessment of and conclusion on the effectiveness of internal control over financial reporting did not include the internal controls of Moog Brno s.r.o. (formerly VUES Brno s.r.o.) and VSM Antriebstechnik GmbH, which is included in the 2018 consolidated financial statements of the Company and constituted 3% and 5% of total and net assets, respectively, as of September 29, 2018 and 1% and (1)% of revenues and net income, respectively, for the year then ended. Our audit of internal control over financial reporting of the Company also did not include an evaluation of the internal control over financial reporting of Moog Brno s.r.o. (formerly VUES Brno s.r.o.) and VSM Antriebstechnik GmbH.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the 2018 consolidated balance sheets of the Company as of September 29, 2018 and September 30, 2017 the related consolidated statements of earnings, comprehensive income, shareholders' equity and cash flows for each of the three years in the period ended September 29, 2018, and the related notes and financial statement schedule listed in the Index at Item 15 (2) and our report dated November 13, 2018 expressed an unqualified opinion thereon.

Basis for Opinion

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

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects.

Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control Over Financial Reporting

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

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

/s/ Ernst & Young LLP

Buffalo, New York
November 13, 2018

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

Not applicable.

Item 9A. Controls and Procedures.

Disclosure Controls and Procedures.

We carried out an evaluation, under the supervision and with the participation of our management, including the Chief Executive Officer and Chief Financial Officer, of the effectiveness of the design and operation of our disclosure controls and procedures as defined in Exchange Act Rules 13a-15(e) and 15d-15(e). Based on that evaluation, the Chief Executive Officer and Chief Financial Officer concluded that these disclosure controls and procedures are effective as of the end of the period covered by this report, to ensure that information required to be disclosed in reports filed or submitted under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the Securities and Exchange Commission's rules and forms, and that such information is accumulated and communicated to management, including our Chief Executive Officer and Chief Financial Officer, as appropriate, to allow timely decisions regarding required disclosures.

Management's Report on Internal Control over Financial Reporting.

See the report appearing under Item 8, Financial Statements and Supplemental Data of this report.

Changes in Internal Control over Financial Reporting.

There have been no changes in our internal control over financial reporting during the most recent fiscal quarter that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Item 9B. Other Information.

Not applicable.

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PART III

Item 10. Directors, Executive Officers and Corporate Governance.

The information required herein with respect to our directors and certain information required herein with respect to our executive officers is incorporated by reference to the 2018 Proxy. Other information required herein is included in Item 1, Business, under “Executive Officers of the Registrant” of this report.

We have adopted a code of ethics that applies to our Chief Executive Officer, Chief Financial Officer and Controller. The code of ethics is available upon request without charge by contacting our Chief Financial Officer at 716-652-2000.

Item 11. Executive Compensation.

The information required herein is incorporated by reference to the 2018 Proxy.

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

The information required herein is incorporated by reference to the 2018 Proxy.

Item 13. Certain Relationships and Related Transactions, and Director Independence.

The information required herein is incorporated by reference to the 2018 Proxy.

Item 14. Principal Accountant Fees and Services.

The information required herein is incorporated by reference to the 2018 Proxy.

PART IV

Item 15. Exhibits and Financial Statement Schedules.

Documents filed as part of this report:

1 Financial Statements

- Consolidated Statements of Earnings
- Consolidated Statements of Comprehensive Income (Loss)
- Consolidated Balance Sheets
- Consolidated Statements of Shareholders' Equity
- Consolidated Statements of Cash Flows
- Notes to Consolidated Financial Statements
- Reports of Independent Registered Public Accounting Firm

2 Financial Statement Schedules

- II. Valuation and Qualifying Accounts.

Schedules other than that listed above are omitted because the conditions requiring their filing do not exist or because the required information is included in the Consolidated Financial Statements, including the Notes thereto.

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3 Exhibits

- (3) Articles of Incorporation and By-Laws.
- (i) Restated Certificate of Incorporation of Moog Inc., incorporated by reference to exhibit 3(i) of our report on Form 10-K for the year ended September 28, 2013.
 - (ii) Restated By-laws of Moog Inc., dated May 8, 2018, as amended, incorporated by reference to exhibit 3.1 of our report on Form 10-Q for the quarter ended June 30, 2018.
- (4) Instruments defining the rights of security holders, including indentures.
- Form of Indenture between Moog Inc. and MUFG Union Bank, N.A. as Trustee, dated November 21, 2014, relating to the 5.25% Senior Notes due 2022, incorporated by reference to exhibit 4.1 of our report on Form 8-K dated November 21, 2014.
- (10) Material contracts.
- Credit and Securitization agreements.
 - Form of Receivables Purchase Agreement, by and among Moog Receivables LLC, as Seller, Moog Inc., as Servicer, Market Street Funding LLC, as Issuer, and PNC Bank, National Association, as Administrator, dated as of March 5, 2012, incorporated by reference to exhibit 10.1 on Form 8-K dated March 9, 2012.
 - Second Amendment to the Receivables Purchase Agreement, dated March 4, 2013, by and among Moog Receivables LLC, as Seller, Moog Inc., as Servicer, Market Street Funding LLC, as Issuer and PNC Bank, National Association, as Administrator, incorporated by reference to exhibit 10.1 on Form 8-K dated March 6, 2013.
 - Fifth Amendment to the Receivables Purchase Agreement, dated February 14, 2014, by and among Moog Receivables LLC, as Seller, Moog Inc., as Servicer, Market Street Funding LLC, as Issuer and PNC Bank, National Association, as Administrator, incorporated by reference to exhibit 10.1 on Form 8-K dated February 14, 2014.
 - Seventh Amendment to the Receivables Purchase Agreement, dated February 10, 2015, by and among Moog Receivables LLC, as Seller, Moog Inc. as Servicer, Market Street Funding LLC, as Issuer and PNC Bank, National Association, as Administrator, incorporated by reference to exhibit 10.1 on Form 8-K dated February 10, 2015.
 - Eighth Amendment to the Receivables Purchase Agreement, dated April 15, 2016, by and among Moog Receivables LLC, as Seller, Moog Inc. as Servicer, Market Street Funding LLC, as Issuer and PNC Bank, National Association, as Administrator, incorporated by reference to exhibit 10.1 on Form 8-K dated April 15, 2016.
 - Ninth Amendment to the Receivables Purchase Agreement, dated October 23, 2017, by and among Moog Receivables LLC, as Seller, Moog Inc. as Servicer, Market Street Funding LLC, as Issuer and PNC Bank, National Association, as Administrator, incorporated by reference to exhibit 10.1 on Form 8-K dated October 26, 2017.
 - Fourth Amended and Restated Loan Agreement between Moog Inc., HSBC Bank USA, National Association, Manufacturers and Traders Trust Company, Bank of America, N.A. and JPMorgan Chase Bank, N.A. dated as of March 28, 2013, incorporated by reference to exhibit 10.1 of our report on Form 8-K dated April 1, 2013.
 - Amendment No. 1 dated as of May 22, 2014, to the Fourth Amended and Restated Loan Agreement, incorporated by reference to exhibit 10.1 of our report on Form 8-K dated May 22, 2014.
 - Amendment No. 3 dated as of June 28, 2016, to the Fourth Amended and Restated Loan Agreement, incorporated by reference to exhibit 10.1 of our report on Form 8-K dated June 28, 2016.
 - Management contracts or compensatory plan or arrangement.
- (j)

2003 Stock Option Plan, incorporated by reference to exhibit A of definitive proxy statement filed under Schedule 14A on January 9, 2003.

(k) Forms of Stock Option Agreements under the 1998 Stock Option Plan and 2003 Stock Option Plan, incorporated by reference to exhibit 10.12 of our report on Form 10-K for the year ended September 25, 2004.

(l) 2008 Stock Appreciation Rights Plan, incorporated by reference to exhibit A of definitive proxy statement filed under Schedule 14A on December 10, 2007.

(m) Form of Stock Appreciation Rights Award Agreement under 2008 Stock Appreciation Rights Plan, incorporated by reference to exhibit 10.14 of our report on Form 10-K for the year ended September 27, 2008.

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- (n) First Amendment to the Moog Inc. 2008 Stock Appreciation Rights Plan, incorporated by reference to Appendix A of definitive proxy statement filed under Schedule 14A on December 13, 2012.
 - (o) Second Amendment to the Moog Inc. 2008 Stock Appreciation Rights Plan, incorporated by reference to Item 8.01 on Form 8-K dated December 26, 2012.
 - (p) 2014 Long Term Incentive Plan, incorporated by reference to exhibit A of definitive proxy statement filed under Schedule 14A on December 12, 2014.
 - (q) Form of Stock Appreciation Rights Award Agreement under the 2014 Long Term Incentive Plan, incorporated by reference to exhibit 10.2 (Class A common stock) and exhibit 10.3 (Class B common stock) of our report on Form 8-K dated November 20, 2015.
 - (r) Form of Restricted Stock Unit Award Agreement under the 2014 Long Term Incentive Plan, incorporated by reference to exhibit 10.4 (Class A common stock) and exhibit 10.5 (Class B common stock) of our report on Form 8-K dated November 20, 2015.
 - (s) Form of Employment Termination Benefits Agreement between Moog Inc. and Employee-Officers, incorporated by reference to exhibit 10(vii) of our report on Form 10-K for the year ended September 25, 1999.
 - (t) Retention Agreement, dated March 1, 2017, incorporated by reference to exhibit 10.1 of our report on form 8-K dated March 6, 2017.
 - (u) Deferred Compensation Plan for Directors and Officers, amended and restated May 16, 2002, incorporated by reference to exhibit 10(ii) of our report on Form 10-K for the year ended September 28, 2002.
 - (v) Form of Indemnification Agreement for officers, directors and key employees, incorporated by reference to exhibit 10.1 of our report on Form 8-K dated November 30, 2004.
 - (w) Description of Management Short Term Incentive Plan, incorporated by reference to exhibit 10.1 of our report on Form 8-K/A dated November 24, 2015.
 - (x) Moog Inc. Management Short Term Incentive Plan, dated September 29, 2017, incorporated by reference to exhibit 10.1 of our report on Form 8-K dated October 5, 2017.
 - (y) First Amendment to the Moog Inc. Management Short Term Incentive Plan, dated July 26, 2018, incorporated by reference to exhibit 10.3 of our report on Form 10-Q for the quarter ended June 30, 2018.
 - (z) Moog Inc. Plan to Equalize Retirement Income and Supplemental Retirement Plan dated August 9, 2017, incorporated by reference to exhibit 10.1 of our report on Form 8-K dated August 11, 2017.
 - (aa) Defined Contribution Supplemental Executive Retirement Plan, dated March 4, 2016, incorporated by reference to exhibit 10.1 of our report on Form 10-Q for the quarter ended April 2, 2016.
 - (ab) First Amendment to the Defined Contribution Supplemental Executive Retirement Plan, dated July 26, 2018, incorporated by reference to exhibit 10.2 of our report on Form 10-Q for the quarter ended June 30, 2018.
- Other material contracts.
- (ac) Moog Inc. Stock Employee Compensation Trust Agreement amended and restated as of August 13, 2014, incorporated by reference to exhibit 10.2 of our report on Form 10-Q for the quarter ended January 3, 2015.
 - (ad) Amendment No. 1 to the Moog Inc. Stock Employee Compensation Trust Agreement, dated May 8, 2018, incorporated by reference to exhibit 10.1 of our report on Form 10-Q for the quarter ended June 30, 2018.
 - (ae) Moog Inc. Supplemental Retirement Plan Trust, as amended and restated, effective January 1, 2015, incorporated by reference to exhibit 10.1 of our Form 10-Q for the quarter ended April 4, 2015.
- All of the exhibits listed above have been filed under Moog Inc., Securities and Exchange Commission file number 1-05129.

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Our subsidiaries.

(21) (All of which are wholly owned by the Corporation, directly or indirectly, unless otherwise noted). The names of indirectly owned subsidiaries are indented under the names of their respective parent corporations.

Name	State/Country of Incorporation
Curlin Medical Inc.	Delaware
Moog MDG SRL	Costa Rica
Viltechmeda UAB	Lithuania
ZEVEX, Inc.	Delaware
Harmonic Linear Drives Ltd.	England and Wales
Moog Asset Management LLC	Delaware
Moog Australia Pty., Ltd.	Australia
Moog do Brasil Controles Ltda.	Brazil
Moog Controls Corp.	Ohio
Moog Controls Hong Kong Ltd.	Hong Kong
Moog Control Systems (Shanghai) Co., Ltd.	People's Republic of China
Moog Industrial Controls (Shanghai) Co., Ltd.	People's Republic of China
Moog Controls (India) Pvt. Ltd. (56% Moog Inc.; 44% Moog Singapore Pte. Ltd.)	India
Moog Controls Ltd.	United Kingdom
Moog Reading Limited	United Kingdom
Tritech Holdings Limited	United Kingdom
Tritech International Limited	United Kingdom
Tritech do Brasil Servicos E Equipamentos Submarinos Ltda.	Brazil
Moog Fernau Ltd.	United Kingdom
Moog Norden AB	Sweden
Moog Wolverhampton Limited	United Kingdom
Moog Europe Holdings Luxembourg SCS	Luxembourg
Moog Holding GmbH & Co. KG	Germany
Insensys Holdings Ltd.	United Kingdom
Moog Insensys Limited	United Kingdom
Moog Brno s.r.o	Czech Republic
Moog B.V.	Netherlands
Moog GmbH	Germany
Moog Italiana S.r.l.	Italy
Moog Luxembourg S.A.R.L.	Luxembourg
Moog Memmingen GmbH	Germany
Moog Rekofa GmbH	Germany
Moog Unna GmbH	Germany
Moog Control Equipment (Shanghai) Co., Ltd.	People's Republic of China
Obshestwo s Ogranizennoi Otvetstvennostju MOOG	Russia
VSM Antriebstechnik GmbH	Germany
Moog Luxembourg Finance S.A.R.L.	Luxembourg
Focal Technologies Corporation	Nova Scotia
Moog International Financial Services Center S.a.r.l.	Luxembourg
Moog Verwaltungs GmbH	Germany
Moog Ireland Limited	Ireland
Moog Holdings Ltd.	Ireland
Moog Japan Ltd.	Japan
Moog Korea Ltd.	South Korea
Moog Receivables LLC	Delaware
Moog S.A.R.L. (95% Moog Inc.; 5% Moog GmbH)	France
Moog Singapore Pte. Ltd.	Singapore
Moog Aircraft Services Asia PTE LTD. (Joint Venture - 51%)	Singapore
Moog EM Solutions (India) Private Limited	India
Moog India Technology Center Pvt. Ltd.	India
Moog Motion Controls Private Limited	India

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(23) Consent of Ernst & Young LLP. (Filed herewith)

(31.1) Certification of Chief Executive Officer pursuant to Exchange Act Rule 13a-14(a) as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002. (Filed herewith)

(31.2) Certification of Chief Financial Officer pursuant to Exchange Act Rule 13a-14(a) as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002. (Filed herewith)

(32.1) Certification pursuant to 18 U.S.C. Section 1350 as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002. (Furnished herewith)

(101) Interactive Data Files (submitted electronically herewith)

(101.INS) XBRL Instance Document - the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document.

(101.SCH) XBRL Taxonomy Extension Schema Document

(101.CAL) XBRL Taxonomy Extension Calculation Linkbase Document

(101.DEF) XBRL Taxonomy Extension Definition Linkbase Document

(101.LAB) XBRL Taxonomy Extension Label Linkbase Document

(101.PRE) XBRL Taxonomy Extension Presentation Linkbase Document

In accordance with Rule 406T of Regulation S-T, the XBRL related information in Exhibit 101 to this Annual Report on Form 10-K shall not be deemed to be "filed" for purposes of Section 18 of the Exchange Act, or otherwise subject to the liability of that section and shall not be part of any registration or other document filed under the Securities Act or the Exchange Act, except as shall be expressly set forth by specific reference in such filing.

Table of Contents**Valuation and Qualifying Accounts - Fiscal Years 2016, 2017 and 2018**

(dollars in thousands)

Schedule II

Description	Balance at beginning of year	Additions charged to costs and expenses	Deductions*	Foreign exchange impact and other	Balance at end of year
Fiscal year ended October 1, 2016					
Contract loss reserves	\$ 30,422	\$ 29,469	\$ 27,152	\$ (196)	\$ 32,543
Allowance for doubtful accounts	5,286	1,594	2,095	(247)	4,538
Reserve for inventory valuation	103,350	24,183	17,622	(719)	109,192
Deferred tax valuation allowance	9,583	2,981	1,521	(105)	10,938
Fiscal year ended September 30, 2017					
Contract loss reserves	\$ 32,543	\$ 40,774	\$ 30,134	\$ 31	\$ 43,214
Allowance for doubtful accounts	4,538	1,291	1,786	308	4,351
Reserve for inventory valuation	109,192	12,661	14,019	705	108,539
Deferred tax valuation allowance	10,938	895	7,172	115	4,776
Fiscal year ended September 29, 2018					
Contract loss reserves	\$ 43,214	\$ 32,685	\$ 33,556	\$ (85)	\$ 42,258
Allowance for doubtful accounts	4,351	2,213	1,468	(137)	4,959
Reserve for inventory valuation	108,539	33,569	15,540	(1,252)	125,316
Deferred tax valuation allowance	4,776	10,499	101	7	15,181

* Includes the effects of divestitures.

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Signatures

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

Moog Inc.

(Registrant)

By/s/ JOHN R. SCANNELL

John R. Scannell

Chief Executive Officer

Date: November 13, 2018

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities indicated on November 13, 2018.

/s/ JOHN R. SCANNELL

John R. Scannell

Chairman of the Board and Director

Chief Executive Officer

(Principal Executive Officer)

/s/ KRAIG H. KAYSER

Kraig H. Kayser

Director

/s/ DONALD R. FISHBACK

Donald R. Fishback

Director

Vice President and Chief Financial Officer

(Principal Financial Officer)

/s/ R. BRADLEY LAWRENCE

R. Bradley Lawrence

Director

/s/ JENNIFER WALTER

Jennifer Walter

Vice President - Finance and Controller

(Principal Accounting Officer)

/s/ BRIAN J. LIPKE

Brian J. Lipke

Director

/s/ WILLIAM G. GISEL, JR.

William G. Gisel, Jr.

Director

/s/ BRENDA L. REICHELDERFER

Brenda L. Reichelderfer

Director

/s/ PETER J. GUNDERMANN

Peter J. Gundermann

Director

