NORDSON CORP
Form 10-K
December 14, 2018

UNITED STATES

SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 10-K

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

(Mark One)

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended October 31, 2018

OR

TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the transition period from to

Commission file number 0-7977

NORDSON CORPORATION

(Exact name of Registrant as specified in its charter)

Ohio (State of incorporation)	34-0590250 (I.R.S. Employer Identification No.)
28601 Clemens Road Westlake, Ohio (Address of principal executive offices)	44145 (Zip Code)

(440) 892-1580

(Registrant's Telephone Number, including area code)

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

Common Shares, without par value	Nasdaq Stock Market LLC
(Title)	(Name of exchange on which registered)

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, and (2) has been subject to such filing requirements for the past 90 days. Yes No

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

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K.

Indicate by check mark whether the Registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company or an emerging growth company. See the definitions of “large accelerated filer,” “accelerated filer,” “smaller reporting company” and “emerging growth company” in Rule 12b-2 of the Exchange Act:

Large accelerated filer	Accelerated filer
Non-accelerated filer	Smaller reporting company
Emerging growth company	

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

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

The aggregate market value of Common Shares, no par value per share, held by nonaffiliates (based on the closing sale price on the Nasdaq Stock Market) as of April 30, 2018 was approximately $7,441,507.

There were 57,927,038 Common Shares outstanding as of November 30, 2018.

Documents incorporated by reference: Portions of the Proxy Statement for the 2019 Annual Meeting - Part III of the Form 10-K

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PART I

NOTE REGARDING AMOUNTS AND FISCAL YEAR REFERENCES

In this annual report, all amounts related to United States dollars and foreign currency and to the number of Nordson Corporation’s common shares, except for per share earnings and dividend amounts, are expressed in thousands. Unless the context otherwise indicates, all references to “we,” “us,” “our,” or the “Company” mean Nordson Corporation.

Unless otherwise noted, all references to years relate to our fiscal year ending October 31.

Item 1. Business

General Description of Business

Nordson engineers, manufactures and markets differentiated products and systems used to dispense, apply and control adhesives, coatings, polymers, sealants, biomaterials, and other fluids, to test and inspect for quality, and to treat and cure surfaces. These products are supported with extensive application expertise and direct global sales and service. We serve a wide variety of consumer non-durable, consumer durable and technology end markets including packaging, nonwovens, electronics, medical, appliances, energy, transportation, building and construction, and general product assembly and finishing.

Our strategy for long-term growth is based on solving customers’ needs globally. We were incorporated in the State of Ohio in 1954 and are headquartered in Westlake, Ohio. Our products are marketed through a network of direct operations in more than 35 countries. Consistent with this global strategy, approximately 68 percent of our revenues were generated outside the United States in 2018.

We have 7,536 employees worldwide. Principal manufacturing facilities are located in the United States, the People’s Republic of China, Germany, Ireland, Israel, Mexico, the Netherlands, Thailand, and the United Kingdom.

Corporate Purpose and Goals

We strive to be a vital, self-renewing, worldwide organization that, within the framework of ethical behavior and enlightened citizenship, grows and produces wealth for our customers, employees, shareholders, and communities.

We operate for the purpose of creating balanced, long-term benefits for all of our constituencies.

Although every quarter may not produce increased sales, net income, or earnings per share, or exceed the comparative prior year's quarter, we expect to produce long-term gains. When short-term swings occur, we do not intend to alter our basic objectives in efforts to mitigate the impact of these temporary occurrences.

We drive organic growth by continually introducing new products and technology, providing high levels of customer service and support, capturing rapidly expanding opportunities in emerging geographies, and by leveraging existing technology into new applications. Additional growth comes through the acquisition of companies that serve international growth markets, share our business model characteristics and can leverage our global infrastructure. The primary goals of our acquisition strategy are to complement our current capabilities, diversify our business into new industry sectors and with new customers and expand the scope of the solutions we can offer to our customers.

We create benefits for our customers through a Package of Values®, which includes carefully engineered, durable products; strong service support; the backing of a well-established, worldwide company with financial and technical strengths; and a corporate commitment to deliver what was promised.

We strive to provide genuine customer satisfaction – it is the foundation upon which we continue to build our business.

Complementing our business strategy is the objective to provide opportunities for employee self-fulfillment, growth, security, recognition and equitable compensation. This goal is met through the Human Resources department's facilitation of employee training, leadership training and the creation of on-the-job growth opportunities. The result is a highly qualified and professional global team capable of meeting corporate objectives.

We recognize the value of employee participation in the planning process. Strategic and operating plans are developed by all business units, resulting in a sense of ownership and commitment on the part of employees in accomplishing our objectives.

We drive continuous improvement in all areas of the company through the Nordson Business System (NBS), our collected set of tools and best practices. Rooted in Lean Six Sigma methodologies, the NBS is applied throughout all business units and corporate functions. Closely tied to the NBS are a set of key performance indicators that help define and measure progress toward corporate goals. The NBS is underpinned by our timeless corporate values of customer passion, energy, excellence, integrity and respect for people.

We are an equal opportunity employer.

We are committed to contributing approximately five percent of domestic pretax earnings to human welfare services, education and other charitable activities, particularly in communities where we have significant operations.

Principal Products and Uses

We engineer, manufacture and market differentiated products and systems used to dispense, apply and control adhesives, coatings, polymers, sealants, biomaterials, medical components, and other fluids, to test and inspect for quality, and to treat and cure surfaces. Our technology-based systems can be found in manufacturing facilities around the world producing a wide range of goods for consumer durable, consumer non-durable and technology end markets. Equipment ranges from single-use components to manual, stand-alone units for low-volume operations to microprocessor-based automated systems for high-speed, high-volume production lines.

We market our products globally, primarily through a direct sales force, and also through qualified distributors and sales representatives. We have built a worldwide reputation for creativity and expertise in the design and engineering of high-technology application equipment that meets the specific needs of our customers. We create value for our customers by developing solutions that increase uptime, enable faster line speeds and reduce consumption of materials.

The following is a summary of the product lines and markets served by our operating segments:

1. Adhesive Dispensing Systems

This segment delivers our proprietary precision dispensing and processing technology to diverse markets for applications that commonly reduce material consumption, increase line efficiency and enhance product strength, durability, brand and appearance.

- Nonwovens – Dispensing, coating and laminating systems for applying adhesives, lotions, liquids and fibers to disposable products and continuous roll goods. Key strategic markets include adult incontinence products, baby diapers and child-training pants, feminine hygiene products and surgical drapes, gowns, shoe covers and face masks.
- Packaging – Automated adhesive dispensing systems used in the rigid packaged goods industries. Key strategic markets include food and beverage packaging, pharmaceutical packaging, and other consumer goods packaging.
- Polymer Processing – Components and systems used in the thermoplastic melt stream in plastic extrusion, injection molding, compounding, polymerization and recycling processes. Key strategic markets include flexible packaging, electronics, medical, building and construction, transportation and aerospace, and general consumer goods.
- Product Assembly – Dispensing, coating and laminating systems for the assembly of plastic, metal and wood products, for paper and paperboard converting applications and for the manufacturing of continuous roll goods. Key strategic markets include appliances, automotive components, building and construction materials, electronics, furniture, solar energy, and the manufacturing of bags, sacks, books, envelopes and folding cartons.

2. Advanced Technology Systems

This segment integrates our proprietary product technologies found in progressive stages of a customer's production process, such as surface treatment, precisely controlled automated, semi-automated or manual dispensing of material, and post-dispense bond testing, optical inspection and x-ray inspection to ensure quality. Related single-use plastic molded syringes, cartridges, tips, tubing and fluid connection components are used to dispense or control fluids in production processes or within customers' end products. This segment primarily serves the specific needs of electronics, medical and related high-tech industries.

- Electronics Systems - Automated dispensing systems for high-speed, accurate application of a broad range of attachment, protection and coating fluids, and related gas plasma treatment systems for cleaning and conditioning surfaces prior to dispense. Key strategic markets include mobile phones, tablets, personal computers, wearable technology, liquid crystal displays, micro hard drives, microprocessors, printed circuit boards, flexible circuits, micro-electronic mechanical systems (MEMS), and semiconductor packaging.
- Fluid Management – Precision manual and semi-automated dispensers, minimally invasive interventional delivery devices, and highly engineered single-use plastic molded syringes, cartridges, tips, fluid connection components, tubing, balloons, and catheters. Products are used for applying and controlling the flow of adhesives, sealants, lubricants, and biomaterials in critical industrial production processes and within medical equipment and related surgical procedures. Key strategic markets include consumer goods, electronics, industrial assembly, and medical.
- Test and Inspection - Bond testing and automated optical, acoustic microscopy and x-ray inspection systems used in the semiconductor and printed circuit board industries. Key strategic markets include mobile phones, tablets, personal computers, wearable technology, liquid crystal displays, micro hard drives, microprocessors, printed circuit boards, flexible circuits, MEMS, and semiconductor packaging.

3. Industrial Coating Systems

This segment provides both standard and highly-customized equipment used primarily for applying coatings, paint, finishes, sealants and other materials, and for curing and drying of dispensed material. This segment primarily serves the industrial capital equipment and consumer durables markets.

- Cold Materials – Automated and manual dispensing products and systems used to apply multiple component adhesive and sealant materials in the general industrial and transportation manufacturing industries. Key strategic markets include aerospace, alternative energy, appliances, automotive, building and construction, composites, electronics and medical.
- Container Coating – Automated and manual dispensing and curing systems used to coat and cure containers. Key strategic markets include beverage containers and food cans.
- Curing and Drying Systems – Ultraviolet equipment used primarily in curing and drying operations for specialty coatings, semiconductor materials and paints. Key strategic markets include electronics, containers, and durable goods products.
- Liquid Finishing – Automated and manual dispensing systems used to apply liquid paints and coatings to consumer and industrial products. Key strategic markets include automotive components, agriculture, construction, metal shelving and drums.
- Powder Coating – Automated and manual dispensing systems used to apply powder paints and coatings to a variety of metal, plastic and wood products. Key strategic markets include agriculture and construction equipment, appliances, automotive components, home and office furniture, lawn and garden equipment, pipe coating, and wood and metal shelving.

Manufacturing and Raw Materials

Our production operations include machining, molding and assembly. We manufacture specially designed parts and assemble components into finished equipment. Many components are made in standard modules that can be used in more than one product or in combination with other components for a variety of models. We have principal manufacturing operations and sources of supply in the United States in Ohio, Georgia, California, Colorado, Connecticut, Illinois, Massachusetts, Michigan, Minnesota, New Jersey, Rhode Island, Tennessee, and Wisconsin; as well as in the People's Republic of China, Germany, Ireland, Israel, Mexico, the Netherlands, Thailand and the United Kingdom.

Principal materials used to make our products are metals and plastics, typically in sheets, bar stock, castings, forgings, tubing and pellets. We also purchase many electrical and electronic components, fabricated metal parts, high-pressure fluid hoses, packings, seals and other items integral to our products. Suppliers are competitively selected based on cost, quality and service. All significant raw materials that we use are available through multiple sources. We purchase most raw materials and other components on the open market and rely on third parties to provide certain finished goods. While these items are generally available from multiple sources, the cost of products sold may be affected by changes in the market price of raw materials and tariffs on certain raw materials, particularly imports from China, as well as disruptions in availability of raw materials, components, and sourced finished goods.

We monitor and investigate alternative suppliers and materials based on numerous attributes including quality, service, and price. We currently source raw materials and components from a number of suppliers, but our ongoing efforts to improve the cost effectiveness of our products and services may result in a reduction in the number of our suppliers.

Senior operating management supervise an extensive quality control program for our equipment, machinery and systems, and manufacturing processes.

Natural gas and other fuels are our primary energy sources. However, standby capacity for alternative sources is available if needed.

Intellectual Property

We maintain procedures to protect our intellectual property (including patents, trademarks and copyrights) both domestically and internationally. Risk factors associated with our intellectual property are discussed in Item 1A, Risk Factors.

Our intellectual property portfolios include valuable patents, trade secrets, know-how, domain names, trademarks and trade names. As of October 31, 2018, we held 545 United States patents and 1,405 foreign patents and had 193 United States patent applications pending and 856 foreign patent applications pending, but there is no assurance that any patent application will be issued. We continue to apply for and obtain patent protection for new products on an ongoing basis.

Patents covering individual products extend for varying periods according to the date of filing or grant and the legal term of patents in various countries where a patent is obtained. Our patent portfolio as of October 31, 2018 had expiration dates ranging from November 2018 to April 2038. The actual protection a patent provides, which can vary from country to country, depends upon the type of patent, the scope of its coverage, and the availability of legal remedies in each country. We believe, however, that the duration of our patents generally exceeds the life cycles of the technologies disclosed and claimed in the patents.

We believe our trademarks are important assets and we aggressively manage our brands. We also own a number of trademarks in the United States and foreign countries, including registered trademarks for Nordson, Asymtek, Avalon, Dage, EFD, Value Plastics and Xaloy and various common law trademarks which are important to our business, inasmuch as they identify Nordson and our products to our customers. As of October 31, 2018, we had a total of 884 trademark registrations in the United States and in various foreign countries.

We rely upon a combination of nondisclosure and other contractual arrangements and trade secret laws to protect our proprietary rights and also enter into confidentiality and intellectual property agreements with our employees that require them to disclose any inventions created during employment, convey all rights to inventions to us, and restrict the distribution of proprietary information.

We protect and promote our intellectual property portfolio and take those actions we deem appropriate to enforce our intellectual property rights and to defend our right to sell our products. Although in aggregate our intellectual property is important to our operations, we do not believe that the loss of any one patent, trademark, or group of related patents or trademarks would have a material adverse effect on our results of operations or financial position of our overall business.

Seasonal Variation in Business

Generally, the highest volume of sales occurs in the second half of the year due in large part to the timing of customers' capital spending programs. Accordingly, first quarter sales volume is typically the lowest of the year due to timing of customers' capital spending programs and customer holiday shutdowns.

Working Capital Practices

No special or unusual practices affect our working capital. We generally require advance payments as deposits on customized equipment and systems and, in certain cases, require progress payments during the manufacturing of these products. We continue to initiate new processes focused on reduction of manufacturing lead times, resulting in lower investment in inventory while maintaining the capability to respond promptly to customer needs.

Customers

We serve a broad customer base, both in terms of industries and geographic regions. In 2018, no single customer accounted for ten percent or more of sales.

Backlog

Our backlog of open orders were relatively consistent at approximately $394,000 at October 31, 2018 and approximately $397,000 at October 31, 2017, inclusive of approximately three percent decline in organic growth, offset by two percent growth due to acquisitions. The amounts for both years were calculated based upon exchange rates in effect at October 31, 2018. All orders in the 2018 year-end backlog are expected to be shipped to customers in 2019.

Government Contracts

Our business neither includes nor depends upon a significant amount of governmental contracts or subcontracts. Therefore, no material part of our business is subject to renegotiation or termination at the option of the government.

Competitive Conditions

Our equipment is sold in competition with a wide variety of alternative bonding, sealing, finishing, coating, processing, testing, inspecting, and fluid control techniques. Potential uses for our equipment include any production processes that require preparation, modification or curing of surfaces; dispensing, application, processing or control of fluids and materials; or testing and inspecting for quality.

Many factors influence our competitive position, including pricing, product quality and service. We maintain a leadership position in our business segments by delivering high-quality, innovative products and technologies, as well as service and technical support. Working with customers to understand their processes and developing the application solutions that help them meet their production requirements also contributes to our leadership position. Our worldwide network of direct sales and technical resources also is a competitive advantage.

Environmental Compliance

We are subject to federal, state, local and foreign environmental, safety and health laws and regulations concerning, among other things, emissions to the air, discharges to land and water and the generation, handling, treatment and disposal of hazardous waste and other materials. Under certain of these laws, we can be held strictly liable for hazardous substance contamination of any real property we have ever owned, operated or used as a disposal site or for natural resource damages associated with such contamination. We are also required to maintain various related permits and licenses, many of which require periodic modification and renewal. The operation of manufacturing plants unavoidably entails environmental, safety and health risks, and we could incur material unanticipated costs or liabilities in the future if any of these risks were realized in ways or to an extent that we did not anticipate.

We believe that we operate in compliance, in all material respects, with applicable environmental laws and regulations. Compliance with environmental laws and regulations requires continuing management effort and expenditures. We have incurred, and will continue to incur, costs and capital expenditures to comply with these laws and regulations and to obtain and maintain the necessary permits and licenses. We believe that the cost of complying with environmental laws and regulations will not have a material effect on our earnings, liquidity or competitive position but cannot assure that material compliance-related costs and expenses may not arise in the future. For example, future adoption of new or amended environmental laws, regulations or requirements or newly discovered contamination or other circumstances could require us to incur costs and expenses that may have a material effect, but cannot be presently anticipated.

We believe that policies, practices and procedures have been properly designed to prevent unreasonable risk of material environmental damage arising from our operations. We accrue for estimated environmental liabilities with charges to expense and believe our environmental accrual is adequate to provide for our portion of the costs of all such known environmental liabilities. Compliance with federal, state, local and foreign environmental protection laws during 2018 had no material effect on our capital expenditures, earnings or competitive position. Based upon consideration of currently available information, we believe liabilities for environmental matters will not have a material adverse effect on our financial position, operating results or liquidity, but we cannot assure that material environmental liabilities may not arise in the future.

Employees

As of October 31, 2018, we had 7,536 full-time and part-time employees, including 134 at our Amherst, Ohio, facility who are represented by a collective bargaining agreement that expires on October 31, 2019.

Available Information

Our proxy statement, annual report to the Securities and Exchange Commission (Form 10-K), quarterly reports (Form 10-Q) and current reports (Form 8-K) and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934 are available free of charge at http://www.nordson.com/investors as soon as reasonably practical after such material is electronically filed with, or furnished to, the SEC. Copies of these reports may also be obtained free of charge by sending written requests to Corporate Communications, Nordson Corporation, 28601 Clemens Road, Westlake, Ohio 44145. The contents of our Internet website are not incorporated by reference herein and are not deemed to be a part of this report.

Item 1A. Risk Factors

In an enterprise as diverse as ours, a wide range of factors could affect future performance. We discuss in this section some of the risk factors that, if they actually occurred, could materially and adversely affect our business, financial condition, value and results of operations. You should consider these risk factors in connection with evaluating the forward-looking statements contained in this Annual Report on Form 10-K because these factors could cause our actual results and financial condition to differ materially from those projected in forward-looking statements.

The significant risk factors affecting our operations include the following:

Changes in United States or international economic conditions, including declines in the industries we serve, could adversely affect the profitability of any of our operations.

In 2018, approximately 32 percent of our revenue was generated in the United States, while approximately 68 percent was generated outside the United States. Our largest markets include appliance, automotive, construction, container, electronics assembly, food and beverage, furniture, medical, metal finishing, nonwovens, packaging, paper and paperboard converting, plastics processing and semiconductor. A slowdown in any of these specific end markets could directly affect our revenue stream and profitability.

A portion of our product sales is attributable to industries and markets, such as the semiconductor, mobile electronics, polymer processing and metal finishing industries, which historically have been cyclical and sensitive to relative changes in supply and demand and general economic conditions. The demand for our products depends, in part, on the general economic conditions of the industries or national economies of our customers. Downward economic cycles in our customers' industries or countries may reduce sales of some of our products. It is not possible to predict accurately the factors that will affect demand for our products in the future.

Any significant downturn in the health of the general economy, globally, regionally or in the markets in which we sell products, could have an adverse effect on our revenues and financial performance, resulting in impairment of assets.

If we fail to develop new products, or our customers do not accept the new products we develop, our revenue and profitability could be adversely impacted.

Innovation is critical to our success. We believe that we must continue to enhance our existing products and to develop and manufacture new products with improved capabilities in order to continue to be a leading provider of precision technology solutions for the industrial equipment market. We also believe that we must continue to make improvements in our productivity in order to maintain our competitive position. Difficulties or delays in research, development or production of new products or failure to gain market acceptance of new products and technologies may reduce future sales and adversely affect our competitive position. We continue to invest in the development and marketing of new products. There can be no assurance that we will have sufficient resources to make such investments, that we will be able to make the technological advances necessary to maintain competitive advantages or that we can recover major research and development expenses. If we fail to make innovations, launch products with quality problems or the market does not accept our new products, our financial condition, results of operations, cash flows and liquidity could be adversely affected. In addition, as new or enhanced products are introduced, we must successfully manage the transition from older products to minimize disruption in customers' ordering patterns, avoid excessive levels of older product inventories and ensure that we can deliver sufficient supplies of new products to meet customers' demands.

Increased IT security threats and more sophisticated and targeted computer crime could pose a risk to our systems, networks, products, solutions and services.

We have experienced and expect to continue to experience cyber-attacks to our systems and networks. To date, we have not experienced any material breaches or material losses related to cyber-attacks. To conduct our business, we rely extensively on information technology systems, networks and services, some of which are managed, hosted and provided by third-party service providers. Increased global IT security threats and more sophisticated and targeted computer crime pose a risk to the security of our systems and networks and those of our third-party service providers and the confidentiality, availability and integrity of our data. Depending on their nature and scope, such threats could potentially lead to the compromising of confidential information, including but not limited to confidential information relating to customer or employee data, improper use of our systems and networks, manipulation and destruction of data, defective products, production downtimes and operational disruptions, which in turn could adversely affect our reputation, competitiveness and results of operations. A cyber-attack or other disruption may also result in financial loss, including potential fines for failure to safeguard data. Our insurance coverage may not be adequate to cover all the costs arising from such events.

We have taken steps and incurred costs to further strengthen the security of our computer systems and continue to assess, maintain and enhance the ongoing effectiveness of our information security systems. While we attempt to mitigate these risks by employing a number of measures, including employee training, comprehensive monitoring of our networks and systems, and maintenance of backup and protective systems, our systems, networks, products, solutions and services remain potentially vulnerable to advanced persistent threats. The techniques used by criminals to obtain unauthorized access to sensitive data change frequently and often are not recognizable until launched against a target. Accordingly, we may be unable to anticipate these techniques or implement adequate preventative measures. It is therefore possible that in the future we may suffer a criminal attack, unauthorized parties may gain access to personal information in our possession and we may not be able to identify any such incident in a timely manner.

The interpretation and application of data protection laws, including federal, state and international laws, relating to the collection, use, retention, disclosure, security and transfer of personally identifiable data in the U.S., Europe (including but not limited to the European Union's General Data Protection Regulation), and elsewhere, are uncertain and evolving. It is possible that these laws may be interpreted and applied in a manner that is inconsistent with our data practices. In addition, as a result of existing or new data protection requirements, we incur and expect to continue to incur significant ongoing operating costs as part of our significant efforts to protect and safeguard our sensitive data and personal information. These efforts also may divert management and employee attention from other business and growth initiatives. A breach in information privacy could result in legal or reputational risks and could have a negative impact on our revenues and results of operations.

Our results could be impacted by changes in tariffs, trade agreements or other trade restrictions imposed by the U.S. or other governments.

Our ability to conduct business can be significantly impacted by changes in tariffs, changes or repeals of trade agreements, including withdrawal from or material modifications to North American Free Trade Agreement, the implementation of the United States-Mexico-Canada Agreement, or certain other international trade agreements, or other trade restrictions or retaliatory actions imposed by various governments. Other effects of these changes, including impacts on the price of raw materials, responsive actions from governments and the opportunity for competitors to establish a presence in markets where we participate, could also have significant impacts on our results.

Our growth strategy includes acquisitions, and we may not be able to execute on our acquisition strategy or integrate acquisitions successfully.

Our recent historical growth has depended, and our future growth is likely to continue to depend, in part on our acquisition strategy and the successful integration of acquired businesses into our existing operations. 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. We cannot assure we will be able to successfully identify suitable acquisition opportunities, prevail against competing potential acquirers, negotiate appropriate acquisition terms, obtain financing that may be needed to consummate such acquisitions, complete proposed acquisitions, successfully integrate acquired businesses into our existing operations or expand into new markets. In addition, we cannot assure that any acquisition, once successfully integrated, will perform as planned, be accretive to earnings, or prove to be beneficial to our operations and cash flow.

The success of our acquisition strategy is subject to other risks and uncertainties, including:

- our ability to realize operating efficiencies, synergies or other benefits expected from an acquisition, and possible delays in realizing the benefits of the acquired company or products;
- diversion of management’s time and attention from other business concerns;
- difficulties in retaining key employees, customers or suppliers of the acquired business;
- difficulties in maintaining uniform standards, controls, procedures and policies throughout acquired companies;
- adverse effects on existing business relationships with suppliers or customers;
- the risks associated with the assumption of product liabilities, contingent or undisclosed liabilities of acquisition targets; and
- the ability to generate future cash flows or the availability of financing.

In addition, an acquisition could adversely impact our operating performance as a result of the incurrence of acquisition-related debt, pre-acquisition potential tax liabilities, acquisition expenses, the amortization of acquisition-acquired assets, or possible future impairments of goodwill or intangible assets associated with the acquisition.

We may also face liability with respect to acquired businesses for violations of environmental laws occurring prior to the date of our acquisition, and some or all of these liabilities may not be covered by environmental insurance secured to mitigate the risk or by indemnification from the sellers from which we acquired these businesses. We could also incur significant costs, including, but not limited to, remediation costs, natural resources damages, civil or criminal fines and sanctions and third-party claims, as a result of past or future violations of, or liabilities, associated with environmental laws.

Significant movements in foreign currency exchange rates or change in monetary policy may harm our financial results.

We are exposed to fluctuations in foreign currency exchange rates, particularly with respect to the euro, the yen, the pound sterling and the Chinese yuan. Any significant change in the value of the currencies of the countries in which we do business against the United States dollar could affect our ability to sell products competitively and control our cost structure, which could have a material adverse effect on our business, financial condition and results of operations. For additional detail related to this risk, see Item 7A, Quantitative and Qualitative Disclosure About Market Risk.

The majority of our consolidated revenues in 2018 were generated in currencies other than the United States dollar, which is our reporting currency. We recognize foreign currency transaction gains and losses arising from our operations in the period incurred. As a result, currency fluctuations between the United States dollar and the currencies in which we do business have caused and will continue to cause foreign currency transaction and translation gains and losses, which historically have been material and could continue to be material. We cannot predict the effects of exchange rate fluctuations upon our future operating results because of the number of currencies involved, the variability of currency exposures and the potential volatility of currency exchange rates. We take actions to manage our foreign currency exposure, such as entering into hedging transactions, where available, but we cannot assure that our strategies will adequately protect our consolidated operating results from the effects of exchange rate fluctuations. For example, the announcement of Brexit and subsequent steps taken by Britain to begin withdrawal from the European Union caused volatility in global currency exchange rate fluctuations that resulted in the strengthening of the United States dollar against foreign currencies in which we conduct business. Future adverse consequences arising from Brexit may include continued volatility in exchange rates. Any significant fluctuation in exchange rates may be harmful to our financial condition and results of operations. We also face risks arising from the imposition of exchange controls and currency devaluations. Exchange controls may limit our ability to convert foreign currencies into United States dollars or to remit dividends and other payments by our foreign subsidiaries or customers located in or conducting business in a country imposing controls. Currency devaluations diminish the United States dollar value of the currency of the country instituting the devaluation and, if they occur or continue for significant periods, could adversely affect our earnings or cash flow.

Any impairment in the value of our intangible assets, including goodwill, would negatively affect our operating results and total capitalization.

Our total assets reflect substantial intangible assets, primarily goodwill. The goodwill results from our acquisitions and represents the excess of cost over the fair value of the identifiable net assets we acquired. We assess at least annually whether there has been any impairment in the value of our intangible assets. If future operating performance at one or more of our business units were to fall significantly below current levels, if competing or alternative technologies emerge, if market conditions for acquired businesses decline, if significant and prolonged negative industry or economic trends exist, if our stock price and market capitalization declines, or if future cash flow estimates decline, we could incur, under current applicable accounting rules, a non-cash charge to operating earnings for goodwill impairment. Any determination requiring the write-off of a significant portion of unamortized intangible assets would negatively affect our results of operations and equity book value, the effect of which could be material.

Changes in United States and international tax law may have a material adverse effect on our business, financial condition and results of operations.

We are subject to income taxes in the United States and various foreign jurisdictions. Changes in applicable domestic or foreign tax laws and regulations, or their interpretation and application, including the possibility of retroactive effect, could affect our business, financial condition and profitability by increasing our tax liabilities. Our future results of operations could be adversely affected by changes in our effective tax rate as a result of a change in the mix of earnings in jurisdictions with differing statutory tax rates, changes in our overall profitability, changes in tax legislation and rates, changes in generally accepted accounting principles and changes in the valuation of deferred tax assets and liabilities. The U.S. federal government may adopt changes to international trade agreements, tariffs, taxes and other government rules and regulations. While we cannot predict what changes will actually occur with respect to any of these items, such changes could affect our business and results of operations.

If our intellectual property protection is inadequate, others may be able to use our technologies and tradenames and thereby reduce our ability to compete, which could have a material adverse effect on us, our financial condition and results of operations.

We regard much of the technology underlying our products and the trademarks under which we market our products as proprietary. The steps we take to protect our proprietary technology may be inadequate to prevent misappropriation of our technology, or third parties may independently develop similar technology. We rely on a combination of patents, trademark, copyright and trade secret laws, employee and third-party non-disclosure agreements and other contracts to establish and protect our technology and other intellectual property rights. The agreements may be breached or terminated, and we may not have adequate remedies for any breach, and existing trade secrets, patent and copyright law afford us limited protection. Policing unauthorized use of our intellectual property is difficult. A third party could copy or otherwise obtain and use our products or technology without authorization. Litigation may be necessary for us to defend against claims of infringement or to protect our intellectual property rights and could result in substantial cost to us and diversion of our efforts. Further, we might not prevail in such litigation, which could harm our business.

Our products could infringe on the intellectual property of others, which may cause us to engage in costly litigation and, if we are not successful, could cause us to pay substantial damages and prohibit us from selling our products.

Third parties may assert infringement or other intellectual property claims against us based on their patents or other intellectual property claims, and we may have to pay substantial damages, possibly including treble damages, if it is ultimately determined our products infringe. We may have to obtain a license to sell our products if it is determined that our products infringe upon another party's intellectual property. We might be prohibited from selling our products before we obtain a license, which, if available at all, may require us to pay substantial royalties. Even if infringement claims against us are without merit, defending these types of lawsuits takes significant time, may be expensive and may divert management attention from other business concerns.

We may be exposed to liabilities under the Foreign Corrupt Practices Act (FCPA), which could have a material adverse effect on our business.

We are subject to compliance with various laws and regulations, including the FCPA and similar worldwide anti-bribery and anti-corruption laws, which generally prohibit companies and their intermediaries from engaging in bribery or making other improper payments to private or public parties for the purpose of obtaining or retaining business or gaining an unfair business advantage. The FCPA also requires proper record keeping and characterization of such payments in our reports filed with the SEC. Our employees are trained and required to comply with these laws, and we are committed to legal compliance and corporate ethics. Violations of these laws could result in severe criminal or civil sanctions and financial penalties and other consequences that may have a material adverse effect on our business, reputation, financial condition or results of operations.

Our inability to comply with our existing credit facilities' restrictive covenants or to access additional sources of capital could impede growth or the repayment or refinancing of existing indebtedness.

The limits imposed on us by the restrictive covenants contained in our credit facilities could prevent us from making acquisitions or cause us to lose access to these facilities.

Our existing credit facilities contain restrictive covenants that limit our ability to, among other things:

- borrow money or guarantee the debts of others;
- use assets as security in other transactions;

- make restricted payments or distributions; and
- sell or acquire assets or merge with or into other companies.

In addition, our credit facilities require us to meet financial ratios, including a “Leverage Ratio” and an “Interest Coverage Ratio,” both as defined in the credit facilities.

These restrictions could limit our ability to plan for or react to market conditions or meet extraordinary capital needs and could otherwise restrict our financing activities.

Our ability to comply with the covenants and other terms of our credit facilities will depend on our future operating performance. If we fail to comply with such covenants and terms, we may be in default and the maturity of the related debt could be accelerated and become immediately due and payable. We may be required to obtain waivers from our lenders in order to maintain compliance under our credit facilities, including waivers with respect to our compliance with certain financial covenants. If we are unable to obtain necessary waivers and the debt under our credit facilities is accelerated, we would be required to obtain replacement financing at prevailing market rates.

We may need new or additional financing in the future to expand our business or refinance existing indebtedness. If we are unable to access capital on satisfactory terms and conditions, we may not be able to expand our business or meet our payment requirements under our existing credit facilities. Our ability to obtain new or additional financing will depend on a variety of factors, many of which are beyond our control. We may not be able to obtain new or additional financing because we have substantial debt or because we may not have sufficient cash flow to service or repay our existing or future debt. In addition, depending on market conditions and our financial performance, neither debt nor equity financing may be available on satisfactory terms or at all. Finally, as a consequence of worsening financial market conditions, our credit facility providers may not provide the agreed credit if they become undercapitalized.

Changes in interest rates could adversely affect us.

Any period of interest rate increases may also adversely affect our profitability. At October 31, 2018, we had $1,314,091 of total debt and notes payable outstanding, of which 51 percent was priced at interest rates that float with the market. A one percentage point increase in the interest rate on the floating rate debt in 2018 would have resulted in approximately $10,672 of additional interest expense. A higher level of floating rate debt would increase the exposure to changes in interest rates. For additional detail related to this risk, see Item 7A, Quantitative and Qualitative Disclosure About Market Risk.

Failure to retain our existing senior management team or the inability to attract and retain qualified personnel could hurt our business and inhibit our ability to operate and grow successfully.

Our success will continue to depend to a significant extent on the continued service of our executive management team and the ability to recruit, hire and retain other key management personnel to support our growth and operational initiatives and replace executives who retire or resign. Failure to retain our leadership team and attract and retain other important management and technical personnel could place a constraint on our global growth and operational initiatives, possibly resulting in inefficient and ineffective management and operations, which would likely harm our revenues, operations and product development efforts and eventually result in a decrease in profitability.

The level of returns on pension plan assets and changes in the actuarial assumptions used could adversely affect us.

Our operating results may be positively or negatively impacted by the amount of expense we record for our defined benefit pension plans. U.S. GAAP requires that we calculate pension expense using actuarial valuations, which are dependent upon our various assumptions including estimates of expected long-term rate of return on plan assets, discount rates for future payment obligations, and the expected rate of increase in future compensation levels. Our pension expense and funding requirements may also be affected by our actual return on plan assets and by legislation and other government regulatory actions. Changes in assumptions, laws or regulations could lead to variability in operating results and could have a material adverse impact on liquidity.

Political conditions in the U.S. and foreign countries in which we operate could adversely affect us.

We conduct our manufacturing, sales and distribution operations on a worldwide basis and are subject to risks associated with doing business outside the United States. In 2018, approximately 68 percent of our total sales were generated outside the United States. We expect that international operations and United States export sales will continue to be important to our business for the foreseeable future. Both sales from international operations and export sales are subject in varying degrees to risks inherent in doing business outside the United States. Such risks include, but are not limited to, the following:

- risks of political or economic instability, such as Brexit;

- unanticipated or unfavorable circumstances arising from host country laws or regulations;
- threats of war, terrorism or governmental instability;
- changes in tax rates, adoption of new tax laws or other additional tax policies, including the implementation of the Tax Cuts and Jobs Act of 2017 and other proposals to reform United States and foreign tax laws that impact how United States multinational corporations are taxed on foreign earnings;
- restrictions on the transfer of funds into or out of a country;
- potential negative consequences from changes to taxation policies;
- the disruption of operations from labor and political disturbances;

- the imposition of tariffs, import or export licensing requirements and other potential changes in trade policies and relations arising from policy initiatives implemented by the current U.S. presidential administration; and
- exchange controls or other trade restrictions including transfer pricing restrictions when products produced in one country are sold to an affiliated entity in another country.

Any of these events could reduce the demand for our products, limit the prices at which we can sell our products, interrupt our supply chain, or otherwise have an adverse effect on our operating performance.

Our international operations also depend upon favorable trade relations between the U.S. and those foreign countries in which our customers, subcontractors and materials suppliers have operations. A protectionist trade environment in either the U.S. or those foreign countries in which we do business, such as a change in the current tariff structures, export compliance or other trade policies, may materially and adversely affect our ability to sell our products in foreign markets. The current U.S. presidential administration has criticized existing trade agreements, and while it is currently unclear what actions the administration may take with respect to existing and proposed trade agreements, or restrictions on trade generally, more stringent export and import controls may be ultimately imposed in the future.

Our business and operating results may be adversely affected by natural disasters or other catastrophic events beyond our control.

While we have taken precautions to prevent production and service interruptions at our global facilities, severe weather conditions such as hurricanes or tornadoes, as well as major earthquakes, wildfires and other natural disasters, as well as cyberterrorism, in areas in which we have manufacturing facilities or from which we obtain products may cause physical damage to our properties, closure of one or more of our manufacturing or distribution facilities, lack of an adequate work force in a market, temporary disruption in the supply of inventory, disruption in the transport of products and utilities, and delays in the delivery of products to our customers. Any of these factors may disrupt our operations and adversely affect our financial condition and results of operations.

The insurance that we maintain may not fully cover all potential exposures.

We maintain property, business interruption and casualty insurance but such insurance may not cover all risks associated with the hazards of our business and is subject to limitations, including deductibles and maximum liabilities covered. We are potentially at risk if one or more of our insurance carriers fail. Additionally, severe disruptions in the domestic and global financial markets could adversely impact the ratings and survival of some insurers. In the future, we may not be able to obtain coverage at current levels, and our premiums may increase significantly on coverage that we maintain.

Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

The following table summarizes our principal properties as of October 31, 2018:

Location	Description of Property	Approximate Square Feet
Amherst, Ohio [2, 3]	A manufacturing, laboratory and office complex	521,000
Austintown, Ohio [1]	A manufacturing, warehouse and office building (leased)	207,000
Carlsbad, California [2]	Three manufacturing and office buildings (leased)	181,000
Duluth, Georgia [1]	A manufacturing, laboratory and office building	176,000
Norwich, Connecticut [2]	A manufacturing, laboratory and office building	159,000
Chippewa Falls, Wisconsin [1]	Three manufacturing, warehouse and office buildings (leased)	151,000
Swainsboro, Georgia [1]	A manufacturing building (leased)	136,000
East Providence, Rhode Island [2]	A manufacturing, warehouse and office building	116,000
Loveland, Colorado [2]	A manufacturing, warehouse and office building	115,000
Robbinsville, New Jersey [2]	A manufacturing, warehouse and office building (leased)	88,000
Minneapolis, Minnesota [2]	Two office, laboratory and warehouse buildings (leased)	69,000
Wixom, Michigan [3]	A manufacturing, warehouse and office building (leased)	64,000
Salem, New Hampshire [2]	A manufacturing, warehouse and office building (leased)	63,000
Vista, California [2]	A manufacturing building (leased)	41,000
Hickory, North Carolina [1]	A manufacturing, warehouse and office building (leased)	41,000
Marlborough, Massachusetts [2]	An office, laboratory and warehouse building (leased)	30,000
Westlake, Ohio	Corporate headquarters	28,000
Spokane, Washington [2]	A manufacturing, warehouse and office building (leased)	27,000
Chattanooga, Tennessee [2]	A manufacturing, warehouse and office building (leased)	25,000
Sunnyvale, California [2]	Two office, laboratory and warehouse buildings (leased)	24,000
Boulder, Colorado [2]	Two office and laboratory buildings (leased)	21,000
Huntington Beach, California [2]	An office, laboratory and warehouse building (leased)	21,000
Concord, California [2]	A manufacturing and office building (leased)	12,000
Ventura, California [2]	Two manufacturing, warehouse and office buildings (leased)	11,000
Münster, Germany [1]	Four manufacturing, warehouse and office buildings (leased)	215,000
Shanghai, China [1, 2, 3]	Three manufacturing, warehouse, laboratory and office buildings	178,000
Shanghai, China [1,2, 3]	Three manufacturing, warehouse and office buildings (leased)	160,000
Lüneburg, Germany [1]	A manufacturing and laboratory building	129,000
Guaymas, Mexico [2]	Three manufacturing, warehouse and office buildings (leased)	89,000
Tokyo, Japan [1, 2, 3]	Four office, laboratory and warehouse buildings (leased)	75,700
Bangalore, India [1, 2, 3]	A manufacturing, warehouse and office building	56,000
Maastricht, Netherlands [1, 2, 3]	A manufacturing, warehouse and office building	54,000
Chonburi, Thailand [1]	A manufacturing, warehouse and office building	52,000
Erkrath, Germany [1, 2, 3]	An office, laboratory and warehouse building (leased)	48,000
Boyle, Ireland [2]	A manufacturing, warehouse and office building (leased)	47,000
Deurne, Netherlands [2]	A manufacturing, warehouse and office building (leased)	46,000
Munich, Germany [2]	An office, laboratory and warehouse buildings (leased)	43,000
Suzhou, China [2]	A manufacturing, warehouse and office building (leased)	42,000
Aylesbury, U.K. [1, 2]	A manufacturing, warehouse and office building (leased)	36,000

Galway, Ireland [2]	An office, laboratory and warehouse building (leased)	36,000
Seongnam-City, South Korea [1, 2, 3]	An office, laboratory and warehouse building (leased)	35,000
Pirmasens, Germany [1]	A manufacturing, warehouse and office building (leased)	32,000
Sao Paulo, Brazil [1, 2, 3]	An office, laboratory and warehouse building (leased)	23,000
El Marques, Mexico [1, 2, 3]	A warehouse and office building (leased)	22,000
Singapore [1, 2, 3]	Two warehouse and office buildings (leased)	22,000
Katzrin, Israel [2]	An office, laboratory and warehouse building (leased)	20,000
Selangos, Malaysia [1, 3]	A laboratory and office building (leased)	17,000

Business Segment - Property Identification Legend

1 - Adhesive Dispensing Systems

2 - Advanced Technology Systems

3 - Industrial Coating Systems

The facilities listed have adequate, suitable and sufficient capacity (production and nonproduction) to meet present and foreseeable demand for our products.

Other properties at international subsidiary locations and at branch locations within the United States are leased. Lease terms do not exceed 25 years and generally contain a provision for cancellation with some penalty at an earlier date. Information about leases is reported in Note 10 of Notes to Consolidated Financial Statements that can be found in Part II, Item 8 of this document.

Item 3. Legal Proceedings

We are involved in pending or potential litigation regarding environmental, product liability, patent, contract, employee and other matters arising from the normal course of business. Including the environmental matter discussed below, after consultation with legal counsel, we believe that the probability is remote that losses in excess of the amounts we have accrued would have a material adverse effect on our financial condition, quarterly or annual operating results or cash flows.

Environmental – We have voluntarily agreed with the City of New Richmond, Wisconsin and other Potentially Responsible Parties to share costs associated with the remediation of the City of New Richmond municipal landfill (the “Site”) and constructing a potable water delivery system serving the impacted area down gradient of the Site. At October 31, 2018 and 2017, our accrual for the ongoing operation, maintenance and monitoring obligation at the Site was $439 and $472, respectively.

The liability for environmental remediation represents management’s best estimate of the probable and reasonably estimable undiscounted costs related to known remediation obligations. The accuracy of our estimate of environmental liability is affected by several uncertainties such as additional requirements that may be identified in connection with remedial activities, the complexity and evolution of environmental laws and regulations, and the identification of presently unknown remediation requirements. Consequently, our liability could be different than our current estimate. However, we do not expect that the costs associated with remediation will have a material adverse effect on our financial condition or results of operations.

Item 4. Mine Safety Disclosures

None.

Executive Officers of the Company

Our executive officers as of October 31, 2018, were as follows:

Name	Age	Officer Since	Position or Office with The Company and Business Experience During the Past Five (5) Year Period
Michael F. Hilton	64	2010	President and Chief Executive Officer, 2010
Gregory A. Thaxton	57	2007	Executive Vice President, Chief Financial Officer, 2012
Gina A. Beredo	44	2018	Executive Vice President, General Counsel and Secretary, 2018
James E. DeVries	59	2012	Executive Vice President, 2012

John J. Keane	57	2003	Executive Vice President, 2005
Stephen P. Lovass	49	2017	Executive Vice President, 2017
Gregory P. Merk	47	2006	Executive Vice President, 2013
Shelly M. Peet	53	2007	Executive Vice President, 2009
Jeffrey A. Pembroke	51	2015	Executive Vice President, 2015
Joseph Stockunas	58	2015	Executive Vice President, 2015

Effective January 1, 2018, Ms. Beredo was appointed Executive Vice President, General Counsel and Secretary. Ms. Beredo served as Deputy General Counsel and Assistant Secretary since joining the Company in 2013. Prior to joining the Company, Ms. Beredo served as Chief Litigation Counsel and Director of Compliance & Ethics at American Greetings Corporation, formerly traded on the NYSE. Prior to joining American Greetings, Ms. Beredo was an associate at BakerHostetler LLP.

On November 28, 2016, Mr. Lovass was elected as Corporate Vice President. Prior to joining the Company, Mr. Lovass served as President for one of the global sensors and controls businesses for Danaher Corporation, a publicly-traded, international Fortune 200, diversified science and technology company from 2012 to 2016. Prior to joining Danaher, Mr. Lovass served as a Senior Vice President and Corporate Officer for Gerber Scientific.

PART II

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

Market Information and Dividends

(a) Our common shares are listed on the Nasdaq Global Select Market under the symbol NDSN. As of November 30, 2018, there were 1,406 record shareholders.

While we have historically paid dividends to shareholders of our common stock on a quarterly basis, the declaration and payment of future dividends will depend on many factors, including but not limited to, our earnings, financial condition, business development needs and regulatory considerations, and are at the discretion of our board of directors.

Performance Graph

The following is a graph that compares the 10-year cumulative return, calculated on a dividend-reinvested basis, from investing $100 on November 1, 2008 in Nordson common shares, the S&P 500 Index, the S&P MidCap 400 Index, the S&P 500 Industrial Machinery Index, the S&P MidCap 400 Industrial Machinery Index and our Proxy Peer Group, which includes: AIN, AME, ATU, B, DCI, ENTG, ESL, FLIR, GGG, GTLS, IEX, ITT, KEYS, LECO, ROP, TER, WTS, and WWD.

Company/Market/Peer Group	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Nordson Corporation	$100.00	$149.23	$226.27	$274.10	$356.22	$439.17	$471.10	$443.80	$632.04	$807.21	$788.83
S&P 500 Index	$100.00	$109.80	$127.94	$138.29	$159.32	$202.61	$237.60	$249.95	$261.23	$322.96	$346.68
S&P MidCap 400	$100.00	$118.18	$150.84	$163.74	$183.57	$245.03	$273.58	$282.95	$300.65	$371.23	$375.02
S&P 500 Ind. Machinery	$100.00	$133.81	$171.21	$177.14	$211.99	$302.70	$341.34	$340.82	$389.16	$536.52	$495.05
S&P MidCap 400 Ind. Machinery	$100.00	$123.61	$160.67	$182.73	$199.57	$277.07	$293.61	$245.77	$288.44	$413.70	$404.98
Peer Group	$100.00	$108.45	$133.57	$150.02	$171.39	$238.19	$262.44	$252.27	$259.12	$388.10	$399.03

Source: Zack’s Investment Research

(b) Use of Proceeds. Not applicable.

(c) Issuer Purchases of Equity Securities

	Total Number of Shares Repurchased(1)	Average Price Paid per Share	Total Number of Shares Repurchased as Part of Publicly Announced Plans or Programs(2)	Maximum Value of Shares That May Yet Be Purchased Under the Plans or Programs
August 1, 2018 to August 31, 2018	—	$—	—	$ 118,971
September 1, 2018 to September 30, 2018	25	$144.63	24	$ 615,471
October 1, 2018 to October 31, 2018	121	$127.33	121	$ 600,032
Total	146		145	

(1) Includes shares tendered for taxes related to vesting of restricted stock.

(2) In December 2014, the board of directors authorized a $300,000 common share repurchase program. In August 2015, the board of directors authorized the repurchase of up to an additional $200,000 of the Company's common shares. In August 2018, the board of directors authorized the repurchase of an additional $500,000 of the Company's common shares. Approximately $600,032 of the total $1,000,000 authorized remained available for share repurchases at October 31, 2018. Uses for repurchased shares include the funding of benefit programs including stock options, restricted stock and 401(k) matching. Shares purchased are treated as treasury shares until used for such purposes. The repurchase program is being funded using cash from operations and proceeds from borrowings under our credit facilities.

Item 6. Selected Financial Data

(In thousands except for per-share amounts)	2018	2017	2016	2015	2014
Operating Data (a)					
Sales	$2,254,668	$2,066,982	$1,808,994	$1,688,666	$1,704,021
Cost of sales	1,018,703	927,981	815,495	774,702	758,923
% of sales	45	45	45	46	45
Selling and administrative expenses	734,856	678,861	594,293	584,823	575,442
% of sales	33	33	33	35	34
Severance and restructuring costs	6,552	2,438	10,775	11,411	2,551
Operating profit	494,557	457,702	388,431	317,730	367,105
% of sales	22	22	21	19	22
Net income	377,375	295,802	271,843	211,111	246,773
% of sales	17	14	15	13	14
Financial Data (a) (e)					
Working capital	$533,822	$240,626	$414,032	$420,815	$301,815
Net property, plant and equipment and other non-current assets	2,536,910	2,526,167	1,675,008	1,646,723	1,606,274
Total capital (b)	2,669,154	2,648,094	1,767,369	1,724,211	1,661,110
Total assets	3,421,012	3,414,539	2,420,583	2,358,314	2,278,957
Long-term liabilities	1,619,991	1,611,300	1,237,437	1,407,522	1,003,292
Shareholders' equity	1,450,741	1,155,493	851,603	660,016	904,797
Return on average total capital — % (c)	15	14	16	13	17
Return on average shareholders' equity — % (d)	28	30	37	26	27
Per-Share Data (a)					
Average number of common shares	57,970	57,533	57,060	60,652	63,656
Average number of common shares and common share equivalents	58,931	58,204	57,530	61,151	64,281
Basic earnings per share	$6.51	$5.14	$4.76	$3.48	$3.88
Diluted earnings per share	6.40	5.08	4.73	3.45	3.84
Dividends per common share	1.25	1.11	0.99	0.90	0.76
Book value per common share	25.00	20.02	14.86	11.51	14.49

(a) See accompanying Notes to Consolidated Financial Statements.
(b) Notes payable, plus current portion of long-term debt, plus long-term debt, minus cash and marketable securities, plus shareholders' equity.
(c) Net income plus after-tax interest expense on borrowings as a percentage of the average of quarterly borrowings (net of cash) plus shareholders' equity over the last five quarterly accounting periods.
(d) Net income as a percentage of average quarterly shareholders' equity over the last five quarterly accounting periods.
(e) Certain amounts for the years 2014 through 2016 have been adjusted to reflect the retrospective application of our reclassification of debt issuance costs upon the adoption of a new accounting standard in 2017.

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

NOTE REGARDING AMOUNTS AND FISCAL YEAR REFERENCES

In this annual report, all amounts related to United States dollars and foreign currency and to the number of Nordson Corporation’s common shares, except for per share earnings and dividend amounts, are expressed in thousands. Unless the context otherwise indicates, all references to “we,” “us,” “our,” or the “Company” mean Nordson Corporation.

Unless otherwise noted, all references to years relate to our fiscal year ending October 31.

Critical Accounting Policies and Estimates

Our Consolidated Financial Statements and accompanying notes have been prepared in accordance with accounting principles generally accepted in the United States. The preparation of these financial statements requires management to make estimates, judgments and assumptions that affect reported amounts of assets, liabilities, revenues and expenses. On an ongoing basis, we evaluate the accounting policies and estimates that are used to prepare financial statements. We base our estimates on historical experience and assumptions believed to be reasonable under current facts and circumstances. Actual amounts and results could differ from these estimates used by management.

Certain accounting policies that require significant management estimates and are deemed critical to our results of operations or financial position are discussed below. On a regular basis, critical accounting policies are reviewed with the Audit Committee of the board of directors.

Revenue recognition – Most of our revenues are recognized upon shipment, provided that persuasive evidence of an arrangement exists, the sales price is fixed or determinable, collectibility is reasonably assured, and title and risk of loss have passed to the customer. Certain arrangements may include installation, installation supervision, training, and spare parts, which tend to be completed in a short period of time, at an insignificant cost, and utilizing skills not unique to us, and, therefore, are typically regarded as inconsequential or perfunctory. Revenue for undelivered items is deferred and included within accrued liabilities in the Consolidated Balance Sheet. Revenues deferred in 2018, 2017 and 2016 were not material.

Business combinations – The acquisitions of our businesses are accounted for under the acquisition method of accounting. The amounts assigned to the identifiable assets acquired and liabilities assumed in connection with acquisitions are based on estimated fair values as of the date of the acquisition, with the remainder, if any, recorded as goodwill. The fair values are determined by management, taking into consideration information supplied by the management of the acquired entities, and other relevant information. Such information typically includes valuations obtained from independent appraisal experts, which management reviews and considers in its estimates of fair values. The valuations are generally based upon future cash flow projections for the acquired assets, discounted to present value. The determination of fair values requires significant judgment by management, particularly with respect to the value of identifiable intangible assets. This judgment could result in either a higher or lower value assigned to amortizable or depreciable assets. The impact could result in either higher or lower amortization and/or depreciation expense.

Goodwill – Goodwill is the excess of purchase price over the fair value of tangible and identifiable intangible net assets acquired in various business combinations. Goodwill is not amortized but is tested for impairment annually at the reporting unit level, or more often if indications of impairment exist. Our reporting units are the Adhesive Dispensing Systems segment, the Industrial Coating Systems segment and one level below the Advanced Technology Systems segment.

We test goodwill in accordance with Accounting Standards Codification (ASC) 350. Goodwill impairment charge is recorded for the amount by which the carrying value of the reporting unit exceeds the fair value of the reporting unit, as calculated in the quantitative analysis described below. We did not record any goodwill impairment charges in 2018. We use an independent valuation specialist to assist with refining our assumptions and methods used to determine fair values using these methods. To test for goodwill impairment, we estimate the fair value of each of our reporting units using a combination of the Income Approach and the Market Approach.

The discounted cash flow method (Income Approach) uses assumptions for revenue growth, operating margin, and working capital turnover that are based on management’s strategic plans tempered by performance trends and reasonable expectations about those trends. Terminal value calculations employ a published formula known as the Gordon Growth Model Method that essentially captures the present value of perpetual cash flows beyond the last projected period assuming a constant Weighted Average Cost of Capital (WACC) methodology and growth rate. For each reporting unit, a sensitivity analysis is performed to vary the discount and terminal growth rates in order to provide a range of reasonableness for detecting impairment. Discount rates are developed using a WACC methodology. The WACC represents the blended average required rate of return for equity and debt capital based on observed market return data and company specific risk factors. For 2018, the discount rates used ranged from 9.5 percent to 12 percent depending upon the reporting unit's size, end market volatility, and projection risk.

In the application of the guideline public company method (Market Approach), fair value is determined using transactional evidence for similar publicly traded equity. The comparable company guideline group is determined based on relative similarities to each reporting unit since exact correlations are not available. An indication of fair value for each reporting unit is based on the placement of each reporting unit within a range of multiples determined for its comparable guideline company group. Valuation multiples are derived by dividing latest twelve-month performance for revenues and EBITDA into total invested capital, which is the sum of traded equity plus interest bearing debt less cash. These multiples are applied against the revenue and EBITDA of each reporting unit. While the implied indications of fair value using the guideline public company method yield meaningful results, the discounted cash flow method of the income approach includes management's thoughtful projections and insights as to what the reporting units will accomplish in the near future. Accordingly, the reasonable, implied fair value of each reporting unit is a blend based on the consideration of both the Income and Market approaches.

In 2018, 2017, and 2016, the results of our annual impairment tests indicated no impairment.

The excess of fair value (FV) over carrying value (CV) was compared to the carrying value for each reporting unit. Based on the results shown in the table below and based on our measurement date of August 1, 2018, our conclusion is that no goodwill was impaired in 2018. Potential events or circumstances, such as a sustained downturn in global economies, could have a negative effect on estimated fair values.

	WACC	Excess of FV over CV	Goodwill
Adhesive Dispensing Systems Segment	9.5%	497%	$392,740
Industrial Coating Systems Segment	11.5%	488%	$24,058
Advanced Technology Systems Segment - Electronics Systems	11.0%	564%	$27,916
Advanced Technology Systems Segment - Fluid Management	10.5%	119%	$1,095,969
Advanced Technology Systems Segment - Test & Inspection	12.0%	141%	$71,050

Pension plans and postretirement medical plans - The measurement of liabilities related to our pension plans and postretirement medical plans is based on management's assumptions related to future factors, including interest rates, return on pension plan assets, compensation increases, mortality and turnover assumptions, and health care cost trend rates.

The weighted-average discount rate used to determine the present value of our domestic pension plan obligations was 4.53 percent at October 31, 2018 and 3.80 percent at October 31, 2017. The weighted-average discount rate used to determine the present value of our various international pension plan obligations was 2.14 percent at October 31, 2018, compared to 2.07 percent at October 31, 2017. The discount rates used for all plans were determined by using quality fixed income investments with a duration period approximately equal to the period over which pension obligations are expected to be settled.

In determining the expected return on plan assets, we consider both historical performance and an estimate of future long-term rates of return on assets similar to those in our plans. We consult with and consider the opinions of financial and actuarial experts in developing appropriate return assumptions. The expected rate of return (long-term investment rate) on domestic pension assets used to determine net benefit costs was 6.00 percent in 2018 and 6.25 percent in 2017. The average expected rate of return on international pension assets used to determine net benefit costs was 3.91 percent in 2018 and 3.51 percent in 2017.

The assumed rate of compensation increases used to determine the present value of our domestic pension plan obligations was 3.90 percent at October 31, 2018, compared to 3.61 percent at October 31, 2017. The assumed rate of compensation increases used to determine the present value of our international pension plan obligations was 3.12 percent at October 31, 2018, compared to 3.13 percent at October 31, 2017.

Annual expense amounts are determined based on the discount rate used at the end of the prior year. Differences between actual and assumed investment returns on pension plan assets result in actuarial gains or losses that are amortized into expense over a period of years.

Economic assumptions have a significant effect on the amounts reported. The effect of a one percent change in the discount rate, expected return on assets and compensation increase is shown in the table below. Bracketed numbers represent decreases in expense and obligation amounts.

	United States 1% Point Increase	United States 1% Point Decrease	International 1% Point Increase	International 1% Point Decrease
Discount rate:				
Effect on total service and interest cost components in 2018	$(6,081)	$7,000	$(1,212)	$1,418
Effect on pension obligation as of October 31, 2018	$(53,084)	$66,632	$(14,279)	$17,644
Expected return on assets:				
Effect on total service and interest cost components in 2018	$(3,660)	$3,660	$(391)	$391
Compensation increase:				
Effect on total service and interest cost components in 2018	$4,648	$(3,266)	$553	$(534)
Effect on pension obligation as of October 31, 2018	$21,688	$(18,104)	$3,588	$(2,944)

With respect to the domestic postretirement medical plan, the discount rate used to value the benefit plan was 4.56 percent at October 31, 2018 and 3.86 percent at October 31, 2017. The annual rate of increase in the per capita cost of covered benefits (the health care cost trend rate) is assumed to be 3.75 percent in 2019, decreasing gradually to 3.27 percent in 2026.

For the international postretirement plan, the discount rate used to value the benefit obligation was 3.88 percent at October 31, 2018 and 3.52 percent at October 31, 2017. The annual rate of increase in the per capita cost of covered benefits (the health care cost trend rate) is assumed to be 6.35 percent in 2019, decreasing gradually to 3.50 percent in 2037.

The discount rate and the health care cost trend rate assumptions have a significant effect on the amounts reported. For example, a one-percentage point change in the discount rate and the assumed health care cost trend rate would have the following effects. Bracketed numbers represent decreases in expense and obligation amounts.

	United States 1% Point Increase	United States 1% Point Decrease	International 1% Point Increase	International 1% Point Decrease
Discount rate:				
Effect on total service and interest cost components in	$(631)	$760	$(4)	$ 4

2018				
Effect on postretirement obligation as of October 31, 2018	$(9,204)	$11,482	$(96)	$127
Health care trend rate:				
Effect on total service and interest cost components in 2018	$516	$(411)	$11	$(8)
Effect on postretirement obligation as of October 31, 2018	$9,316	$(7,659)	$120	$(93)

Employees hired after January 1, 2002, are not eligible to participate in the domestic postretirement medical plan.

In the fourth quarter of 2016, we adopted a change in the method to be used to estimate the service and interest cost components of net periodic benefit cost for defined benefit pension plans. Historically, for the vast majority of our plans, the service and interest cost components were estimated using a single weighted-average discount rate derived from the yield curve used to measure the benefit obligation at the beginning of the period. Beginning in 2017, we used a spot rate approach by applying the specific spot rates along the yield curve to the relevant projected cash flows in the estimation of the service and interest components of benefit cost, resulting in a more precise measurement. This change did not affect the measurement of total benefit obligations. The change was accounted for as a change in estimate that is inseparable from a change in accounting principle and, accordingly, was accounted for prospectively starting in 2017. The reductions in service and interest costs for 2017 associated with this change were $1,200 and $3,100, respectively.

Pension and postretirement expenses in 2019 are expected to be approximately $990 lower than 2018.

Income taxes – Income taxes are estimated based on income for financial reporting purposes. Deferred income taxes reflect the net tax effect of temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes and the amounts used for income tax purposes and certain changes in valuation allowances. We provide valuation allowances against deferred tax assets if, based on available evidence, it is more likely than not that some portion or all of the deferred tax assets will not be realized.

Management believes the valuation allowances are adequate after considering future taxable income, allowable carryforward periods and ongoing prudent and feasible tax planning strategies. In the event we were to determine that we would be able to realize the deferred tax assets in the future in excess of the net recorded amount (including the valuation allowance), an adjustment to the valuation allowance would increase income in the period such determination was made. Conversely, should we determine that we would not be able to realize all or part of the net deferred tax asset in the future, an adjustment to the valuation allowance would be expensed in the period such determination was made.

Further, at each interim reporting period, we estimate an effective income tax rate that is expected to be applicable for the full year. Judgment is involved regarding the application of global income tax laws and regulations and when projecting the jurisdictional mix of income. Additionally, interpretation of tax laws, court decisions or other guidance provided by taxing authorities influences our estimate of the effective income tax rates. As a result, our actual effective income tax rates and related income tax liabilities may differ materially from our estimated effective tax rates and related income tax liabilities. Any resulting differences are recorded in the period they become known.

2018 compared to 2017

Sales – Worldwide sales for 2018 were $2,254,668, an increase of 9.1 percent from 2017 sales of $2,066,982. Sales volume increased 7.1 percent and favorable currency translation effects increased sales by 2.0 percent. The volume increase consisted of 2.5 percent from organic growth and 4.6 percent from acquisitions. We had two acquisitions during 2018, Sonoscan, Inc. (“Sonoscan”), and Cladach Nua Teoranta (“Clada”), which are both included within the Advanced Technology Systems segment. We had four acquisitions during 2017, ACE Production Technologies, Inc. (“ACE”), Plas-Pak Industries, Inc. (“Plas-Pak), InterSelect GmbH (“InterSelect”), and Vention Medical’s Advanced Technologies business (“Vention”), which are also included within the Advanced Technology Systems segment. As used throughout this Form 10-K, geographic regions include the Americas (Canada, Mexico and Central and South America), Asia Pacific (excluding Japan), Europe, Japan, and the United States.

Sales of the Adhesive Dispensing Systems segment were $955,192 in 2018, an increase of $39,173, or 4.3 percent, from 2017 sales of $916,019. The increase was the result of a sales volume increase of 1.5 percent and favorable currency effects that increased sales by 2.8 percent. Within this segment, sales volume increased in all geographic regions with the exception of the United States. Growth in packaging and product assembly product lines was offset by softness in product lines serving polymer processing end markets.

Sales of the Advanced Technology Systems segment were $1,039,366 in 2018, an increase of $141,743 or 15.8 percent, from 2017 sales of $897,623. The increase was the result of a sales volume increase of 14.5 percent and favorable currency effects that increased sales by 1.3 percent. The sales volume increase consisted of 3.8 percent from organic volume and 10.7 percent from the first-year effect of acquisitions. Within this segment, sales volume, inclusive of acquisitions, increased in all geographic regions with the exception of the Asia Pacific region. Organic volume was driven by demand in our fluid management product lines serving industrial and medical end markets.

Sales of the Industrial Coating Systems segment were $260,110 in 2018, an increase of $6,770, or 2.7 percent, from 2017 sales of $253,340. The increase was the result of a sales volume increase of 1.1 percent and favorable currency effects that increased sales by 1.6 percent. Within this segment, sales volume increased in Europe, Japan and the Asia

Pacific regions. Growth in powder, liquid and container product lines serving industrial end markets was offset by softness in cold materials product lines serving automotive end markets.

Sales outside the United States accounted for 68.0 percent of our sales in 2018, as compared to 68.7 percent in 2017. On a geographic basis, sales in the United States were $720,832, an increase of 11.3 percent from 2017. The increase in sales volume consisted of 1.9 percent from organic volume and 9.4 percent from acquisitions. In the Americas region, sales were $158,837, an increase of 8.0 percent from 2017, with volume increasing 8.8 percent partially offset by unfavorable currency effects of 0.8 percent. The increase in sales volume consisted of 3.5 percent from organic volume and 5.3 percent from acquisitions. Sales in Europe were $622,108, an increase of 17.2 percent from 2017, with volume increasing 11.4 percent and favorable currency effects of 5.8 percent. The increase in sales volume consisted of 9.2 percent from organic volume and 2.2 percent from acquisitions. Sales in Japan were $161,771, an increase of 9.9 percent from 2017, with volume increasing 8.6 percent and favorable currency effects of 1.3 percent. The increase in sales volume consisted of 7.0 percent from organic volume and 1.6 percent from acquisitions. Sales in the Asia Pacific region were $591,120, a decrease of 0.5 percent from 2017, with volume decreasing 2.2 percent partially offset by favorable currency effects of 1.7 percent. The decrease in sales volume consisted of lower organic volume of 4.4 percent, offset by 2.2 percent growth from acquisitions.

It is estimated that the effect of pricing on 2018 total sales was not material relative to 2017.

Operating profit – Cost of sales were $1,018,703 in 2018, up 9.8 percent from $927,981 in 2017. Gross profit, expressed as a percentage of sales, decreased to 54.8 percent in 2018 from 55.1 percent in 2017. Of the 0.3 percentage point decrease in gross margin, unfavorable product mix contributed 0.7 percentage points offset by 0.4 percentage points due to favorable currency translation effects.

Selling and administrative expenses were $734,856 in 2018, compared to $678,861 in 2017. The 8.2 percent increase includes 8.7 percent primarily in support of higher sales growth and 1.7 percent due to unfavorable currency translation effects, offset by 2.2 percent due to lower acquisition transaction costs in the current year.

Selling and administrative expenses as a percentage of sales decreased to 32.6 percent in 2018 from 32.8 percent in 2017. Of the 0.2 percentage point improvement, 0.7 percentage points is due to lower acquisition transaction costs, offset by 0.5 percentage points due to higher base business costs.

Severance and restructuring costs of $6,552 were recorded in 2018. Within the Adhesives Dispensing Systems segment, a restructuring initiative to consolidate certain polymer processing product line facilities in the U.S. resulted in severance and restructuring costs of $5,631. Within the Advanced Technology Systems segment, severance costs of $401 were recorded in Europe. Severance costs of $520 were recorded in the U.S. due to a Corporate restructuring initiative. No costs related to severance and restructuring were recorded in the Industrial Coating Systems segment in 2018. Additional costs related to these initiatives are not expected to be material in future periods. All severance and restructuring costs are included in selling and administrative expenses in the Consolidated Statements of Income.

Operating capacity for each of our segments can support fluctuations in order activity without significant changes in operating costs. Also, currency translation affects reported operating margins. Operating margins for each segment were favorably impacted by a weaker dollar primarily against the Euro during 2018 as compared to 2017.

Operating profit as a percentage of sales decreased to 21.9 percent in 2018 compared to 22.1 percent in 2017. Of the 0.2 percentage point decline in operating margin, unfavorable leverage of our selling and administrative expenses contributed 0.9 percentage points, higher severance and restructuring expenses contributed 0.2 percentage points, and unfavorable product mix contributed 0.7 percentage points. This decline was offset by 0.3 percentage points due to the first year effect of acquisitions, 0.7 percentage points due to lower acquisition transaction costs, and 0.6 percentage points due to favorable foreign currency translation effects.

For the Adhesive Dispensing Systems segment, operating profit as a percentage of sales decreased to 27.2 percent in 2018 compared to 27.7 percent in 2017. Of the 0.5 percentage point decline in operating margin, dilution in gross margin of 0.8 percentage points was due to the consolidation of certain facilities in the U.S., and higher severance and restructuring expenses contributed 0.3 percentage points, offset by favorable foreign currency translation effects of 0.6 percentage points.

For the Advanced Technology Systems segment, operating profit as a percentage of sales decreased to 23.4 percent in 2018 compared to 25.4 percent in 2017. Of the 2.0 percentage point decline in operating margin, unfavorable product mix contributed 1.2 percentage points, incremental amortization expense contributed 1.1 percentage points, and higher severance and restructuring expenses contributed 0.1 percentage points. This decline was partially offset by 0.4 percentage points due to favorable foreign currency translation effects.

For the Industrial Coating Systems segment, operating profit as a percentage of sales increased to 19.5 percent in 2018 compared to 17.4 percent in 2017. Of the 2.1 percentage point improvement in operating margin, 1.9 percentage points related to favorable product mix and 0.4 percentage points related to favorable foreign currency translation effects. This improvement was partially offset by 0.2 percentage points due to unfavorable leverage of our selling and administrative expenses.

Interest and other income (expense) - Interest expense in 2018 was $49,576, an increase of $12,975, or 35.4 percent, from 2017. The increase was due to higher average borrowing levels between periods. Other income in 2018 was $2,154 compared to other expense of $1,934 in 2017. Included in the current year's other income are foreign currency gains of $1,133 and a non-recurring gain of $2,512. Included in the prior year's other expense were foreign currency losses of $686.

Income taxes –

Income tax expense in 2018 was $71,144, or 15.9 percent of pre-tax income, as compared to $124,489, or 29.6 percent of pre-tax income in 2017.

On December 22, 2017, the U.S. Tax Cuts and Jobs Act ("the Act") was enacted. It reduced the U.S. federal corporate income tax rate from 35 percent to 21 percent. We have an October 31 fiscal year-end, therefore the lower corporate income tax rate will be phased in, resulting in a U.S. statutory federal rate of 23.34 percent for our fiscal year ended October 31, 2018, and 21 percent for subsequent fiscal years. The statutory tax rate of 23.34 percent was applied to earnings in the current year.

The Act requires us to revalue our existing U.S. deferred tax balance to reflect the lower statutory tax rate and pay a one-time transition tax on earnings of certain foreign subsidiaries that were previously deferred from U.S. taxes. As a result, during 2018, we recorded a provisional tax benefit of $49,082 to reflect the revaluation of our tax assets and liabilities at the reduced corporate tax rate. We also recorded a provisional tax expense of $27,618 to reflect the transition tax on previously deferred foreign earnings. The net tax effect of these discrete items resulted in a decrease of $21,464 in income tax expense for 2018. We intend to pay the transition tax in installments over the eight-year period allowable under the Act. The transition tax is primarily included in other long-term liabilities in the Consolidated Balance Sheet at October 31, 2018. Incremental adjustments have been made to these estimates during the three months ended October 31, 2018 based on availability of additional information. The amounts recorded are considered a provisional estimate under the U.S. Securities and Exchange Commission Staff Accounting Bulletin No. 118. The provisional calculations may change after various components of the computation are finalized. Furthermore, we are still analyzing certain aspects of the Act and related interpretive guidance and refining our calculations, which could potentially affect the measurement of these balances or give rise to new or additional deferred tax amounts. Certain provisions of the Act will impact the Company starting in 2019. These provisions include, but are not limited to, the creation of the base erosion anti-abuse tax, a general limitation of U.S. federal income taxes on dividends from foreign subsidiaries, a new provision designed to tax global intangible low-taxed income and the repeal of the domestic production activities deduction. We continue to evaluate the future impacts of these provisions and, as of October 31, 2018, have not recorded any impact of any of these future provisions.

In March 2016, the FASB issued a new standard which simplifies the accounting for share-based payment transactions, which we adopted in the first quarter of 2018. This guidance requires that excess tax benefits and tax deficiencies be recognized as income tax expense or benefit in the Consolidated Statements of Income rather than as additional paid-in capital. Our income tax provision for 2018 also includes a favorable adjustment to unrecognized tax benefits of $1,120 related to the lapse of the statute of limitations.

Our income tax provision for 2017 includes a discrete tax expense of $1,070 related to nondeductible acquisition costs.

Net income – Net income was $377,375, or $6.40 per diluted share, in 2018, compared to net income of $295,802, or $5.08 per diluted share, in 2017. This represents a 27.6 percent increase in net income and a 26.0 percent increase in diluted earnings per share.

2017 compared to 2016

Sales – Worldwide sales for 2017 were $2,066,982, an increase of 14.3 percent from 2016 sales of $1,808,994. Sales volume increased 14.8 percent and unfavorable currency translation effects reduced sales by 0.5 percent. The volume increase consisted of 7.9 percent from organic growth and 6.9 percent from acquisitions. We had four acquisitions during 2017, ACE Production Technologies, Inc. (“ACE”), Plas-Pak Industries, Inc. (“Plas-Pak), InterSelect GmbH (“InterSelect”), and Vention Medical’s Advanced Technologies business (“Vention”), which are all included within the Advanced Technology Systems segment. We had one acquisition during 2016, LinkTech, which is also included within the Advanced Technology Systems segment. As used throughout this Form 10-K, geographic regions include the Americas (Canada, Mexico and Central and South America), Asia Pacific (excluding Japan), Europe, Japan, and the United States.

Sales of the Adhesive Dispensing Systems segment were $916,019 in 2017, an increase of $36,446, or 4.1 percent, from 2016 sales of $879,573. The increase was the net result of a sales volume increase of 4.3 percent partially offset by unfavorable currency effects that reduced sales by 0.2 percent. Within this segment, sales volume increased in all geographic regions with the exception of Europe. Growth in product lines serving rigid packaging, consumer non-durable, disposable hygiene and general product assembly end markets, was offset by softness in product lines serving polymer processing end markets.

Sales of the Advanced Technology Systems segment were $897,623 in 2017, an increase of $221,294 or 32.7 percent, from 2016 sales of $676,329. The increase was the result of a sales volume increase of 33.4 percent partially offset by unfavorable currency effects that reduced sales by 0.7 percent. The sales volume increase consisted of 15.1 percent from organic volume and 18.3 percent from the first-year effect of acquisitions. Within the segment, sales volume, inclusive of acquisitions, increased in all geographic regions. Organic volume increased in most product lines, and was driven by demand in electronics and medical end markets.

Sales of the Industrial Coating Systems segment were $253,340 in 2017, an increase of $248, or 0.1 percent, from 2016 sales of $253,092. The increase was the result of a sales volume increase of 0.8 percent partially offset by unfavorable currency effects that reduced sales by 0.7 percent. Within this segment, sales volume increased in Europe, Japan and the Americas regions. Sales volume increased in most product lines, and was driven by demand for liquid and UV curing, powder coating and container product lines serving industrial end markets.

Sales outside the United States accounted for 68.7 percent of our sales in 2017, as compared to 70.6 percent in 2016. On a geographic basis, sales in the United States were $647,657, an increase of 21.9 percent from 2016. The increase in sales volume consisted of 5.3 percent from organic volume and 16.6 percent from acquisitions. In the Americas region, sales were $147,026, an increase of 17.9 percent from 2016, with volume increasing 18.0 percent partially offset by unfavorable currency effects of 0.1 percent. The increase in sales volume consisted of 7.7 percent from organic volume and 10.3 percent from acquisitions. Sales in Europe were $530,812, an increase of 5.3 percent from 2016, with volume increasing 5.5 percent partially offset by unfavorable currency effects of 0.2 percent. The increase in sales volume consisted of 2.2 percent from organic volume and 3.3 percent from acquisitions. Sales in Japan were $147,189, an increase of 20.6 percent from 2016, with volume increasing 24.5 percent partially offset by unfavorable currency effects of 3.9 percent. The increase in sales volume consisted of 23.1 percent from organic volume and 1.4 percent from acquisitions. Sales in the Asia Pacific region were $594,298, an increase of 12.7 percent from the prior year, with volume increasing 13.2 percent partially offset by unfavorable currency effects of 0.5 percent. The increase in sales volume consisted of 12.3 percent from organic growth and 0.9 percent from acquisitions.

It is estimated that the effect of pricing on 2017 total sales was not material relative to 2016.

Operating profit – Cost of sales were $927,981 in 2017, up 13.8 percent from $815,495 in 2016. Gross profit, expressed as a percentage of sales, increased to 55.1 percent in 2017 from 54.9 percent in 2016. Of the 0.2 percentage point improvement in gross margin, favorable product mix added 0.3 percentage points primarily related to higher sales growth in our Adhesive Dispensing Systems and Advanced Technology Systems segments, which have higher margins than the Industrial Coating Systems segment. The 0.1 percentage point offset is primarily due to unfavorable currency translation effects.

Selling and administrative expenses were $678,861 in 2017, compared to $594,293 in 2016. The 14.2 percentage point increase includes 6.1 percent primarily in support of higher sales growth, 6.1 percent related to the first year effect of acquisitions and 2.5 percent of corporate charges related to acquisition transaction costs, offset by 0.5 percentage points due to currency translation effects.

Selling and administrative expenses as a percentage of sales decreased to 32.8 percent in 2017 from 32.9 percent in 2016. Of the 0.1 percentage point improvement, 2.5 percentage points is due to leveraging higher sales growth in our Adhesive Dispensing Systems and Advanced Technology Systems segments. This improvement was partially offset by 1.7 percentage points due to the first year effect of acquisitions and 0.7 percentage points due to corporate charges related to acquisition transaction costs.

Severance and restructuring costs of $2,438 were recorded in 2017. Within the Adhesives Dispensing Systems segment, restructuring initiatives to optimize operations in the U.S. and Belgium and consolidate certain polymer processing product line facilities in the U.S. resulted in severance and restructuring costs of $2,618. Within the Advanced Technology Systems segment, costs of $180 were reversed during 2017 related to a 2015 restructuring initiative. No costs related to severance and restructuring were recorded in the Industrial Coating Systems segment in 2017. Additional costs related to these initiatives are not expected to be material in future periods. All severance and restructuring costs are included in selling and administrative expenses in the Consolidated Statements of Income.

Operating capacity for each of our segments can support fluctuations in order activity without significant changes in operating costs. Also, currency translation affects reported operating margins. Operating margins for each segment were unfavorably impacted by a stronger dollar primarily against the Euro during 2017 as compared to 2016.

Operating profit as a percentage of sales increased to 22.1 percent in 2017 compared to 21.5 percent in 2016. Of the 0.6 percentage point improvement in operating margin, favorable leverage of our selling and administrative expenses contributed 2.4 percentage points, lower severance and restructuring expenses added 0.5 percentage points, and favorable product mix added 0.2 percentage points primarily related to higher sales growth in our Adhesives Dispensing Systems and Advanced Technology Systems segments. This improvement was offset by 1.7 percentage points due to the first year effect of acquisitions, 0.7 percentage points due to corporate charges related to acquisition transaction costs, and 0.1 percentage points due to short term purchase price accounting charges for acquired inventory.

For the Adhesive Dispensing Systems segment, operating profit as a percentage of sales increased to 27.7 percent in 2017 compared to 26.1 percent in 2016. Of the 1.6 percentage point improvement in operating margin, favorable product mix added 0.7 percentage points due to increased sales to consumer non-durable, disposable hygiene and rigid packaging end markets, lower severance and restructuring expenses added 0.6 percentage points, favorable foreign currency translation effects added 0.2 percentage points and favorable leverage of selling and administrative expenses added 0.1 percentage points.

For the Advanced Technology Systems segment, operating profit as a percentage of sales increased to 25.4 percent in 2017 compared to 23.6 percent in 2016. Of the 1.8 percentage point improvement in operating margin, favorable leverage of our selling and administrative expenses due to higher sales contributed 5.6 percentage points, favorable product mix added 0.4 percentage points, and lower severance and restructuring expenses contributed 0.2 percentage points. These increases were partially offset by 4.0 percentage points due to the first year effect of acquisitions, 0.3 percentage points due to unfavorable currency translation effects, and 0.1 percentage points due to short term purchase price accounting charges for acquired inventory.

For the Industrial Coating Systems segment, operating profit as a percentage of sales increased to 17.4 percent in 2017 compared to 17.2 percent in 2016. Of the 0.2 percentage point improvement in operating margin, lower severance and restructuring expenses added 0.8 percentage points and favorable leverage of our selling and administrative expenses added 0.4 percentage points. These increases were offset by 0.7 percentage points related to unfavorable product mix and 0.3 percentage points related to unfavorable foreign currency translation effects.

Interest and other income (expense) - Interest expense in 2017 was $36,601, an increase of $15,279, or 71.7 percent, from 2016. The increase was due to higher average borrowing levels between periods. Other expense in 2017 was $1,934 compared to other income of $657 in 2016. Included in the current year’s other expense are foreign currency losses of $686. Included in the prior year’s other income were a litigation settlement of $800 and foreign currency gains of $2,004. These gains were partially offset by $1,530 of net unfavorable adjustments primarily related to the reversal of an indemnification asset resulting from the effective settlement of a tax exam.

Income taxes – Income tax expense in 2017 was $124,489, or 29.6 percent of pre-tax income, as compared to $96,651, or 26.2 percent of pre-tax income in 2016.

Our income tax provision for 2017 includes a discrete tax expense of $1,070 related to nondeductible acquisition costs.

On December 18, 2015, the Protecting Americans from Tax Hikes Act of 2015 was enacted which retroactively reinstated the Federal Research and Development Tax Credit (Federal R&D Tax Credit) as of January 1, 2015, and made it permanent. As a result, our income tax provision for 2016 includes a discrete tax benefit of $2,200 related to 2015. The tax rate for 2016 also includes a discrete tax benefit of $6,154 related to dividends paid from previously taxed foreign earnings generated prior to 2015, and a benefit of $2,682 related to the effective settlement of a tax exam.

Net income – Net income was $295,802, or $5.08 per diluted share, in 2017, compared to net income of $271,843, or $4.73 per diluted share, in 2016. This represents an 8.8 percent increase in net income and a 7.4 percent increase in diluted earnings per share.

Liquidity and Capital Resources

Cash and cash equivalents increased $5,295 in 2018. Cash provided by operating activities was $504,638 in 2018, compared to $356,752 in 2017. The primary sources were net income adjusted for non-cash income and expenses (consisting of depreciation and amortization, non-cash stock compensation, provision for losses on receivables, deferred income taxes, other non-cash expense, and loss on sale of property, plant and equipment) which was $476,757 in 2018, compared to $413,341 in 2017. The increase in cash provided by operating activities was primarily due to higher net income. Also, changes in operating assets and liabilities provided $27,881 of cash in 2018, compared to $56,589 used in 2017.

Cash used in investing activities was $139,918 in 2018, compared to $877,694 in 2017. In the current year, cash of $50,586 was used for the Clada and Sonoscan acquisitions, partially offset by cash received of $458 which was primarily due to the sale of a building in the U.S. Capital expenditures were $89,790 in 2018 compared to $71,558 in 2017. The increase in capital expenditures was primarily due to the purchase of a new production and development manufacturing facility in China for product lines within our Adhesives Dispensing Systems segment.

Cash used in financing activities was $353,690 in 2018, compared to cash of $540,750 provided in 2017. Net repayment of long-term debt and short-term borrowings used $268,887 of cash in 2018, compared to net short and long-term proceeds of debt of $602,221 in 2017. Issuance of common shares related to employee benefit plans generated $18,811 of cash in 2018, up from $14,086 in 2017. This increase was the result of higher stock option exercises. In 2018, cash of $24,012 was used for the purchase of treasury shares, up from $3,216 in 2017. Dividend payments were $72,443 in 2018, up from $63,840 in 2017 due to an increase in the annual dividend to $1.25 per share from $1.11 per share.

The following is a summary of significant changes by balance sheet caption from October 31, 2017 to October 31, 2018. Net property, plant and equipment increased $40,255 due to capital expenditures of $89,790, offset by depreciation expense. Goodwill increased $18,808 due primarily to acquisitions completed during 2018. Net intangible assets decreased $47,439, primarily due to amortization expense, offset by acquisitions completed during 2018. Current maturities of long-term debt decreased $297,853 as a result of repayments and a reclassification to long-term debt in 2018.

In December 2014, the board of directors authorized a $300,000 common share repurchase program. In August 2015, the board of directors authorized the repurchase of up to an additional $200,000 of the Company's common shares. In August 2018, the board of directors authorized the repurchase of an additional $500,000 of the Company's common shares. Approximately $600,032 of the total $1,000,000 authorized remained available for share repurchases at October 31, 2018. Uses for repurchased shares include the funding of benefit programs including stock options, restricted stock and 401(k) matching. Shares purchased are treated as treasury shares until used for such purposes. The repurchase program is being funded using cash from operations and proceeds from borrowings under our credit facilities.

As of October 31, 2018, approximately 91 percent of our consolidated cash and cash equivalents were held at various foreign subsidiaries. Deferred income taxes are not provided on undistributed earnings of international subsidiaries that are intended to be permanently invested in those operations. These undistributed earnings represent the post-income tax earnings under U.S. GAAP not adjusted for previously taxed income which aggregated approximately $1,088,183 and $1,026,793 at October 31, 2018 and 2017, respectively. Should these earnings be distributed, applicable foreign tax credits, distributions of previously taxed income, and utilization of other attributes would substantially offset taxes due upon the distribution. It is not practical to estimate the amount of additional taxes that might be payable on such undistributed earnings.

Contractual Obligations

The following table summarizes contractual obligations as of October 31, 2018:

	Payments Due by Period				
	Total	Less than 1 Year	1-3 Years	4-5 Years	After 5 Years
Long-term debt (1)	$1,318,064	$28,734	$476,091	$466,587	$346,652
Interest payments on long-term debt (1)	132,947	23,769	40,162	34,378	34,638
Capital lease obligations (2)	18,198	6,161	6,393	1,574	4,070
Operating leases (2)	66,098	16,603	20,914	13,349	15,232
Contributions related to pension and postretirement benefits (3)	24,400	24,400	—	—	—
Purchase obligations (4)	74,207	71,084	3,123	—	—
Total obligations	$1,633,914	$170,751	$546,683	$515,888	$400,592

(1) In October 2018, we entered into a €150,000 agreement with Bank of America Merrill Lynch International Limited. The interest rate is variable based on the EUR LIBOR rate. The weighted average interest rate at October 31, 2018 was 0.88 percent. At October 31, 2018, the balance outstanding was €15,000 ($16,967). We were in compliance with all covenants at October 31, 2018.

In June 2018, we entered into a Note Purchase Agreement with a group of insurance companies under which we sold $350,000 of Senior Notes to the insurance companies and their affiliates. The notes start to mature in June 2023 and mature through June 2030 and bear interest at fixed rates between 3.71 percent and 4.17 percent. We used the proceeds from the sale of the notes to repay approximately $315,000 of the outstanding balance under our existing syndicated revolving credit facility at that time, and the remainder for general corporate purposes. We were in compliance with all covenants at October 31, 2018.

In March 2017, we entered into a $705,000 term loan facility with a group of banks. The Term Loan Agreement provides for the following term loans in three tranches: $200,000 due in October 2018, $200,000 due in March 2020, and $305,000 due in March 2022. In May 2018, we entered into a Second Amendment to our $705,000 term loan facility to extend the maturity due date of the first $200,000 tranche from October 2018 to October 2021. In October 2018, we paid down $100,000 of the portion due in March 2020. The weighted average interest rate for borrowings under this agreement was 3.23 percent at October 31, 2018. Borrowings under this agreement were used for the single purpose of acquiring Vention during the second quarter of 2017. We were in compliance with all covenants at October 31, 2018.

In February 2015, we increased, amended and extended our existing syndicated revolving credit agreement that was scheduled to expire in December 2016. We entered into a $600,000 unsecured, multicurrency credit facility with a group of banks. This facility has a five-year term and includes a $50,000 subfacility for swing-line loans and was increased to $850,000 in June 2018. It expires in February 2020. Balances outstanding under the prior facility were transferred to the new facility. At October 31, 2018, $52,200 was outstanding under this facility, compared to $249,138 outstanding at October 31, 2017. . The weighted average interest rate for borrowings under this agreement was 3.10 percent at October 31, 2018. We were in compliance with all covenants at October 31, 2018, and the amount we could borrow under the facility would not have been limited by any debt covenants.

We entered into a $150,000 three-year Note Purchase and Private Shelf agreement with New York Life Investment Management LLC in 2011. In 2015, the amount of the facility was increased to $180,000, and in 2016 it was increased to $200,000. Notes issued under the agreement may have a maturity of up to 12 years, with an average life of up to 10 years, and are unsecured. The interest rate on each note can be fixed or floating and is based upon the market rate at the borrowing date. At October 31, 2018, there was $36,111 outstanding under this facility, compared to $146,666 at October 31, 2017. We paid down $100,000 of the outstanding balance during October 2018. Existing notes mature between January 2020 and September 2020. The interest rate on each borrowing is fixed based upon the market rate at the borrowing date or is variable based upon the LIBOR rate. At October 31, 2018, the amount outstanding under this facility was at fixed rates of 2.21 percent and 2.56 percent. This agreement contains customary events of default and covenants related to limitations on indebtedness and the maintenance of certain financial ratios. We were in compliance with all covenants at October 31, 2018, and the amount we could borrow would not have been limited by any debt covenants.

In 2012, we entered into a Note Purchase Agreement with a group of insurance companies under which we sold $200,000 of Senior Notes. At October 31, 2018, $156,700 was outstanding under this agreement. Existing notes mature between July 2019 and July 2025 and bear interest at fixed rates between 2.62 percent and 3.13 percent. We were in compliance with all covenants at October 31, 2018.

In April 2015, we entered into a $200,000 term loan facility with a group of banks, of which we paid down $100,000 in April 2018 and $100,000 in August 2018.

In July 2015, we entered into a Note Purchase Agreement under which $100,000 of Senior Unsecured Notes were purchased primarily by a group of insurance companies. The notes mature in July 2019 and July 2027 and bear interest at fixed rates of 2.89 percent and 3.19 percent. We were in compliance with all covenants at October 31, 2018.

See Note 9 for additional information.

(2) See Note 10 for additional information.
(3) Pension and postretirement plan funding amounts after 2018 will be determined based on the future funded status of the plans and therefore cannot be estimated at this time. See Note 6 for additional information.
(4) Purchase obligations primarily represent commitments for materials used in our manufacturing processes that are not recorded in our Consolidated Balance Sheet.

We believe that the combination of present capital resources, cash from operations and unused financing sources are more than adequate to meet cash requirements for 2019. There are no significant restrictions limiting the transfer of funds from international subsidiaries to the parent company.

Outlook

Our operating performance, balance sheet position, and financial ratios for 2018 remained strong relative to recent years, although uncertainties persisted in global financial markets and the general economic environment. Going forward, we are well-positioned to manage our liquidity needs that arise from working capital requirements, capital expenditures, contributions related to pension and postretirement obligations, and principal and interest payments on indebtedness. Primary sources of capital to meet these needs as well as other opportunistic investments are cash provided by operations and borrowings under our loan agreements. In 2018, cash from operations was 22.4 percent of revenue. With respect to borrowings under existing loan agreements, as of October 31, 2018, we had $797,800 available capacity under our five-year term, $850,000 unsecured, multicurrency credit facility. This credit facility expires in February 2020.

Respective to all of these loans are two primary covenants, the leverage ratio that restricts indebtedness (net of cash) to a maximum 3.50 times consolidated four-quarter trailing EBITDA and the interest coverage ratio that requires four-quarter trailing EBITDA to be at minimum 2.5 times consolidated trailing four-quarter interest expense. (Debt, EBITDA, and interest expense are as defined in respective credit agreements.)

Regarding expectations for 2019, we are optimistic about longer term growth opportunities in the diverse consumer durable, non-durable, medical, electronics and industrial end markets we serve. For 2019, organic sales are expected to increase 3 percent to 5 percent compared to the prior year, offset by an unfavorable currency effect of 2 percent based on the current exchange rate environment as compared to the prior year. We move forward with caution given continued slower growth in emerging markets than previous years, expectations for global GDP indicating a low-growth macroeconomic environment, tax reform and trade agreement implications, and marketplace effects of political instability in certain areas of the world. Though the pace of improvement in the global economy remains unclear, our growth potential has been demonstrated over time from our capacity to build and enhance our core businesses by entering emerging markets, pursuing market adjacencies and driving growth initiatives. We drive value for our customers through our application expertise, differentiated technology, and direct sales and service support. Our priorities also are focused on operational efficiencies by employing continuous improvement methodologies in our business processes. We expect our efforts will continue to provide more than sufficient cash from operations for meeting our liquidity needs and paying dividends to common shareholders, as well as enabling us to invest in the development of new applications and markets for our technologies. Cash from operations have been 16 to 22 percent of revenues over the past five years, which, when combined with, our available borrowing capacity and ready access to capital markets, is more than adequate to fund our liquidity needs over the next year.

With respect to contractual spending, the table above presents our financial obligations as $1,633,914, of which $170,751 is payable in 2019. In December 2014, the board of directors authorized a $300,000 common share repurchase program. In August 2015, the board of directors authorized the repurchase of up to an additional $200,000 of the Company's common shares. In August 2018, the board of directors authorized the repurchase of an additional $500,000 of the Company's common shares. Approximately $600,032 of the total $1,000,000 authorized remained available for share repurchases at October 31, 2018. The repurchase program is funded using cash from operations and proceeds from borrowings under our credit facilities. Timing and actual number of shares subject to repurchase are contingent on a number of factors including levels of cash generation from operations, cash requirements for acquisitions, repayment of debt and our share price. We intend to focus on capital expenditures for 2019 on continued investments in our information systems and projects that improve both capacity and efficiency of manufacturing and distribution operations.

Effects of Foreign Currency

The impact of changes in foreign currency exchange rates on sales and operating results cannot be precisely measured due to fluctuating selling prices, sales volume, product mix and cost structures in each country where we operate. As a general rule, a weakening of the United States dollar relative to foreign currencies has a favorable effect on sales and net income, while a strengthening of the dollar has a detrimental effect.

In 2018, as compared with 2017, the United States dollar was generally weaker against foreign currencies. If 2017 exchange rates had been in effect during 2018, sales would have been approximately $41,800 lower and third-party costs would have been approximately $21,708 higher. In 2017, as compared with 2016, the United States dollar was generally stronger against foreign currencies. If 2016 exchange rates had been in effect during 2017, sales would have been approximately $8,210 higher and third-party costs would have been approximately $5,791 higher. These effects on reported sales do not include the impact of local price adjustments made in response to changes in currency exchange rates.

Inflation

Inflation affects profit margins as the ability to pass cost increases on to customers is restricted by the need for competitive pricing. Although inflation has been modest in recent years and has had no material effect on the years covered by the financial statements included in this report, we continue to seek ways to minimize the impact of inflation through focused efforts to increase productivity.

Trends

The Five-Year Summary in Item 6 documents our historical financial trends. Over this period, the world's economic conditions fluctuated significantly. Our solid performance is attributed to our participation in diverse geographic and industrial markets and our long-term commitment to develop and provide quality products and worldwide service to meet our customers' changing needs.

Safe Harbor Statements Under the Private Securities Litigation Reform Act of 1995

This Form 10-K, particularly “Management’s Discussion and Analysis,” contains forward-looking statements within the meaning of the Securities Act of 1933, as amended, the Securities Exchange Act of 1934, as amended, and the Private Securities Litigation Reform Act of 1995. Such statements relate to, among other things, income, earnings, cash flows, changes in operations, operating improvements, businesses in which we operate and the United States and global economies. Statements in this 10-K that are not historical are hereby identified as “forward-looking statements” and may be indicated by words or phrases such as “anticipates,” “supports,” “plans,” “projects,” “expects,” “believes,” “should,” “woul “hope,” “forecast,” “management is of the opinion,” use of the future tense and similar words or phrases.

In light of these risks and uncertainties, actual events and results may vary significantly from those included in or contemplated or implied by such statements. Readers are cautioned not to place undue reliance on such forward-looking statements. These forward-looking statements speak only as of the date made. We undertake no obligation to publicly update or revise any forward-looking statements, whether as a result of new information, future events or otherwise, except as required by law. Factors that could cause our actual results to differ materially from the expected results are discussed in Item 1A, Risk Factors.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

We operate internationally and enter into intercompany transactions denominated in foreign currencies. Consequently, we are subject to market risk arising from exchange rate movements between the dates foreign currencies are recorded and the dates they are settled. We regularly use foreign exchange contracts to reduce our risks related to most of these transactions. These contracts, primarily associated with the euro, yen and pound sterling, typically have maturities of 90 days or less, and generally require the exchange of foreign currencies for United States dollars at rates stated in the contracts. Gains and losses from changes in the market value of these contracts offset foreign exchange losses and gains, respectively, on the underlying transactions. Other transactions denominated in foreign currencies are designated as hedges of our net investments in foreign subsidiaries or are intercompany transactions of a long-term investment nature. As a result of the use of foreign exchange contracts on a routine basis to reduce the risks related to most of our transactions denominated in foreign currencies, as of October 31, 2018, we did not have material foreign currency exposure.

Note 12 to the financial statements contains additional information about our foreign currency transactions and the methods and assumptions used to record these transactions.

A portion of our operations is financed with short-term and long-term borrowings and is subject to market risk arising from changes in interest rates.

The tables that follow present principal repayments and weighted-average interest rates on outstanding borrowings of fixed-rate debt.

At October 31, 2018	2019	2020	2021	2022	2023	Thereafter	Total Value	Fair Value
Annual repayments of long-term debt	$28,734	$68,738	$38,187	$30,791	$130,796	$346,652	$643,898	$622,283
Average interest rate on total borrowings outstanding during the year	3.5 %	3.5 %	3.6 %	3.7 %	3.7 %	3.8 %	3.5 %	

At October 31, 2017	2018	2019	2020	2021	2022	Thereafter	Total Value	Fair Value
Annual repayments of long-term debt	$26,586	$28,734	$68,738	$38,187	$30,791	$127,448	$320,484	$324,965
Average interest rate on total borrowings outstanding during the year	2.9 %	3.0 %	3.0 %	3.1 %	3.1 %	3.1 %	2.9 %	

We also have variable-rate notes payable and long-term debt. The weighted average interest rate of this debt was 3.2 percent at October 31, 2018 and 2.3 percent at October 31, 2017. A one percent increase in interest rates would have resulted in additional interest expense of approximately $10,672 on the variable rate notes payable and long-term debt in 2018.

Item 8. Financial Statements and Supplementary Data

Consolidated Statements of Income

Years ended October 31, 2018, 2017 and 2016 (In thousands except for per-share amounts)	2018	2017	2016
Sales	$2,254,668	$2,066,982	$1,808,994
Operating costs and expenses:			
Cost of sales	1,018,703	927,981	815,495
Selling and administrative expenses	741,408	681,299	605,068
	1,760,111	1,609,280	1,420,563
Operating profit	494,557	457,702	388,431
Other income (expense):			
Interest expense	(49,576)	(36,601)	(21,322)
Interest and investment income	1,384	1,124	728
Other - net	2,154	(1,934)	657
	(46,038)	(37,411)	(19,937)
Income before income taxes	448,519	420,291	368,494
Income tax provision:			
Current	105,093	124,961	100,248
Deferred	(33,949)	(472)	(3,597)
	71,144	124,489	96,651
Net income	$377,375	$295,802	$271,843
Average common shares	57,970	57,533	57,060
Incremental common shares attributable to outstanding stock options, restricted stock and deferred stock-based compensation	961	671	470
Average common shares and common share equivalents	58,931	58,204	57,530
Basic earnings per share	$6.51	$5.14	$4.76
Diluted earnings per share	$6.40	$5.08	$4.73
Dividends declared per common share	$1.25	$1.11	$0.99

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

Consolidated Statements of Comprehensive Income

Years ended October 31, 2018, 2017 and 2016 (In thousands)	2018	2017	2016
Net income	$377,375	$295,802	$271,843
Components of other comprehensive income (loss), net of tax:			
Foreign currency translation adjustments	(28,619)	22,697	(8,693)
Pension and postretirement benefit plans:			
Prior service (cost) credit arising during the year	(45)	—	1,831
Net actuarial gain (loss) arising during the year	(7,783)	2,641	(22,482)
Amortization of prior service (cost) credit	(322)	(210)	92
Amortization of actuarial loss	10,536	7,972	6,724
Settlement loss recognized	200	712	111
Curtailment (gain) loss recognized	—	—	(1,144)
Total pension and postretirement benefit plans	2,586	11,115	(14,868)
Total other comprehensive income (loss)	(26,033)	33,812	(23,561)
Reclassification due to adoption of new accounting standard (Note 2)	(18,846)	—	—
Total comprehensive income	$332,496	$329,614	$248,282

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

Consolidated Balance Sheets

October 31, 2018 and 2017	2018	2017
(In thousands)		
Assets		
Current assets:		
Cash and cash equivalents	$95,678	$90,383
Receivables - net	491,423	505,087
Inventories - net	264,477	264,266
Prepaid expenses	32,524	28,636
Total current assets	884,102	888,372
Property, plant and equipment - net	386,666	346,411
Goodwill	1,608,018	1,589,210
Intangible assets - net	499,741	547,180
Deferred income taxes	9,780	11,020
Other assets	32,705	32,346
	$3,421,012	$3,414,539
Liabilities and shareholders' equity		
Current liabilities:		
Accounts payable	$83,590	$86,016
Income taxes payable	19,319	22,310
Accrued liabilities	175,085	173,366
Customer advance payments	38,997	34,654
Current maturities of long-term debt	28,734	326,587
Current obligations under capital leases	4,555	4,813
Total current liabilities	350,280	647,746
Long-term debt	1,285,357	1,256,397
Obligations under capital leases	8,850	9,693
Pension obligations	113,222	111,666
Postretirement obligations	70,154	73,589
Deferred income taxes	100,704	134,090
Other liabilities	41,704	25,865
Shareholders' equity:		
Preferred shares, no par value; 10,000 shares authorized;		
none issued	—	—
Common shares, no par value; 160,000 shares authorized;		
98,023 shares issued at October 31, 2018 and 2017	12,253	12,253
Capital in excess of stated value	446,555	412,785
Retained earnings	2,488,375	2,164,597
Accumulated other comprehensive loss	(179,314)	(134,435)
Common shares in treasury, at cost	(1,317,128)	(1,299,707)
Total shareholders' equity	1,450,741	1,155,493
	$3,421,012	$3,414,539

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

Consolidated Statements of Shareholders’ Equity

Years ended October 31, 2018, 2017 and 2016 (In thousands)	2018	2017	2016
Number of common shares in treasury			
Balance at beginning of year	40,308	40,716	40,665
Shares issued under company stock and employee benefit plans	(503)	(438)	(421)
Purchase of treasury shares	181	30	472
Balance at end of year	39,986	40,308	40,716
Common shares			
Balance at beginning and ending of year	$12,253	$12,253	$12,253
Capital in excess of stated value			
Balance at beginning of year	$412,785	$376,625	$348,986
Shares issued under company stock and employee benefit plans	12,220	8,913	5,952
Tax benefit from stock option and restricted stock transactions	—	7,079	3,476
Stock-based compensation	21,550	20,168	18,211
Balance at end of year	$446,555	$412,785	$376,625
Retained earnings			
Balance at beginning of year	$2,164,597	$1,932,635	$1,717,228
Net income	377,375	295,802	271,843
Dividends declared ($1.25 per share in 2018, $1.11 per share in 2017, and $0.99 per share in 2016)	(72,443)	(63,840)	(56,436)
Reclassification due to adoption of new accounting standard (Note 2)	18,846	—	—
Balance at end of year	$2,488,375	$2,164,597	$1,932,635
Accumulated other comprehensive loss			
Balance at beginning of year	$(134,435)	$(168,247)	$(144,686)
Foreign currency translation adjustments	(28,619)	22,697	(8,693)
Settlement and curtailment loss (gain) recognized, net of tax of $(52) in 2018, $(299) in 2017 and $332 in 2016	200	712	(1,033)
Defined benefit and OPEB activity - prior service cost, net of tax of $189 in 2018, $75 in 2017 and $(558) in 2016	(367)	(210)	1,923
Defined benefit and OPEB activity - actuarial gain (loss), net of tax of $(802) in 2018, $(4,628) in 2017 and $8,642 in 2016	2,753	10,613	(15,758)
Reclassification due to adoption of new accounting standard (Note 2)	(18,846)	—	—
Balance at end of year	$(179,314)	$(134,435)	$(168,247)
Common shares in treasury, at cost			
Balance at beginning of year	$(1,299,707)	$(1,301,663)	$(1,273,765)
Shares issued under company stock and employee benefit plans	6,591	5,342	5,735
Purchase of treasury shares	(24,012)	(3,386)	(33,633)
Balance at end of year	$(1,317,128)	$(1,299,707)	$(1,301,663)
Total shareholders' equity	$1,450,741	$1,155,493	$851,603

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

Consolidated Statements of Cash Flows

Years ended October 31, 2018, 2017 and 2016	2018	2017	2016
(In thousands)			
Cash flows from operating activities:			
Net income	$377,375	$295,802	$271,843
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation	52,959	45,947	41,243
Amortization	55,448	44,907	29,061
Provision for losses on receivables	1,185	4,030	1,867
Deferred income taxes	(33,949)	(472)	(3,597)
Non-cash stock compensation	21,550	20,168	18,211
Loss on sale of property, plant and equipment	830	188	859
Other non-cash	1,359	2,770	2,973
Changes in operating assets and liabilities:			
Receivables	10,236	(46,152)	(41,247)
Inventories	5,532	(19,667)	1,784
Prepaid expenses	(4,046)	4,737	(8,667)
Other assets	320	(3,429)	7,773
Accounts payable	(2,671)	4,805	7,296
Income taxes payable	(2,718)	7,522	(2,684)
Accrued liabilities	2,134	(5,629)	23,328
Customer advance payments	5,047	5,163	3,631
Other liabilities	18,402	2,266	(17,739)
Other	(4,355)	(6,204)	(1,301)
Net cash provided by operating activities	504,638	356,752	334,634
Cash flows from investing activities:			
Additions to property, plant and equipment	(89,790)	(71,558)	(60,851)
Proceeds from sale of property, plant and equipment	458	4,007	1,300
Acquisition of businesses, net of cash acquired	(50,586)	(805,943)	(42,650)
Equity investments	—	(4,470)	—
Net cash used in investing activities	(139,918)	(877,964)	(102,201)
Cash flows from financing activities:			
Proceeds from short-term borrowings	996	6,017	13,456
Repayment of short-term borrowings	(1,006)	(8,149)	(12,059)
Proceeds from long-term debt	585,661	841,536	261,161
Repayment of long-term debt	(854,538)	(237,183)	(392,775)
Repayment of capital lease obligations	(5,333)	(5,287)	(5,059)
Payment of debt issuance costs	(1,826)	(3,214)	(99)
Issuance of common shares	18,811	14,086	11,476
Purchase of treasury shares	(24,012)	(3,216)	(33,421)
Dividends paid	(72,443)	(63,840)	(56,436)
Net cash provided by (used in) financing activities	(353,690)	540,750	(213,756)
Effect of exchange rate changes on cash	(5,735)	3,606	(1,706)
Increase in cash and cash equivalents	5,295	23,144	16,971
Cash and cash equivalents at beginning of year	90,383	67,239	50,268
Cash and cash equivalents at end of year	$95,678	$90,383	$67,239

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

Notes to Consolidated Financial Statements

NOTE REGARDING AMOUNTS AND FISCAL YEAR REFERENCES

In this annual report, all amounts related to United States dollars and foreign currency and to the number of Nordson Corporation's common shares, except for per share earnings and dividend amounts, are expressed in thousands. Unless the context otherwise indicates, all references to "we" or the "Company" mean Nordson Corporation.

Unless otherwise noted, all references to years relate to our fiscal year.

Note 1 — Significant accounting policies

Consolidation — The consolidated financial statements include the accounts of Nordson Corporation and its majority-owned and controlled subsidiaries. Investments in affiliates and joint ventures in which our ownership is 50 percent or less or in which we do not have control but have the ability to exercise significant influence, are accounted for under the equity method. All significant intercompany accounts and transactions have been eliminated in consolidation.

Use of estimates — The preparation of financial statements in conformity with generally accepted accounting principles in the United States requires management to make estimates and assumptions that affect the amounts reported in the Consolidated Financial Statements and notes. Actual amounts could differ from these estimates.

Fiscal year — Our fiscal year is November 1 through October 31.

Revenue recognition — Most of our revenues are recognized upon shipment, provided that persuasive evidence of an arrangement exists, the sales price is fixed or determinable, collectibility is reasonably assured, and title and risk of loss have passed to the customer.

Certain arrangements may include installation, installation supervision, training, and spare parts, which tend to be completed in a short period of time, at an insignificant cost, and utilizing skills not unique to us, therefore, are typically regarded as inconsequential or perfunctory. Revenue for undelivered items is deferred and included within accrued liabilities in the Consolidated Balance Sheet. Revenues deferred in 2018, 2017 and 2016 were not material.

Shipping and handling costs — Amounts billed to customers for shipping and handling are recorded as revenue. Shipping and handling expenses are included in cost of sales.

Advertising costs — Advertising costs are expensed as incurred and were $12,451, $11,296 and $11,095 in 2018, 2017 and 2016, respectively.

Research and development — Investments in research and development are important to our long-term growth, enabling us to keep pace with changing customer and marketplace needs through the development of new products and new applications for existing products. We place strong emphasis on technology developments and improvements through internal engineering and research teams. Research and development costs are expensed as incurred and were $58,806, $52,462 and $46,247 in 2018, 2017 and 2016, respectively. As a percentage of sales, research and development expenses were 2.6, 2.5 and 2.6 percent in 2018, 2017 and 2016, respectively.

Earnings per share — Basic earnings per share are computed based on the weighted-average number of common shares outstanding during each year, while diluted earnings per share are based on the weighted-average number of common shares and common share equivalents outstanding. Common share equivalents consist of shares issuable upon exercise of stock options computed using the treasury stock method, as well as restricted stock and deferred stock-based compensation. Options whose exercise price is higher than the average market price are excluded from the calculation of diluted earnings per share because the effect would be anti-dilutive. No options were excluded from the calculation of diluted earnings per share in 2018 and 2017. Options for 396 common shares were excluded from the diluted earnings per share calculation in 2016, because their effect would have been anti-dilutive. Under the Amended & Restated 2012 Stock Incentive and Award Plan, executive officers and selected other key employees receive common share awards based on corporate performance measures over three-year performance periods. Awards for which performance measures have not been met were excluded from the calculation of diluted earnings per share.

Cash — Highly liquid instruments with maturities of 90 days or less at date of purchase are considered to be cash equivalents.

Allowance for doubtful accounts — An allowance for doubtful accounts is maintained for estimated losses resulting from the inability of customers to make required payments. The amount of the allowance is determined principally on the basis of past collection experience and known factors regarding specific customers. Accounts are written off against the allowance when it becomes evident that collection will not occur. Credit is extended to customers satisfying pre-defined credit criteria. We believe we have limited concentration of credit risk due to the diversity of our customer base.

Inventories — Inventories are valued at net realizable value. Cost was determined using the last-in, first-out (LIFO) method for 15 percent of consolidated inventories at October 31, 2018 and 16 percent of consolidated inventories at October 31, 2017. The first-in, first-out (FIFO) method is used for all other inventories. Consolidated inventories would have been $6,545 and $6,684 higher than reported at October 31, 2018 and 2017, respectively, had the FIFO method, which approximates current cost, been used for valuation of all inventories.

Property, plant and equipment and depreciation — Property, plant and equipment are carried at cost. Additions and improvements that extend the lives of assets are capitalized, while expenditures for repairs and maintenance are expensed as incurred. Plant and equipment are depreciated for financial reporting purposes using the straight-line method over the estimated useful lives of the assets or, in the case of property under capital leases, over the terms of the leases. Leasehold improvements are depreciated over the shorter of the lease term or their useful lives. Useful lives are as follows:

Land improvements	15-25 years
Buildings	20-40 years
Machinery and equipment	3-18 years
Enterprise management systems	5-13 years

Depreciation expense is included in cost of sales and selling and administrative expenses.

Internal use software costs are expensed or capitalized depending on whether they are incurred in the preliminary project stage, application development stage or the post-implementation stage. Amounts capitalized are amortized over the estimated useful lives of the software beginning with the project’s completion. All re-engineering costs are expensed as incurred. Interest costs on significant capital projects are capitalized. No interest was capitalized in 2018, 2017 or 2016.

Goodwill and intangible assets — Goodwill is the excess of cost of an acquired entity over the amounts assigned to assets acquired and liabilities assumed in a business combination. Goodwill relates to and is assigned directly to specific reporting units. Goodwill is not amortized but is subject to annual impairment testing. Our annual impairment testing is performed as of August 1. Testing is done more frequently if an event occurs or circumstances change that would indicate the fair value of a reporting unit is less than the carrying amount of those assets.

Other amortizable intangible assets, which consist primarily of patent/technology costs, customer relationships, noncompete agreements, and trade names, are amortized over their useful lives on a straight-line basis. At October 31, 2018, the weighted-average useful lives for each major category of amortizable intangible assets were:

Patent/technology costs	13 years

Customer relationships	14 years
Noncompete agreements	3 years
Trade names	15 years

Foreign currency translation — The financial statements of subsidiaries outside the United States are generally measured using the local currency as the functional currency. Assets and liabilities of these subsidiaries are translated at the rates of exchange at the balance sheet dates. Income and expense items are translated at average monthly rates of exchange. The resulting translation adjustments are included in accumulated other comprehensive income (loss), a separate component of shareholders' equity. Generally, gains and losses from foreign currency transactions, including forward contracts, of these subsidiaries and the United States parent are included in net income. Gains and losses from intercompany foreign currency transactions of a long-term investment nature are included in accumulated other comprehensive income (loss).

Accumulated other comprehensive loss — Accumulated other comprehensive loss at October 31, 2018 and 2017 consisted of:

	Cumulative translation adjustments	Pension and postretirement benefit plan adjustments	Accumulated other comprehensive loss
Balance at October 31, 2017	$ (28,423)	$ (106,012)	$ (134,435)
Pension and postretirement plan changes, net of tax of $(665)	—	2,586	2,586
Reclassification due to adoption of new accounting standard (Note 2)	—	(18,846)	(18,846)
Currency translation losses	(28,619)	—	(28,619)
Balance at October 31, 2018	$ (57,042)	$ (122,272)	$ (179,314)

Warranties — We offer warranties to our customers depending on the specific product and terms of the customer purchase agreement. A typical warranty program requires that we repair or replace defective products within a specified time period (generally one year) measured from the date of delivery or first use. We record an estimate for future warranty-related costs based on actual historical return rates. Based on analysis of return rates and other factors, the adequacy of our warranty provisions are adjusted as necessary. The liability for warranty costs is included in accrued liabilities in the Consolidated Balance Sheet.

Following is a reconciliation of the product warranty liability for 2018 and 2017:

	2018	2017
Balance at beginning of year	$13,377	$11,770
Accruals for warranties	11,937	11,394
Warranty assumed from acquisitions	—	75
Warranty payments	(12,966)	(10,090)
Currency adjustments	(153)	228
Balance at end of year	$12,195	$13,377

Note 2 — Recently issued accounting standards

New accounting guidance adopted:

In March 2016, the Financial Accounting Standards Board ("FASB") issued a new standard which simplifies the accounting for share-based payment transactions. This guidance requires that excess tax benefits and tax deficiencies be recognized as income tax expense or benefit in the statements of income rather than additional paid-in capital. Additionally, the excess tax benefits will be classified along with other income tax cash flows as an operating activity, rather than a financing activity, in the statements of cash flows. Further, the update allows an entity to make a policy election to recognize forfeitures as they occur or estimate the number of awards expected to be forfeited. We adopted this new standard during the first quarter of 2018. As a result, net excess tax benefits of $9,498 were recognized as a reduction of income tax expense during 2018. The cash flow classification requirements of this new standard were applied retrospectively. As a result, excess tax benefits of $9,498 were reported as net cash provided by operating activities in 2018 and $7,079 and $3,476 of excess tax benefits were reclassified from net cash used in financing activities to net cash provided by operating activities in 2017 and 2016, respectively. This new standard also requires that employee taxes paid when an employer withholds shares for tax-withholding purposes be reported as financing activities in the statements of cash flows on a retrospective basis. Previously, this activity was included in operating activities. The impact of this change was immaterial to the statements of cash flows. Additionally, we elected to continue to estimate forfeitures rather than account for them as they occur.

In February 2018, the FASB issued a new standard which gives entities the option to reclassify tax effects stranded in accumulated other comprehensive income as a result of the Tax Cuts and Jobs Act (“the Act”) into retained earnings. The guidance allows entities to reclassify from accumulated other comprehensive income to retained earnings stranded tax effects resulting from the Act's new federal corporate income tax rate. The guidance also allows entities to elect to reclassify other stranded tax effects that relate to the Act but do not directly relate to the change in the federal tax rate (e.g., state taxes, changing from a worldwide tax system to a territorial system). Tax effects that are stranded in accumulated other comprehensive income for other reasons (e.g., prior changes in tax law, a change in valuation allowance) may not be reclassified. This standard is effective for us beginning November 1, 2019; with early adoption permitted. We early adopted this standard in the fourth quarter of 2018. As a result, we reclassified $18,846 of stranded tax effects from accumulated other comprehensive income to retained earnings.

In March 2018, the FASB issued amendments which incorporate various Securities and Exchange Commission ("SEC") paragraphs pursuant to the issuance of the December 2017 SEC Staff Accounting Bulletin No. 118 ("SAB 118"), Income Tax Accounting Implications of the Tax Cuts and Jobs Act, effective immediately. The SEC issued SAB 118 to address concerns about reporting entities' ability to timely comply with the accounting requirements to recognize all of the effects of the Act in the period of enactment. SAB 118 allows disclosure that timely determination of some or all of the income tax effects from the Act are incomplete by the due date of the financial statements and if possible to provide a reasonable estimate. We have accounted for the tax effects of the Act under the guidance of SAB 118, on a provisional basis. Our accounting for certain income tax effects is incomplete, but we have determined reasonable estimates for those effects and have recorded provisional amounts in our Consolidated Financial Statements. Refer to Note 7 for additional information.

New accounting guidance issued and not yet adopted:

In May 2014, the FASB issued a new standard regarding revenue recognition. Under this standard, a company recognizes revenue when it transfers promised goods or services to customers in an amount that reflects the consideration to which the company expects to be entitled in exchange for those goods or services. The standard implements a five-step process for customer contract revenue recognition that focuses on transfer of control. The new standard is required to be applied retrospectively to each prior reporting period presented or retrospectively with the cumulative effect of initially applying it recognized at the date of initial application (modified retrospective method). We adopted the standard beginning November 1, 2018 using the modified retrospective method.

We have established our accounting policy, provided training to our reporting units and completed our evaluation of the new standard, including the impact on our business processes, systems, and controls as well as differences in the timing and/or method of revenue recognition for our contracts. We also designed and implemented specific controls over the evaluation of the impact of the new standard, including the calculation of the cumulative effect of adopting the new standard. We determined that the revenue recognition for our products and services will remain largely unchanged; and therefore, the adoption of this new standard did not have a material impact on our Consolidated Financial Statements. We will provide expanded disclosures as required under this standard in the Consolidated Financial Statements subsequent to adoption.

In February 2016, the FASB issued a new standard which requires a lessee to recognize on the balance sheet the assets and liabilities for the rights and obligations created by those leases with a lease term of more than twelve months. Leases will continue to be classified as either financing or operating, with classification affecting the recognition, measurement and presentation of expenses and cash flows arising from a lease. It will be effective for us beginning November 1, 2019. Early adoption is permitted. We are currently assessing the impact this standard will have on our Consolidated Financial Statements.

In March 2017, the FASB issued a new standard which requires the presentation of the service cost component of the net periodic benefit cost in the same income statement line item as other employee compensation costs arising from services rendered during the period. All other components of net periodic benefit cost will be presented below operating income. Additionally, only the service cost component will be eligible for capitalization in assets. It will be effective for us beginning November 1, 2018. The adoption of this standard is not expected to have a material impact on our Consolidated Financial Statements.

In August 2018, the FASB issued a new standard which removes, modifies, and adds certain disclosure requirements on fair value measurements. The guidance removes disclosure requirements pertaining to the amount of and reasons for transfers between Level 1 and Level 2 of the fair value hierarchy, the policy for timing of transfers between levels, and the valuation processes for Level 3 fair value measurements. For investments in certain entities that calculate net asset value, an entity is required to disclose the timing of liquidation of an investee's assets and the date when restrictions from redemption might lapse only if the investee has communicated the timing to the entity or announced the timing publicly. In addition, the amendment clarifies that the measurement uncertainty disclosure is to communicate information about the uncertainty in measurement as of the reporting date. The guidance adds disclosure requirements for changes in unrealized gains and losses for the period included in other comprehensive income for recurring Level 3 fair value measurements held at the end of the reporting period as well as the range and weighted average of significant unobservable inputs used to develop Level 3 fair value measurements. It will be effective for us beginning November 1, 2020. Early adoption is permitted. We are currently assessing the impact this standard will have on our Consolidated Financial Statements.

In August 2018, the FASB issued a new standard which addresses defined benefit plans. The amendments modify the following disclosure requirements for employers that sponsor defined benefit pension or other postretirement plans: the amounts in accumulated other comprehensive income expected to be recognized as components of net period benefit cost over the next fiscal year, amount and timing of plan assets expected to be returned to the employer, related party disclosure about the amount of future annual benefits covered by insurance and annuity contracts and significant transactions between the employer or related parties and the plan, and the effects of a one-percentage point change in assumed health care cost trend rates on the (a) aggregate of the service and interest cost components of net periodic benefit costs and (b) benefit obligation for postretirement health care benefits are removed. A disclosure requirement was added for the explanation of the reasons for significant gains and losses related to changes in the benefit obligation for the period. Additionally, the standard clarifies disclosure requirement surrounding the projected benefit obligation (PBO) and fair value of plan assets for plans with PBOs in excess of plan assets and the accumulated benefit obligation (ABO) and fair value of plan assets for plans with ABOs in excess of plan assets. It will be effective for us beginning November 1, 2020. Early adoption is permitted. We are currently assessing the impact this standard will have on our Consolidated Financial Statements.

Note 3 — Acquisitions

Business acquisitions have been accounted for using the acquisition method, with the acquired assets and liabilities recorded at estimated fair value on the dates of acquisition. The cost in excess of the net assets of the business acquired is included in goodwill. Operating results since the respective dates of acquisitions are included in the Consolidated Statement of Income.

2018 acquisitions

On October 17, 2018, we purchased 100 percent of the outstanding shares of Cladach Nua Teoranta (“Clada”), a Galway, Ireland designer and developer primarily focused on medical balloons and balloon catheters. Clada’s technologies are used in key applications such as angioplasty and the treatment of vascular disease. We acquired Clada for an aggregate purchase price of $5,222, which included an earn-out liability of $1,131. Based on the fair value of the assets acquired and the liabilities assumed, goodwill of $2,905 and identifiable intangible assets of $1,218 were recorded. The identifiable intangible assets consist primarily of $812 of customer relationships (amortized over 10 years), $203 of tradenames (amortized over 15 years) and $203 of technology (amortized over 15 years). Goodwill associated with this acquisition is not tax deductible. This acquisition is being reported in our Advanced Technology Systems segment. As of October 31, 2018, the purchase price allocations remain preliminary as we complete our assessments of goodwill, intangible assets, income taxes and certain reserves.

On January 2, 2018, we purchased 100 percent of the outstanding shares of Sonoscan, Inc. (“Sonoscan”), an Elk Grove Village, Illinois leading designer and manufacturer of acoustic microscopes and sophisticated acoustic micro imaging systems used in a variety of microelectronic, automotive, aerospace and industrial electronic assembly applications. We acquired Sonoscan for an aggregate purchase price of $46,018, net of $655 of cash. Based on the fair value of the assets acquired and the liabilities assumed, goodwill of $22,775 and identifiable intangible assets of $7,910 were recorded. The identifiable intangible assets consist primarily of $1,700 of customer relationships (amortized over 7 years), $3,300 of tradenames (amortized over 11 years), $2,500 of technology (amortized over 7 years) and $410 of non-compete agreements (amortized over 5 years). Goodwill associated with this acquisition is tax deductible. This acquisition is being reported in our Advanced Technology Systems segment. As of October 31, 2018, the purchase price allocations remain preliminary as we complete our assessments of income taxes.

Pro forma sales and results of operations for our 2018 acquisitions, had they occurred at the beginning of the applicable fiscal year ended October 31, are not material and, accordingly, are not provided.

2017 acquisitions

On March 31, 2017, we completed the acquisition of Vention Medical’s Advanced Technologies business (“Vention”), a Salem, New Hampshire leading designer, developer and manufacturer of minimally invasive interventional delivery devices, catheters and advanced components for the global medical technology market. This is a highly complementary business that adds significant scale and enhances strategic capabilities of our existing medical platform. We acquired Vention for an aggregate purchase price of $705,000, net of $3,313 of cash and other closing adjustments of $10,726. The acquisition was funded primarily through a new term loan facility, as well as through cash and borrowings on our credit facility. The purchase price was allocated to the underlying assets acquired and liabilities assumed based upon their estimated fair values at the date of acquisition. We determined the estimated fair values based on independent appraisals, discounted cash flow analyses, quoted market prices, replacement cost analyses and estimates made by management.

Based on the fair value of the assets acquired and the liabilities assumed, goodwill of $434,123, of which $37,200 is tax deductible, and identifiable intangible assets of $286,000 were recorded. The identifiable intangible assets consist primarily of $240,000 of customer relationships (amortized over 14 years), $2,000 of tradenames (amortized over 6 years), and $44,000 of technology, consisting of $36,000 (amortized over 14 years) and $8,000 (amortized over 10 years). Goodwill represents the value we expect to achieve through the expansion of our existing medical platform. This acquisition is being reported in our Advanced Technology Systems segment.

The following table summarizes the purchase price allocation of the estimated fair values of the assets acquired and liabilities assumed at the acquisition date:

Assets acquired:	
Cash	$3,313
Receivables	26,742
Inventories	14,279
Prepaid expenses	3,079
Property, plant and equipment	34,319
Goodwill	434,123
Intangible assets	286,000
Other assets	1,071
Total assets acquired	$802,926
Liabilities assumed:	
Current liabilities	19,130
Deferred tax liabilities	64,757
Total liabilities assumed	$83,887
Net assets acquired	$719,039

On February 16, 2017, we purchased 100 percent of the outstanding shares of InterSelect GmbH (“InterSelect”), a German designer and manufacturer of selective soldering systems used in a variety of automotive, aerospace and industrial electronics assembly applications. We acquired InterSelect for an aggregate purchase price of $5,432, net of cash acquired of $492. Based on the fair value of the assets acquired and the liabilities assumed, goodwill of $3,548 and identifiable intangible assets of $1,879 were recorded. The identifiable intangible assets consist primarily of $1,109 of customer relationships (amortized over 9 years), $348 of tradenames (amortized over 12 years), and $422 of technology (amortized over 9 years). Goodwill associated with this acquisition is not tax deductible. This acquisition is being reported in our Advanced Technology Systems segment.

On February 1, 2017, we purchased 100 percent of the outstanding shares of Plas-Pak Industries, Inc. (“Plas-Pak”), a Norwich, Connecticut designer and manufacturer of injection molded, single-use plastic dispensing products. Plas-Pak’s broad product offering includes two-component (2K) cartridges for industrial and commercial do-it-yourself adhesives, dial-a-dose calibrated syringes for veterinary and animal health applications, and specialty syringes for pesticide, dental and other markets. We acquired Plas-Pak for an aggregate purchase price of $70,798, net of cash acquired of $543. Based on the fair value of the assets acquired and the liabilities assumed, goodwill of $24,995 and identifiable intangible assets of $33,800 were recorded. The identifiable intangible assets consist primarily of $23,700 of customer relationships (amortized over 17 years), $4,100 of tradenames (amortized over 12 years), $5,000 of technology (amortized over 9 years) and $1,000 of non-compete agreements (amortized over 5 years). Goodwill associated with this acquisition is tax deductible. This acquisition is being reported in our Advanced Technology Systems segment.

On January 3, 2017, we purchased certain assets of ACE Production Technologies, Inc. (“ACE”), a Spokane, Washington based designer and manufacturer of selective soldering systems used in a variety of automotive and industrial electronics assembly applications. We acquired the assets for an aggregate purchase price of $13,761. Based on the fair value of the assets acquired and the liabilities assumed, goodwill of $6,383 and identifiable intangible assets of $5,010 were recorded. The identifiable intangible assets consist primarily of $2,800 of customer relationships (amortized over 7 years), $1,000 of tradenames (amortized over 11 years), $1,100 of technology (amortized over 7 years) and $110 of non-compete agreements (amortized over 3 years). Goodwill associated with this acquisition is tax deductible. This acquisition is being reported in our Advanced Technology Systems segment.

2016 acquisition

On September 1, 2016, we purchased 100 percent of the outstanding shares of LinkTech Quick Couplings, Inc. ("LinkTech"), a Ventura, California designer, manufacturer and distributor of highly engineered precision couplings and fittings. We acquired LinkTech for an aggregate purchase price of $43,348, net of cash acquired of $36. Based on the fair value of the assets acquired and the liabilities assumed, goodwill of $25,867 and identifiable intangible assets of $14,610 were recorded. The identifiable intangible assets consist primarily of $8,600 of customer relationships (amortized over 11 years), $2,800 of tradenames (amortized over 12 years), $2,300 of technology (amortized over 8 years) and $910 of non-compete agreements (amortized over 5 years). Goodwill associated with this acquisition is tax deductible. This acquisition is being reported in our Advanced Technology Systems segment.

Note 4 — Details of Consolidated Balance Sheet

	2018	2017
Receivables:		
Accounts	$475,638	$491,224
Notes	4,476	5,121
Other	20,889	18,533
	501,003	514,878
Allowance for doubtful accounts	(9,580)	(9,791)
	$491,423	$505,087
Inventories:		
Raw materials and component parts	$112,823	$105,424
Work-in-process	47,126	45,743
Finished goods	148,618	152,923
	308,567	304,090
Obsolescence and other reserves	(37,545)	(33,140)
LIFO reserve	(6,545)	(6,684)
	$264,477	$264,266
Property, plant and equipment:		
Land	$10,544	$10,598
Land improvements	4,294	4,292
Buildings	252,127	190,611
Machinery and equipment	456,307	424,006
Enterprise management system	53,234	52,936
Construction-in-progress	24,266	49,713
Leased property under capitalized leases	26,118	25,715
	826,890	757,871
Accumulated depreciation and amortization	(440,224)	(411,460)
	$386,666	$346,411
Accrued liabilities:		
Salaries and other compensation	$72,364	$73,234
Pension and retirement	5,095	4,768

Taxes other than income taxes	8,060	7,663
Other	89,566	87,701
	$175,085	$173,366

Note 5 — Goodwill and intangible assets

We account for goodwill and other intangible assets in accordance with the provisions of ASC 350 and account for business combinations using the acquisition method of accounting and accordingly, the assets and liabilities of the entities acquired are recorded at their estimated fair values at the acquisition date. Goodwill is the excess of purchase price over the fair value of tangible and identifiable intangible net assets acquired in various business combinations. Goodwill is not amortized but is tested for impairment annually at the reporting unit level, or more often if indications of impairment exist. We assess the fair value of reporting units on a non-recurring basis using a combination of two valuation methods, a market approach and an income approach, to estimate the fair value of our reporting units. The implied fair value of our reporting units is determined based on significant unobservable inputs; accordingly, these inputs fall within Level 3 of the fair value hierarchy.

Our reporting units are the Adhesive Dispensing Systems segment, the Industrial Coating Systems segment and one level below the Advanced Technology Systems segment.

In the fourth quarter of each year, we estimate a reporting unit's fair value using a combination of the discounted cash flow method of the Income Approach and the guideline public company method of the Market Approach and compare the result against the reporting unit's carrying value of net assets. An impairment charge is recorded for the amount by which the carrying value of the reporting unit exceeds the fair value of the reporting unit, as calculated in the quantitative analysis described above. We did not record any goodwill impairment charges in 2018, 2017, or 2016.

Changes in the carrying amount of goodwill during 2018 by operating segment:

	Adhesive Dispensing Systems	Advanced Technology Systems	Industrial Coating Systems	Total
Balance at October 31, 2017	$ 392,295	$ 1,172,857	$ 24,058	$ 1,589,210
Acquisitions	—	24,679	—	24,679
Currency effect	(3,304)	(2,567)	—	(5,871)
Balance at October 31, 2018	$ 388,991	$ 1,194,969	$ 24,058	$ 1,608,018

Changes in the carrying amount of goodwill during 2017 by operating segment:

	Adhesive Dispensing Systems	Advanced Technology Systems	Industrial Coating Systems	Total
Balance at October 31, 2016	$ 385,733	$ 697,346	$ 24,058	$ 1,107,137
Acquisition	—	470,248	—	470,248
Currency effect	6,562	5,263	—	11,825
Balance at October 31, 2017	$ 392,295	$ 1,172,857	$ 24,058	$ 1,589,210

Accumulated impairment losses, which were recorded in 2009, were $232,789 at October 31, 2018 and October 31, 2017. Of these losses, $229,173 related to the Advanced Technology Systems segment and $3,616 related to the Industrial Coating Systems segment.

Information regarding intangible assets subject to amortization:

October 31, 2018

	Carrying Amount	Accumulated Amortization	Net Book Value
Customer relationships	$480,404	$ 137,640	$342,764
Patent/technology costs	153,602	59,845	93,757
Trade name	96,433	34,768	61,665
Noncompete agreements	11,469	9,919	1,550
Other	1,386	1,381	5
Total	$743,294	$ 243,553	$499,741

	October 31, 2017		
	Carrying Amount	Accumulated Amortization	Net Book Value
Customer relationships	$480,536	$ 102,033	$378,503
Patent/technology costs	150,581	48,669	101,912
Trade name	93,281	28,366	64,915
Noncompete agreements	11,142	9,298	1,844
Other	1,384	1,378	6
Total	$736,924	$ 189,744	$547,180

Amortization expense for 2018, 2017 and 2016 was $55,448, $44,907 and $29,061 respectively.

Estimated amortization expense for each of the five succeeding years:

Year	Amounts
2019	$48,523
2020	$48,055
2021	$42,703
2022	$38,730
2023	$37,885

Note 6 — Retirement, pension and other postretirement plans

Retirement plans — We have funded contributory retirement plans covering certain employees. Our contributions are primarily determined by the terms of the plans, subject to the limitation that they shall not exceed the amounts deductible for income tax purposes. We also sponsor unfunded contributory supplemental retirement plans for certain employees. Generally, benefits under these plans vest gradually over a period of approximately three years from date of employment, and are based on the employee's contribution. The expense applicable to retirement plans for 2018, 2017 and 2016 was approximately $22,634, $19,259 and $17,194, respectively.

Pension plans — We have various pension plans covering a portion of our United States and international employees. Pension plan benefits are generally based on years of employment and, for salaried employees, the level of compensation. Actuarially determined amounts are contributed to United States plans to provide sufficient assets to meet future benefit payment requirements. We also sponsor an unfunded supplemental pension plan for certain employees. International subsidiaries fund their pension plans according to local requirements.

A reconciliation of the benefit obligations, plan assets, accrued benefit cost and the amount recognized in financial statements for pension plans is as follows:

	United States		International	
	2018	2017	2018	2017
Change in benefit obligation:				
Benefit obligation at beginning of year	$430,816	$409,459	$88,761	$91,396
Service cost	13,543	12,456	2,069	2,378
Interest cost	14,306	12,844	1,635	1,537
Participant contributions	—	—	90	85
Plan amendments	—	—	50	—
Settlements	—	(1,548)	(1,431)	(1,309)
Foreign currency exchange rate change	—	—	(2,676)	4,896
Actuarial (gain) loss	(20,502)	9,351	107	(7,602)
Benefits paid	(12,558)	(11,746)	(1,378)	(2,620)
Benefit obligation at end of year	$425,605	$430,816	$87,227	$88,761
Change in plan assets:				
Beginning fair value of plan assets	$369,234	$333,867	$37,504	$35,604
Actual return on plan assets	(13,890)	29,620	2,370	612
Company contributions	18,287	19,041	3,728	3,165

Participant contributions	—	—	90	85
Settlements	—	(1,548)	(1,431)	(1,309)
Foreign currency exchange rate change	—	—	(1,266)	1,967
Benefits paid	(12,558)	(11,746)	(1,378)	(2,620)
Ending fair value of plan assets	$361,073	$369,234	$39,617	$37,504
Funded status at end of year	$(64,532)	$(61,582)	$(47,610)	$(51,257)
Amounts recognized in financial statements:				
Noncurrent asset	$1,544	$—	$748	$64
Accrued benefit liability	(1,176)	(1,201)	(36)	(36)
Long-term pension and retirement obligations	(64,900)	(60,381)	(48,322)	(51,285)
Total amount recognized in financial statements	$(64,532)	$(61,582)	$(47,610)	$(51,257)

	United States		International	
	2018	2017	2018	2017
Amounts recognized in accumulated other comprehensive (gain) loss:				
Net actuarial (gain) loss	$130,788	$124,917	$23,304	$27,134
Prior service credit	(161)	(184)	(2,844)	(3,279)
Accumulated other comprehensive loss	$130,627	$124,733	$20,460	$23,855
Amounts expected to be recognized during next fiscal year:				
Amortization of net actuarial (gain) loss	$6,221	$8,672	$1,700	$2,074
Amortization of prior service credit	(61)	(23)	(302)	(313)
Total	$6,160	$8,649	$1,398	$1,761

The following table summarizes the changes in accumulated other comprehensive loss:

	United States		International	
	2018	2017	2018	2017
Balance at beginning of year	$124,733	$134,447	$23,855	$31,645
Net (gain) loss arising during the year	15,351	515	(752)	(6,867)
Prior service cost arising during the year	—	—	50	—
Net (gain) loss recognized during the year	(9,479)	(9,537)	(2,115)	(2,605)
Prior service (cost) credit recognized during the year	22	(44)	316	302
Settlement loss	—	(648)	(252)	(363)
Exchange rate effect during the year	—	—	(642)	1,743
Balance at end of year	$130,627	$124,733	$20,460	$23,855

Information regarding the accumulated benefit obligation is as follows:

	United States		International	
	2018	2017	2018	2017
For all plans:				
Accumulated benefit obligation	$403,590	$420,035	$74,690	$76,032
For plans with benefit obligations in excess of plan assets:				
Projected benefit obligation	373,531	430,816	46,292	83,289
Accumulated benefit obligation	351,516	420,035	42,363	70,985
Fair value of plan assets	307,455	369,234	5,355	32,325

Net pension benefit costs include the following components:

	United States			International		
	2018	2017	2016	2018	2017	2016
Service cost	$13,543	$12,456	$11,490	$2,069	$2,378	$2,448
Interest cost	14,306	12,844	15,932	1,635	1,537	2,294
Expected return on plan assets	(21,964)	(20,784)	(19,666)	(1,512)	(1,338)	(1,501)
Amortization of prior service cost (credit)	(22)	44	76	(316)	(302)	(203)
Amortization of net actuarial gain (loss)	9,479	9,537	8,480	2,115	2,605	1,723
Settlement (gain) loss	—	648	—	252	363	160
Curtailment (gain) loss	—	—	—	—	—	(1,526)
Total benefit cost	$15,342	$14,745	$16,312	$4,243	$5,243	$3,395

Net periodic pension cost for 2018 included a settlement loss of $252 due to lump sum retirement payments. Net periodic pension cost for 2017 included a settlement loss of $1,011 due to lump sum retirement payments. Net periodic pension cost for 2016 included a settlement loss of $160 due to lump sum retirement payments and a curtailment gain of $1,526 due to a plan amendment allowing participants to elect a new defined contribution plan or a new defined benefit plan.

The weighted average assumptions used in the valuation of pension benefits were as follows:

	United States			International		
	2018	2017	2016	2018	2017	2016
Assumptions used to determine benefit obligations at October 31:						
Discount rate	4.53%	3.80%	3.94%	2.14%	2.07%	1.86%
Rate of compensation increase	3.90	3.61	3.61	3.12	3.13	3.12
Assumptions used to determine net benefit costs for the years ended October 31:						
Discount rate - benefit obligation	3.80	3.94	4.39	2.07	1.86	2.81
Discount rate - service cost	4.01	4.31	4.39	1.76	1.55	2.81
Discount rate - interest cost	3.31	3.20	4.39	1.83	1.66	2.81
Expected return on plan assets	6.00	6.25	6.72	3.91	3.51	4.22
Rate of compensation increase	3.61	3.61	3.50	3.13	3.12	3.22

The amortization of prior service cost is determined using a straight-line amortization of the cost over the average remaining service period of employees expected to receive benefits under the plans.

The discount rate reflects the current rate at which pension liabilities could be effectively settled at the end of the year. The discount rate used considers a yield derived from matching projected pension payments with maturities of a portfolio of available bonds that receive the highest rating given from a recognized investments ratings agency. The changes in the discount rates in 2018, 2017, and 2016 are due to changes in yields for these types of investments as a result of the economic environment.

In determining the expected return on plan assets using the calculated value of plan assets, we consider both historical performance and an estimate of future long-term rates of return on assets similar to those in our plans. We consult with and consider the opinions of financial and other professionals in developing appropriate return assumptions. The rate of compensation increase is based on managements' estimates using historical experience and expected increases in rates.

Net actuarial gains or losses are amortized to expense on a plan-by-plan basis when they exceed the accounting corridor, which is set at 10% of the greater of the plan assets or benefit obligations. Gains or losses outside of the corridor are subject to amortization over an average employee future service period that differs by plan. If substantially all of the plan's participants are no longer actively accruing benefits, the average life expectancy is used.

In the fourth quarter of 2016, we adopted a change in the method to be used to estimate the service and interest cost components of net periodic benefit cost for defined benefit pension plans. Historically, for the vast majority of our plans, the service and interest cost components were estimated using a single weighted-average discount rate derived from the yield curve used to measure the benefit obligation at the beginning of the period. Beginning in 2017, we used a spot rate approach by applying the specific spot rates along the yield curve to the relevant projected cash flows in the estimation of the service and interest components of benefit cost, resulting in a more precise measurement. This change did not affect the measurement of total benefit obligations. The change was accounted for as a change in estimate that is inseparable from a change in accounting principle and, accordingly, was accounted for prospectively starting in 2017. The reductions in service and interest costs for 2017 associated with this change in estimate were $1,200 and $3,100, respectively.

The allocation of pension plan assets as of October 31, 2018 and 2017 is as follows:

	United States 2018	2017	International 2018	2017
Asset Category				
Equity securities	13 %	13 %	— %	— %
Debt securities	50	48	—	—
Insurance contracts	—	—	55	56
Pooled investment funds	36	39	44	42
Other	1	—	1	2
Total	100 %	100 %	100 %	100 %

Our investment objective for defined benefit plan assets is to meet the plans' benefit obligations, while minimizing the potential for future required plan contributions.

Our United States plans comprise 90 percent of the worldwide pension assets. In general, the investment strategies focus on asset class diversification, liquidity to meet benefit payments and an appropriate balance of long-term investment return and risk. Target ranges for asset allocations are determined by dynamically matching the actuarial projections of the plans' future liabilities and benefit payments with expected long-term rates of return on the assets, taking into account investment return volatility and correlations across asset classes. For 2018, the target in "return-seeking assets" is 35 percent and 65 percent in fixed income. Plan assets are diversified across several investment managers and are invested in liquid funds that are selected to track broad market indices. Investment risk is carefully controlled with plan assets rebalanced to target allocations on a periodic basis and continual monitoring of investment managers' performance relative to the investment guidelines established with each investment manager.

Our international plans comprise 10 percent of the worldwide pension assets. Asset allocations are developed on a country-specific basis. Our investment strategy is to cover pension obligations with insurance contracts or to employ independent managers to invest the assets.

The fair values of our pension plan assets at October 31, 2018 by asset category are in the table below:

	United States				International			
	Total	Level 1	Level 2	Level 3	Total	Level 1	Level 2	Level 3
Cash	$1,083	$1,083	$—	$ —	$528	$528	$ —	$—
Money market funds	1,620	1,620	—	—	—	—	—	—
Equity securities:								
Basic materials	2,763	2,763	—	—	—	—	—	—
Consumer goods	3,703	3,703	—	—	—	—	—	—
Financial	5,306	5,306	—	—	—	—	—	—
Healthcare	4,179	4,179	—	—	—	—	—	—
Industrial goods	2,516	2,516	—	—	—	—	—	—
Technology	4,690	4,690	—	—	—	—	—	—
Utilities	732	732	—	—	—	—	—	—
Mutual funds	21,987	21,987	—	—	—	—	—	—
Fixed income securities:								
U.S. Government	50,602	10,224	40,378	—	—	—	—	—
Corporate	123,159	—	123,159	—	—	—	—	—
Other	5,589	—	5,589	—	—	—	—	—
Other types of investments:								
Insurance contracts	—	—	—	—	21,645	—	—	21,645
Other	1,967	1,967	—	—	—	—	—	—
Total investments in the fair value hierarchy	$229,896	$60,770	$169,126	$ —	$22,173	$528	$ —	$21,645
Investments measured at Net Asset Value:								
Real estate collective funds	23,109				—			
Pooled investment funds	108,068				17,444			

Total Investments at Fair Value	$361,073	$39,617

The fair values of our pension plan assets at October 31, 2017 by asset category are in the table below:

	United States				International			
	Total	Level 1	Level 2	Level 3	Total	Level 1	Level 2	Level 3
Cash	$959	$959	$—	$ —	$566	$566	$ —	$—
Money market funds	3,615	3,615	—	—	—	—	—	—
Equity securities:								
Basic materials	2,129	2,129	—	—	—	—	—	—
Consumer goods	3,776	3,776	—	—	—	—	—	—
Financial	6,147	6,147	—	—	—	—	—	—
Healthcare	3,940	3,940	—	—	—	—	—	—
Industrial goods	2,459	2,459	—	—	—	—	—	—
Technology	3,815	3,815	—	—	—	—	—	—
Utilities	793	793	—	—	—	—	—	—
Mutual funds	20,698	20,698	—	—	—	—	—	—
Fixed income securities:								
U.S. Government	57,789	9,372	48,417	—	—	—	—	—
Corporate	112,112	—	112,112	—	—	—	—	—
Other	6,566	—	6,566	—	—	—	—	—
Other types of investments:								
Insurance contracts	—	—	—	—	21,037	—	—	21,037
Other	1,013	1,013	—	—	—	—	—	—
Total investments in the fair value hierarchy	$225,811	$58,716	$167,095	$ —	$21,603	$566	$ —	$21,037
Investments measured at Net Asset Value:								
Real estate collective funds	21,699				—			
Pooled investment funds	121,724				15,901			
Total Investments at Fair Value	$369,234				$37,504			

These investment funds did not own a significant number of shares of Nordson Corporation common stock for any year presented.

The inputs and methodology used to measure fair value of plan assets are consistent with those described in Note 11. Following are the valuation methodologies used to measure these assets:

- Money market funds - Money market funds are public investment vehicles that are valued with a net asset value of one dollar. This is a quoted price in an active market and is classified as Level 1.
- Equity securities - Common stocks and mutual funds are valued at the closing price reported on the active market on which the individual securities are traded and are classified as Level 1.
- Fixed income securities - U.S. Treasury bills reflect the closing price on the active market in which the securities are traded and are classified as Level 1. Securities of U.S. agencies are valued using bid evaluations and are classified as Level 2. Corporate fixed income securities are valued using evaluated prices, such as dealer quotes, bids and offers and are therefore classified as Level 2.

- Insurance contracts - Insurance contracts are investments with various insurance companies. The contract value represents the best estimate of fair value. These contracts do not hold any specific assets. These investments are classified as Level 3.
- Real estate collective funds – These funds are valued using the net asset value of the underlying properties. Net asset value is calculated using a combination of key inputs, such as revenue and expense growth rates, terminal capitalization rates and discount rates.
- Pooled investment funds - These are public investment vehicles valued using the net asset value. The net asset value is based on the value of the assets owned by the plan, less liabilities. These investments are not quoted on an active exchange.

The following tables present an analysis of changes during the years ended October 31, 2018 and 2017 in Level 3 plan assets, by plan asset class, for U.S. and international pension plans using significant unobservable inputs to measure fair value:

	Fair Value Measurements Using Significant Unobservable Inputs (Level 3) Insurance contracts	Total
Beginning balance at October 31, 2017	$21,037	$21,037
Actual return on plan assets:		
Assets held, end of year	862	862
Assets sold during the period	—	—
Purchases	2,760	2,760
Sales	(2,501)	(2,501)
Foreign currency translation	(513)	(513)
Ending balance at October 31, 2018	$21,645	$21,645

	Fair Value Measurements Using Significant Unobservable Inputs (Level 3) Insurance contracts	Total
Beginning balance at October 31, 2016	$20,927	$20,927
Actual return on plan assets:		
Assets held, end of year	(412)	(412)
Assets sold during the period	—	—
Purchases	2,330	2,330
Sales	(2,502)	(2,502)
Foreign currency translation	694	694
Ending balance at October 31, 2017	$21,037	$21,037

Contributions to pension plans in 2019 are estimated to be approximately $22,000.

Retiree pension benefit payments, which reflect expected future service, are anticipated to be paid as follows:

Year	United States	International
2019	$ 15,639	$ 2,202
2020	17,076	2,728
2021	18,525	3,144
2022	19,894	2,636
2023	22,048	2,736
2024-2028	129,157	17,052

Other postretirement plans - We sponsor an unfunded postretirement health care benefit plan covering certain of our United States employees. Employees hired after January 1, 2002, are not eligible to participate in this plan. For eligible retirees under the age of 65 who enroll in the plan, the plan is contributory in nature, with retiree contributions in the form of premiums that are adjusted annually. For eligible retirees age 65 and older who enroll in the plan, the plan delivers a benefit in the form of a Health Reimbursement Account (HRA), which retirees use for eligible reimbursable expenses, including premiums paid for purchase of a Medicare supplement plan or other out-of-pocket medical expenses such as deductibles or co-pays.

A reconciliation of the benefit obligations, accrued benefit cost and the amount recognized in financial statements for other postretirement plans is as follows:

	United States		International	
	2018	2017	2018	2017
Change in benefit obligation:				
Benefit obligation at beginning of year	$75,146	$71,904	$599	$623
Service cost	737	752	20	20
Interest cost	2,529	2,307	20	20
Participant contributions	663	503	—	—
Foreign currency exchange rate change	—	—	(11)	24
Actuarial (gain) loss	(4,519)	2,212	(110)	(81)
Benefits paid	(2,546)	(2,532)	(6)	(7)
Benefit obligation at end of year	$72,010	$75,146	$512	$599
Change in plan assets:				
Beginning fair value of plan assets	$—	$—	$—	$—
Company contributions	1,883	2,029	6	7
Participant contributions	663	503	—	—
Benefits paid	(2,546)	(2,532)	(6)	(7)
Ending fair value of plan assets	$—	$—	$—	$—
Funded status at end of year	$(72,010)	$(75,146)	$(512)	$(599)
Amounts recognized in financial statements:				
Accrued benefit liability	$(2,360)	$(2,148)	$(8)	$(8)
Long-term postretirement obligations	(69,650)	(72,998)	(504)	(591)
Total amount recognized in financial statements	$(72,010)	$(75,146)	$(512)	$(599)

	United States		International	
	2018	2017	2018	2017
Amounts recognized in accumulated other comprehensive (gain) loss:				
Net actuarial (gain) loss	$14,526	$20,124	$(423)	$(342)
Prior service credit	(43)	(142)	—	—
Accumulated other comprehensive (gain) loss	$14,483	$19,982	$(423)	$(342)
Amounts expected to be recognized during next fiscal year:				
Amortization of net actuarial (gain) loss	$609	$995	$(28)	$(20)
Amortization of prior service cost (credit)	(27)	(99)	—	—
Total	$582	$896	$(28)	$(20)

The following table summarizes the changes in accumulated other comprehensive (gain) loss:

	United States		International	
	2018	2017	2018	2017

Balance at beginning of year	$19,982	$18,480	$(342)	$(265)
Net (gain) loss arising during the year	(4,519)	2,212	(110)	(82)
Net gain (loss) recognized during the year	(1,079)	(874)	20	17
Prior service (cost) credit recognized during the year	99	164	—	—
Exchange rate effect during the year	—	—	9	(12)
Balance at end of year	$14,483	$19,982	$(423)	$(342)

Net postretirement benefit costs include the following components:

	United States			International		
	2018	2017	2016	2018	2017	2016
Service cost	$737	$752	$849	$20	$20	$16
Interest cost	2,529	2,307	2,923	20	20	23
Amortization of prior service cost (credit)	(99)	(164)	(267)	—	—	—
Amortization of net actuarial (gain) loss	1,079	874	684	(20)	(17)	(24)
Total benefit cost	$4,246	$3,769	$4,189	$20	$23	$15

The weighted average assumptions used in the valuation of postretirement benefits were as follows:

	United States			International		
	2018	2017	2016	2018	2017	2016
Assumptions used to determine benefit obligations at October 31:						
Discount rate	4.56 %	3.86 %	4.05 %	3.88 %	3.52 %	3.40 %
Health care cost trend rate	3.75	3.70	3.63	6.35	6.50	6.13
Rate to which health care cost trend rate is assumed to decline (ultimate trend rate)	3.27	3.23	3.24	3.50	3.50	3.50
Year the rate reaches the ultimate trend rate	2026	2026	2026	2037	2037	2031
Assumption used to determine net benefit costs for the years ended October 31:						
Discount rate - benefit obligation	3.84 %	4.03 %	4.50 %	3.52 %	3.40 %	4.35 %
Discount rate - service cost	4.11	4.48	4.50	3.54	3.56	4.35
Discount rate - interest cost	3.39	3.27	4.50	3.40	3.20	4.35

The weighted average health care trend rates reflect expected increases in the Company's portion of the obligation.

Net actuarial gains or losses are amortized to expense on a plan-by-plan basis when they exceed the accounting corridor, which is set at 10% of the greater of the plan assets or benefit obligations. Gains or losses outside of the corridor are subject to amortization over an average employee future service period that differs by plan. If substantially all of the plan's participants are no longer actively accruing benefits, the average life expectancy is used.

Similar to the changes in the discount rate approach discussed for the pension plans above, beginning in 2017 we elected to use an approach that discounts the individual expected cash flows underlying interest and service costs using the applicable spot rates derived from the yield curve used to determine the benefit obligation to the relevant projected cash flows. The Company has accounted for this change in estimate that is inseparable from a change in accounting principle on a prospective basis starting in fiscal year 2017. The reductions in service and interest costs for 2017 associated with this change in estimate were $100 and $500, respectively.

A one-percentage point change in the assumed health care cost trend rate would have the following effects. Bracketed numbers represent decreases in expense and obligation amounts.

	United States		International	
	1% Point Increase	1% Point Decrease	1% Point Increase	1% Point Decrease
Health care trend rate:				
Effect on total service and interest cost components in 2018	$516	$(411)	$11	$(8)
Effect on postretirement obligation as of October 31, 2018	$9,316	$(7,659)	$120	$(93)

Contributions to postretirement plans in 2019 are estimated to be approximately $2,400.

Retiree postretirement benefit payments are anticipated to be paid as follows:

Year	United States	International
2019	$2,360	$ 8
2020	2,725	8
2021	2,993	8
2022	3,239	8
2023	3,528	8
2024-2028	20,613	59

Note 7 — Income taxes

Income tax expense includes the following:

	2018	2017	2016
Current:			
U.S. federal	$39,837	$54,878	$44,156
State and local	1,734	3,731	2,256
Foreign	63,522	66,352	53,836
Total current	105,093	124,961	100,248
Deferred:			
U.S. federal	(32,829)	3,596	(2,334)
State and local	891	1,164	563
Foreign	(2,011)	(5,232)	(1,826)
Total deferred	(33,949)	(472)	(3,597)
	$71,144	$124,489	$96,651

Earnings before income taxes of domestic operations, which are calculated after intercompany profit eliminations, were $192,643, $181,840 and $156,723 in 2018, 2017 and 2016, respectively.

On December 22, 2017 the Act was enacted. It reduces the U.S. federal corporate income tax rate from 35 percent to 21 percent. We have an October 31 fiscal year end, therefore the lower corporate income tax rate will be phased in, resulting in a U.S. statutory federal rate of 23.34 percent for our fiscal year ending October 31, 2018, and 21 percent for subsequent fiscal years. The statutory tax rate of 23.34 percent was applied to earnings in the current year.

The Act requires us to revalue our existing U.S. deferred tax balance to reflect the lower statutory tax rate and pay a one-time transition tax on earnings of certain foreign subsidiaries that were previously deferred from U.S. taxes. As a result, during 2018, we recorded a provisional tax benefit of $49,082 to reflect the revaluation of our tax assets and liabilities at the reduced corporate tax rate. We also recorded a provisional tax expense of $27,618 to reflect the transition tax on previously deferred foreign earnings. The net tax effect of these discrete items resulted in a decrease of $21,464 in income tax expense for 2018. We intend to pay the transition tax in installments over the eight-year period allowable under the Act. The transition tax is primarily included in other long-term liabilities in the Consolidated Balance Sheet at October 31, 2018. The amounts recorded are considered a provisional estimate under the U.S. Securities and Exchange Commission Staff Accounting Bulletin No. 118. The provisional calculations may change after various components of the computation are finalized. Furthermore, we are still analyzing certain aspects of the Act and related interpretive guidance and refining our calculations which could potentially affect the measurement of these balances or potentially give rise to new or additional deferred tax amounts. Certain provisions of the Act will impact the Company starting in 2019. These provisions include, but are not limited to, the creation of the base erosion anti-abuse tax, a general limitation of U.S. federal income taxes on dividends from foreign subsidiaries, a new provision designed to tax global intangible low-taxed income and the repeal of the domestic production activities deduction. We continue to evaluate the future impacts of these provisions and, as of October 31, 2018, have not recorded any impact of any of these future provisions.

As discussed in Note 2, in the first quarter of 2018 we adopted a new standard which simplifies the accounting for share-based payment transactions of which excess tax benefits of $9,498 were reported as net cash provided by operating activities in 2018 and $7,079 and $3,476 of excess tax benefits were reclassified from net cash used in financing activities to net cash provided by operating activities in 2017 and 2016, respectively. This guidance requires that excess tax benefits and tax deficiencies be recognized as income tax expense or benefit in the Consolidated Statements of Income rather than as additional paid-in capital. Our income tax provision for 2018 includes a favorable adjustment to unrecognized tax benefits of $1,120 related to the lapse of statute of limitations.

Our income tax provision for 2017 includes a discrete tax expense of $1,070 related to nondeductible acquisition costs.

Our income tax provision for 2016 also includes discrete tax benefits. On December 18, 2015, the Protecting Americans from Tax Hikes Act of 2015 was enacted which retroactively reinstated the Federal Research and Development Tax Credit (Federal R&D Tax Credit) as of January 1, 2015, and made it permanent. As a result, our income tax provision for 2016 includes a discrete tax benefit of $2,200 related to 2015. The tax rate for 2016 also includes a discrete tax benefit of $6,154 related to dividends paid from previously taxed foreign earnings generated prior to 2015, and a benefit of $2,682 related to the effective settlement of a tax exam.

A reconciliation of the U.S. statutory federal rate to the worldwide consolidated effective tax rate follows:

	2018	2017	2016
Statutory federal income tax rate	23.34 %	35.00 %	35.00 %
Transition Tax	6.16	—	—
Tax Rate Change Deferred Tax Remeasurement	(10.94)	—	—
Share-Based and Other Compensation	(1.45)	—	—
Domestic Production Deduction	(0.82)	(1.48)	(1.43)
Foreign tax rate variances, net of foreign tax credits	(0.46)	(4.69)	(4.59)
State and local taxes, net of federal income tax benefit	0.45	0.76	0.50
Amounts related to prior years	(0.21)	0.03	(1.20)
Tax benefit from previously taxed dividends paid	—	—	(1.67)
Other – net	(0.21)	—	(0.38)
Effective tax rate	15.86 %	29.62 %	26.23 %

Earnings before income taxes of international operations, which are calculated before intercompany profit elimination entries, were $255,877, $238,451 and $211,771 in 2018, 2017 and 2016, respectively. Deferred income taxes are not provided on undistributed earnings of international subsidiaries that are intended to be permanently invested in their operations. These undistributed earnings represent the post-income tax earnings under U.S. GAAP not adjusted for previously taxed income which aggregated approximately $1,088,183 and $1,026,793 at October 31, 2018 and 2017, respectively. Should these earnings be distributed, applicable foreign tax credits, distributions of previously taxed income, and utilization of other attributes would substantially offset taxes due upon the distribution. It is not practical to estimate the amount of additional taxes that might be payable on these basis differences because of the multiple methods by which these differences could reverse and the impact of withholding, US state and local taxes and currency translation considerations.

At October 31, 2018 and 2017, total unrecognized tax benefits were $2,891 and $3,781, respectively. The amounts that, if recognized, would impact the effective tax rate were $2,411 and $3,273 at October 31, 2018 and 2017, respectively. During 2016, unrecognized tax benefits related primarily to foreign positions and, as recognized, a substantial portion of the gross unrecognized tax benefits were offset against assets recorded in the Consolidated Balance Sheet. A reconciliation of the beginning and ending amount of unrecognized tax benefits for 2018, 2017 and 2016 is as follows:

	2018	2017	2016
Balance at beginning of year	$3,781	$3,336	$6,258
Additions based on tax positions related to the current year	310	529	522
Additions for tax positions of prior years	40	621	310
Reductions for tax positions of prior years	(120)	(150)	(140)
Settlements	—	—	(3,091)
Lapse of statute of limitations	(1,120)	(555)	(523)
Balance at end of year	$2,891	$3,781	$3,336

At October 31, 2018 and 2017, we had accrued interest and penalty expense related to unrecognized tax benefits of $538 and $623, respectively. We include interest accrued related to unrecognized tax benefits in interest expense. Penalties, if incurred, would be recognized as other income (expense).

We are subject to United States Federal income tax as well as income taxes in numerous state and foreign jurisdictions. We are subject to examination in the U.S. by the Internal Revenue Service (IRS) for the 2015 through 2018 tax years; tax years prior to the 2015 year are closed to further examination by the IRS. Generally, major state and foreign jurisdiction tax years remain open to examination for tax years after 2012. Within the next twelve months, it is reasonably possible that certain statute of limitations periods would expire, which could result in a minimal decrease in our unrecognized tax benefits.

Significant components of deferred tax assets and liabilities are as follows:

	2018	2017
Deferred tax assets:		
Employee benefits	$56,622	$84,109
Other accruals not currently deductible for taxes	18,186	28,579
Tax credit and loss carryforwards	16,652	23,976
Inventory adjustments	4,451	8,778
Total deferred tax assets	95,911	145,442
Valuation allowance	(14,862)	(14,891)
Total deferred tax assets	81,049	130,551
Deferred tax liabilities:		
Depreciation and amortization	171,304	252,489
Other - net	669	1,132
Total deferred tax liabilities	171,973	253,621
Net deferred tax liabilities	$(90,924)	$(123,070)

At October 31, 2018, we had $6,804 of tax credit carryforwards of which have an indefinite carryforward period. We also had $2,751 Federal, $64,899 state and $15,678 foreign operating loss carryforwards, and $20,149 capital loss carryforward, of which $89,635 will expire in 2019 through 2038, and $13,842 of which has an indefinite carryforward period. The net change in the valuation allowance was a decrease of $29 in 2018 and an increase of $6,587 in 2017. The valuation allowance of $14,862 at October 31, 2018, related primarily to tax credits and loss carryforwards that may expire before being realized. We continue to assess the need for valuation allowances against deferred tax assets based on determinations of whether it is more likely than not that deferred tax benefits will be realized.

Note 8 — Notes payable

Bank lines of credit and notes payable are summarized as follows:

	2018	2017
Maximum borrowings available under bank lines of credit (all foreign banks)	$76,151	$75,041
Outstanding borrowings / notes payable (all foreign bank debt)	—	—
Weighted-average interest rate on notes payable	—	—
Unused bank lines of credit	$76,151	$75,041

Note 9 — Long-term debt

A summary of long-term debt is as follows:

	2018	2017
Revolving credit agreement, due 2020	$52,200	$249,138
Senior notes, due 2018-2025	156,700	172,600
Senior notes, due 2019-2027	100,000	100,000
Senior notes, due 2023-2030	350,000	—
Term loan, due 2018-2020	—	200,000
Term loan, due 2018-2022	605,000	705,000
Euro loan, due 2019	—	12,191
Euro loan, due 2021	16,967	—
Private shelf facility, due 2018-2026	36,111	146,666
Development loans, due 2018-2026	1,086	1,218
	1,318,064	1,586,813
Less current maturities	28,734	326,587
Less unamortized debt issuance costs	3,973	3,829
Long-term maturities	$1,285,357	$1,256,397

Revolving credit agreement — This $850,000 unsecured multi-currency revolving credit agreement is with a group of banks and expires in February 2020. Payment of quarterly fees is required. The interest rate is variable based upon the LIBOR rate. The weighted average interest rate for borrowings under this agreement was 3.10 percent at October 31, 2018.

Senior notes, due 2018-2025 — These fixed-rate notes entered into in 2012 with a group of insurance companies had a remaining weighted-average life of 3.45 years. The weighted-average interest rate at October 31, 2018 was 3.03 percent.

Senior notes, due 2019-2027 — These fixed-rate notes entered into in 2015 with a group of insurance companies had a remaining weighted-average life of 5.24 years. The weighted-average interest rate at October 31, 2018 was 3.04 percent.

Senior notes, due 2023-2030 – These fixed-rate notes entered in 2018 with a group of insurance companies had a remaining weighted-average life of 7.05 years. The weighted-average interest rate at October 31, 2018 was 3.90 percent.

Term loan, due 2018-2020 — In 2015, we entered into a $200,000 term loan facility with a group of banks. This loan was paid off in 2018.

Term loan, due 2018-2022 — In 2017, we entered into a $705,000 term loan facility with a group of banks. The interest rate is variable based upon the LIBOR rate. The agreement provides for term loans due in three tranches. $100,000 is due in March 2020 with a weighted-average interest rate of 3.24 percent, $200,000 is due in October 2021 with a weighted-average interest rate of 3.19 percent and $305,000 is due in March 2022 with a weighted-average interest rate of 3.26 percent. For the portion that is due in March 2020, $100,000 of this term loan facility was paid down in 2018.

Euro loan, due 2019 — This Euro denominated loan was entered into in 2015 with Bank of America Merrill Lynch International Limited. This loan was paid off in 2018.

Euro loan, due 2021 — This Euro denominated loan was entered into in 2018 with Bank of America Merrill Lynch International Limited. The interest rate is variable based upon the EUR LIBOR rate. The weighted average interest rate at October 31, 2018 was 0.88 percent.

Private shelf facility — In 2011, we entered into a $150,000 three-year Private Shelf Note agreement with New York Life Investment Management LLC (NYLIM). The amount of the facility was increased to $180,000 in 2015, and then increased to $200,000 in 2016. Borrowings under the agreement may be for up to 12 years and are unsecured. The interest rate on each borrowing is fixed based upon the market rate at the borrowing date or is variable based upon the LIBOR rate. We paid down $100,000 during 2018. At October 31, 2018, the amount outstanding under this facility was at fixed rates of 2.21 percent and 2.56 percent.

Development loans, due 2018-2026 — These fixed-rate loans with the State of Ohio and Cuyahoga County, Ohio were issued in 2011 in connection with the construction of our corporate headquarters building and are payable in monthly installments over 15 years beginning in 2011. The interest rate on the State of Ohio loan is 3.00 percent, and the interest rate on the Cuyahoga County loan is 3.50 percent.

Annual maturities — The annual maturities of long-term debt for the five years subsequent to October 31, 2018, are as follows: $28,734 in 2019; $220,938 in 2020; $255,153 in 2021; $335,791 in 2022 and $130,796 in 2023.

Note 10 — Leases

We have lease commitments expiring at various dates, principally for manufacturing, warehouse and office space, automobiles and office equipment. Many leases contain renewal options and some contain purchase options and residual guarantees.

Rent expense for all operating leases was approximately $19,131, $17,938 and $18,047 in 2018, 2017 and 2016, respectively.

Amortization of assets recorded under capital leases is recorded in depreciation expense.

Assets held under capitalized leases and included in property, plant and equipment are as follows:

	2018	2017
Transportation equipment	$18,226	$17,594
Other	7,892	8,121
Total capitalized leases	26,118	25,715
Accumulated amortization	(12,956)	(11,408)
Net capitalized leases	$13,162	$14,307

At October 31, 2018, future minimum lease payments under non-cancelable capitalized and operating leases are as follows:

	Capitalized Leases	Operating Leases
Year:		
2019	$ 6,161	$ 16,603
2020	4,241	11,520
2021	2,152	9,394
2022	909	8,050
2023	665	5,299
Later years	4,070	15,232
Total minimum lease payments	18,198	$ 66,098
Less amount representing executory costs	1,926	
Net minimum lease payments	16,272	
Less amount representing interest	2,867	
Present value of net minimum lease payments	13,405	
Less current portion	4,555	
Long-term obligations at October 31, 2018	$ 8,850	

Note 11 — Fair value measurements

The inputs to the valuation techniques used to measure fair value are classified into the following categories:

Level 1: Quoted market prices in active markets for identical assets or liabilities.

Level 2: Observable market based inputs or unobservable inputs that are corroborated by market data.

Level 3: Unobservable inputs that are not corroborated by market data.

The following tables present the classification of our assets and liabilities measured at fair value on a recurring basis:

October 31, 2018	Total	Level 1	Level 2	Level 3
Assets:				
Foreign currency forward contracts (a)	$6,428	$ —	$6,428	$ —
Total assets at fair value	$6,428	$ —	$6,428	$ —
Liabilities:				
Deferred compensation plans (b)	$11,018	$ —	$11,018	$ —
Foreign currency forward contracts (a)	9,289	—	9,289	—
Total liabilities at fair value	$20,307	$ —	$20,307	$ —

October 31, 2017	Total	Level 1	Level 2	Level 3
Assets:				
Foreign currency forward contracts (a)	$3,249	$ —	$3,249	$ —
Total assets at fair value	$3,249	$ —	$3,249	$ —
Liabilities:				
Deferred compensation plans (b)	$11,004	$ —	$11,004	$ —
Foreign currency forward contracts (a)	2,959	—	2,959	—
Total liabilities at fair value	$13,963	$ —	$13,963	$ —

(a) We enter into foreign currency forward contracts to reduce the risk of foreign currency exposures resulting from receivables, payables, intercompany receivables, intercompany payables and loans denominated in foreign currencies. Foreign exchange contracts are valued using market exchange rates. These foreign exchange contracts are not designated as hedges.

(b) Executive officers and other highly compensated employees may defer up to 100 percent of their salary and annual cash incentive compensation and for executive officers, up to 90 percent of their long-term incentive compensation, into various non-qualified deferred compensation plans. Deferrals can be allocated to various market performance measurement funds. Changes in the value of compensation deferred under these plans are recognized each period based on the fair value of the underlying measurement funds.

Fair value disclosures related to goodwill and indefinite-lived intangible assets are disclosed in Note 5.

The carrying amounts and fair values of financial instruments, other than cash and cash equivalents, receivables, and accounts payable, are shown in the table below. The carrying values of cash and cash equivalents, receivables and accounts payable approximate fair value due to the short-term nature of these instruments.

	2018 Carrying Amount	Fair Value	2017 Carrying Amount	Fair Value
Long-term debt (including current portion)	1,314,091	1,293,899	1,582,984	1,587,920

We used the following methods and assumptions in estimating the fair value of financial instruments:

- Long-term debt is valued by discounting future cash flows at currently available rates for borrowing arrangements with similar terms and conditions, which are considered to be Level 2 inputs under the fair value hierarchy. The carrying amount of long-term debt is shown net of unamortized debt issuance costs as described in Note 9.

Note 12 — Derivative financial instruments

We operate internationally and enter into intercompany transactions denominated in foreign currencies. Consequently, we are subject to market risk arising from exchange rate movements between the dates foreign currency transactions occur and the dates they are settled. We regularly use foreign currency forward contracts to reduce our risks related to most of these transactions. These contracts usually have maturities of 90 days or less and generally require us to exchange foreign currencies for U.S. dollars at maturity, at rates stated in the contracts. These contracts are not designated as hedging instruments under U.S. GAAP. Accordingly, the changes in the fair value of the foreign currency forward contracts are recognized in each accounting period in "Other – net" on the Consolidated Statement of Income together with the transaction gain or loss from the related balance sheet position. In 2018, we recognized net losses of $3,151 on foreign currency forward contracts and net gains of $4,284 from the change in fair value of balance sheet positions. In 2017, we recognized net gains of $329 on foreign currency forward contracts and net losses of $1,015 from the change in fair value of balance sheet positions. In 2016, we recognized net gains of $2,317 on foreign currency forward contracts and net losses of $312 from the change in fair value of balance sheet positions.

The following table summarizes, by currency, the contracts outstanding at October 31, 2018 and 2017:

	Notional Amounts Sell	Buy
October 31, 2018 contract amounts:		
Euro	$323,571	$184,170
Pound sterling	23,879	60,007
Japanese yen	25,408	46,671
Australian dollar	178	7,912
Hong Kong dollar	—	112,414
Singapore dollar	604	14,092
Others	4,730	57,546
Total	$378,370	$482,812
October 31, 2017 contract amounts:		
Euro	$144,611	$78,253
Pound sterling	45,252	54,204
Japanese yen	24,904	28,358
Australian dollar	193	8,185
Hong Kong dollar	—	100,131
Singapore dollar	794	12,681
Others	5,413	51,930
Total	$221,167	$333,742

We also use intercompany foreign currency transactions of a long-term investment nature to hedge the value of investment in wholly-owned subsidiaries. For hedges of the net investment in foreign operations, realized and unrealized gains and losses are shown in the cumulative translation adjustment account included in total comprehensive income. For 2018 and 2017, net gains of $828 and net losses of $760, respectively, were included in the cumulative translation adjustment account related to foreign denominated fixed-rate debt designated as a hedge of net investment in foreign operations.

We are exposed to credit-related losses in the event of nonperformance by counterparties to financial instruments. These financial instruments include cash deposits and foreign currency forward contracts. We periodically monitor the credit ratings of these counterparties in order to minimize our exposure. Our customers represent a wide variety of industries and geographic regions. As of October 31, 2018 and 2017, there were no significant concentrations of credit risk.

Note 13 — Capital shares

Preferred — We have authorized 10,000 Series A convertible preferred shares without par value. No preferred shares were outstanding in 2018, 2017 or 2016.

Common — We have 160,000 authorized common shares without par value. At October 31, 2018 and 2017, there were 98,023 common shares issued. At October 31, 2018 and 2017, the number of outstanding common shares, net of treasury shares, was 58,037 and 57,715, respectively.

Common shares repurchased as part of publicly announced programs during 2018, 2017 and 2016 were as follows:

Year	Number of Shares	Total Amount	Average per Share
2018	145	$18,939	$130.21
2017	—	$—	$—
2016	447	$31,877	$71.37

Note 14 — Stock-based compensation

During the 2018 Annual Meeting of Shareholders, our shareholders approved the Amended and Restated 2012 Stock Incentive and Award Plan (the "2012 Plan"). The 2012 Plan provides for the granting of stock options, stock appreciation rights, restricted shares, restricted share units, performance shares, cash awards and other stock or performance-based incentives. A maximum of 4,525 common shares is available for grant under the 2012 Plan.

Stock options — Nonqualified or incentive stock options may be granted to our employees and directors. Generally, options granted to employees may be exercised beginning one year from the date of grant at a rate not exceeding 25 percent per year and expire 10 years from the date of grant. Vesting accelerates upon a qualified termination in connection with a change in control. In the event of termination of employment due to early retirement or normal retirement at age 65, options granted within 12 months prior to termination are forfeited, and vesting continues post retirement for all other unvested options granted. In the event of disability or death, all unvested stock options granted within 12 months prior to termination (or at any time prior to December 28, 2017) fully vest. Termination for any other reason results in forfeiture of unvested options and vested options in certain circumstances. The amortized cost of options is accelerated if the retirement eligibility date occurs before the normal vesting date. Option exercises are satisfied through the issuance of treasury shares on a first-in, first-out basis. We recognized compensation expense related to stock options of $9,964, $9,326 and $7,874 for 2018, 2017 and 2016, respectively.

The following table summarizes activity related to stock options during 2018:

	Number of Options	Weighted Average Exercise Price Per Share	Aggregate Intrinsic Value	Weighted Average Remaining Term
Outstanding at October 31, 2017	1,922	$ 70.08		
Granted	368	$ 127.67		
Exercised	(387)	$ 48.68		
Forfeited or expired	(18)	$ 108.33		
Outstanding at October 31, 2018	1,885	$ 85.33	$ 72,193	6.5 years
Vested at October 31, 2018 or expected to vest	1,870	$ 85.05	$ 72,091	6.5 years
Exercisable at October 31, 2018	956	$ 66.82	$ 53,374	5.0 years

Summarized information on currently outstanding options follows:

	Range of Exercise Price		
	$27 - $44	$45 - $73	$74 - $129
Number outstanding	230	716	939
Weighted-average remaining contractual life, in years	2.4	6.0	8.0
Weighted-average exercise price	$40.85	$69.19	$108.53
Number exercisable	230	491	235
Weighted-average exercise price	$40.85	$68.40	$88.92

As of October 31, 2018, there was $7,740 of total unrecognized compensation cost related to nonvested stock options. That cost is expected to be amortized over a weighted average period of approximately 1.6 years.

The Black-Scholes option valuation model was used to estimate the fair value of traded options that have no vesting restrictions and are fully transferable. Option valuation models require the input of subjective assumptions, including the expected stock price volatility. The fair value of each option grant was estimated at the date of grant using the Black-Scholes option-pricing model with the following assumptions:

	2018	2017	2016
Expected volatility	24.0%-26.7%	26.0%-29.2%	29.1%-30.4%
Expected dividend yield	0.97%	0.91%-1.17%	1.54%
Risk-free interest rate	2.09%-2.20%	1.89%-2.06%	1.78%-1.90%
Expected life of the option (in years)	5.4-6.2	5.4-6.2	5.4-6.2

The weighted-average expected volatility used to value options granted in 2018, 2017 and 2016 was 25.0 percent, 29.1 percent and 29.6 percent, respectively.

Historical information was the primary basis for the selection of the expected volatility, expected dividend yield and the expected lives of the options. The risk-free interest rate was selected based upon yields of United States Treasury issues with terms equal to the expected life of the option being valued.

The weighted average grant date fair value of stock options granted during 2018, 2017 and 2016 was $31.42, $28.86 and $18.23, respectively.

The total intrinsic value of options exercised during 2018, 2017 and 2016 was $35,696, $22,317 and $17,271, respectively.

Cash received from the exercise of stock options for 2018, 2017 and 2016 was $18,811, $14,086 and $11,476, respectively.

Restricted shares and restricted share units — We may grant restricted shares and/or restricted share units to our employees and directors. These shares or units may not be transferred for a designated period of time (generally one to three years) defined at the date of grant.

For employee recipients, in the event of termination of employment due to early retirement, with consent of the Company, restricted shares granted within 12 months prior to termination are forfeited, and other restricted shares vest on a pro-rata basis. In the event of termination of employment due to normal retirement at age 65, restricted shares granted within 12 months prior to termination are forfeited, and, for other restricted shares, the restriction period will lapse and the shares will vest and be transferable. For restricted shares granted within 12 months prior to termination (or at any time prior to December 28, 2017), the restrictions lapse in the event of a recipient's disability or death. Termination for any other reason prior to the lapse of any restrictions results in forfeiture of the shares.

For non-employee directors, all restrictions lapse in the event of disability or death. Termination of service as a director for any other reason within one year of date of grant results in a pro-rata vesting of shares or units.

As shares or units are issued, deferred stock-based compensation equivalent to the fair market value on the date of grant is expensed over the vesting period. Tax benefits arising from the lapse of restrictions are recognized when realized and credited to capital in excess of stated value.

The following table summarizes activity related to restricted shares during 2018:

	Number of Shares	Weighted Average Grant Date Fair Value Per Share
Restricted at October 31, 2017	58	$ 90.38
Granted	22	$ 127.89
Forfeited	(1)	$ 95.20
Vested	(26)	$ 83.95
Restricted at October 31, 2018	53	$ 108.82

As of October 31, 2018, there was $2,981 of unrecognized compensation cost related to restricted shares. The cost is expected to be amortized over a weighted average period of 1.7 years. The amount charged to expense related to restricted shares was $2,610, $2,127 and $1,963 in 2018, 2017 and 2016, respectively. These amounts included common share dividends of $70, $64, and $60 in 2018, 2017 and 2016, respectively.

The following table summarizes activity related to restricted share units in 2018:

	Number of Units	Weighted Average Grant Date Fair Value
Restricted share units at October 31, 2017	0	$ —
Granted	8	$ 126.38
Vested	(8)	$ 126.38
Restricted share units at October 31, 2018	0	$ —

As of October 31, 2018, there was no remaining expense to be recognized related to outstanding restricted share units. The amount charged to expense related to restricted share units during 2018 and 2017 was $1,011 in both years, and was $974 for 2016.

Deferred directors' compensation — Non-employee directors may defer all or part of their cash and equity-based compensation until retirement. Cash compensation may be deferred as cash or as share equivalent units. Deferred cash amounts are recorded as liabilities, and share equivalent units are recorded as equity. Additional share equivalent units are earned when common share dividends are declared.

The following table summarizes activity related to director deferred compensation share equivalent units during 2018:

	Number of Shares	Weighted Average Grant Date Fair Value Per Share
Outstanding at October 31, 2017	101	$ 46.74
Restricted stock units vested	5	$ 126.49
Dividend equivalents	1	$ 138.50
Outstanding at October 31, 2018	107	$ 51.24

The amount charged to expense related to director deferred compensation was $127, $106 and $158 in 2018, 2017 and 2016, respectively.

Performance share incentive awards — Executive officers and selected other key employees are eligible to receive common share-based incentive awards. Payouts, in the form of unrestricted common shares, vary based on the degree to which corporate financial performance exceeds predetermined threshold, target and maximum performance goals over three-year performance periods. No payout will occur unless threshold performance is achieved.

The amount of compensation expense is based upon current performance projections for each three-year period and the percentage of the requisite service that has been rendered. The calculations are also based upon the grant date fair value determined using the closing market price of our common shares at the grant date, reduced by the implied value of dividends not to be paid. The per share values were $123.45 for 2018, $103.75 and $104.49 for 2017 and $67.69 per share for 2016. The amounts charged to expense for executive officers and selected other key employees in 2018, 2017 and 2016 were $7,635, $7,398 and $7,083, respectively. The cumulative amount recorded in shareholders' equity at October 31, 2018, and 2017 was $14,757 and $12,820, respectively.

Deferred compensation — Our executive officers and other highly compensated employees may elect to defer up to 100 percent of their base pay and cash incentive compensation and, for executive officers, up to 90 percent of their share-based performance incentive award payout each year. Additional share units are credited for quarterly dividends paid on our common shares. Expense related to dividends paid under this plan was $273, $264 and $219 for 2018, 2017 and 2016, respectively.

Shares reserved for future issuance — At October 31, 2018, there were 2,459 of common shares reserved for future issuance through the exercise of outstanding options or rights.

Note 15 — Operating segments and geographic area data

We conduct business in three primary operating segments: Adhesive Dispensing Systems, Advanced Technology Systems, and Industrial Coating Systems. The composition of segments and measure of segment profitability is consistent with that used by our chief operating decision maker. The primary measure used by the chief operating decision maker for purposes of making decisions about allocating resources to the segments and assessing performance is operating profit, which equals sales less cost of sales and certain operating expenses. Items below the operating profit line of the Consolidated Statement of Income (interest and investment income, interest expense and other income/expense) are excluded from the measure of segment profitability reviewed by our chief operating decision maker and are not presented by operating segment. The accounting policies of the segments are generally the same as those described in Note 1, Significant Accounting Policies.

No single customer accounted for 10 percent or more of sales in 2018, 2017 or 2016.

The following table presents information about our reportable segments:

	Adhesive Dispensing Systems	Advanced Technology Systems	Industrial Coating Systems	Corporate		Total
Year ended October 31, 2018						
Net external sales	$ 955,192	$ 1,039,366	$ 260,110	$ —		$ 2,254,668
Depreciation and amortization	31,597	62,594	6,166	8,050		108,407
Operating profit (loss)	259,493	243,523	50,638	(59,097)		494,557
Identifiable assets (b)	829,696	1,713,404	122,088	763,734	(a)	3,428,922
Expenditures for long-lived assets	46,911	16,205	8,546	18,128		89,790
Year ended October 31, 2017						
Net external sales	$ 916,019	$ 897,623	$ 253,340	$ —		$ 2,066,982
Depreciation and amortization	29,118	49,535	5,559	6,642		90,854
Operating profit (loss)	253,580	228,062	43,991	(67,931)		457,702
Identifiable assets (b)	794,699	1,718,844	120,458	790,940	(a)	3,424,941
Expenditures for long-lived assets	35,310	21,135	9,108	6,005		71,558
Year ended October 31, 2016						
Net external sales	$ 879,573	$ 676,329	$ 253,092	$ —		$ 1,808,994
Depreciation and amortization	28,294	29,649	5,041	7,320		70,304
Operating profit (loss)	229,143	159,531	43,511	(43,754)		388,431
Identifiable assets (b)	751,153	1,080,711	140,169	463,642	(a)	2,435,675
Expenditures for long-lived assets	17,407	18,967	17,357	7,120		60,851

(a) Corporate assets are principally cash and cash equivalents, deferred income taxes, capital leases, headquarter facilities, the major portion of our enterprise management system, and intangible assets.

(b) Operating segment identifiable assets include notes and accounts receivable net of customer advance payments and allowance for doubtful accounts, inventories net of reserves, property, plant and equipment net of accumulated depreciation and goodwill.

We have significant sales and long-lived assets in the following geographic areas:

	2018	2017	2016
Net external sales			
United States	$ 720,832	$ 647,657	$ 531,117
Americas	158,837	147,026	124,657
Europe	622,108	530,812	503,869
Japan	161,771	147,189	122,054
Asia Pacific	591,120	594,298	527,297
Total net external sales	$ 2,254,668	$ 2,066,982	$ 1,808,994
Long-lived assets			
United States	$ 279,437	$ 266,921	$ 209,959
Americas	2,158	2,322	1,730

Europe	41,663	39,102	23,943
Japan	5,492	5,594	6,408
Asia Pacific	57,916	32,472	31,089
Total long-lived assets	$386,666	$346,411	$273,129

A reconciliation of total segment operating profit to total consolidated income before income taxes is as follows:

	2018	2017	2016
Total profit for reportable segments	$494,557	$457,702	$388,431
Interest expense	(49,576)	(36,601)	(21,322)
Interest and investment income	1,384	1,124	728
Other-net	2,154	(1,934)	657
Income before income taxes	$448,519	$420,291	$368,494

A reconciliation of total assets for reportable segments to total consolidated assets is as follows:

	2018	2017	2016
Total assets for reportable segments	$3,428,922	$3,424,941	$2,435,675
Customer advance payments	38,997	34,654	26,175
Eliminations	(46,907)	(45,056)	(41,267)
Total consolidated assets	$3,421,012	$3,414,539	$2,420,583

Note 16 — Supplemental information for the statement of cash flows

	2018	2017	2016
Cash operating activities:			
Interest paid	$42,305	$36,450	$23,423
Income taxes paid	87,879	118,096	102,592
Non-cash investing and financing activities:			
Capitalized lease obligations incurred	$5,330	$6,509	$5,639
Capitalized lease obligations terminated	415	670	1,033
Shares acquired and issued through exercise of stock options	—	170	212

Note 17 — Quarterly financial data (unaudited)

	First	Second	Third	Fourth
2018:				
Sales	$550,424	$553,706	$581,243	$569,295
Gross margin	301,003	306,828	320,396	307,738
Net income	104,555	91,235	94,884	86,702
Earnings per share:				
Basic	1.81	1.57	1.63	1.49
Diluted	1.78	1.55	1.61	1.47
2017:				
Sales	$407,470	$496,137	$589,438	$573,938
Gross margin	225,138	275,512	326,265	312,088
Net income	49,988	64,523	101,456	79,835
Earnings per share:				
Basic	0.87	1.12	1.76	1.38

Diluted	0.86	1.11	1.74	1.37

The sum of the per-share amounts for the four quarters may not always equal the annual per-share amounts due to differences in the average number of shares outstanding during the respective periods. The sum of other amounts for the four quarters may not always equal the annual amounts due to rounding.

During the third quarter of 2018, we recorded a favorable adjustment of unrecognized tax benefits of $1,041 related to the lapse of statute of limitations.

During the first quarter of 2018, we recorded discrete items to income tax expense as a result of the Act. See Note 7 for additional information.

During the fourth quarter of 2017, we recorded pre-tax acquisition costs of $391 related to the acquisition of Vention.

During the third quarter of 2017, we recorded pre-tax acquisition costs of $865 related to Vention.

During the second quarter of 2017, we recorded pre-tax acquisition costs of $13,415 related to Vention. As a result, our income tax provision for the second quarter included a discrete tax expense of $2,600 related to nondeductible acquisition costs.

Note 18 — Contingencies

We are involved in pending or potential litigation regarding environmental, product liability, patent, contract, employee and other matters arising from the normal course of business. It is our opinion, after consultation with legal counsel, that resolutions of these matters are not expected to result in a material effect on our financial condition, quarterly or annual operating results or cash flows.

Management’s Report on Internal Control Over Financial Reporting

The management of Nordson Corporation is responsible for establishing and maintaining adequate internal control over financial reporting.

Using criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) in Internal Control-Integrated Framework (2013 framework), Nordson’s management assessed the effectiveness of our internal control over financial reporting as of October 31, 2018.

We completed the acquisitions of Sonoscan, Inc. (“Sonoscan”) and Cladach Nua Teoranta (“Clada”) on January 2, 2018, and October 17, 2018, respectively. As permitted by SEC guidance, the scope of our evaluation of internal control over financial reporting as of October 31, 2018 did not include the internal control over financial reporting of Sonoscan and Clada. The results of Sonoscan and Clada are included in our consolidated financial statements from the date each business was acquired. The combined total assets of Sonoscan and Clada represented one percent of our total assets at October 31, 2018. The combined net sales and net income of Sonoscan and Clada represented one percent of our consolidated net sales and less than one percent of our net income for 2018.

Based on our assessment, management concluded that our internal control over financial reporting was effective as of October 31, 2018.

The independent registered public accounting firm, Ernst & Young LLP, has also audited the effectiveness of our internal control over financial reporting as of October 31, 2018. Their report is included herein.

/s/ Michael F. Hilton President and Chief Executive Officer December 14, 2018	/s/ Gregory A. Thaxton Executive Vice President, Chief Financial Officer December 14, 2018

Report of Independent Registered Public Accounting Firm

To the Shareholders and the Board of Directors of Nordson Corporation

Opinion on Internal Control over Financial Reporting

We have audited Nordson Corporation's internal control over financial reporting as of October 31, 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, Nordson Corporation (the Company) maintained, in all material respects, effective internal control over financial reporting as of October 31, 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 Sonoscan, Inc. (Sonoscan) and Cladach Nua Teoranta (Clada), which are included in the 2018 consolidated financial statements of the Company and on a combined basis constituted one percent of total assets as of October 31, 2018 and one percent of consolidated net sales and less than one percent of consolidated net income 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 Sonoscan and Clada.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheets of the Company as of October 31, 2018 and 2017, the related consolidated statements of income, shareholders' equity and cash flows, for each of the three years in the period ended October 31, 2018, and the related notes and financial statement schedule listed in the Index at Item 15(a) and our report dated December 14, 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.

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

Cleveland, Ohio

December 14, 2018

Report of Independent Registered Public Accounting Firm

To the Shareholders and the Board of Directors of Nordson Corporation

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Nordson Corporation (the Company) as of October 31, 2018 and 2017, the related consolidated statements of income, comprehensive income, shareholders' equity and cash flows for each of the three years in the period ended October 31, 2018, and the related notes and financial statement schedule listed in the Index at Item 15(a) (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 October 31, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended October 31, 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 October 31, 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 December 14, 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 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 1956.

Cleveland, Ohio

December 14, 2018

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

None.

Item 9A. Controls and Procedures

(a) Evaluation of disclosure controls and procedures. Our management, with the participation of the principal executive officer (president and chief executive officer) and the principal financial officer (executive vice president and chief financial officer), has reviewed and evaluated our disclosure controls and procedures (as defined in the Securities Exchange Act Rule 13a-15e) as of October 31, 2018. Based on that evaluation, our management, including the principal executive and financial officers, has concluded that our disclosure controls and procedures were effective as of October 31, 2018 in ensuring that information required to be disclosed in the reports that we file or submit under the Securities Exchange Act of 1934 is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms and is accumulated and communicated to our management, including the principal executive officer and the principal financial officer, as appropriate to allow timely decisions regarding required disclosure.

(b) Management’s report on internal control over financial reporting. The Report of Management on Internal Control over Financial Reporting and the Report of Independent Registered Public Accounting Firm thereon are set forth in Part II, Item 8 of this Annual Report on Form 10-K.

(c) Changes in internal control over reporting. There were no changes in our internal controls over financial reporting that occurred during the fourth quarter of 2018 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Item 9B. Other Information

None.

PART III

Item 10. Directors, Executive Officers and Corporate Governance

The information required by this Item is incorporated by reference to the captions “Election of Directors Whose Terms Expire in 2022” and “Section 16(a) Beneficial Ownership Reporting Compliance” of our definitive Proxy Statement for the 2019 Annual Meeting of Shareholders. Information regarding Audit Committee financial experts is incorporated by reference to the caption “Election of Directors Whose Terms Expire in 2022” of our definitive Proxy Statement for the 2019 Annual Meeting of Shareholders.

Our executive officers serve for a term of one year from date of election to the next organizational meeting of the board of directors and until their respective successors are elected and qualified, except in the case of death, resignation or removal. Information concerning executive officers is contained in Part I of this report under the caption “Executive Officers of the Company.”

We have adopted a code of ethics and business conduct for all employees and directors, including the principal executive officer, other executive officers, principal finance officer and other finance personnel. A copy of the code of ethics is available free of charge on our Web site at http://www.nordson.com/en/our-company/corporate-governance. We intend to satisfy our disclosure requirement under Item 5.05 of Form 8-K regarding any amendment to or waiver of a provision of our code of ethics and business conduct that applies to our principal executive officer, principal financial officer, principal accounting officer or controller or persons performing similar functions and that relates to any element of the code of ethics definition enumerated in Item 406(b) of Regulation S-K by posting such information on our Web site.

Item 11. Executive Compensation

The information required by this Item is incorporated by reference to the “Executive Compensation Discussion and Analysis” section of the definitive Proxy Statement for the 2019 Annual Meeting of Shareholders, along with the sections captioned “Directors Compensation,” “Summary Compensation Table,” “Grants of Plan-Based Awards,” “Outstanding Equity Awards at October 31, 2018,” “Stock Option Exercises and Stock Vested Tables,” “Pension Benefits Table,” “Nonqualified Deferred Compensation” and “Potential Benefits Upon Termination” in our definitive Proxy Statement for the 2019 Annual Meeting of Shareholders.

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

The information required by this Item is incorporated by reference to the caption “Security Ownership of Nordson Common Shares by Directors, Director Nominees, Executive Officers and Large Beneficial Owners” in our definitive Proxy Statement for the 2019 Annual Meeting of Shareholders.

Equity Compensation Table

The following table sets forth information regarding equity compensation plans in effect as of October 31, 2018:

Plan category	Number of securities to be issued upon exercise	Weighted-average exercise price of	Number of securities remaining available for

	of outstanding options, warrants and rights	outstanding options, warrants and rights	future issuance under equity compensation plans (excluding securities reflected in first reporting column)
Equity compensation plans approved by security holders	1,885	$ 85.33	2,314
Equity compensation plans not approved by security holders	—	—	—
Total	1,885	$ 85.33	2,314

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

The information required by this Item is incorporated by reference to the caption “Review of Transactions with Related Persons” in our definitive Proxy Statement for the 2019 Annual Meeting of Shareholders.

Item 14. Principal Accountant Fees and Services

The information required by this Item is incorporated by reference to the caption “Fees Paid to Ernst & Young LLP” and the caption “Pre-Approval of Audit and Non-Audit Services” in our definitive Proxy Statement for the 2019 Annual Meeting of Shareholders.

PART IV

Item 15. Exhibits and Financial Statement Schedules

The following are filed as part of this report:

(a) 1. Financial Statements

The following financial statements are included in Part II, Item 8:

Consolidated Statements of Income for each of the three years in the period ended October 31, 2018

Consolidated Statements of Comprehensive Income for each of the three years in the period ended October 31, 2018

Consolidated Balance Sheets as of October 31, 2018 and October 31, 2017

Consolidated Statements of Shareholders' Equity for each of the three years in the period ended October 31, 2018

Consolidated Statements of Cash Flows for each of the three years in the period ended October 31, 2018

Notes to Consolidated Financial Statements

Reports of Independent Registered Public Accounting Firm

(a) 2. Financial Statement Schedule

Schedule II Valuation and Qualifying Accounts and Reserves for each of the three years in the period ended October 31, 2018.

No other consolidated financial statement schedules are presented because the schedules are not required, because the required information is not present or not present in amounts sufficient to require submission of the schedule, or because the information required is included in the financial statements, including the notes thereto.

(a) 3. Exhibits

The exhibits listed on the accompanying index to exhibits are filed as part of this Annual Report on Form 10-K.

NORDSON CORPORATION

Index to Exhibits

(Item 15(a) (3))

Exhibit Number	Description
(2)	Plan of Acquisition, Reorganization or Arrangement
2-a	Agreement and Plan of Merger, dated as of February 20, 2017, by and among Nordson Corporation, Viking Merger Corp., Vention Medical Holdings, Inc. and VMHI Rep Services, LLC (incorporated herein by reference to Exhibit 2.1 to Registrant's Form 8-K dated April 5, 2017)**
2-b	First Amendment to Agreement and Plan of Merger, dated as of March 30, 2017, by and among Nordson Corporation, Viking Merger Corp., Vention Medical Holdings, Inc. and VMHI Rep Services, LLC (incorporated herein by reference to Exhibit 2.2 to Registrant's Form 8-K dated April 5, 2017)
(3)	Articles of Incorporation and By-Laws
3-a	1989 Amended Articles of Incorporation (incorporated herein by reference to Exhibit 3-a to Registrant's Annual Report on Form 10-K for the year ended October 31, 2017)
3-a-1	Certificate of Amendment to 1989 Amended Articles of Incorporation (incorporated herein by reference to Exhibit 3-a-1 to Registrant's Annual Report on Form 10-K for the year ended October 31, 2017)
3-b	1998 Amended Regulations (incorporated herein by reference to Exhibit 3-b to Registrant's Annual Report on Form 10-K for the year ended October 31, 2016)
(4)	Instruments Defining the Rights of Security Holders, including indentures
4-b	Amended and Restated Note Purchase and Private Shelf Agreement for $200 million between Nordson Corporation and New York Life Investment Management LLC dated as of September 30, 2016 (incorporated herein by reference to Exhibit 4-b to Registrant's Annual Report on Form 10-K for the year ended October 31, 2016)
4-e	Master Note Purchase Agreement dated July 26, 2012 between Nordson Corporation and the purchasers listed therein
4-g	Credit Agreement dated August 6, 2014 by and among Nordson Corporation, PNC Bank National Association and PNC Capital Markets LLC (incorporated herein by reference to Exhibit 10.3 to Registrant's Quarterly Report on Form 10-Q for the quarter ended July 31, 2014)
4-h	Second Amended and Restated Credit Agreement dated February 20, 2015 among Nordson Corporation, various financial institutions named therein, and KeyBank, National Association as administrative agent (incorporated herein by reference to Exhibit 4.1 to Registrant's Form 8-K dated February 26, 2015)
4-h-1	Amendment No. 1 dated June 28, 2018, to the Second Amended and Restated Credit Agreement, dated February 20, 2015, among Nordson Corporation, various financial institutions named therein, and KeyBank National Association, as administrative agent (incorporated herein by reference to Exhibit 4.2 to Registrant's Form 8-K dated June 28, 2018)
4-i	$200 million Term Loan Facility Agreement dated April 10, 2015 among Nordson Corporation, various financial institutions named therein, and PNC Bank National Association, as administrative agent (incorporated herein by reference to Exhibit 4.2 to Registrant's Quarterly Report on Form 10-Q for the quarter ended April 30, 2015)
4-i-1	First Amendment dated June 26, 2018 to the Term Loan Facility Agreement dated April 10, 2015 among Nordson Corporation, various financial institutions named therein and PNC Bank, National Association, as administrative agent (incorporated herein by reference to Exhibit 4.3 to Registrant's Form 8-K dated June 28,

	2018)
4-j	Master Note Purchase Agreement dated July 28, 2015 between Nordson Corporation and the purchasers listed therein (incorporated herein by reference to Exhibit 4.1 to Registrant's Quarterly Report on Form 10-Q for the quarter ended July 31, 2015)
4-k	First Amendment and Joinder to Term Loan Agreement, dated as of March 31, 2017, by and among Nordson Corporation, the lenders party thereto and PNC Bank, National Association, as administrative agent and lender, and Term Loan Agreement, dated as of February 21, 2017, by and among Nordson Corporation, the lenders party thereto, PNC Bank, National Association, as lender and administrative agent, the joint lead arrangers and joint bookrunners party thereto, the co-syndication agents party thereto and the co-documentation agents party thereto (incorporated herein by reference to Exhibit 4.1 to Registrant's Form 8-K dated April 5, 2017)
4-k-1	Second Amendment dated May 17, 2018 to Term Loan Agreement dated as of February 21, 2017, among Nordson Corporation, the lenders party thereto and PNC Bank, National Association, as administrative agent and lender (incorporated herein by reference to Exhibit 10.1 to Registrant's Form 8-K dated May 23, 2018)
4-k-2	Third Amendment dated June 26, 2018 to Term Loan Agreement dated as of February 21, 2017, among Nordson Corporation, various financial institutions named therein and PNC Bank, National Association, as administrative agent (incorporated herein by reference to Exhibit 4.4 to Registrant's Form 8-K dated June 28, 2018)
4-l	Master Note Purchase Agreement, dated as of June 22, 2018, by and among Nordson Corporation and the purchasers named therein (incorporated herein by reference to Exhibit 4.1 to Registrant's Form 8-K dated June 28, 2018)

NORDSON CORPORATION

Index to Exhibits

(Item 15(a) (3))

Exhibit Number	Description
(10)	Material Contracts
10-b-2	Nordson Corporation 2005 Deferred Compensation Plan (as Amended and Restated Effective January 1, 2009) (incorporated herein by reference to Exhibit 10-b-2 to Registrant's Annual Report on Form 10-K for the year ended October 31, 2014)*
10-b-3	First Amendment to the Nordson Corporation 2005 Deferred Compensation Plan (incorporated herein by reference to Exhibit 10.1 to Registrant's Quarterly Report on Form 10-Q for the quarter ended April 30, 2016)
10-c	Resolution of Board of Directors Authorizing Execution of Indemnification Agreements (incorporated herein by reference to Exhibit 10-c to Registrant's Annual Report on Form 10-K for the year ended October 31, 2013)*
10-c-1	Form of Indemnity Agreement between the Registrant and Directors, effective November 1, 2016 (incorporated herein by reference to Exhibit 10-c-1 to Registrant's Annual Report on Form 10-K for the year ended October 31, 2016)*
10-c-2	Form of Indemnity Agreement between the Registrant and Executive Officers, effective November 1, 2016 (incorporated herein by reference to Exhibit 10-c-2 to Registrant's Annual Report on Form 10-K for the year ended October 31, 2016)*
10-d-1	First Amendment to Nordson Corporation Excess Defined Contribution Retirement Plan*
10-d-2	Nordson Corporation 2005 Excess Defined Contribution Benefit Plan (incorporated herein by reference to Exhibit 10-d-2 to Registrant's Annual Report on Form 10-K for the year ended October 31, 2017)*
10-d-3	Nordson Corporation 2005 Excess Defined Contribution Retirement Plan (as Amended and Restated Effective January 1, 2009) (incorporated herein by reference to Exhibit 10-d-3 to Registrant's Annual Report on Form 10-K for the year ended October 31, 2014)*
10-e-1	Second Amendment to Nordson Corporation Excess Defined Benefit Pension Plan*
10-e-2	Nordson Corporation 2005 Excess Defined Benefit Pension Plan (incorporated herein by reference to Exhibit 10-e-2 to Registrant's Annual Report on Form 10-K for the year ended October 31, 2016)*
10-e-3	Nordson Corporation 2005 Excess Defined Benefit Pension Plan (as Amended and Restated Effective January 1, 2009) (incorporated herein by reference to Exhibit 10-e-3 to Registrant's Annual Report on Form 10-K for the year ended October 31, 2014)*
10-g-1	Amended and Restated Nordson Corporation 2004 Long-Term Performance Plan (incorporated herein by reference to Exhibit 10-g-1 to Registrant's Annual Report on Form 10-K for the year ended October 31, 2013)*
10-g-2	Nordson Corporation Amended and Restated 2012 Stock Incentive and Award Plan (incorporated by reference to Exhibit 10.1 to Registrant's Form 8-K dated March 2, 2018)*
10-g-3	Nordson Corporation 2012 Stock Incentive and Award Plan, Form of Notice of Award – Key Employees (as amended November 24, 2014) (incorporated herein by reference to Exhibit 10-g-3 to Registrant's Annual Report on Form 10-K for the year ended October 31, 2014)*
10-g-4	Nordson Corporation 2012 Stock Incentive and Award Plan, Form of Notice of Award – Executive Officers (as amended November 24, 2014) (incorporated herein by reference to Exhibit 10-g-4 to Registrant's Annual Report on Form 10-K for the year ended October 31, 2014)*

10-g-5	Nordson Corporation 2012 Stock Incentive and Award Plan, Directors' Deferred Compensation Sub-Plan (incorporated herein by reference to Exhibit 10-g-5 to Registrant's Annual Report on Form 10-K for the year ended October 31, 2013)*
10-g-6	Nordson Corporation 2012 Stock Incentive and Award Plan, Directors' Deferred Compensation Sub-Plan, Form of Notice of Award (incorporated herein by reference to Exhibit 10-g-6 to Registrant's Annual Report on Form 10-K for the year ended October 31, 2013)*
10-g-7	Amended and Restated Nordson Corporation Directors' Deferred Compensation Sub-Plan (incorporated herein by reference to Exhibit 10-g-7 to Registrant's Annual Report on Form 10-K for the year ended October 31, 2017)*
10-h	Assurance Trust Agreement between Nordson Corporation and Key Trust Company of Ohio, N.A. amended and restated as of January 22, 2014 (incorporated herein by reference to Exhibit 10.1 to Registrant's Quarterly Report on Form 10-Q for the quarter ended January 31, 2014)
10-h-1	Form of Change in Control Retention Agreement between the Registrant and Executive Officers (incorporated herein by reference to Exhibit 10-h-1 to Registrant's Annual Report on Form 10-K for the year ended October 31, 2014)*
10-i	Compensation Committee Rules of the Nordson Corporation 2004 Long Term Performance Plan governing directors' deferred compensation (incorporated herein by reference to Exhibit 10-i to Registrant's Annual Report on Form 10-K for the year ended October 31, 2016)*

NORDSON CORPORATION

Index to Exhibits

(Item 15(a) (3))

Exhibit Number	Description
10-j	Compensation Committee Rules of the Nordson Corporation Amended and Restated Nordson Corporation 2004 Long Term Performance Plan governing directors' deferred compensation (incorporated herein by reference to Exhibit 10-j to Registrant's Annual Report on Form 10-K for the year ended October 31, 2016)*
10-m	Employment Agreement between Registrant and Michael F. Hilton (incorporated herein by reference to Exhibit 10-m to Registrant's Annual Report on Form 10-K for the year ended October 31, 2015)*
10-n	Employment Agreement (Change in Control Retention Agreement) between Registrant and Michael F. Hilton (incorporated herein by reference to Exhibit 10-n to Registrant's Annual Report on Form 10-K for the year ended October 31, 2015)*
10-o	Supplemental Retirement Agreement between the Registrant and Michael F. Hilton (incorporated herein by reference to Exhibit 10-o to Registrant's Annual Report on Form 10-K for the year ended October 31, 2016)*
(21)	Subsidiaries of the Registrant
(23)	Consent of Independent Registered Public Accounting Firm
31.1	Certification pursuant to Rule 13a-14(a)/15d-14(a) of the Securities Exchange Act of 1934 by the Chief Executive Officer, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002
31.2	Certification pursuant to Rule 13a-14(a)/15d-14(a) of the Securities Exchange Act of 1934 by the Chief Financial Officer, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002
32.1	Certification of CEO pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
32.2	Certification of CFO pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
99-a	Form S-8 Undertakings
101	The following financial information from Nordson Corporation's Annual Report on Form 10-K for the year ended October 31, 2018, formatted in Extensible Business Reporting Language (XBRL): (i) the Consolidated Statements of Income for the years ended October 31, 2018, 2017 and 2016, (ii) the Consolidated Statements of Comprehensive Income for the years ended October 31, 2018, 2017 and 2016 (iii) the Consolidated Balance Sheets at October 31, 2018 and 2017, (iv) the Consolidated Statements of Changes in Shareholders' Equity for the years ended October 31, 2018, 2017 and 2016, (v) the Consolidated Statements of Cash Flows for the years ended October 31, 2018, 2017 and 2016, and (vi) Notes to Consolidated Financial Statements.

* Indicates management contract or compensatory plan, contract or arrangement in which one or more directors and/or executive officers of Nordson Corporation may be participants.

** Certain exhibits and schedules have been omitted and the Registrant agrees to furnish supplementally to the Securities and Exchange Commission a copy of any omitted exhibits and schedules upon request.

Item 16. Form 10-K Summary

None.

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.

NORDSON CORPORATION

Date: December 14, 2018	By: /s/ Gregory A. Thaxton
	Gregory A. Thaxton
	Executive Vice President, Chief Financial Officer

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS, that each person whose signature appears below hereby constitutes and appoints Gregory A. Thaxton as his or her true and lawful attorney-in-fact and agent with full power to act alone, for him or her and in his or her name, place and stead, in any and all capacities, to sign any and all amendments to this Annual Report on Form 10-K, and to file the same, with all exhibits thereto, and all other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorney-in-fact and agent full power and authority to do and perform each and every act and thing requisite and necessary to be done in and about the premises, as fully to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorney-in-fact and agent, may lawfully do or cause to be done by virtue hereof.

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

Signatures	Title	Date
/s/ Michael F. Hilton Michael F. Hilton	Director, President and Chief Executive Officer (Principal Executive Officer)	December 14, 2018
/s/ Gregory A. Thaxton Gregory A. Thaxton	Executive Vice President, Chief Financial Officer (Principal Financial Officer) (Principal Accounting Officer)	December 14, 2018
/s/ Michael J. Merriman, Jr. Michael J. Merriman, Jr.	Chairman of the Board	December 14, 2018
/s/ Lee C. Banks Lee C. Banks	Director	December 14, 2018
/s/ Randolph W. Carson Randolph W. Carson	Director	December 14, 2018
/s/ Arthur L. George, Jr. Arthur L. George, Jr.	Director	December 14, 2018
/s/ Frank M. Jaehnert Frank M. Jaehnert	Director	December 14, 2018
/s/ Joseph P. Keithley	Director	December 14, 2018

Joseph P. Keithley		
/s/ Mary G. Puma Mary G. Puma	Director	December 14, 2018
/s/ Victor L. Richey, Jr. Victor L. Richey, Jr.	Director	December 14, 2018

Schedule II – Valuation and Qualifying Accounts and Reserves

	Balance at Beginning of Year	Charged to Expense	Deductions	Currency Effects	Balance at End of Year
Allowance for Doubtful Accounts					
2016	$ 4,502	1,867	945	111	$5,535
2017	$ 5,535	4,030	349	575	$9,791
2018	$ 9,791	1,185	1,189	(207)	$9,580
Inventory Obsolescence and Other Reserves					
2016	$ 28,230	6,719	6,096	471	$29,324
2017	$ 29,324	8,888	4,530	(542)	$33,140
2018	$ 33,140	13,041	8,930	294	$37,545