Vishay Precision Group, Inc.
Form 10-K
March 14, 2019
UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549
FORM 10-K
ý ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended December 31, 2018
or
o TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the transition period from _______ to _______
Commission file number 1-34679
Vishay Precision Group, Inc.
(Exact name of registrant as specified in its charter)

Delaware	27-0986328
(State or other jurisdiction of incorporation or organization)	(IRS employer identification no.)

3 Great Valley Parkway, Suite 150
Malvern, PA 19355
(Address of principal executive offices)
484-321-5300
(Registrant’s telephone number, including area code)
Securities registered pursuant to Section 12(b) of the Act:

Common Stock, $0.10 par value	New York Stock Exchange
(Title of class)	(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 o No ý
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 o No ý
Note – Checking the box above will not relieve any registrant required to file reports under Section 13 or 15(d) of the Exchange Act from their obligations under those Sections.
Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ý No o
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 ý No o
Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (Section 229.405 of this chapter) is not contained herein, and will not be contained, to the best of registrant’s knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. o

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 definition of “accelerated filer”, “large accelerated filer”, “smaller reporting company”, and "emerging growth company" in Rule 12b-2 of the Act. (Check one):

Large accelerated filer o	Non-accelerated filer o
Accelerated filer ý	Smaller reporting company o

Emerging growth company o

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

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

The aggregate market value of the voting stock held by non-affiliates computed by reference to the price at which the common stock was last sold as of the last business day of the registrant's most recently completed second fiscal quarter ($38.15 on June 30, 2018), assuming conversion of all of its Class B convertible common stock held by non-affiliates into common stock of the registrant, was $480,732,000. There is no non-voting stock outstanding.

As of March 14, 2019, the registrant had 12,465,989 shares of its common stock and 1,025,158 shares of its Class B convertible common stock outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's definitive proxy statement, which will be filed within 120 days of December 31, 2018, are incorporated by reference into Part III of this Annual Report on Form 10-K.

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PART I

Item 1. BUSINESS DESCRIPTION

General

Vishay Precision Group, Inc. (“VPG,” the “Company,” “we,” “us” or “our”) is an internationally recognized designer, manufacturer and marketer of sensors, and sensor-based measurement systems, as well as specialty resistors and strain gages based upon our proprietary technology. We provide precision products and solutions, many of which are “designed-in” by our customers, specializing in the growing markets of stress, force, weight, pressure, and current measurements. A significant portion of our products and solutions are primarily based upon our proprietary foil technology and are produced as part of our vertically integrated structure. We believe this strategy results in higher quality, more cost effective and focused solutions for our customers. Our products are marketed under a variety of brand names that we believe are characterized as having a very high level of precision and quality. Our global operations enable us to produce a wide variety of products in strategically effective geographic locations that also optimize our resources for specific technologies, sensors, assemblies, and systems.

The Company also has a long heritage of innovation in precision foil resistors, foil strain gages, and sensors that convert mechanical inputs into an electronic signal for display, processing, interpretation, or control by our instrumentation and systems products. Our advanced sensor product line continues this heritage by offering high-quality foil strain gages produced in a proprietary, highly automated environment. Precision sensors are essential to the accurate measurement, resolution and display of force, weight, pressure, torque, tilt, motion, or acceleration, especially in the legal-for-trade, commercial, and industrial marketplaces. This expertise served as a foundation for our expansion into strain gage instrumentation, load cells, transducers, weighing modules, and complete systems for process control and on-board weighing. Although our products are typically used in the industrial market, our advanced sensors have been used in a consumer electronics product and are being evaluated for other non-industrial applications.

The precision sensor market is integral to the development of intelligent products across a wide variety of end markets upon which we focus, including medical, agricultural, transportation, industrial, avionics, military, and space applications. We believe that as original equipment manufacturers (“OEMs”) continue a drive to make products “smarter,” they will integrate more sensors and related systems into their solutions to link the mechanical/physical world with digital control and/or response. We believe this offers a substantial growth opportunity for our products and expertise.

Our History

In 1962, Dr. Felix Zandman founded Vishay Intertechnology Inc. (“Vishay Intertechnology”) to develop and manufacture the first generation of Bulk Metal® foil resistors and later, foil strain gages.

Resistors are basic components used in all forms of electronic circuitry to adjust and regulate levels of voltage and current. They vary widely in precision and cost, and are manufactured from numerous materials and in many forms. Bulk Metal foil resistors, developed by Dr. Zandman in the 1950’s, are the most precise and stable type of resistors currently available. A strain gage is a resistive sensor that is attached to the surface of an object to determine the surface strain caused by an applied force.

Beginning in the 1960’s, Vishay Intertechnology established itself as a technical and market leader in precision foil resistors, and foil strain gages. These innovations were the genesis of the foil technology that is a unique strategic competitive advantage of VPG. The subsequent innovations and advancement of foil resistance and strain gage technology opened the door to numerous commercial applications, such as force sensors and control systems on a vertical market basis.

On July 6, 2010, Vishay Intertechnology spun off its precision measurement and foil technology businesses through a tax-free stock dividend of VPG stock to Vishay Intertechnology’s stockholders and we became a publicly-traded company. In the decade prior to the spin-off, Vishay Intertechnology expanded our sensor and measurement business through acquisitions, extending our business from its initial focus on precision foil resistors and foil strain gages to include an array of sensor-based solutions. These solutions include transducers/load cells, which are force sensors combining strain gages and the metallic structures to which they are bonded; load cell modules that utilize electronic instrumentation and software for measuring the load cell output; and measurement instrumentation and complete systems for process control and on-board weighing.

In 2013, we completed our first acquisition as an independent public company when we acquired substantially all of the assets of the George Kelk Corporation ("KELK"). KELK engineers, designs and manufactures highly accurate optical and electronic roll force measurement and control equipment primarily used by metals rolling mills and mining applications throughout the world. As a part of our acquisition, we acquired a leased manufacturing, engineering, sales, and administrative facility in Toronto, Canada.

On December 30, 2015, we completed the acquisition of Stress-Tek, Inc. ("Stress-Tek") based in Kent, Washington. Stress-Tek designs and manufactures state-of-the-art, rugged and reliable strain gage-based load cells and force measurement systems. Stress-Tek primarily operates in North America, where their sensors and display systems are used in a wide range of industries, predominantly in transportation and trucking, for timber, refuse, aggregate, mining, and general trucking applications. Stress-Tek products are marketed under the Vulcan brand as part of the VPG Onboard Weighing offerings for our Weighing and Control Systems reporting segment. As a part of the Stress-Tek acquisition, we acquired ownership of a manufacturing, engineering, sales, administrative, and warehouse facility in Kent, Washington.

On April 6, 2016, the Company completed the acquisition of Pacific Instruments, Inc. ("Pacific") based in Concord, California. Pacific designs and manufactures high-performance signal conditioning, data acquisition and control systems and has extensive experience integrating these systems. Pacific sells primarily to the aerospace, commercial aviation and defense markets in the United States. Pacific products expanded the offerings of our Foil Technology Products reporting segment, which already offered data acquisition systems, primarily in the field of strain measurement. As a result of our acquisition, we acquired a leased manufacturing, engineering, sales and administrative facility in Concord, California.

While our acquisitions provided us an array of strong brand names, in addition to our historical resistor and strain gage brands, we believe the continued success of our strategy is best served by the establishment of a strong overall global brand. In 2014, we launched the “VPG” brand, which is intended to leverage the strength of these historical brands under the umbrella of a more unified, globally recognizable VPG name. We continue to broaden and emphasize the VPG brand in the markets we serve under the following brands for each of our business segments:

Foil Technology Products	Force Sensors	Weighing and Control Systems
VPG Foil Resistors	VPG Transducers	BLH Nobel
- Alpha Electronics	- Celtron	KELK
- Powertron	- Revere	VPG Onboard Weighing
- Vishay Foil Resistors	- Sensortronics	
Micro-Measurements	- Tedea-Huntleigh	
Pacific Instruments		

Our acquisitions added to our strong, diverse, global manufacturing, sales and distribution network, which includes facilities in Canada, China, France, Germany, India, Israel, Japan, Sweden, Taiwan, the United Kingdom, and the United States.

We were incorporated in Delaware on August 28, 2009. Our principal executive offices are located at 3 Great Valley Parkway, Suite 150, Malvern, PA 19355. Our main telephone number is 484-321-5300.

Key Business Vision and Strategies

Our vision is to be the leading provider of sensors, and sensor-based systems with the highest precision, quality, value, and service for measuring force (weight, pressure, torque, acceleration) and current. As part of that vision, we are a leading provider of foil specialty resistors and strain gages, which are particularly effective in precision measurement applications.

Our strategy is to achieve corporate growth and shareholder value by expanding our existing product portfolio organically, as well as by acquiring complementary precision measurement products. Specifically, we are focused on the following strategic initiatives:

Optimize Core Competence

The Company’s core competency and key value proposition is providing customers with proprietary foil technology products and precision measurement sensors and sensor-based systems. Our foil technology resistors and strain gages are recognized as global market leading products that provide high precision and high stability over extreme temperature ranges, and long life. Our force sensor products and our weighing and control systems products are also certified to meet some of the highest levels of precision measurements of force, weight, pressure, torque, tilt, motion, and acceleration. We continue to optimize all aspects of our development, manufacturing and sales processes, including by increasing our technical sales efforts; continuing to innovate in product performance and design; and refining our manufacturing processes.

Our foil technology research group developed innovations that enhance the capability and performance of our strain gages, while simultaneously reducing their size and power consumption as part of our advanced sensors product line. We believe this unique foil technology will create new markets as customers “design in” these next generation products in existing and new applications. Our development engineering team is also responsible for creating new processes to further automate manufacturing, and improve productivity and quality. Our advanced sensors manufacturing technology also offers us the capability to produce high-quality foil strain gages in a highly automated environment, which we believe results in reduced manufacturing and lead times, improved quality and increased margins. As a sign of our commitment to these businesses, we recently signed a long term lease for a state of the art facility to be constructed in Israel to move forward with our advanced sensors business.

We also seek to achieve significant production cost savings through the transfer, expansion, and construction of manufacturing operations in countries such as India and Israel, where we can benefit from lower labor costs, improved efficiencies, or available tax and other government-sponsored incentives. For example, in 2017 we closed two leased facilities in the United States and moved to more cost effective locations. .

Organic Growth

Our product portfolio is focused, to a significant extent, on specialty products serving niche markets. The development of specialty products requires us to form long-term relationships with our customers. Our specialty products are usually designed, or engineered, to meet unique specifications for OEMs. This often results in our customers creating a non-standard part number used solely to designate our product on their bill of materials. We call this customer activity a “design win.” This activity may create organic growth as the OEM customer begins to order increasing quantities to meet their production requirements, with little or no opportunity to purchase a similar part from competing suppliers. The “design in” time for these initiatives is typically 12 to 24 months.

We expect to continue to use our research and development, engineering, and product marketing resources to introduce new and innovative specialty products. An example of our success in this regard is the recent acceptance and growth of our on-board vehicle weighing solution incorporating microelectromechanical systems ("MEMS") technology. Our ability to react to changing customer needs, emerging markets, and industry trends will continue to be a key to our success.

Our design, research, and product development teams, in partnership with our marketing teams, drive our efforts to bring innovations to market. We intend to leverage our insights into customer demand to continually develop and roll out new, innovative products within our existing lines and to modify our existing core products in ways that make them more appealing, addressing changing customer needs and industry trends in terms of form, fit, and function.

Growth from Acquisitions

We expect to continue to make strategic acquisitions where opportunities present themselves to grow our segments. Historically, our growth and acquisition strategy has been largely focused on vertical product integration, using our foil strain gages in our force sensor products, and incorporating those products into our weighing and control systems. The acquisitions of Stress-Tek and KELK, each of which employ our foil strain gages to manufacture load cells for their systems, continue this strategy. Additionally, the KELK acquisition resulted in the acquisition of certain optical sensor technology. The Pacific acquisition significantly broadened our existing data acquisition offerings and opened new markets for us. Along with our success in MEMS technology for on-board weighing, we expect to expand our expertise, and our acquisition focus, outside our traditional vertical approach to other precision sensor solutions in the fields of measurement of force, weight, pressure, torque, tilt, motion, and acceleration. We believe acquired businesses will benefit from improvements we implement to reduce redundant functions and from our current global manufacturing and distribution footprint.

Product Segments

Foil Technology Products

The Foil Technology Products ("FTP") segment includes our foil resistor and strain gage operating segments. Foil resistor products offer superior precision, stability, and reliability. Our resistor portfolio encompasses a wide variety of configurations and packages designed to meet the requirements of even the most demanding applications. Typical applications for foil resistors include high end test equipment and electronics for the aviation, military and space, semiconductor, process control, oil and gas, and medical markets. Typical applications for strain gages, which include advanced sensor gages, are stress analysis for structural testing in the aviation, military and space, infrastructure, and construction markets, along with force measurement and weighing markets. Our innovative advanced sensors product line enhances the capability and performance of our strain gages, while simultaneously reducing their size and power consumption. This segment also includes our data acquisition systems business.

The products in these segments are primarily based on our resistive foil technology, which continues to evolve and enables many products in both segments to be suited for new and varied applications.

The manufacturing of the foil material is a critical and common component of the Company’s strain gage and precision foil resistor operating segments, and as a result, we experience synergies between our foil resistor and strain gage operating segments. The production cycles for foil resistors and strain gages are similar and many of the same raw materials are utilized in the manufacturing processes for both operating segments. The foil resistor and strain gage products require a similar level of labor and capital. However, the advanced sensors’ manufacturing technology offers us the capability to produce high-quality foil strain gages in a highly automated environment, which we believe results in reduced manufacturing costs and lead times, higher quality, and increased margins.

Our Pacific business offers a broad range of high performance signal conditioning, data acquisition and control systems, many of which reach customers outside our traditional commercial customer base, such as U.S. government related customers.

A significant portion of products from the strain gage operating segment are sold to third parties as “standard catalog items”; the remainder of this operating segment's products are sold as non-standard and/or custom products to third parties and to our Force Sensors segment.

Force Sensors

The Force Sensors segment includes a broad line of load cells and force measurement transducers that are offered as precision sensors for industrial and commercial use. Typical applications for force sensors are in construction machinery(for stability control, overload protection), agricultural equipment (for precision force measurement), and medical devices (such as hospital beds and medication dosing). The truck and heavy equipment market has begun to adopt force sensors technology as process control and equipment control features for their products. These sensors use our foil technology products, which serve as sensing elements and components within each unit. Further integration of our load cells technology is also offered as part of our weighing module products, which provide customers with a complete sensor assembly that may be used within a wide variety of digital transducers.

A majority of products from the Force Sensors segment are sold to third parties as “standard catalog items,” but a growing sector of this segment’s products are sold as non-standard and/or custom products to third parties. In addition, we sell products from this segment to our Weighing and Control Systems segment as well as to OEM manufacturers, which often involve "design-in" features. Direct sales channels (field application engineers (“FAEs”)) are utilized as the primary customer interface relating to initial design specifications, development of prototypes, and pricing/delivery of this segment’s products. Distributors are also used for those customers that desire standard products.

Weighing and Control Systems

The Weighing and Control Systems segment designs and manufactures complete systems comprised of load cells and instrumentation for weighing and force control/measurement for a variety of uses, including on-board weighing and overload monitor systems. Typical applications for our weighing and control systems products are: process weighing of chemicals, food and pharmaceuticals; aircraft and truck weighing and overload protections; weight force and process optimization in steel and paper mills; and force measurement for offshore oil and gas exploration.

Other major components that comprise our systems are: electronic displays; optical gages; signal processors; MEMS sensors; cabling; system software; and communication software/hardware. The end use for the majority of these products is the precision measurement of force, weight, pressure, torque, tilt, motion, and acceleration. FAEs are utilized as the primary customer interface relating to initial design specifications, development of prototypes, and pricing/delivery of this segment’s products. Distributors and sales agents are also used, as appropriate, to market, sell, and support certain products in this segment.

Products

Our precision sensor and sensor-based systems include products such as load cells, transducers, weighing modules, and complete systems for process control and on-board weighing applications. Our precision foil resistors and strain gages are based on our proprietary foil technology, which we invented. We manufacture and sell high precision foil resistors, foil strain gages, and data acquisition systems.

Our product portfolio includes:

- Foil resistors – Foil resistors are the most precise and stable type of resistors currently available. Resistors are basic components used in all forms of electronic circuitry to adjust and regulate levels of voltage and current. Our foil resistors and current sensors are used in applications requiring a high degree of precision and stability, such as in medical applications, precision equipment for front-end and back-end semiconductor testing and semiconductor fabrication equipment, and avionics/military/aerospace applications. We sell our foil resistors under the Vishay Foil Resistors, Alpha Electronics, and Powertron brands, including under our well-known Bulk Metal® trademark. The ultra-precision technology also provides extremely low temperature coefficient resistance and exceptional long term stability through temperature extremes. To complement our extensive portfolio of high-performance foil resistors, we also offer decade boxes, standard resistors, exceptional precision thin film and power resistors including special construction configurations to meet the requirements of high temperature applications. We continue to develop, manufacture and market new types of Bulk Metal foil resistors, including military-established reliability components and devices for high temperature applications.
- Foil strain gages – Strain gages, including our advanced sensors, are resistive sensors that are attached to the surface of an object to determine the surface strain caused by an applied force. Typical uses of strain gages include test and

measurement applications where the strength of the object is the main consideration and the object under test is a structural component in a machine or device, such as an automobile, an aircraft, or a highway bridge. Strain gages are also used inside precision transducers where the magnitude of an applied force is the focus of the measurement. A variety of physical measurements can be made using strain gages attached to metal components including force, weight, pressure, displacement, and acceleration. We sell our strain gages under the well-known Micro-Measurements brand.

- Transducers, load cells, and modules – A transducer is mounted on a structure that is subjected to weight or other forces, such as the platform of an industrial scale. The term “load cell” is primarily used to describe transducers used in weighing applications. Strain gage transducers consist of one or more strain gages bonded to a metallic support. The change in resistance of the strain gages in response to deformation of the transducer by the applied load is detected by electronic instrumentation. Transducers are manufactured with different designs and configurations depending on their application and the type of stress or strain to be measured; for example, weight or tension. We produce both analog and digital transducers. Modules are transducers combined with a mounting and with external features, such as instruments and cables, and are used for weighing and control applications. We sell our load cells and modules under the overall VPG Transducers name as we continue to transition from the previously used Celtron, Revere, Sensortronics, and Tedea-Huntleigh brands.
- Data acquisition systems – Data acquisition systems, which include instruments to measure, process, digitize, display, and record the output of our strain gages, transducers, and other sensor or sensor-based systems as well as deliver information to control systems. Our acquisition of Pacific significantly expanded our previous instruments offerings.
- Weighing and control systems – Weighing and control systems are integrated systems for the detection and measurement of weight and other types of force, primarily for use in industrial applications. These include systems to control process weighing in food, chemical, and pharmaceutical plants; force measurement systems used to control web tension in paper mills, roller force in steel mills, and cable tension in winch controls; on-board weighing systems installed in logging and waste-handling trucks; and special scale systems used for aircraft weighing and portable truck weighing. With our acquisition of Stress-Tek, we enhanced and broadened our on-board weighing offerings with products that are recognized for high quality in their markets. With our acquisition of KELK, we added certain optical gages for control systems and enhanced our other product offerings for process control in the steel mill industry. We sell our systems under a variety of brand names including BLH Nobel, KELK, and VPG Onboard Weighing.

Qualifications and Specifications

Certain of our products must be qualified or approved under various military and aerospace specifications and other standards.

We have qualified certain of our foil resistor and sensor products under various military specifications approved and monitored by the United States Defense Logistics Agency (“DLA”), under certain European military specifications, and various aerospace standards approved by the U.S. National Aeronautics and Space Administration (“NASA”) and the European Space Agency (“ESA”).

Qualification and specification levels are based in part upon the rate of failure of products. We must continuously perform tests on our products, and report the results for qualified products to the qualifying organization. If a product fails to meet the requirements for the applicable classification level, the product’s classification may be suspended or reduced to a lower level. During the time that the classification is suspended or reduced, net revenues and earnings attributable to that product may be adversely affected.

Certain of our load cell and instrumentation products are approved by the National Type Evaluation Program (“NTEP”) and International Organization of Legal Metrology (“OIML”). Many of our weighing systems must also meet these standards to make them usable for legal-for-trade weighing applications. Products and systems that are to be used in hazardous areas, where explosive atmospheres might exist, must comply with special safety standards, such as the European Atmosphère Explosible (“ATEX”) Standard and the U.S. Factory Mutual (“FM”) Standard. Our load cell manufacturing sites undergo periodic audits by regulatory authorities in order to verify compliance with standard requirements and to extend product approvals.

Manufacturing Operations

Our principal manufacturing facilities are located in Israel, the United States, Canada, India, the People’s Republic of China, Germany, and Japan. We also have manufacturing facilities in Sweden, the United Kingdom, the Republic of China (Taiwan), and France. Over the past several years, we have invested substantial resources to increase capacity and to enhance automation in our plants, which we believe will further reduce production costs.

We have quality management systems at all of our major manufacturing facilities approved under the ISO 9001 Quality Management Systems Standard. ISO 9001 is a comprehensive set of quality program standards developed by the International Organization for Standardization ("ISO"). The quality management system in our major foil resistors manufacturing site is certified against Aerospace Standard AS9100.

To maintain our cost competitiveness, we are pursuing our strategic initiatives to shift manufacturing emphasis to more advanced automation in higher-labor-cost regions and to relocate production to regions with skilled workforces and relatively lower labor costs. See additional information in Item 7 “Management’s Discussion and Analysis of Financial Condition and Results of Operations – Cost Management” related to our restructuring efforts.

Sources of Supplies

Although most materials incorporated in our products are available from a number of sources, certain materials are available only from a relatively limited number of suppliers. The principal materials used in our products include various metallic foil alloys, aluminum, stainless steel, tool steel, plastics, and for a few products, gold. Some of the most highly specialized materials for our sensors are sourced from a single vendor. We maintain a safety stock inventory of certain critical materials at our facilities. We are taking steps to determine the use, source, and origin of any tin, tantalum, tungsten, or gold in our global product portfolio and, if appropriate, would work with our suppliers to remediate issues and source more responsibly.

A significant portion of our Force Sensors and Weighing and Control Systems segment products are based on strain gages produced by our Foil Technology Products segment.

Inventory and Backlog

We manufacture both standardized products and those designed and produced to meet customer specifications. We maintain an inventory of standardized components, and monitor the backlog of outstanding orders for our products. We include in our backlog only open orders that have been released by the customer for shipment in the next twelve months. Many of our customers for strain gages, load cells, and foil resistors encounter uncertain and changing demand for their products. They typically order products from us based on their forecasts. If the customers' business needs change, they may cancel or reschedule the shipments that are included in our backlog, in many instances without the payment of any penalty. Therefore, the backlog at any point in time is not necessarily indicative of the results to be expected for future periods.

Customers and Marketing

Our customer base is diversified in terms of industry, geographic region, and range of product needs. No single customer comprises greater than 5% of net revenues. The vast majority of our products are used in the broad industrial market, with selected uses in the military and aerospace, medical, agricultural, steel, and construction sectors. Within the broad industrial market, our products serve a wide variety of applications in waste management, bulk hauling, logging, scales manufacturing, engineering systems, pharmaceutical, oil, chemical, steel, paper, and food industries.

Many of our products have historically been sold by dedicated sales forces, consisting mainly of FAEs focusing on specific market segments or specific customers. The FAEs help identify the products in our portfolio that best meet the needs of our customers and provide technical and applications support. Their in-depth knowledge of customer needs is a key factor in new product design and future research and development initiatives.

Competition

Our competitive success depends on our ability to maintain a competitive advantage on the basis of superior product capability and performance, product quality, know-how, proprietary data, market knowledge, service capability, and business reputation. Price competitiveness can be an important factor, especially within our Force Sensors segment. Our sales and marketing programs offer our customers a broad range of world-class precision technologies, and superior global sales and support.

Competition in the markets where we sell the bulk of our products is extremely fragmented, both geographically and by application. To our knowledge, there are no competitors with the same product mix and proprietary technology as ours. Our competitors range from very small, local companies to large, international companies with greater financial resources than us.

Our foil resistors, where we maintain a leading market share, and our foil strain gages are based on our proprietary technology. Competitors try to compete in this market using different technology to offer functionally equivalent products. Competition in our Foil Technology Products segment includes IRC, SSM, Caddock and Flat Dashi for foil resistors, and HBM, an operating company of Spectris, Tokyo Sokki Kenkyujo Co., Ltd (TML), Kyowa and Zemic for foil strain gages. Competitors in our Force Sensors segment include HBM, Zemic, Utilcell, and Flintec. Competitors in our Weighing and Control Systems segment include Hardy Instruments and Mettler-Toledo for process weighing; ABB, Siemens, Haehne, Dalian and IMS for steel mill systems; and Air-Weigh, Vehicle Weighing Systems, MOBA, and AMCS for onboard weighing.

Research and Development

Many of our products, manufacturing techniques, and technologies have been invented, designed, and developed by our engineers and scientists. Special proprietary resistive metal foil is the most important material in both our foil resistors and our foil strain gages, and our research and development activities related to foil materials are an important linkage between these two products.

We maintain strategically placed design centers for each of our business segments where proximity to customers enables us to more easily monitor and satisfy the needs of local markets. These design centers are located in the United States, Israel, Canada, Sweden, Japan, the United Kingdom, and Germany.

We also maintain research and development staff, and promote programs at a number of our production facilities to develop new products and new applications of existing products, and to improve manufacturing techniques. This decentralized system encourages individualized product development at specific manufacturing facilities that occasionally has applications at other facilities.

Our research and development staff and our sales force are closely linked. Our sales force is comprised of individuals with an engineering background who can help meet the needs of our customers for technical and applications support. This in-depth knowledge of customer needs and specifications is a key factor in future research and development initiatives.

Research and development will continue to play a key role in our efforts to introduce innovative products for new sales, and to improve profitability. We expect to continue to expand our position as a leading supplier of precision foil technology products. We believe our R&D efforts should provide us with a variety of opportunities to leverage technology, products, and our manufacturing base and, ultimately, our financial performance. To that end, we expect to sustain or increase our R&D expenditures in order to fill the product development pipeline and lay the foundation for future sales growth.

Patents and Licenses

We have made a significant investment in securing intellectual property protection for our technology and products. We seek to protect our technology by, among other things, filing patent applications for technology considered important to the development of our business. Although we have numerous United States and foreign patents covering certain of our products and manufacturing processes, no particular patent is considered individually material to our business. We also rely upon trade secrets, unpatented know-how, and continuing technological innovation.

Our ability to compete effectively with other companies depends, in part, on our ability to maintain the proprietary nature of our technology. Although we have been awarded, have filed applications for, or have obtained numerous patents in the United States and other countries, there can be no assurance concerning the degree of protection afforded by these patents, or the likelihood that pending patents will be issued.

We require all of our technical, research and development, sales and marketing, and management employees, and most consultants and other advisors to execute confidentiality agreements upon the commencement of employment, or consulting relationships with us. These agreements provide that all confidential information developed, or made known to the entity or individual during the course of the entity’s or individual’s relationship with us, is to be kept confidential and not disclosed to third parties except in specific circumstances. Substantially all of our technical, research and development, sales and marketing, and management employees have entered into agreements providing for the assignment to us of rights to inventions made by them while employed by us.

Environmental, Health and Safety

We have an Environmental, Health and Safety Policy that commits us to achieve health and safety for employees and protection of the environment, to maintain compliance with applicable environmental, health and safety laws, to promote proper management of hazardous materials, and to minimize the hazardous materials generated in the course of our operations. In addition, our manufacturing operations are subject to various regional, federal, state, and local laws restricting discharge of materials into the environment. We are not involved in any pending or threatened proceedings that would require curtailment of our operations.

Employees

As of December 31, 2018, we employed approximately 2,600 total employees, substantially all of which were full-time employees. Approximately 87% of the employees were located outside the United States. Our future success is substantially dependent on our ability to attract and retain highly qualified technical and administrative personnel. Some of our employees outside the United States are members of trade unions. Our relationship with our employees is generally good. However, no assurance can be given that labor unrest or strikes will not occur.

Executive Officers

The following table sets forth certain information regarding our executive officers as of March 14, 2019:

Name	Age	Positions
Ziv Shoshani	52	Chief Executive Officer, President, and Director
William M. Clancy	56	Executive Vice President and Chief Financial Officer
Roland B. Desilets	57	Vice President and General Counsel

Ziv Shoshani is our Chief Executive Officer and President, and also serves on the board of directors. Mr. Shoshani was Chief Operating Officer of Vishay Intertechnology from January 1, 2007 to November 1, 2009. During 2006, he was Deputy Chief Operating Officer of Vishay Intertechnology. Mr. Shoshani was Executive Vice President of Vishay Intertechnology from 2000 to 2009 with various areas of responsibility, including Executive Vice President of the Capacitors and the Resistors businesses, as well as heading the Measurements Group and Foil Divisions. Mr. Shoshani had been employed by Vishay Intertechnology since 1995. He continues to serve on the Vishay Intertechnology board of directors. Mr. Shoshani is a nephew of the late Dr. Felix Zandman, the founder of Vishay Intertechnology.

William M. Clancy is our Executive Vice President and Chief Financial Officer. Mr. Clancy was Corporate Controller of Vishay Intertechnology from 1993 until November 1, 2009. He became a Vice President of Vishay Intertechnology in 2001 and a Senior Vice President of Vishay Intertechnology in 2005. Mr. Clancy served as Corporate Secretary of Vishay Intertechnology from 2006 to 2009. From June 16, 2000 until May 16, 2005 (the date Vishay Intertechnology acquired the noncontrolling interest in Siliconix incorporated), Mr. Clancy served as the principal accounting officer of Siliconix. Mr. Clancy had been employed by Vishay Intertechnology since 1988. Mr. Clancy is a licensed CPA in Pennsylvania.

Roland B. Desilets is our Vice President and General Counsel. He joined VPG in March 2010 after serving as Executive Vice President, General Counsel, and Secretary for QAD, Inc. (NASDAQ:QADA/QADB) from 2001 to 2009. Prior to that time he spent one year as Executive Vice President, General Counsel, and Secretary of Atlas Commerce, Inc., a Safeguard Scientifics (NYSE:SFE) partner company. Mr. Desilets initially joined QAD, Inc. in 1993, serving as Regional General Counsel until 1998, when he was named General Counsel. Previously, he was Intellectual Property Counsel for Unisys Corporation. Mr. Desilets holds a juris doctor degree from Widener University Delaware School of Law, a master of science degree in computer science from Villanova University, and a bachelor of science degree in physics from Ursinus College.

Company Information and Website

We began filing annual, quarterly, and current reports, proxy statements, and other documents with the Securities and Exchange Commission (“SEC”) under the Securities Exchange Act of 1934 after our spin-off from Vishay Intertechnology on July 6, 2010. The SEC maintains an Internet website that contains reports, proxy and information statements, and other information regarding issuers, including us, that file electronically with the SEC. The public can obtain any documents that we file with the SEC at www.sec.gov.

In addition, our company website can be found on the Internet at www.vpgsensors.com. The website contains information about us and our operations. Copies of each of our filings with the SEC on Form 10-K, Form 10-Q, and Form 8-K, and all amendments to those reports, can be viewed and downloaded free of charge as soon as reasonably practicable after the reports and amendments are electronically filed with or furnished to the SEC. To view the reports, access http://ir.vpgsensors.com and click on “SEC Filings”/ “Documents.”

The following corporate governance related documents are also available on our website:

- Compensation Committee Charter
- Nominating and Corporate Governance Committee Charter
- Audit Committee Charter
- Code of Business Conduct and Ethics
- Code of Ethics Applicable to the Chief Executive Officer, Chief Financial Officer, and Principal Accounting Officer or Controller
- Corporate Governance Principles

To view these documents, access http://ir.vpgsensors.com and click on “Corporate Governance.”

To view our Ethics Program Reporting Procedures, access http:/www.vpgsensors.com/company and click on “Ethics.”

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We are not incorporating by reference into this Annual Report on Form 10-K any material from our website.
Any of the above documents can also be obtained in print by any stockholder, upon request to our Investor Relations Department at the following address:

Corporate Investor Relations
Vishay Precision Group, Inc.
3 Great Valley Parkway, Suite 150
Malvern, PA 19355

Item 1A. RISK FACTORS

You should carefully consider the following risks and other information in this Form 10-K in evaluating our company and common stock. Any of the following risks, as well as additional risks and uncertainties not currently known to us or that we currently deem immaterial, could materially and adversely affect our business, results of operations or financial condition, and could also adversely affect the trading price of our common stock.

Risks Related to Our Business

We face intense competition in our business.

We face various degrees and types of competition in our different businesses. In some cases our products compete directly with those of third party competitors. In other cases, competition in one segment, such as in our Weighing and Control Systems segment, may affect not only the sales of our systems within that segment, but also sales of products that we incorporate in those systems from other segments, such as load cells and strain gages.

We have a significant market position in foil resistors and foil strain gages. Foil resistors and foil strain gages are also produced by competitors, principally located in China. We believe that our foil technology products provide superior performance relative to our competitors, but that could change if our competitors succeed in developing and introducing innovative competitive offerings. Also, our foil strain gages compete with other types of strain gages, such as semiconductor strain gages, which we do not manufacture. We believe that other types of strain gages are not as reliable or stable as our foil strain gages, but that could change as the technology for these other products continues to evolve. If our competitors are able to improve the quality, performance, or pricing of their products relative to our offerings, our results of operations could be adversely affected.

The market for transducer/load cell products is highly fragmented and very competitive. Our load cell modules and systems face competition from numerous other load cell module and systems manufacturers. Competition for modules and systems is most often based on customer relationships, product reliability, technical performance, and the ability to anticipate and satisfy customer needs for specific design configurations. Many other manufacturers have more experience in particular geographic markets and specific applications than we do, and may be better positioned to compete in these areas. We cannot assure you that we will be able to successfully grow our business in the face of these competitive challenges.

Our vertical product integration exposes us to certain risks.

Our business structure emphasizes vertical product integration. For example our force sensor business is significant customer (by volume) for our strain gages. While we believe this has been, and will continue to be, a sound business structure, vertical product integration and the resulting interdependencies of our divisions exposes us to certain risks. As a consequence of our vertical integration, our force sensors business may compete with certain of our customers and potential customers for strain gages while our systems business may compete with certain of our customers and potential customers for force sensors, who, for that reason, may elect not to do business with us.

To remain successful, we must continue to innovate, and our investments in new technologies may not prove successful.

Our future operating results depend on our ability to continually develop, introduce, and market new and innovative products, to modify existing products, to respond to technological change, and to customize certain products to meet customer requirements. There are numerous risks inherent in this process, including the risks that we will be unable to anticipate the direction of technological change, that customers may be unwilling, or unable, to adopt the new products or methods of using them, that we will be unable to develop and market new products and applications in a timely fashion to satisfy customer demands, or that such products will experience quality or other qualification issues with our customers as they, and we, gain experience with qualifying them and using them. If this occurs, we could lose customers and experience adverse effects on our financial condition and results of operations.

We may not be successful in future acquisitions or other strategic transaction endeavors, if any, which could have an adverse effect on our business and results of operations.

Historically, we expanded our business in part by completing acquisitions, and an important element of our business strategy continues to be expansion through acquisition. We cannot assure that we will identify, have the financial capabilities to execute, and/or successfully complete strategic transactions with suitable partners in the future. We also cannot assure that any such transactions that we do complete in the future will be successful.

Such transactions or investments involve a number of risks, including the following:

- we may incur substantial costs, including advisory fees and diversion of management attention, in evaluating a potential transaction;
- we may be unable to achieve the anticipated benefits from the transaction;

- we may have difficulty integrating the operations and personnel of an acquired business, and may have difficulty retaining the key personnel of the acquired business;
- we may have difficulty incorporating acquired technologies or products into our existing solutions;
- our ongoing business and management's attention may be disrupted or diverted by transition or integration issues, and the complexity of managing geographically and culturally diverse locations; and
- we may lose customers of those companies, or may lose our customers due to the change in control or for other reasons.

The factors noted above could have a material adverse effect on our business, results of operations, and financial condition or cash flows, particularly in the case of a larger acquisition. From time to time, we may enter into negotiations for acquisitions or investments that are not ultimately consummated. These negotiations could result in significant diversion of management time, as well as out-of-pocket costs.

Future acquisitions may require us to incur or issue additional indebtedness or issue additional equity.

If we were to undertake future substantial acquisitions for cash, these acquisitions would likely need to be financed in part through bank borrowings, or the issuance of public or private debt. This acquisition financing would likely decrease our ratio of earnings to fixed charges and adversely affect other credit metrics. Our revolving credit facilities require us to obtain the lenders’ consent for certain additional debt financing and to comply with other covenants, including the application of specific financial ratios. We cannot assure that the necessary acquisition financing would be available to us on acceptable terms, if and when, required. If we were to make an acquisition with equity, the acquisition may have a dilutive effect on the interests of the holders of our common stock.

We may experience difficulties, delays, or unexpected costs in completing our cost reduction programs.

To remain competitive, particularly when business conditions are difficult, we sometimes take steps to reduce our cost structure by restructuring our existing businesses to achieve efficiencies, eliminate redundant functions, facilities and staff positions, and move operations, where possible, to reduce labor or other costs.

We may not realize, in full or in part, the anticipated benefits of these programs without encountering difficulties, which may include complications in the transfer of production knowledge, loss of key employees and/or customers, and the disruption of ongoing business. Any of these difficulties could delay and/or undermine our ability to realize the benefits of these cost reduction programs, as well as potentially adversely affecting our customer relationships and operations.

Our business is cyclical, and in periods of increased economic strength, we may experience intense demand for our products. If our cost reduction programs and related restructuring result in us not being able to satisfy our customer’s demand for products during a rising economy, and our competitors sufficiently expand production, we could lose customers and/or market share. These losses could have an adverse effect on our operations, financial condition, and results of operations.

We might require additional capital to support business growth and this capital might not be available.

We intend to continue to make investments to support our business growth and may require additional funds to respond to business challenges or opportunities, including the need to develop new offerings or enhance our existing offerings, enhance our operating infrastructure, or acquire complementary businesses and technologies. Accordingly, we may need to engage in equity or debt financings to secure additional funds. If we raise additional funds through further issuances of equity or convertible debt securities, our existing stockholders could suffer significant dilution, and any new equity securities we issue could have rights, preferences, and privileges superior to those of holders of our common stock. Any debt financing secured by us in the future could involve additional restrictive covenants relating to our capital raising activities and other financial and operational matters, which may make it more difficult for us to obtain additional capital and to pursue business opportunities, including potential acquisitions.

In addition, we may not be able to obtain additional financing on terms favorable to us, if at all. If we are unable to obtain adequate financing or financing on terms satisfactory to us, when we require it, our ability to continue to support our business growth and to respond to business challenges could be significantly limited.

We may encounter difficulties in the implementation or operation of new enterprise resource planning systems.

We have implemented, and continue to implement, new enterprise resource planning (“ERP”) systems in different parts of our business. ERP systems are integral to our ability to accurately and efficiently manage our manufacturing and sales activities, and provide critical business information to management. The implementation of an ERP system may cause us to incur additional costs, shipment delays, and related customer dissatisfaction; expend employee (including Company management) time and attention; and otherwise burden our internal resources. Any difficulties we encounter with the implementation or successful operation of an ERP system could damage the effectiveness of our business processes and could adversely impact our ability to accurately and effectively forecast and manage sales demand, manage our supply chain, and report management information on an accurate and timely basis, any of which could have a material adverse effect on our business and results of operations.

Our success is dependent upon our ability to protect our proprietary technology and other intellectual property.

We rely on a combination of the protections provided by applicable patent, trademark, copyright, and trade secret laws, as well as on confidentiality procedures and other contractual arrangements, to establish and protect our rights in our technology, and related materials and information. We enter into agreements with our customers and distributors. These agreements contain confidentiality and non-disclosure provisions, a limited warranty covering our products, and indemnification for the customer from infringement actions related to our products.

Despite our efforts, it may be possible for others to copy portions of our products, reverse engineer them, or obtain and use information that we regard as proprietary, all of which could adversely affect our competitive position. Furthermore, there can be no assurance that our competitors will not independently develop technology similar to ours. The laws of certain countries in which we manufacture do not protect our intellectual property ("IP") rights to the same extent as the laws of the United States. In the Office of the United States Trade Representative (“USTR”) annual "Special 301" Report released in April 2018, the adequacy and effectiveness of intellectual property protection in a number of foreign countries were analyzed.

A number of countries in which we manufacture are identified in the report as being on the Priority Watch List. In China, for instance, the USTR is concerned about the urgent need to remediate a range of IP-related concerns, including trade secret theft, online piracy and counterfeiting, the high-volume manufacture and export of counterfeit goods, technology transfer requirements imposed as a condition to access the Chinese market, the mandatory application of adverse terms to foreign IP licensors, and IP ownership and research and development localization requirements. Structural impediments to administrative, civil, and criminal IP enforcement are also problematic. The USTR also expressed concern that in India there is a lack of sufficient measurable improvements to its IP framework on long standing and new challenges that have negatively affected U.S. right holders over the past year. Other countries in which we do business were also identified because of problems in intellectual property enforcement. The absence of harmonized intellectual property protection laws and effective enforcement makes it difficult to ensure consistent respect for patent, trade secret, and other intellectual property rights on a worldwide basis. As a result, it is possible that we will not be able to enforce our rights against third parties that misappropriate our proprietary technology in those countries.

The success of our business is highly dependent on maintenance of intellectual property rights.

The unauthorized use of our IP rights may increase the cost of protecting these rights or reduce our revenues. We seek to protect trade secrets and our other proprietary technology, in part, by requiring each of our employees to enter into non-disclosure and IP assignment agreements. In these agreements, the employee agrees to maintain the confidentiality of all of our proprietary information and, subject to certain exceptions, to assign to us all rights in any proprietary information or technology made, or contributed, by the employee during his or her employment. Generally, we do not enter into non-compete arrangements with our employees, with the exception of certain executives and, in some cases, one or more of the principals of the businesses that we acquire.

All of these types of agreements may be breached or be found unenforceable, and we may not have an adequate remedy for any such breach of, or inability to enforce, these agreements. We may initiate, or be subject to, claims or litigation for infringement of proprietary rights, or to establish the validity of our proprietary rights, which could result in significant expense to us, cause product shipment delays, require us to enter royalty or licensing agreements, and divert the efforts of our technical and management personnel from productive tasks, whether or not such litigation were determined in our favor.

We may be exposed to product liability claims.

While our agreements with our customers and distributors typically contain provisions designed to limit our exposure to potential material product liability claims, including appropriate warranty, indemnification, damages waiver, and limitation of liability provisions, it is possible that such provisions may not be effective under the laws of some jurisdictions, thus exposing us to substantial liability. Moreover, defending a suit, regardless of its merits, could entail substantial expense, and require the time and attention of key management personnel. If product liability claims are brought against us, the costs associated with defending such claims may adversely affect our results of operations and future cash flows.

We must expend significant resources to obtain design wins without assurance that we will be successful.

In many cases, we must initiate communication with our customers, and convince the customer that our products and systems will offer solutions for its business that are technically superior and more cost effective compared to their existing arrangements. To do so, we must often expend significant financial and human resources to develop technologically compelling products or systems with no guarantee that they will be adopted by our customers. The non-recurring engineering ("NRE") costs for product development in these cases could be substantial, and may adversely affect our profitability if we are unable to recover these costs.

Also, customers will often require a lengthy period of on-site testing before committing to purchase a product or system, during which period we will not receive material revenue from the customer. While a design win for our products and systems may result in a long period of recurring revenue during which we hope to recover our costs, we must often internally finance our development costs over significant time periods. If our products or systems fail to gain acceptance with our customers, we will be forced to absorb any NRE costs, which could adversely affect our business if these costs are substantial.

The long development times for certain of our products and systems may result in unpredictable fluctuations in revenue and results of operations.

Our force sensor products, and weighing and control systems, often have long product development cycles, both to develop the product or system and to secure customer acceptance following what may be a lengthy on-site testing period. During product development and testing, we may incur substantial costs without corresponding revenues. If our custom product or system is ultimately accepted by the customer, we may then begin to realize substantial revenues from our development efforts.

In particular, our weighing and control systems can be priced for several hundred thousand dollars per unit, so that a contract to acquire one or more units can materially contribute to our revenues during the period or periods that we are permitted to recognize the contract revenues for accounting purposes. The nature of our weighing and control products and systems, and in particular, the products and systems manufactured by the steel business, may therefore result in substantial fluctuations in our operating results, including revenues and profitability, from period to period, even though there has been no fundamental change in our business or its prospects. Further, customers may request a delay in shipping a product they have ordered due to changes in their business needs, which may delay the revenue recognition for the product until shipment occurs. This may make it difficult for investors to undertake period-to-period comparisons of our performance. Also, the fluctuating nature of key components of our revenues may limit the visibility of our management regarding performance in future periods, and make it more difficult for our management to provide guidance to our investors.

We may not have adequate facilities to satisfy future increases in demand for our products.

Our business is cyclical and in periods of a rising economy, we may experience intense demand for our products. During such periods, we may have difficulty expanding our manufacturing capacity to satisfy demand. Factors which could limit such expansion include delays in procurement of manufacturing equipment, shortages of skilled personnel, and physical constraints on expansion at our facilities. If we are unable to meet our customers' requirements and our competitors sufficiently expand production, we could lose customers and/or market share. These losses could have an adverse effect on our financial condition and results of operations. Also, capacity that we add during upturns in the business cycle may result in excess capacity during periods when demand for our products recedes, resulting in inefficient use of capital, adversely affecting our business.

The nature of the market for our products may render them particularly susceptible to downturns in the economic environment.

Our products are designed to replace and provide superior functionality over existing product infrastructure utilized by our customers. Often, it is only after introductory demonstrations by our sales and engineering teams that our customers come to appreciate the advantages of our products and systems, and the long-term benefits of their adoption. An economic downturn or extended period of economic uncertainty may make customers less receptive to adopting new technological solutions at our suggestion - even ones with demonstrated operational and financial advantages. During these periods, customers may defer, or even cancel, orders for products and systems for which they have previously contracted, or given indications of interest.

Also, because our business is concentrated largely in the industrial sector, we do not benefit from countervailing fluctuations in consumer demand. As a result, our business may be more significantly affected by the consequences of a general economic slowdown than other segments of our industry, and may also take longer to recover from the effects of a slowdown.

Our backlog is subject to customer cancellation.

Many of the orders that comprise our backlog may be canceled by our customers without penalty. Our customers, particularly for our foil technology products, often cancel orders when business is weak and inventories are excessive, a situation that we have experienced during periods of economic slowdown. Therefore, we cannot be certain that the amount of our backlog accurately forecasts the level of orders that will ultimately be delivered. Our results of operations could be adversely impacted if customers cancel a material portion of orders in our backlog.

The complexity of our sophisticated weighing and control systems may require costly corrections if design flaws are found.

Our weighing and control systems combine sophisticated electronic hardware and computer software. We believe that the sophistication of our systems contributes to their competitive advantage over similar products offered by other system integrators. We go to substantial lengths to assure that our systems are free of design flaws when they are delivered to our customers for installation and testing. However, due to the systems' complexity, design flaws may occur and require correction. If the requisite corrections are substantial, or difficult to implement due to the systems' complexity, we may not be able to recover the costs of correction and retesting, with the result that our profit margins on these systems could be substantially reduced, or even negated by losses, and our results of operations could be materially and adversely affected.

Our results are sensitive to raw material availability, quality, and cost.

Although most materials incorporated in our products are available from a number of sources, certain materials are available only from a relatively limited number of suppliers. We generally maintain a supply of strategic raw materials for continuity and risk management. Our customers would need significant advance notification to qualify alternative materials, if we had to use them.

Alternative suppliers are available worldwide for most of our raw materials, but significant time (up to 12 months) would be required to qualify new suppliers and establish efficient production scheduling.
Certain metals used in the manufacture of our products are traded on active markets, and can be subject to significant price volatility.
Our results of operations may be materially and adversely affected if we have difficulty obtaining these raw materials, if the quality of available raw materials deteriorates, if there are significant price changes for these raw materials, or if compliance with the laws and regulations described below proves costly and time-consuming. For periods in which the prices of these raw materials are rising, we may be unable to pass on the increased cost to our customers, which would result in decreased margins for the products in which they are used. For periods in which the prices are declining, we may be required to write down our inventory carrying cost of these raw materials, since we record our inventory at the lower of cost or market. Depending on the extent of the difference between market price and our carrying cost, this write-down could have a material adverse effect on our net earnings. We also may need to record losses for adverse purchase commitments for these materials in periods of declining prices.
Pursuant to the SEC’s “conflict minerals” rules, reporting companies that determine that certain metals, dubbed “conflict minerals” by the SEC (which include tantalum, gold, tin, and tungsten sourced from the Democratic Republic of the Congo or adjoining countries), are necessary to the functionality or production of a product they manufacture, or contract to have manufactured, must file a specialized disclosure form with the SEC. We use raw materials that are subject to conflict minerals rules. The compliance with the SEC's related disclosure requirements may affect the sourcing and availability of minerals used in the manufacture of our products. Also, because our supply chain is complex, we may face reputational challenges with our customers and other stakeholders if we are unable to materially verify the origins of all "in scope" metals used in our products.
Our product sales may be adversely affected by changes in product classification levels under various qualification and specification standards.
Certain of our products must be qualified or approved under various military and aerospace specifications and other standards. We have qualified certain of our foil resistor products under various military specifications approved and monitored by the DLA, and under certain European military specifications, and various aerospace standards approved by NASA and the ESA. Qualification and specification levels are based in part upon product failure rate. We must continuously perform tests on our products, and for products that are qualified, the results of these tests must be reported to the qualifying organization. Certain of our force sensor products are approved by the NTEP and OIML. Our on-board weighing systems must meet approved standards to make them legal-for-trade. If a product fails to meet the requirements for the applicable classification level or other approval, the product’s classification or approval may be suspended or reduced to a lower level. During the time that the classification is suspended or reduced to a lower level, net revenues and earnings attributable to that product may be adversely affected.
Our future success is substantially dependent on our ability to attract and retain highly qualified technical, managerial, marketing, finance, and administrative personnel.
The competitive environment of our business requires us to attract and retain highly qualified personnel to develop technological innovations and bring them to market on a timely basis. Our complex operations also require us to attract and retain highly qualified administrative personnel in functions such as legal, tax, accounting, business development, financial reporting, and treasury. The market for personnel with such qualifications is highly competitive. We have not entered into employment or non-competition agreements with many of our key personnel. The loss of the services of, or the failure to effectively recruit, qualified personnel, including for key executive positions, could have a material adverse effect on our business.
Failure to maintain effective internal control over financial reporting could adversely affect our ability to meet our reporting requirements.
Effective internal control over financial reporting is necessary for us to provide reasonable assurance with respect to our financial reports, and to effectively prevent fraud. Internal control over financial reporting may not prevent or detect misstatements because of inherent limitations, including the possibility of human error, the circumvention or overriding of controls, or fraud. Therefore, even effective internal control over financial reporting can provide only reasonable assurance with respect to the preparation and fair presentation of financial statements. If we cannot provide reasonable assurance with respect to our financial reports and effectively prevent fraud, our operating results could be

harmed. In the past, we experienced a material weakness in our internal control over financial reporting related to deficiencies in our internal control structure arising out of our significant change in size, complexity and structure due to multiple restructurings and acquisitions. We have since remediated the material weakness through updates to our control activities documentation and process in numerous locations and improved processes related to monitoring of the design and effectiveness of internal controls. If we fail to maintain the effectiveness of our internal control over financial reporting, including any failure to implement required new or improved controls, or if we experience difficulties in their implementation, our business and operating results could be harmed, we could fail to meet our reporting obligations, and there could be a material adverse effect on our stock price.

We are exposed to, and may be adversely affected by, interruptions to our computer and information technology systems and sophisticated cyber-attacks.

We rely on our information technology systems and networks in connection with many of our business activities. Some of these networks and systems are managed by third party service providers and are not under our direct control. Our operations routinely involve receiving, storing, processing, and transmitting sensitive information pertaining to our business, customers, suppliers, employees, and other sensitive matters. Any cyber incidents could materially disrupt operational systems; result in loss of trade secrets or other proprietary or competitively sensitive information; compromise personally identifiable information regarding customers or employees; and jeopardize the security of our facilities. Because techniques used to obtain unauthorized access, or to sabotage systems, change frequently and generally are not recognized until they are launched against a target, we may be unable to anticipate these techniques, or to implement adequate preventative measures. Information technology security threats, including security breaches, computer malware, and other cyber-attacks are increasing in both frequency and sophistication, and could create financial liability, subject us to legal or regulatory sanctions, or damage our reputation with customers, suppliers, and other stakeholders. We continuously seek to maintain a robust program of information security and controls, but the impact of a material information technology event could have a material adverse effect on our competitive position, reputation, results of operations, financial condition, and cash flows.

Future changes in our environmental liability and compliance obligations may harm our ability to operate or increase costs.

Our manufacturing operations, products and/or packaging are subject to environmental laws and regulations governing air emissions, wastewater discharges, the handling, disposal, and remediation of hazardous substances, wastes, and certain chemicals used or generated in our manufacturing processes, workplace health and safety labeling, or other notifications with respect to the content, or other aspects of our processes, products or packaging, restrictions on the use of certain materials in or on design aspects of our products or packaging, and responsibility for disposal of products or packaging. New liabilities could arise, and we may have unavoidably inherited certain pre-existing environmental liabilities, generally based on successor liability doctrines. Although we have never been involved in any environmental matter that has had a material adverse impact on our overall operations, there can be no assurance that in connection with any past or future operation, acquisition or otherwise, we will not be obligated to address environmental matters that could have a material adverse impact on our operations. In addition, more stringent environmental regulations may be enacted in the future, and we cannot presently determine the modifications, if any, in our operations that any such future regulations might require, or the cost of compliance with these regulations.

Our credit facilities subject us to financial and operating restrictions.

We maintain revolving credit agreements and term loans with banks that we use, or may use, for working capital, acquisition financing, and other purposes. These credit facilities subject us to certain restrictions which may affect, and in some cases significantly limit or prohibit, among other things, our ability to:

- borrow additional funds;
- pay dividends or make other distributions;
- repurchase our common stock;
- make investments, including capital expenditures;
- complete acquisitions;
- engage in transactions with affiliates or subsidiaries; or
- create liens on our assets.

Our primary credit facility requires us to maintain certain financial ratios. If we fail to comply with the covenant restrictions contained in the credit facility, that failure could result in termination of the facility, and all amounts outstanding could become immediately payable.

Unexpected events, such as a natural disaster, could disrupt our operations and adversely affect our results of operations.

We have manufacturing and other facilities in countries around the world. Unexpected events, including fires or explosions at facilities; natural disasters, such as flooding, hurricanes, and earthquakes; war or terrorist activities; unplanned outages; supply disruptions; and failures of equipment or systems at any of our facilities could adversely affect our results of operation. If adverse conditions were to arise with respect to any of our facilities as a result of a natural disaster or other unexpected event, they may result in customer disruption, physical damage to one or more key operating facilities, the temporary closure of one or more key operating facilities, the temporary disruptions of information systems, and/or an adverse effect on our results of operations.

A significant portion of our cash and cash equivalents and short-term investments balances were held by our non-U.S. subsidiaries.
We generate a significant amount of cash and profits from our non-U.S. subsidiaries. As of December 31, 2018, $84.2 million of our cash and cash equivalents and short-term investments were held by subsidiaries outside of the United States.

The Tax Cuts and Jobs Act (“2017 Tax Act”), enacted on December 22, 2017, transitioned the U.S. from a worldwide tax system to a modified territorial tax system. Under previous law, companies could indefinitely defer U.S. income taxation on unremitted foreign earnings. The 2017 Tax Act imposes a one-time transition tax on deferred foreign earnings of 15.5% for liquid assets and 8% for illiquid assets, payable in defined increments over eight years. In 2017, we provided a provisional amount of $0.2 million. After finalizing the amount of earnings and profits subject to the transition tax and our foreign tax credit calculation in 2018, we determined the final current portion of transition tax to be immaterial. We did not need to repatriate amounts from our non-U.S. subsidiaries to the United States to satisfy this tax obligation.

These previously deferred foreign earnings may now be repatriated to the United States with little to no additional U.S. federal taxation. However, any such repatriation could incur local withholding tax in the source and intervening foreign jurisdictions. These amounts could also be subject to certain U.S. state taxes.
Changes in our tax rate or exposure to additional income tax liabilities could affect our profitability. In addition, audits by tax authorities could result in additional tax payments for prior periods.
We are subject to income taxes in the U.S. and in various foreign jurisdictions. Domestic and international tax liabilities are subject to the allocation of income among various tax jurisdictions. Our effective tax rate can be affected by changes in the mix of earnings in countries with differing statutory tax rates (including as a result of business acquisitions and dispositions), changes in the valuation of deferred tax assets and liabilities, accruals related to contingent tax liabilities, the results of audits and examinations of previously filed tax returns, and changes in tax laws.
Any of these factors may adversely affect our tax rate and decrease our profitability. The amount of income taxes we pay is subject to audit by U.S. federal, state, local, and foreign tax authorities. If these tax audits result in assessments, our future results may be unfavorably impacted.
As a global business, we have a complex tax structure, and there is a risk that the tax authorities will disagree with our transfer pricing.
We are subject to complex transfer pricing regulations in the U.S. and foreign countries in which we operate. Transfer pricing regulations generally require that transactions between related companies be determined comparable to transactions on an arm’s length basis and that contemporaneous documentation be maintained to support the pricing used. Although transfer pricing standards are generally similar in many of the countries in which we operate, there is still a relatively high degree of uncertainty and inherent subjectivity in complying with these requirements. This topic has received additional scrutiny in recent years, including the Organization for Economic Co-operation and Development’s Base Erosion and Profit Shifting project. To the extent that any tax authority disagrees with our transfer pricing practices, we could incur significant costs to defend our position and could be subject to significant additional tax liabilities, interest, and penalties.
We may not be able to realize our deferred tax assets which would adversely impact tax expense in future periods.
We regularly assess the ability to realize deferred tax assets in each jurisdiction in which we operate based on a number of factors, including historic operating results, estimates of future earnings, the economic environment, the nature and character of the income, and the existence of cost effective tax planning strategies. This assessment requires significant judgment. If we determine that deferred tax assets are not "more likely than not" to be realized, we record a valuation allowance to reduce deferred tax assets to a level that is expected to be realized. If we subsequently determine that realization becomes "more likely than not", a valuation allowance will be reversed. Any increase or decrease in our valuation allowances could have a significant impact on our financial results.
We use the mark Vishay under license from Vishay Intertechnology, which could result in product and market confusion.

We use the mark Vishay as part of our name and in connection with many of our products. Our use of the Vishay mark is governed by an agreement between us and Vishay Intertechnology, giving us a perpetual, royalty-free, worldwide license for the use of the mark. We believe that it is important that we continue the use of the Vishay name, to a certain extent, in order to benefit from the reputation of the Vishay brand, which was first used in connection with our foil resistors and strain gages when Vishay Intertechnology was founded over 50 years ago.

There are risks associated with our use of the Vishay mark, however, both for us and for Vishay Intertechnology. Because both we, and Vishay Intertechnology, use the Vishay mark, confusion could arise in the market regarding the products offered by the two companies, and there could be a misplaced perception of our continuing to be associated with Vishay Intertechnology. Also, any negative publicity associated with one of the two companies in the future could adversely affect the public image of the other.

Finally, Vishay Intertechnology will have the right to terminate the license agreement, in certain extreme circumstances, if we are in material and repeated breach of the terms of the agreement, which would likely have an adverse effect on us and our business.

Risks relating to our operations outside the United States

We attempt to improve profitability by operating in countries in which manufacturing efficiencies may be achieved, but the shift of operations to these regions may entail considerable expense.

Our strategy is aimed at achieving significant production cost savings through the transfer and expansion of manufacturing operations to and in countries in which we have existing capacity, as well as countries with lower production costs or other benefits, such as India. During this process, we may experience under-utilization of certain plants and factories in higher-cost regions, and capacity constraints in plants and factories located in lower-cost regions. Also, we may experience delays in the expected transition from a higher-cost location to a lower-cost one that results in greater than expected use of the higher-cost facility. This transitional utilization may result initially in production inefficiencies and higher costs. These costs include those associated with compensation in connection with workforce reductions and plant closings in the higher-cost regions, start-up expenses, manufacturing and construction delays, and increased depreciation costs in connection with the initiation or expansion of production in lower-cost regions. In addition, as we implement transfers of certain of our operations, we may experience strikes or other types of labor unrest as a result of layoffs or termination of our employees in higher-cost countries.

In connection with the transfer of manufacturing operations to lower-cost countries, and upgrading of existing facilities in higher-cost countries, we are also increasing the level of automation in our plants to optimize our capital and labor resources in production, inventory management, quality control, and warehousing. Although we have substantial experience with automation in several of our plants in higher-cost countries, there are risks in automating plants which previously did not use a significant amount of automation, including the possibility of inefficiencies and higher operating costs in the transition from manual to automated operations. If the transition extends longer than anticipated, we could suffer product yield inefficiencies, contributing to higher product costs and increasing the time it will take for us to achieve a return on our investment in the capital equipment involved in the automation process. Furthermore, any layoffs or termination of our employees as a result of increased automation may lead to strikes or other types of labor unrest. If we experience these types of inefficiencies, they could have an adverse effect on our operating results, customer relationships, and financial condition.

We conduct a significant amount of business in the European Union, including in England, and our operations may be affected by the departure of the United Kingdom from the European Union.

On June 23, 2016, the citizens of the United Kingdom approved a referendum to leave the European Union (“Brexit”), which led to significant market volatility around the world, as well as political, economic and legal uncertainty. [In addition, the Brexit vote triggered a devaluing of the pound sterling relative to the euro and the U.S. dollar, and in Europe we generally sell our products and incur expense in local currencies including the pound sterling and the euro, but incur exchange rate gains and losses for U.S. dollar denominated assets and liabilities including intercompany and third-party accounts receivables and payables.] This exposure to movements in foreign currency exchange rates relative to some of these U.S. dollar denominated balances may result in an adverse impact on our results of operations.

The long-term nature of the United Kingdom’s relationship with the European Union is unclear and there is considerable uncertainty when any relationship will be agreed and established. Withdrawal from the European Union is controversial in the United Kingdom notwithstanding the 2016 vote. In December 2018, the European Court of Justice ruled that, subject to certain conditions, a member state could revoke notification of its intention to withdraw from the European Union. The British government and the European Union negotiated a withdrawal agreement which the European Union approved. However, the British parliament recently rejected the agreement. Although the British Prime Minister Theresa May has committed to drafting and negotiating a new withdrawal agreement, there remains considerable uncertainty around the withdrawal agreement. Failure to obtain both European Union and parliamentary approval of a negotiated withdrawal agreement would mean that the United Kingdom would leave the European Union on March 29, 2019, probably with no agreement (a so-called “hard Brexit”). During this time, negotiations will take place to unravel all of the existing legal, political and financial frameworks and obligations, and put new

structures in place. At this stage, it is uncertain what the final results of these negotiations will be and, given the lack of comparable precedent, it is unclear how Brexit, especially in the case of a hard Brexit, will affect economic conditions in the United Kingdom, the European Union, or globally. Because we have sales throughout the European Union and offices in England and throughout the EU, it is possible that Brexit may require us to restructure our European operations, and depending on what is negotiated, could impair our ability to transact business in other countries in the European Union.
Significant developments from the recent and potential changes in tariffs, trade regulation or other restrictions may adversely impact our business, financial condition and results of operations.
We have manufacturing operations in China, Europe, Canada, and the United States, as well as in other countries. Significant tariffs or other restrictions which are placed on Chinese, European, or Canadian imports to the United States, or any related counter-

measures which are taken by the countries involved, may materially harm our revenues and results of operations. Examples of recent actions are tariffs on steel and aluminum product imports announced by the U.S. Department of Commerce in March 2018 and a 25% tariff on certain products that originate in China announced by the United States Trade Representative ("USTR") in June 2018. The USTR also announced in June and July 2018 two additional supplemental lists of products that are subject to tariffs if the goods imported into the United States originate in China, which would increase the cost of imported products. We are implementing operational changes intended to mitigate the impact of these tariffs.

Additionally, the current U.S. administration continues to signal that it may alter trade agreements and terms between China and the United States, including limiting trade with China, and may impose additional tariffs on imports from China.

These new tariffs, or other changes in U.S. trade policy, could trigger retaliatory actions by affected countries. Certain foreign governments have instituted or are considering imposing trade sanctions on certain U.S. goods. We cannot predict future trade policy or the terms of any renegotiated trade agreements and their impacts on our business. The adoption and expansion of trade restrictions, the occurrence of a trade war, or other governmental actions related to tariffs, quotas, duties, taxes or trade agreements or policies has the potential to adversely impact demand for our products, our costs, our customers, and our suppliers, which in turn could adversely impact our business, financial condition and results of operations.

We are subject to the risks of political, economic, and military instability in countries outside the United States in which we operate.

Some of our products are produced in Israel, India, China, and other countries which are particularly subject to risks of political, economic, and military instability. This instability could result in wars, riots, nationalization of industry, currency fluctuations, and labor unrest. These conditions could have an adverse impact on our ability to operate in these regions and, depending on the extent and severity of these conditions, could materially and adversely affect our overall financial condition and operating results.

We have principal manufacturing facilities and operations located in Israel. Accordingly, our business will be directly influenced by the political, economic and military conditions affecting Israel at any given time. Since the establishment of the State of Israel in 1948, a number of armed conflicts have occurred between Israel and its neighboring countries. We have never experienced any material interruption in our operations attributable to these factors, in spite of several Middle East crises, including wars. A change in the security and political situation in Israel and in the economy could have a material adverse effect on our business, operating results and financial condition.

Operational difficulties, including those associated with a planned new facility in Israel, could adversely impact our business.

We have entered into a long term lease for property in Israel on which a new approximately 121,400 square foot facility will be constructed. We intend to consolidate certain of our operations in Israel in this facility, including expanding the capability of our advance sensors product line. Any delay in constructing and opening this new facility and in consolidating our operations could adversely affect our future business and results of operations. We cannot guarantee that this facility will be completed in a timely manner or that the consolidation of operations in Israel will be completed successfully.

We are subject to foreign currency exchange rate risks which may impact our results of operations.

We are exposed to foreign currency exchange rate risks, particularly due to market values of transactions in currencies other than the functional currencies of certain subsidiaries.

Our significant foreign subsidiaries are located in the United Kingdom, Canada, Germany, Israel, Japan, and India. Our operations in Europe, Canada and certain locations in Asia primarily generate and expend cash in local currencies. Our operations in Israel and certain locations in Asia primarily generate cash in U.S. dollars, but these subsidiaries also have significant transactions in local currencies. Our exposure to foreign currency exchange rate risk is more pronounced in situations such as our operations in Canada, India, Israel, and China - where costs, such as

production labor costs are predominantly paid in local currencies while the sales revenue for those products is predominantly denominated in U.S. dollars.
As of December 31, 2018, we did not have in place any arrangements to mitigate or hedge against exposures relating to fluctuations in foreign currency exchange rate.
A change in the mix of the currencies in which we transact our business could have a material effect on results of operations. Furthermore, the timing of cash receipts and disbursements could have a material effect on our results of operations, particularly if there are significant changes in exchange rates in a short period of time.

Risks Relating to Our Common Stock

Our stock price could become more volatile and investments could lose value.

The market price of our common stock, and the number of shares traded each day, has experienced significant fluctuations and may continue to fluctuate significantly. The market price for our common stock may be affected by a number of factors, including, but not limited to:

- shortfalls in our expected net revenue, earnings or key performance metrics;
- changes in recommendations or estimates by securities analysts;
- the announcement of new products by us or our competitors;
- quarterly variations in our or our competitors' results of operations;
- a change in our dividend or stock repurchase activities;
- developments in our industry or changes in the market for technology stocks;
- changes in rules or regulations applicable to our business; and
- other factors, including economic instability and changes in political or market conditions.

A significant drop in our stock price could expose us to costly and time consuming litigation, which could result in substantial costs, and divert management's attention and resources, resulting in an adverse effect on our business.

Also, given our market capitalization and trading volume fluctuations, it is possible that there will be less market and institutional interest in our shares, and that we will not attract substantial coverage in the analyst community. As a result, the trading market for our shares may be less liquid, making it more difficult for investors to dispose of their shares at favorable prices, and investors may have less independent information and analysis available to them concerning our company.

The holders of Class B convertible common stock have effective voting control of our company.

We have two classes of common stock: common stock and Class B convertible common stock. The holders of common stock are entitled to one vote for each share held, while the holders of Class B convertible common stock are entitled to 10 votes for each share held. The ownership of Class B convertible common stock is highly concentrated, and holders of Class B convertible common stock effectively can cause the election of directors and the approval/or disapproval of other matters requiring stockholder approval. Mrs. Ruta Zandman, the wife of the late founder of our technology, Dr. Felix Zandman, controls, or shares control of, the voting of approximately 76.8% of our Class B convertible common stock, representing 34.6% of the total voting power of our capital stock as of December 31, 2018.

Your percentage ownership of our common stock may be diluted in the future.

Your percentage ownership of our common stock may be diluted in the future because of equity awards that we expect will be granted to our directors, officers, and employees, as well as due to certain convertible or exchangeable debt instruments. The Vishay Precision Group, Inc. 2010 Stock Incentive Program provides for the grant of equity-based awards, including restricted stock, restricted stock units, stock options, and other equity-based awards to our directors, officers, and other employees, advisors and consultants.

Certain provisions of our certificate of incorporation and bylaws may reduce the likelihood of any unsolicited acquisition proposal or potential change of control that you might consider favorable.

Our bylaws contain provisions that could be considered "anti-takeover" provisions because they make it harder for a third party to acquire us without the consent of our incumbent board of directors. Under these by-law provisions:

- stockholders may not change the size of the board of directors or, except in limited circumstances, fill vacancies on the board of directors;
- stockholders may not call special meetings of stockholders;
- stockholders must comply with advance notice provisions for nominating directors or presenting other proposals at stockholder meetings; and
- our Board of Directors, may without stockholder approval, issue preferred shares and determine their rights and terms, including voting rights, or adopt a stockholder rights plan.

These provisions could have the effect of discouraging an unsolicited acquisition proposal or delaying, deferring, or preventing a change of control transaction that might involve a premium price or otherwise be considered favorable by our stockholders.

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Item 1B. UNRESOLVED STAFF COMMENTS

None.

Item 2. PROPERTIES

Our business has approximately 18 principal locations. Our facilities include owned locations and locations leased from third parties. The principal locations, along with available space including administrative offices, are listed below:

	Reporting segment	Approx. Available Space (square feet)
Owned Locations		
Wendell, North Carolina USA	Foil Technology Products	147,000
Chennai, India [a]	Force Sensors	129,000
Holon, Israel	Foil Technology Products	97,000
Bradford, United Kingdom	Weighing and Control Systems	75,000
Kent, Washington	Weighing and Control Systems	47,000
Akita, Japan [b]	Foil Technology Products	46,000
Chartres, France	Force Sensors	11,000
Basingstoke, United Kingdom	Force Sensors/Foil Technology Products	11,000
Third-Party Leased Locations		
Toronto, Canada	Weighing and Control Systems	65,000
Tianjin, People’s Republic of China	Force Sensors	34,000
Karmiel, Israel	Force Sensors	26,000
Omer, Israel	Foil Technology Products	24,000
Holon, Israel	Foil Technology Products	18,000
Concord, California USA	Foil Technology Products	16,000
Taipei, Republic of China (Taiwan)	Force Sensors/Weighing and Control Systems	13,000
Teltow, Germany	Foil Technology Products	11,000
Degerfors, Sweden	Weighing and Control Systems	8,000
Malvern, Pennsylvania USA	Corporate	8,000

(a) The Chennai building is owned and the land is held under a 99 year lease (which began in 2012).

(b) A facility on the campus is leased to Vishay Intertechnology. Approximate available space reported above excludes the area leased.

In the opinion of management, our properties and equipment generally are in good operating condition and are adequate for our present needs. We do not anticipate difficulty in renewing leases as they expire, or in finding alternative facilities.

On February 17, 2019, one of our indirect wholly-owned subsidiaries entered into a lease agreement as tenant related to a property in Israel. Such lease agreement provides that we will lease a new building containing approximately 121,400 square feet that will be built by the landlord.

Our corporate headquarters are located at 3 Great Valley Parkway, Suite 150, Malvern, PA 19355.

Item 3. LEGAL PROCEEDINGS

We are subject to various legal proceedings that constitute ordinary, routine litigation incidental to our business. In our opinion, the disposition of these proceedings will not have a material adverse effect on our business or our financial condition, results of operations, and cash flows.

Item 4. MINE SAFETY DISCLOSURES

Not applicable.

PART II

Item 5. MARKET FOR REGISTRANT’S COMMON EQUITY, RELATED STOCKHOLDER MATTERS, AND ISSUER PURCHASES OF EQUITY SECURITIES

Our common stock is listed on the New York Stock Exchange under the symbol VPG. The Board of Directors may only declare dividends or other distributions with respect to the common stock or the Class B convertible common stock if it grants such dividends or distributions in the same amount, per share, with respect to the other class of stock. Stock dividends or distributions, on any class of stock, are payable only in shares of stock of that class. Shares of either common stock or Class B convertible common stock cannot be split, divided, or combined unless the other is also split, divided, or combined equally. Holders of record of our common stock totaled approximately 753 at March 14, 2019.

We have two classes of common stock: common stock and Class B convertible common stock. The holders of common stock are entitled to one vote for each share held, while the holders of Class B convertible common stock are entitled to 10 votes for each share held. At March 14, 2019 we had outstanding 1,025,158 shares of Class B convertible common stock, par value $0.10 per share. Currently, the holders of VPG’s Class B convertible common stock hold approximately 45.1% of the voting power of our Company. Mrs. Ruta Zandman, the wife of the late founder of our technology, Dr. Felix Zandman, controls, or shares control of, the voting of approximately 76.8% of our Class B convertible common stock, representing 34.6% of the total voting power of our capital stock as of December 31, 2018.

Stock Performance Graph

The graph and table below compare the cumulative total stockholder return on the Company's common stock over a sixty month period, with the returns on the Russell 2000 Stock Index, and a peer group of companies selected by our management. The peer group is made up of six publicly held manufacturers of sensors, sensor-based equipment, and sensor-based systems. Management believes that the product offerings of the peer group companies are more similar to our product offerings than those of the companies contained in any published industry index. The return of each peer issuer has been weighted according to the respective issuer's stock market capitalization. The graph and table assume that $100 had been invested at December 31, 2013, and that all dividends were reinvested. The graph and table are not necessarily indicative of future investment performance.

		12/31/13	12/31/14	12/31/15	12/31/16	12/31/17	12/31/18
Vishay Precision Group, Inc.	Cumulative $	100.00	115.25	76.02	126.93	168.91	203.02
Russell 2000 Index	Cumulative $	100.00	104.89	100.26	121.63	139.44	124.09
Peer Group *	Cumulative $	100.00	115.85	112.46	119.57	162.28	145.51

*The management selected peer group includes: MTS Systems, Kyowa Electronic Instruments, Mettler – Toledo, Spectris, Sensata Technologies, CTS Corp.

Item 6. SELECTED FINANCIAL DATA

The following table presents our selected historical financial data. The statements of operations data for each of the five years ended December 31, 2018 and the balance sheet data as of December 31, 2018, 2017, 2016, 2015, and 2014 have been derived from our audited consolidated financial statements.

The data should be read in conjunction with our historical financial statements and "Management's Discussion and Analysis of Financial Condition and Results of Operations" included elsewhere in this document.

(in thousands, except per share amounts)	As of and for the years ended December 31,				
	2018	2017	2016	2015	2014
Statement of Operations Data:					
Net revenues	$299,794	$254,350	$224,929	$232,178	$250,028
Costs of products sold	178,527	156,067	142,120	147,949	159,254
Gross profit	121,267	98,283	82,809	84,229	90,774
Selling, general, and administrative expenses	80,935	73,751	68,382	71,282	77,034
Acquisition costs	—	—	494	185	—
Impairment of goodwill and indefinite-lived intangibles	2,820	—	—	4,942	5,579
Restructuring costs	289	2,044	2,666	4,461	668
Operating income	37,223	22,488	11,267	3,359	7,493
Other income (expense):					
Interest expense	(1,738)	(1,842)	(1,486)	(771)	(882)
Other	(1,496)	(83)	(174)	(2,082)	(740)
Other (expense) income - net	(3,234)	(1,925)	(1,660)	(2,853)	(1,622)
Income before taxes	33,989	20,563	9,607	506	5,871
Income tax expense	10,344	6,169	3,199	13,500	2,613
Net earnings (loss)	23,645	14,394	6,408	(12,994)	3,258
Less: net earnings attributable to noncontrolling interests	(1)	49	4	14	178
Net earnings (loss) attributable to VPG stockholders	$23,646	$14,345	$6,404	$(13,008)	$3,080
Earnings (loss) per share data:					
Basic	$1.76	$1.08	$0.49	$(0.96)	$0.22
Diluted	$1.75	$1.07	$0.48	$(0.96)	$0.22
Weighted average shares outstanding - basic	13,439	13,262	13,187	13,485	13,755
Weighted average shares outstanding - diluted	13,535	13,471	13,419	13,485	13,977
Balance Sheet Data:					
Cash and cash equivalents	$90,159	$74,292	$58,452	$62,641	$79,642
Total assets	326,383	306,551	270,510	263,747	286,923
Long-term debt, less current portion	22,421	28,477	33,529	31,037	17,713
Working capital	160,088	139,400	118,952	121,065	131,714
Total VPG stockholders' equity	218,415	193,156	171,383	172,256	199,651

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

Overview

VPG is an internationally recognized designer, manufacturer and marketer of sensors, and sensor-based measurement systems, as well as specialty resistors and strain gages based upon our proprietary technology. We provide precision products and solutions, many of which are “designed-in” by our customers, specializing in the growing markets of stress, force, weight, pressure, and current measurements. A significant portion of our products and solutions are primarily based upon our proprietary foil technology and are produced as part of our vertically integrated structure. We believe this strategy results in higher quality, more cost effective and focused solutions for our customers. Our products are marketed under a variety of brand names that we believe are characterized as having a very high level of precision and quality. Our global operations enable us to produce a wide variety of products in strategically effective geographic locations that also optimize our resources for specific technologies, sensors, assemblies, and systems.

The Company also has a long heritage of innovation in precision foil resistors, foil strain gages, and sensors that convert mechanical inputs into an electronic signal for display, processing, interpretation, or control by our instrumentation and systems products. Our advanced sensor product line continues this heritage by offering high-quality foil strain gages produced in a proprietary, highly automated environment. Precision sensors are essential to the accurate measurement, resolution and display of force, weight, pressure, torque, tilt, motion, or acceleration, especially in the legal-for-trade, commercial, and industrial marketplaces. This expertise served as a foundation for our expansion into strain gage instrumentation, load cells, transducers, weighing modules, and complete systems for process control and on-board weighing. Although our products are typically used in the industrial market, our advanced sensors have been used in a consumer electronics product and are being evaluated for other non-industrial applications.

The precision sensor market is integral to the development of intelligent products across a wide variety of end markets upon which we focus, including medical, agricultural, transportation, industrial, avionics, military, and space applications. We believe that as original equipment manufacturers (“OEMs”) continue a drive to make products “smarter,” they will integrate more sensors and related systems into their solutions to link the mechanical/physical world with digital control and/or response. We believe this offers a substantial growth opportunity for our products and expertise.

VPG reports in three product segments: the Foil Technology Products segment, the Force Sensors segment, and the Weighing and Control Systems segment. The Foil Technology Products reporting segment is comprised of the foil resistor and strain gage operating segments. The Force Sensors reporting segment is comprised of transducers, load cells, and modules. The Weighing and Control Systems reporting segment is comprised of complete systems which include load cells and instrumentation for weighing, force control and force measurement for a variety of uses such as process control and on-board weighing applications.

Net revenues for the year ended December 31, 2018 were $299.8 million compared to net revenues of $254.4 million for the year ended December 31, 2017. Net earnings attributable to VPG stockholders for the year ended December 31, 2018 were $23.6 million, or $1.75 per diluted share, compared to $14.3 million, or $1.07 per diluted share, for the year ended December 31, 2017.

The results of operations for the years ended December 31, 2018 and 2017 include items affecting comparability as listed in the reconciliations below. The reconciliations below include certain financial measures which are not recognized in accordance with U.S. generally accepted accounting principles ("GAAP"), including adjusted gross profits, adjusted gross profit margin, adjusted net earnings, and adjusted net earnings per diluted share. These non-GAAP measures should not be viewed as an alternative to GAAP measures of performance. Non-GAAP measures such as adjusted gross profit margin, adjusted net earnings, and adjusted net earnings per diluted share do not have uniform definitions. These measures, as calculated by VPG, may not be comparable to similarly titled measures used by other companies. Management believes that these measures are meaningful because they provide insight with respect to intrinsic operating results. The reconciling items presented below represent significant charges or credits which are important to understanding our intrinsic operations.

The items affecting comparability are (dollars in thousands, except per share amounts):

	Years ended December 31,	
	2018	2017
Gross profit	$121,267	$98,283
Gross profit margin	40.5 %	38.6 %
Reconciling items affecting gross profit margin		
Acquisition purchase accounting adjustments [a]	—	91
Adjusted gross profit	$121,267	$98,374
Adjusted gross profit margin	40.5 %	38.7 %

	Years ended December 31,	
	2018	2017
Operating income	$37,223	22,488
Operating margin	12.4 %	8.8 %
Reconciling items affecting operating margin		
Acquisition purchase accounting adjustments [a]	—	91
Impairment of goodwill and indefinite-lived intangibles	2,820	—
Restructuring costs	289	2,044
Adjusted operating income	$40,332	$24,623
Adjusted operating margin	13.5 %	9.7 %

	Years ended December 31,	
	2018	2017
Net earnings attributable to VPG stockholders	$23,646	$14,345
Reconciling items affecting operating margin		
Acquisition purchase accounting adjustments [(a)]	—	91
Impairment of goodwill and indefinite-lived intangibles	2,820	—
Restructuring costs	289	2,044
Reconciling items affecting other income/expense		
UK pension settlement [(b)]	673	—
Net proceeds from lease termination [(c)]	—	(1,544)
Tax rebate	—	189
Less reconciling items affecting income tax expense		
Tax effect of reconciling items and discrete tax items[(d)]	(333)	(174)
Adjusted net earnings attributable to VPG stockholders	$27,761	$15,299
Weighted average shares outstanding - diluted	13,535	13,471
Adjusted net earnings per diluted share	$2.05	$1.14

(a) Acquisition purchase accounting adjustments in 2017 include fair market value adjustments associated with inventory recorded as a component of costs of products sold.

(b) In 2018, the Company incurred one-time settlement costs in connection with the de-risking of the pension plan in our UK location (see Note 9 to our consolidated financial statements).

(c) Net proceeds related to a lease termination payment at the Company's Tianjin, People's Republic of China location in 2017.

(d) Included in the discrete items for 2018 is a $0.6 million tax expense related to Israel foreign currency. Included in the discrete items for 2017 is a $1.6 million tax benefit related to Israel foreign currency and deferred tax rate change, offset by $1.5 million of income tax expense impact from tax reform.

Financial Metrics

We utilize several financial measures and metrics to evaluate the performance and assess the future direction of our business. These key financial measures and metrics include net revenues, gross profit margin, end-of-period backlog, book-to-bill ratio, and inventory turnover.

Gross profit margin is gross profit shown as a percentage of net revenues. Gross profit is generally net revenues less costs of products sold, but could also include certain other period costs. Gross profit margin is clearly a function of net revenues, but also reflects our cost-cutting programs and our ability to contain fixed costs.

End-of-period backlog is one indicator of potential future sales. We include in our backlog only open orders that have been released by the customer for shipment in the next twelve months. If demand falls below customers' forecasts, or if customers do not control their inventory effectively, they may cancel or reschedule the shipments that are included in our backlog, in many instances without the payment of any penalty. Therefore, the backlog is not necessarily indicative of the results to be expected for future periods.

Another important indicator of demand in our industry is the book-to-bill ratio, which is the ratio of the amount of product ordered during a period compared with the product that we ship during that period. A book-to-bill ratio that is greater than one indicates that demand is higher than current revenues and manufacturing capacities, and it indicates that we may generate increasing revenues in future periods. Conversely, a book-to-bill ratio that is less than one is an indicator of lower demand compared to existing revenues and current capacities and may foretell declining sales.

We focus on our inventory turnover as a measure of how well we are managing our inventory. We define inventory turnover for a financial reporting period as our costs of products sold for the four fiscal quarters ending on the last day of the reporting period

divided by our average inventory (computed using each quarter-end balance) for this same period. A higher level of inventory turnover reflects more efficient use of our capital.
The quarter-to-quarter trends in these financial metrics can also be an important indicator of the likely direction of our business. The following table shows net revenues, gross profit margin, the end-of-period backlog, the book-to-bill ratio, and the inventory turnover for our business as a whole during the five quarters beginning with the fourth quarter of 2017 and through the fourth quarter of 2018 (dollars in thousands):

	4th Quarter 2017	1st Quarter 2018	2nd Quarter 2018	3rd Quarter 2018	4th Quarter 2018
Net revenues	$69,439	$73,091	$74,231	$75,490	$76,982
Gross profit margin	38.5 %	39.0 %	42.3 %	40.5 %	40.0 %
End-of-period backlog	$88,900	$93,900	$101,000	$99,400	$93,400
Book-to-bill ratio	1.18	1.05	1.13	0.98	0.93
Inventory turnover	2.85	2.93	2.71	2.74	2.89

	4th Quarter 2017	1st Quarter 2018	2nd Quarter 2018	3rd Quarter 2018	4th Quarter 2018
Foil Technology Products					
Net revenues	$29,888	$34,154	$34,202	$35,912	$36,741
Gross profit margin	39.3 %	42.8 %	46.1 %	43.9 %	42.0 %
End-of-period backlog	$46,600	$47,900	$54,900	$53,100	$48,700
Book-to-bill ratio	1.36	1.01	1.24	0.95	0.88
Inventory turnover	2.98	3.18	2.81	2.83	3.07
Force Sensors					
Net revenues	$17,726	$19,228	$19,358	$17,602	$16,998
Gross profit margin	29.5 %	27.3 %	29.4 %	25.9 %	26.6 %
End-of-period backlog	$21,600	$19,900	$17,300	$16,800	$17,700
Book-to-bill ratio	1.18	0.91	0.88	0.98	1.05
Inventory turnover	2.07	2.26	2.26	2.26	2.34
Weighing and Control Systems					
Net revenues	$21,825	$19,709	$20,671	$21,976	$23,243
Gross profit margin	44.8 %	43.9 %	48.0 %	46.6 %	46.8 %
End-of-period backlog	$20,700	$26,100	$28,800	$29,500	$27,000
Book-to-bill ratio	0.92	1.28	1.18	1.02	0.92
Inventory turnover	4.22	3.83	3.35	3.35	3.36

Net revenues for the fourth quarter of 2018 increased 2.0% from the net revenues of $75.5 million reported in the third quarter of 2018, and increased 10.9% from $69.4 million for the comparable prior year period.
Net revenues in the Foil Technology Products segment of $36.7 million in the fourth quarter of 2018 increased 2.3% from $35.9 million in the third quarter of 2018, and increased 22.9% from $29.9 million in the fourth quarter of 2017. The sequential increase in net revenues from the third quarter was primarily attributable to precision resistor products in Asia for EMS and distribution customers in the test and measurement and avionics, military and space markets.
Compared to the fourth quarter of 2017, net revenues increased due to higher revenue related to precision resistor products in all regions for distribution and EMS customers, primarily in the test and measurement and avionics, military and space markets. In addition, advance sensors products in Asia for

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OEM customers in the force measurement market and Pacific Instruments products in the Americas for end users customers in the avionics, military and space market contributed to the increase.

Net revenues in the Force Sensors segment of $17.0 million in the fourth quarter of 2018 decreased 3.4% compared to revenues of $17.6 million in the third quarter of 2018 due to lower volume attributable to distribution customers in the precision weighing market, mainly in the Americas. Net revenues in the fourth quarter of 2018 decreased 4.1% compared to $17.7 million in the fourth quarter of 2017 mainly due to lower volume attributable to distribution customers in the force measurement market, primarily in the Americas.

Net revenues in the Weighing and Control Systems segment of $23.2 million in the fourth quarter of 2018 increased 5.8% from $22.0 million in the third quarter of 2018 and increased 6.5% from $21.8 million in the fourth quarter of 2017. The sequential increase in net revenues was primarily attributable to a volume increase in the steel product line in Asia and process weighing product line in Europe, partially offset by a reduction in volume for the steel product line in Europe. Compared to the fourth quarter of 2017, the increase in net revenues was primarily attributable to the steel product line in Asia and process weighing product line in the Americas and Europe.

The gross profit margin for the fourth quarter of 2018 decreased 0.5% compared to the third quarter of 2018, and increased 1.5% from the fourth quarter of 2017.

Sequentially, improved gross profit margins in the Force Sensors and Weighing and Control Systems segments were partially offset by a decline in gross profit margin in the Foil Technology Products segment. In the Force Sensors segment, gross profit margin increased due to manufacturing efficiencies, partially offset by a reduction in volume. In the Weighing and Control System segment, gross profit margin increased due to an increase in volume. In the Foil Technology Products segment, the decline in gross profit margin was due to higher supplies and tooling and repairs and maintenance costs, manufacturing inefficiencies, partially offset by an increase in volume.

Compared to the fourth quarter of 2017, improved gross profit margins in the Foil Technology Products and Weighing and Control Systems segments, mainly due to higher volume, were partially offset by lower gross profit margins in the Force Sensors segment. The Force Sensors segment gross profit margin was negatively impacted by an increase in wages, the U.S. imposition of tariffs on goods from China, and a reduction in inventory.

Optimize Core Competence

The Company’s core competency and key value proposition is providing customers with proprietary foil technology products and precision measurement sensors and sensor-based systems. Our foil technology resistors and strain gages are recognized as global market leading products that provide high precision and high stability over extreme temperature ranges, and long life. Our force sensor products and our weighing and control systems products are also certified to meet some of the highest levels of precision measurements of force, weight, pressure, torque, tilt, motion, and acceleration. We continue to optimize all aspects of our development, manufacturing and sales processes, including by increasing our technical sales efforts; continuing to innovate in product performance and design; and refining our manufacturing processes.

Our foil technology research group developed innovations that enhance the capability and performance of our strain gages, while simultaneously reducing their size and power consumption as part of our advanced sensors product line. We believe this unique foil technology will create new markets as customers “design in” these next generation products in existing and new applications. Our development engineering team is also responsible for creating new processes to further automate manufacturing, and improve productivity and quality. Our advanced sensors manufacturing technology also offers us the capability to produce high-quality foil strain gages in a highly automated environment, which we believe results in reduced manufacturing and lead times, improved quality and increased margins. As a sign of our commitment to these businesses, we recently signed a long term lease for a state of the art facility to be constructed in Israel to move forward with our advanced sensors business.

Our design, research, and product development teams, in partnership with our marketing teams, drive our efforts to bring innovations to market. We intend to leverage our insights into customer demand to continually develop and roll out new, innovative products within our existing lines and to modify our existing core products in ways that make them more appealing, addressing changing customer needs and industry trends in terms of form, fit, and function.

We also seek to achieve significant production cost savings through the transfer, expansion, and construction of manufacturing operations in countries such as India and Israel, where we can benefit from lower labor costs, improved efficiencies, or available tax and other government-sponsored incentives. For example, in 2017 we closed two leased facilities in the United States and moved to more cost effective locations.

Acquisition Strategy

We expect to continue to make strategic acquisitions where opportunities present themselves to grow our segments. Historically, our growth and acquisition strategy has been largely focused on vertical product integration, using our foil strain gages in our force sensor products, and incorporating those products into our weighing and control systems. The acquisitions of Stress-Tek and KELK, each of which employ our foil strain gages to manufacture load cells for their systems, continue this strategy. Additionally, the KELK acquisition resulted in the acquisition of certain optical sensor technology. The Pacific acquisition significantly broadened our existing data acquisition offerings and opened new markets for us. Along with our success in MEMS technology for on-board weighing, we expect to expand our expertise, and our acquisition focus, outside our traditional vertical approach to other precision sensor solutions in the fields of measurement of force, weight, pressure, torque, tilt, motion, and acceleration. We believe acquired businesses will benefit from improvements we implement to reduce redundant functions and from our current global manufacturing and distribution footprint.

Research and Development

Research and development will continue to play a key role in our efforts to introduce innovative products to generate new sales and to improve profitability. We expect to continue to expand our position as a leading supplier of precision foil technology products. We believe our R&D efforts should provide us with a variety of opportunities to leverage technology, products, and our manufacturing base in order to ultimately improve our financial performance. The amount charged to expense for research and development aggregated $11.8 million, $11.7 million, and $11.1 million for the years ended December 31, 2018, 2017, and 2016, respectively.

Cost Management

To be successful, we believe we must seek new strategies for controlling operating costs. Through automation in our plants, we believe we can optimize our capital and labor resources in production, inventory management, quality control, and warehousing. We are in the process of moving some manufacturing to more cost effective locations. This may enable us to become more efficient and cost competitive, and also maintain tighter controls of the operation. Production transfers, facility consolidations, and other long-term cost-cutting measures require us to initially incur significant severance and other exit costs. We are realizing the benefits of our restructuring through lower labor costs and other operating expenses, and expect to continue reaping these benefits in future periods. However, these programs to improve our profitability also involve certain risks which could materially impact our future operating results, as further detailed in Part I, Item 1A “Risk Factors” of this Annual Report on Form 10-K.

The Company recorded restructuring costs of $0.3 million, $2.0 million, and $2.7 million during the years ended December 31, 2018, 2017, and 2016, respectively. Restructuring costs were comprised primarily of employee termination costs, including severance and statutory retirement allowances, and were incurred in connection with various cost reduction programs.

We are evaluating plans to further reduce our costs by consolidating additional manufacturing operations. These plans may require us to incur restructuring and severance costs in future periods. While streamlining and reducing fixed overhead, we are exercising caution so that we will not negatively impact our customer service or our ability to further develop products and processes.

Foreign Currency

We are exposed to foreign currency exchange rate risks, particularly due to transactions in currencies other than the functional currencies of certain subsidiaries. U.S. GAAP requires that entities identify the “functional currency” of each of their subsidiaries and measure all elements of the financial statements in that functional currency. A subsidiary’s functional currency is the currency of the primary economic environment in which it operates. In cases where a subsidiary is relatively self-contained within a particular country, the local currency is generally deemed to be the functional currency. However, a foreign subsidiary that is a direct and integral component or extension of the parent company’s operations generally would have the parent company’s currency as its functional currency. We have subsidiaries that fall into each of these categories.

Foreign Subsidiaries which use the Local Currency as the Functional Currency

Our operations in Europe, Canada, and certain locations in Asia primarily generate and expend cash using local currencies, and accordingly, these subsidiaries utilize the local currency as their functional currency. For those subsidiaries where the local currency is the functional currency, assets and liabilities in the consolidated balance sheets have been translated at the rate of exchange as of the balance sheet date. Translation adjustments do not impact the results of operations and are reported as a separate component of equity.

For those subsidiaries where the local currency is the functional currency, revenues and expenses are translated at the average exchange rate for the year. While the translation of revenues and expenses into U.S. dollars does not directly impact the consolidated statements of operations, the translation effectively increases or decreases the U.S. dollar equivalent of revenues generated and expenses incurred in those foreign currencies.

Foreign Subsidiaries which use the U.S. Dollar as the Functional Currency

Our operations in Israel and certain locations in Asia primarily generate cash in U.S. dollars, and accordingly, these subsidiaries utilize the U.S. dollar as their functional currency. For those foreign subsidiaries where the U.S. dollar is the functional currency, all foreign currency financial statement amounts are remeasured into U.S. dollars. Exchange gains and losses arising from remeasurement of foreign currency-denominated monetary assets and liabilities are included in the results of operations. While these subsidiaries transact most business in U.S. dollars, they may have significant costs, particularly related to payroll, which are incurred in the local currency.

Effects of Foreign Exchange Rate on Operations

For the year ended December 31, 2018, exchange rate impacts increased net revenues by $3.1 million, and increased costs of products sold and selling, general, and administrative expenses by $2.7 million, when compared to the prior year. For the year ended December 31, 2017, exchange rate impacts reduced net revenues by $0.1 million, and increased costs of products sold and selling, general, and administrative expenses by $2.8 million, when compared to the prior year. For the year ended December 31, 2016, exchange rate impacts reduced net revenues by $2.8 million, and costs of products sold and selling, general, and administrative expenses by $3.1 million, when compared to the prior year.

Off-Balance Sheet Arrangements

As of December 31, 2018 and 2017, we did not have any off-balance sheet arrangements.

Critical Accounting Policies and Estimates

Our significant accounting policies are summarized in Note 1 to our consolidated financial statements. We identify here a number of policies that entail significant judgments or estimates by management.

Revenue Recognition

We recognize revenue when the obligation under the terms of a contract with our customer are satisfied, which generally occurs with the transfer of control of our products. For certain contracts with post-shipment obligations, revenue is recognized when the post-shipment obligation is satisfied. Revenue is measured as the amount of consideration expected to be received in exchange for transferring goods or providing post-shipment obligations. Sales, value add and other taxes collected concurrent with revenue-producing activities are excluded from revenue. Given the specialized nature of our products, we generally do not allow product returns.

Inventories

We value our inventories at the lower of cost or market, with cost determined under the first-in, first-out method, and market based upon net realizable value. The valuation of our inventories requires management to make market estimates. For work in process goods, we are required to estimate the cost to completion of the products and the prices at which we will be able to sell the products. For finished goods, we must assess the prices at which we believe the inventory can be sold. Inventories are also adjusted for estimated obsolescence and written down to net realizable value based upon estimates of future demand, technology developments, and market conditions.

Business Combinations

The Company allocates the purchase price of an acquired company, including when applicable, the fair value of contingent consideration between tangible and intangible assets acquired and liabilities assumed from the acquired businesses based on estimated fair values, with any residual of the purchase price recorded as goodwill. Third party appraisal firms and other consultants are engaged to assist management in determining the fair values of certain assets acquired and liabilities assumed. Estimating fair values requires significant judgments, estimates and assumptions, including but not limited to: discount rates, future cash flows and the economic lives of trade names, technology, customer relationships, property, plant and equipment, as well as income taxes. These estimates are based on historical experience and information obtained from the management of the acquired companies, and are inherently uncertain.

Estimates of Restructuring and Severance Costs

To maintain our cost competitiveness, we are shifting manufacturing emphasis to more advanced automation in higher-cost regions and relocating production to regions with skilled workforces and relatively lower labor costs. We could also incur similar costs after we acquire companies.

These production transfers, facility consolidations, and other long-term cost-cutting measures require us to initially incur significant severance and other exit costs. We anticipate that we will realize the benefits of our restructuring efforts through lower labor costs and other operating efficiencies in future periods.

Restructuring and severance costs are expensed during the period in which we incur those costs and all other requirements for accrual are met. Because transfers of manufacturing operations sometimes occur incrementally over a period of time, the expense initially recorded is often based on estimates. Because these costs are recorded based on estimates, our actual expenditures for restructuring activities may differ from the initially recorded costs. If this happens, we will adjust our estimates in future periods, either by recording additional expenses in future periods if our initial estimates were too low, or by reversing part of the charges that we recorded initially if our initial estimates were too high.

Goodwill and Other Intangible Assets

Goodwill and indefinite-lived trademarks are tested for impairment at least annually, and whenever events or changes in circumstances occur indicating that it is "more likely than not" impairment may have been incurred. We have the option to first assess qualitative factors to determine whether it is "more likely than not" that the fair value of a reporting unit is less than its carrying amount as a basis for determining if it is necessary to perform the quantitative goodwill impairment test. However, if we conclude otherwise, then we are required to perform the quantitative impairment test by calculating the fair value of the reporting unit and comparing it against its carrying amount. We estimate the fair value of our reporting units by considering both an income approach and a market approach to valuation. The income approach to valuation uses our estimates of the future cash flows of the reporting unit discounted to their net present value using a discount rate determined using the capital asset pricing model and adjusted for the forecast risk inherent in our projections of future cash flows. The income approach to valuation is dependent on inputs from management such as expected revenue growth, profitability, capital expenditures, and working capital requirements. The market approach to valuation uses the market capitalization of public companies similar to the reporting unit to calculate an implied EBITDA multiple, and we apply that calculated EBITDA multiple to the expected EBITDA of the reporting unit to estimate the fair value of the reporting unit, after consideration of appropriate control premiums. We weigh the results of the income approach and the market approach to arrive at the estimated fair value of the reporting unit. If the fair value exceeds the carrying value, no further evaluation is required and no impairment loss is recognized. An impairment charge would be recognized to the extent the carrying amount of goodwill exceeds the reporting unit fair value.

The indefinite-lived trade names are tested for impairment either by employing the qualitative approach outlined above, or by comparing the carrying value to the fair value based on current revenue projections of the related operations, under the relief from royalty method. Any excess carrying value over the applicable fair value is recognized as impairment. Any impairment would be recognized in the reporting period in which it has been identified.

Definite-lived intangible assets, such as customer relationships, patents and acquired technology, non-competition agreements, and certain trade names are amortized on a straight-line method over their estimated useful lives. Patents and acquired technology are being amortized over useful lives of seven to twenty years. Customer relationships are being amortized over useful lives of five to eighteen years. Trade names are being amortized over their contractual period ranging from seven to ten years. Non-competition agreements are being amortized over periods of five to ten years. We review the carrying values of these assets for possible impairment whenever events or changes in circumstances indicate that the carrying value of the assets, when combined with the broader asset group in which they belong, may not be recoverable based on undiscounted estimated cash flows expected to result from its use and eventual disposition.

During 2018, we recognized an impairment loss associated with the goodwill and indefinite lived intangible assets in the instrumentation reporting unit, which holds goodwill related to our 2016 Pacific acquisition, which was recognized in the fourth quarter of fiscal 2018. The impairment was primarily from lower margins on the forecasted projections due to product mix. After considering the impact of the impairment charges, the carrying amount of goodwill and indefinite-lived trade names as of December 31, 2018 was $3.5 million and $0.4 million, respectively.
Determining whether to test goodwill for impairment, and the application of goodwill impairment tests, require significant management judgment, including the identification of reporting units, assigning assets and liabilities to reporting units, assigning goodwill to reporting units, and determining the fair value of each reporting unit. Changes in these estimates could materially affect the determination of fair value for each reporting unit. A slowdown or deferral of orders for a business, with

which we have goodwill associated, could impact our valuation of that goodwill. The reporting unit associated with the Pacific acquisition is particularly sensitive to the revenue projections used in the income approach valuation to determine the fair value and its related impact on gross margin. Additionally, our forecast has been established expecting that we will normalize our supply chain costs, which also positively impacts our gross margin projections. In the event the revenue and margin projections are not achieved, we could have an additional impairment of the goodwill and indefinite-lived trade name that are associated with the Pacific acquisition. For example, if we reduced our future gross profit margin projections by 50 basis points, with no changes to other assumptions, our goodwill impairment would have increased by approximately $1.0 million.

Impairment of Long-Lived Assets

We assess the impairment of our long-lived assets, other than goodwill and indefinite-lived intangible assets, including property and equipment, whenever events or changes in circumstances indicate the carrying value may not be recoverable. Factors we consider important, which could trigger an impairment review, include significant changes in the manner of our use of the asset, changes in historical or projected operating performance, and significant negative economic trends.

Pension and Other Postretirement Benefits

Accounting for defined benefit pension and other postretirement plans involves numerous assumptions and estimates. The discount rate at which obligations could effectively be settled and the expected long-term rate of return on plan assets are two critical assumptions in measuring the cost and benefit obligations of our pension and other postretirement benefit plans. Other important assumptions include the anticipated rate of future increases in compensation levels, estimated mortality, and for postretirement medical plans, increases or trends in health care costs. Management reviews these assumptions at least annually. We use independent actuaries to assist us in formulating assumptions and making estimates. These assumptions are updated periodically to reflect the actual experience and expectations on a plan-specific basis, as appropriate.

Our defined benefit plans are concentrated in the United States and the United Kingdom. Plans in these countries comprise approximately 81% of our retirement obligations at December 31, 2018. We utilize published long-term high-quality bond indices to determine the discount rate at the measurement date. We utilize bond yields at various maturity dates to reflect the timing of expected future benefit payments. We believe the discount rates selected are the rates at which these obligations could effectively be settled.

For benefit plans which are funded, we establish strategic asset allocation percentage targets and appropriate benchmarks for significant asset classes with the aim of achieving a prudent balance between return and risk. We set the expected long-term rate of return based on the expected long-term average rates of return to be achieved by the underlying investment portfolios. In establishing this rate, we consider historical and expected returns for the asset classes in which the plans are invested, advice from pension consultants and investment advisors, and current economic and capital market conditions. The expected return on plan assets is incorporated into the computation of pension expense. The difference between this expected return and the actual return on plan assets is deferred.

We believe that the current assumptions used to estimate plan obligations and annual expense are appropriate in the current economic environment. However, if economic conditions change, we may be inclined to change some of our assumptions, and the resulting change could have a material impact on the consolidated statements of operations and on the consolidated balance sheets.

Income Taxes

We are subject to income taxes in the United States and numerous foreign jurisdictions. Our annual effective tax rate is based on pre-tax earnings, statutory tax rates and enacted tax laws. Significant judgments and estimates must be made in determining our consolidated income tax expense as presented in our financial statements.

We must assess the likelihood that we will realize deferred tax assets which requires significant judgment. If we determine that deferred tax assets are not "more likely than not" to be realized, we record a valuation allowance to reduce deferred tax assets to a level that is expected to be realized. If we subsequently determine that realization of a deferred tax asset becomes "more likely than not", the valuation allowance will be reversed. Any change in valuation allowances could have a significant impact on our financial results.

The calculation of our tax liabilities involves an assessment of uncertainties in the application of complex tax laws and regulations in multiple jurisdictions. We record a benefit from an uncertain tax position when it is "more likely than not" that a tax return position will be sustained upon examination, including resolutions of any related appeals or litigation based on the technical merits of the position. If the position is not "more likely than not" to be sustained, a liability for the tax return position is established. We adjust the liability when our judgment changes as a result of the evaluation of new information. The ultimate tax due in a jurisdiction may result in a payment that is materially different from our most recent estimate of the liability. Further judgment is required in determining whether an uncertain tax position is effectively settled. Any change in the analysis will impact income tax expense.

We consider the earnings of most of our non-U.S. subsidiaries to be indefinitely invested outside the United States based on our estimates that future domestic cash generation will be sufficient to meet future domestic cash needs and our plans for reinvestment of foreign subsidiary earnings. As a result of the Tax Cut and Jobs Act, in 2017 the Company had recorded a deferred tax liability of approximately $1.8 million of withholding tax associated with a planned distribution of approximately $25.5 million of previously unremitted earnings. As of December 31, 2018, the planned distribution amount is approximately $17.5 million with a remaining deferred tax liability of approximately $1.6 million. In addition, we estimate that additional withholding taxes of approximately $17.6 million would be payable upon the distribution of the balance of our previously unremitted earnings at December 31, 2018. If we decide to distribute any portion of the balance of our unremitted earnings to the United States from a foreign country, we would adjust our income tax provision in the period we determine that the earnings are no longer indefinitely invested outside the United States.

On December 22, 2017, the Tax Cuts and Jobs Act ("2017 Tax Act") was enacted. The 2017 Tax Act significantly changed U.S.tax law by, among other things, lowering the corporate tax rate, implementing a modified territorial tax system, and imposing a one-time transition tax on post 1986 undistributed foreign earnings as of December 31, 2017. The 2017 Tax Act permanently reduces the U.S. tax rate from a maximum of 35% to a flat 21%, effective January 1, 2018. Under U.S. GAAP, changes in tax rates and tax law are accounted for in the period of enactment and deferred tax assets and liabilities are measured at the enacted tax rate expected to apply to taxable income in the years in which the temporary differences are expected to recover or be settled.

The 2017 Tax Act subjects a U.S. shareholder to tax on global intangible low-taxed income (“GILTI”) earned by certain foreign subsidiaries. The FASB Staff Q&A, Topic 740, No. 5, Accounting for Global Intangible Low-Taxed Income, states that an entity can make an accounting policy election to either recognize deferred taxes for temporary basis differences expected to reverse as GILTI in the future years or provide for tax expense related to GILTI in the year the tax is incurred. The Company elects to recognize tax expense related to GILTI in the year the tax is incurred.

Additional information about income taxes is included in Note 6 to our consolidated financial statements.

Results of Operations – Years Ended December 31, 2018, 2017, and 2016

Statement of operations' captions as a percentage of net revenues and the effective tax rates were as follows:

	Years ended December 31,		
	2018	2017	2016
Costs of products sold	59.5%	61.4%	63.2%
Gross profit	40.5%	38.6%	36.8%
Selling, general, and administrative expenses	27.0%	29.0%	30.4%
Operating income	12.4%	8.8 %	5.0 %
Income before taxes	11.3%	8.1 %	4.3 %
Net earnings	7.9 %	5.7 %	2.8 %
Net earnings attributable to VPG stockholders	7.9 %	5.6 %	2.8 %
Effective tax rate	30.4%	30.0%	33.3%

Net Revenues

Net revenues were as follows (dollars in thousands):

	Years ended December 31,		
	2018	2017	2016
Net revenues	$299,794	$254,350	$224,929
Change versus prior year	$45,444	$29,421	
Percentage change versus prior year	17.9 %	13.1 %	

Changes in net revenues were attributable to the following:

	2018 vs. 2017	2017 vs. 2016
Change attributable to:		
Change in volume	16.3%	13.0 %
Change in average selling prices	0.1 %	(0.2)%
Foreign currency effects	1.5 %	(0.2)%
Acquisitions	0.0 %	0.5 %
Net change	17.9%	13.1 %

During the year ended December 31, 2018, net revenues increased 17.9% over the prior year. The increase in net revenues is attributable to volume increases in all three reporting segments including the test and measurement, force measurement, and avionics, military and space market sectors in the Foil Technology Products segment, the force measurement and precision weighing markets in the Force Sensors segment, and the steel and precision weighing market sectors in the Weighing and Control Systems segment.

During the year ended December 31, 2017, revenues increased 13.1% over the prior year. The increase in net revenues is attributable to volume increases in all three reporting segments including the test and measurement and force measurement market sectors in the Foil Technology Products segment, the force measurement and precision weighing end markets in the Force Sensors segment, and the steel and precision weighing market sectors in the Weighing and Control Systems segment.

Gross Profit Margin

Gross profit as a percentage of net revenues was as follows:

	Years ended December 31,		
	2018	2017	2016
Gross profit margin	40.5%	38.6%	36.8%

The gross profit margin for the year ended December 31, 2018 increased 1.9% over the prior year. Improved gross profit margin was due to volume increases from all reporting segments, a 16.3% increase from the prior year, partially offset by higher manufacturing costs, including wage increases and labor inefficiencies, and U.S. imposition of tariffs on goods from China, mainly in the Force Sensors reporting segment.

The gross profit margin for the year ended December 31, 2017 increased 1.8% over the prior year mainly due to higher volume, in all three reporting segments. Volume increased 13.0% in 2017 as compared to 2016.

Segments

Analysis of revenues and gross profit margins for our reportable segments is provided below.

Foil Technology Products

Net revenues of the Foil Technology Products segment were as follows (dollars in thousands):

	Years ended December 31,		
	2018	2017	2016
Net revenues	$141,009	$116,272	$100,942
Change versus prior year	$24,737	$15,330	
Percentage change versus prior year	21.3 %	15.2 %	

Changes in Foil Technology Products segment net revenues were attributable to the following:

	2018 vs. 2017	2017 vs. 2016
Change attributable to:		
Change in volume	19.8 %	14.6 %
Change in average selling prices	(0.1)%	(0.2)%
Foreign currency effects	1.6 %	(0.3)%
Acquisitions	— %	1.1 %
Net change	21.3 %	15.2 %

For the year ended December 31, 2018, net revenues increased 21.3% as compared to the prior year. Improved volume resulted from sales of precision resistor products in all regions for distribution and OEM customers, primarily in the test and measurement market, strain gage products in all regions mainly for OEM customers in the force measurement and test and measurement markets and Pacific Instruments products in the Americas for end users customers in the avionics, military and space market. Favorable exchange rate impacts, mainly from the Euro, also impacted net revenues for the year ended December 31, 2018 as compared to the comparable prior year period.

For the year ended December 31, 2017, net revenues increased 15.2% as compared to the prior year due to higher volume from precision resistor OEM customers in the test and measurement market sector in Asia and Europe and the avionics military and aerospace market sector in the U.S.. Additionally, higher volume from advanced sensors products in the force measurement market sector in Asia and additional revenues from the acquisition of Pacific contributed to the improvements in net revenues. Unfavorable exchange rate impacts from the Japanese yen and the British pound were partially offset by favorable exchange rate impacts from the Euro.

Gross profit as a percentage of net revenues for the Foil Technology Products segment was as follows:

	Years ended December 31,		
	2018	2017	2016
Gross profit margin	43.7%	41.1%	39.0%

For the year ended December 31, 2018, the gross profit margin increased 2.6% as compared to the prior year primarily due to higher volume and favorable exchange rate impacts relating to the Euro.

For the year ended December 31, 2017, the gross profit margin increased 2.1% as compared to the prior year mainly due to higher volume and labor efficiencies, partially offset by unfavorable exchange rate impacts relating to the Israeli shekel and higher fixed manufacturing costs including headcount and wage increases.

Force Sensors

Net revenues of the Force Sensors segment were as follows (dollars in thousands):

	Years ended December 31,		
	2018	2017	2016
Net revenues	$73,186	$65,446	$60,234
Change versus prior year	$7,740	$5,212	
Percentage change versus prior year	11.8 %	8.7 %	

Changes in Force Sensors segment net revenues were attributable to the following:

	2018 vs. 2017	2017 vs. 2016
Change attributable to:		
Change in volume	10.7%	9.4 %
Change in average selling prices	0.0 %	(0.9)%
Foreign currency effects	1.1 %	0.2 %
Net change	11.8%	8.7 %

For the year ended December 31, 2018, net revenues increased 11.8% from the prior year mainly due to higher volume with OEM customers in the force measurement and precision weighing market sectors in the Americas and Europe. Favorable exchange rate impacts from the Euro and British pound offset the unfavorable exchange rate impacts with the India rupee to add to the improvement in net revenues.

For the year ended December 31, 2017, net revenues increased 8.7% from the prior year mainly due to higher volume with OEM customers in the force measurement and precision weighing end markets in all regions. Favorable exchange rate impacts from the Euro offset the unfavorable exchange rate impacts with the British pound to add to the improvement in net revenues.

Gross profit as a percentage of net revenues for the Force Sensors segment was as follows:

	Years ended December 31,		
	2018	2017	2016
Gross profit margin	27.3%	27.8%	26.0%

For the year ended December 31, 2018, the gross profit margin decreased 0.5% when compared to the prior year. Higher net revenues were offset by labor and manufacturing inefficiencies, U.S. imposition of tariffs on goods from China, higher wages and unfavorable exchange rate impacts with the India rupee. For the year ended December 31, 2017, the gross profit margin increased 1.8% when compared to the prior year primarily due to higher volume and cost savings measures, including headcount reductions from plant closures and relocations.

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Weighing and Control Systems

Net revenues of the Weighing and Control Systems segment were as follows (dollars in thousands):

	Years ended December 31,		
	2018	2017	2016
Net revenues	$85,599	$72,632	$63,753
Change versus prior year	$12,967	$8,879	
Percentage change versus prior year	17.9 %	13.9 %	

Changes in Weighing and Control Systems segment net revenues were attributable to the following:

	2018 vs. 2017	2017 vs. 2016
Change attributable to:		
Change in volume	15.6%	13.7 %
Change in average selling prices	0.7 %	0.3 %
Foreign currency effects	1.6 %	(0.1)%
Net change	17.9%	13.9 %

For the year ended December 31, 2018, net revenues increased 17.9% when compared to the prior year with strong revenues from the precision weighing and steel market sectors, across all products lines and all regions, Favorable exchange rate impacts with the Euro and British pound also contributed to the improvement in net revenues over the prior year.

For the year ended December 31, 2017, net revenues increased 13.9% when compared to the prior year mainly due to improvements in the steel business in Asia and the on-board weighing products in Europe and the Americas. Unfavorable exchange rate impacts with the British pound were almost completely offset by favorable exchange rate impacts from the Euro and Canadian dollar.

Gross profit as a percentage of net revenues for the Weighing and Control Systems segment was as follows:

	Years ended December 31,		
	2018	2017	2016
Gross profit margin	46.4%	44.5%	43.6%

For the year ended December 31, 2018, the gross profit margin increased 1.9% from the prior year mainly due to improved volume across all product lines.

For the year ended December 31, 2017, the gross profit margin increased from the prior year mainly driven by the improved volume in the steel business and on-board weighing business.

Selling, General, and Administrative Expenses

Selling, general, and administrative (“SG&A”) expenses were as follows (dollars in thousands):

	Years ended December 31,		
	2018	2017	2016
Total SG&A expenses	$80,935	$73,751	$68,382
as a percentage of net revenues	27.0 %	29.0 %	30.4 %

SG&A expenses for the year ended December 31, 2018 increased $7.2 million versus the prior year mainly due to higher personnel costs, including wage increases, higher commissions and bonuses, higher headcount, higher professional fees and $0.6 million related to unfavorable exchange rate impacts.

SG&A expenses for the year ended December 31, 2017 increased $5.4 million versus the prior year mainly due to higher personnel costs, including wage increases, higher bonuses and incentive compensation and additional SG&A expenses of $0.6 million

associated with the operation of Pacific, which was acquired on April 6, 2016. Additionally, SG&A expenses for the year ended December 31, 2016 included $1.3 million of strategic evaluation costs.

Impairment of Goodwill and Indefinite-lived Intangible Assets

As a result of our required annual impairment test performed on goodwill and indefinite-lived intangible assets,for the year ended December 31, 2018, we recorded a $2.5 million pre-tax, non-cash impairment charge which reduced the carrying value of our goodwill and a $0.3 million net of tax, non-cash impairment charge which reduced the carnying value of indefinite-lived intangible assets. See our critical accounting policies and Note 4 for further discussion. There were no impairment charges recorded for the years ended December 31, 2017 or December 31, 2016.

Restructuring Costs

Restructuring costs reflect the cost reduction programs implemented by the Company. Restructuring costs are expensed during the period in which the Company determines it will incur those costs and all requirements for accrual are met. Because these costs are recorded based upon estimates, actual expenditures for the restructuring activities may differ from the initially recorded costs. If the initial estimates are too low or too high, the Company could be required to either record additional expense in future periods, or to reverse part of the previously recorded charges. The Company recorded restructuring costs of $0.3 million, $2.0 million, and $2.7 million during the years ended December 31, 2018, 2017, and 2016, respectively. Restructuring costs were comprised primarily of employee termination costs, including severance and statutory retirement allowances, and were incurred in connection with various cost reduction programs.

Acquisition Costs

No acquisition costs were incurred for the year ended December 31, 2018 or December 31, 2017. For the year ended December 31, 2016, we recorded acquisition costs in our consolidated statements of operations of $0.5 million in connection with the acquisitions of Stress-Tek and Pacific.

Other Income (Expense)

Interest Expense

The Company recorded interest expense of $1.7 million, $1.8 million, and $1.5 million for the years ended, December 31, 2018, 2017, and 2016, respectively. Interest expense was lower in 2018 compared to 2017, with lower debt balances and lower interim borrowings offsetting the slightly higher interest rates. Interest expense was higher in 2017 compared to 2016 due higher interim borrowings and higher interest rates.

Other

The following table analyzes the components of the line “Other” on the consolidated statements of operations (in thousands):

	Years ended December 31, 2018	2017	Change
Foreign exchange gain/(loss)	$(279)	$(724)	$445
Interest income	506	167	339
Pension expense	(1,682)	(863)	(819)
Other	(41)	1,337	(1,378)
	$(1,496)	$(83)	$(1,413)

Foreign currency exchange gains and losses represent the impact of changes in foreign currency exchange rates. The change in foreign exchange gains/(losses) during the period, as compared to the prior year period, is primarily due to fluctuations in the Israeli shekel, the Euro, and the Canadian dollar.

The Company adopted Accounting Standards Update ("ASU") No. 2017-07, "Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost" . This ASU requires the service cost component of net periodic benefit cost to be presented in the same income statement line item as other employee compensation costs. All other components of the net periodic benefit cost are presented outside of operating income. The Company adopted the new standard as of January 1, 2018 and recorded the non-service cost component of $1.7 million to Other income (expense) - other for the year ended December 31, 2018. Additionally, the non-service cost component of $0.9 million and $0.6 million was reclassified from Operating income to Other income (expense) - other for the years ended December 31, 2017 and 2016, respectively.
Included within Other, for the year ended December 31, 2017, is net proceeds of $1.5 million related to a lease termination payment at the Company's Tianjin, People's Republic of China location. The relocation of operation in Tianjin has been completed and the majority of the expenses associated with the move have been incurred.

	Years ended December 31,		
	2017	2016	Change
Foreign exchange gain/(loss)	$(724)	$449	$(1,173)
Interest income	167	179	(12)
Pension expense	(863)	(556)	(307)
Other	1,337	(246)	1,583
	$(83)	$(174)	$91

Foreign currency exchange gains and losses represent the impact of changes in foreign currency exchange rates. The change in foreign exchange losses during the period, as compared to the prior year period is primarily due to fluctuations in the Canadian dollar and Israeli shekel.
Income Taxes
Our effective tax rate for the year ended December 31, 2018 was 30.4%, compared to 30.0% for the year ended December 31, 2017, and 33.3% for the year ended December 31, 2016. Our effective tax rate is slightly higher in 2018 compared to 2017 primarily due to the geographical mix of income.
On December 22, 2017, the 2017 Tax Act was enacted. The 2017 Tax Act significantly changed U.S. tax law by, among other things, lowering the corporate tax rate, implementing a modified territorial tax system, and imposing a one-time transition tax on post 1986 undistributed foreign earnings as of December 31, 2017. The 2017 Tax Act permanently reduced the U.S. tax rate from a maximum of 35% to a flat 21% , effective January 1, 2018. Under U.S. GAAP, changes in tax rates and tax law are accounted for in the period of enactment and deferred tax assets and liabilities are re-measured at the enacted tax rate expected to apply to taxable income in the years in which the temporary differences are expected to recover or be settled.
Guidance issued by the Securities Exchange Commission ("SEC"), provides for a measurement period of one year from the enactment date to finalize the accounting for effects of the 2017 Tax Act. Consistent with that guidance, the Company had provisionally determined the tax cost of the one-time transition tax under the 2017 Tax Act to be approximately $2.2 million for 2017. This amount included the tax benefit from the net operating loss of approximately $3.9 million. As a result of the implementation of a modified territorial tax system, the Company reassessed its assertion with respect to certain subsidiaries that the earnings of those subsidiaries are indefinitely reinvested and in 2017 recorded a deferred tax liability of $1.8 million of withholding tax associated with a planned cash distribution of approximately $25.5 million of previously unremitted earnings. The deferred tax liability of $1.8 million was included in the provisional tax of $2.2 million for 2017. In accordance with SAB 118 the financial reporting impact of the 2017 Tax Act was completed in the fourth quarter of 2018 which resulted in a net increase in tax expense of approximately $0.8 million caused by a decrease in the transition tax and an increase in the valuation allowance.
We reassessed our ability to realize our U.S. deferred tax assets during 2018 and have concluded that realization of those deferred tax assets is still not "more likely than not". Our tax rate is affected by recurring items, such as tax rates in foreign jurisdictions as compared to the U.S. federal statutory tax rate, and the relative amount of income earned in each jurisdiction. The tax rate is also impacted by discrete items that vary from year to year and may not be indicative

of the tax rate on continuing operations. The following items had the most significant impact on the difference between the statutory U.S. federal income tax rate and our effective tax rate:

2018

- 2.4% increase as a result of the enactment of the 2017 Tax Act in the U.S., as described above.
- 1.8% rate increase related to the effects of foreign operations primarily related to the difference between the U.S. statutory rate and foreign tax rates.
- 1.5% rate increase related to increase in valuation allowance primarily related to our US entities.
- 1.5% rate increase related to impairment of goodwill.
- 0.9% rate increase related to foreign currency primarily attributable to our operations in Israel and India.

2017

- 10.8% increase as a result of the enactment of the 2017 Tax Act in the U.S., as described above, on December 22, 2017, which significantly changed U.S. corporate income tax laws.
- 5.5% rate reduction related to the effects of foreign operations primarily related to the difference between the U.S. statutory rate and foreign tax rates primarily attributable to our operations in Israel.
- 6.3% rate reduction related to foreign currency primarily attributable to our operations in Israel and India.
- 1.9% rate reduction related to decrease in valuation allowance primarily by our non-US entities.

2016

- 13.2% rate increase relating to the current year impact of establishing valuation allowances on deferred tax assets, primarily with respect to U.S. federal and state deferred tax assets.
- 8.5% rate increase related to the adjustment of deferred tax assets established in various foreign jurisdictions in prior years.
- 14.8% rate reduction related to the effects of foreign operations primarily related to the difference between the U.S. statutory rate and foreign tax rates primarily attributable to our operations in Israel.
- 9.4% rate reduction attributable to changes in our liability for uncertain tax positions, primarily attributable to the settlement of a tax examination in Israel.

Additional information about income taxes is included in Note 6 to our consolidated financial statements.

Financial Condition, Liquidity, and Capital Resources

We believe that our current cash and cash equivalents, credit facilities, and projected cash from operations will be sufficient to meet our liquidity needs for at least the next 12 months.

On December 30, 2015, the Company entered into a Second Amended and Restated Credit Agreement (the “2015 Credit Agreement”) among the Company, VPG Canada, the lenders, Citizens Bank, National Association and Wells Fargo Bank, National Association as joint book-runners and JPMorgan Chase Bank, National Association as agent for such lenders (the “Agent”), pursuant to which the terms of the Company’s multi-currency, secured credit facility were revised and expanded to provide for the following facilities: (1) a secured revolving facility (the “2015 Revolving Facility”) in an aggregate principal amount of $30.0 million, with a sublimit of $10.0 million which can be used for letters of credit for the account of the Company or its U.S. and Canadian subsidiaries, the proceeds of which may be used for working capital and general corporate purposes, and a portion of which was used to fund the Stress-Tek and Pacific acquisitions; (2) a secured closing date term facility for the Company (the “2015 U.S. Closing Date Term Facility”) in an aggregate principal amount of $4.5 million, the proceeds of which were used by the Company to refinance indebtedness under its existing term loan; (3) a secured delayed draw term facility for the Company (the "2015 U.S. Delayed Draw Term Facility") in an aggregate principal amount of $11.0 million, the proceeds of which were used to fund a portion of the Stress-Tek acquisition; and (4) a secured term facility for VPG Canada (the “2015 Canadian Term Facility”) in an aggregate principal amount of $9.5 million, the proceeds of which were used by VPG Canada to refinance indebtedness under its existing term loan. The aggregate principal amount of the 2015 Revolving Facility may be increased by a maximum of $15.0 million upon the request of the Company, subject to the terms of the 2015 Credit Agreement. The 2015 Credit Agreement terminates on December 30, 2020. The term loans are being repaid in quarterly installments.

Interest payable on amounts borrowed under the 2015 Revolving Facility, the 2015 U.S. Closing Date Term Facility, the 2015 U.S. Delayed Draw Term Facility, and the 2015 Canadian Term Facility (collectively, the “Facilities”) is based upon, at the Company’s option, (1) the greatest of: the Agent’s prime rate, the Federal Funds rate, or a LIBOR floor (the “Base Rate”), or (2) LIBOR plus a specified margin. An interest margin of 0.25% is added to Base Rate loans. Depending upon the Company’s leverage ratio, an interest rate margin ranging from 2.00% to 3.50% per annum is added to the applicable LIBOR rate to determine the interest payable on the Facilities. The Company is required to pay a quarterly commitment fee of 0.30% per annum to 0.50% per annum on the unused portion of the 2015 Revolving Facility, which is determined based on the Company's leverage ratio each quarter. Additional customary fees apply with respect to letters of credit. The total interest rates at December 31, 2018 and December

31, 2017, were 4.82% and 4.19%, respectively, for the 2015 Revolving and U.S. Delayed Draw Term Facilities and 4.82% and 4.19%, respectively, for the 2015 U.S. Closing Date Term and 2015 Canadian Term Facilities.

The obligations of the Company and VPG Canada under the 2015 Credit Agreement are secured by pledges of stock in certain domestic and foreign subsidiaries, as well as guarantees by substantially all of the Company's domestic subsidiaries and of the Company (with respect to the 2015 Canadian Term Facility). The obligations of the Company and the guarantors under the 2015 Credit Agreement are secured by substantially all the assets (excluding real estate) of the Company and such guarantors. The 2015 Canadian Term Facility is secured by substantially all the assets of VPG Canada and by a secured guarantee by the Company and its domestic subsidiaries. The 2015 Credit Agreement restricts the Company from paying cash dividends and requires the Company to comply with other customary covenants, representations, and warranties, including the maintenance of specific financial ratios. The financial maintenance covenants include a tangible net worth ratio, a leverage ratio, and a fixed charges coverage ratio. The Company was in compliance with its financial maintenance covenants at December 31, 2018. If the Company is not in compliance with any of these covenant restrictions, the credit facility could be terminated by the lenders, and all amounts outstanding pursuant to the credit facility could become immediately payable.

By reason of the spin-off, VPG assumed the liability for an aggregate $10.0 million principal amount of exchangeable notes effective July 6, 2010. The maturity date of the notes was December 13, 2102.

Effective February 26, 2018, the holder of the Company's exchangeable notes exercised its option to exchange the remaining $2.8 million principal amount of the notes for 123,808 shares of VPG common stock at the contractual put/call rate of $22.57 per share. Following these transactions, all exchangeable notes have been canceled and VPG has no further obligations pursuant to such notes.

Our other long-term debt is not significant and consists of debt held by one of our Japanese subsidiaries of approximately $0.3 million at December 31, 2018 and $0.4 million at December 31, 2017. The debt is payable monthly over the next 3 years at a zero percent interest rate.

See Note 7 to our consolidated financial statements for additional details.

Our business has historically generated significant cash flow. Our cash provided by operating activities for the year ended December 31, 2018 was $35.4 million as compared to $22.7 million for the year ended December 31, 2017, and $11.5 million for the year ended December 31, 2016. Cash provided by operating activities for the year ended December 31, 2018 was driven by an increase in net earnings. Cash provided by operating activities for the year ended December 31, 2017 was driven by an increase in net earnings and a receipt of a lease termination payment of $1.5 million. Cash provided by operating activities for the year ended December 31, 2016 was impacted by cash payments of $4.2 million related to restructuring and $1.1 million related to the strategic alternative evaluation process.

Approximately 93% of our cash and cash equivalents balance at December 31, 2018 and 2017, respectively, was held by our non-U.S. subsidiaries. See the following table for the percentage of cash and cash equivalents, by region, at December 31, 2018 and December 31, 2017:

	December 31,	
	2018	2017
Asia	28 %	28 %
United States	7 %	7 %
Israel	35 %	37 %
Europe	13 %	15 %
United Kingdom	12 %	5 %
Canada	5 %	8 %
Total	100 %	100 %

We earn a significant amount of our operating income outside the United States, the majority of which is deemed to be indefinitely reinvested in the foreign jurisdictions. As a result, as discussed above, a significant portion of our cash and short-term investments are held by foreign subsidiaries. As a result of the 2017 Tax Act, the Company reassessed its assertion with respect to the indefinite reinvestment for certain of Company's foreign subsidiaries and recorded a deferred tax liability of approximately $1.8 million of withholding tax associated with the planned cash distribution of approximately $25.5 million. As of December 31, 2018, the remaining planned cash distribution amount is approximately $17.5 million with a remaining deferred tax liability of approximately $1.6 million. The Company will continue to evaluate its cash needs, however we currently do not intend, nor do we foresee a need, to repatriate funds in excess of what is already planned. The Company will evaluate the possibility of repatriating future cash provided such repatriation can be accomplished in a tax efficient manner. In addition, we expect existing domestic cash, short-term investments, and cash flows from operations to continue to be sufficient to fund our domestic operating activities and cash commitments for investing and financing activities, such as debt repayment and capital expenditures, for at least the next 12 months and thereafter for the foreseeable future.

If we should require more capital in the United States than is generated by our domestic operations, and the planned dividend noted above, for example, to fund significant discretionary activities, such as business acquisitions, we could elect to repatriate future earnings from foreign jurisdictions or raise capital in the United States through debt or equity issuances. These alternatives could result in higher tax expense, increased interest expense, or dilution of our earnings.

We consider the majority of the undistributed earnings of our foreign subsidiaries, as of December 31, 2018, to be indefinitely reinvested and, accordingly, no provision has been made for taxes in excess of the $1.6 million noted above.

For the year ended December 31, 2018, we generated free cash of $21.0 million. We refer to “free cash,” a measure which management uses to evaluate our ability to fund acquisitions, as the amount of cash generated from operations ($35.4 million) in excess of our capital expenditures ($14.5 million) and net of proceeds from the sale of assets ($0.1 million).

The following table summarizes the components of net cash (debt) at December 31, 2018 and at December 31, 2017 (in thousands):

	December 31,	
	2018	2017
Cash and cash equivalents	$90,159	$74,292
Third-party debt, including current and long-term		
Term loans	$15,018	$20,500
Revolving debt	12,000	9,000
Third-party debt held by Japanese subsidiary	279	401
Exchangeable notes, due 2102	—	2,794
Deferred financing costs	(222)	(340)
Total third-party debt	27,075	32,355
Net cash	$63,084	$41,937

Measurements such as “free cash” and “net cash (debt)” do not have uniform definitions and are not recognized in accordance with U.S. GAAP. Such measures should not be viewed as alternatives to GAAP measures of performance or liquidity. However, management believes that “free cash” is a meaningful measure of our ability to fund acquisitions, and that an analysis of “net cash (debt)” assists investors in understanding aspects of our cash and debt management. These measures, as calculated by us, may not be comparable to similarly titled measures used by other companies.

Our financial condition as of December 31, 2018 is strong, with a current ratio (current assets to current liabilities) of 3.9 to 1.0, as compared to a current ratio of 3.7 to 1.0 at December 31, 2017.

Cash paid for property and equipment for the year ended December 31, 2018 and December 31, 2017 was $14.5 million and $7.0 million, respectively. Capital spending for 2018 was comprised of projects related to the normal maintenance of business, cost reduction programs, and some carryover projects from 2017. Capital expenditures for 2019 are expected to be approximately $30 million, which includes expected building projects of approximately $15 million for capacity expansion in Israel and India.

Contractual Commitments

As of December 31, 2018, we had contractual obligations as follows (in thousands):

	Payments due by period				
	Total	Less than 1 year	1-3 years	4-5 years	After 5 years
Long-term debt	$27,297	$4,654	$22,643	$—	$—
Interest payments on long-term debt	1,166	696	470	—	—
Operating leases	8,267	3,580	3,123	1,228	336
Unrecognized tax benefits, including interest and penalties	1,052	188	—	—	864
Expected pension and postretirement plan benefit payments from unfunded plans [(a)]	4,762	362	970	994	2,436
Expected pension and postretirement plan contributions to funded plans [(b)]	976	976	—	—	—
Total contractual cash obligations	$43,520	$10,456	$27,206	$2,222	$3,636

(a) Due to the nature of unfunded plans, benefit payments are considered to be funded when paid.

(b) Due to the uncertainty of future cash outflows, contributions to the pension and other postretirement benefit plans subsequent to 2019 have been excluded from the table above.

Our consolidated balance sheet at December 31, 2018 includes approximately $1.1 million of liabilities associated with uncertain tax positions relating to multiple taxing jurisdictions. There are certain guarantees and indemnifications extended among Vishay Intertechnology and us in accordance with the terms of the Master Separation and Distribution Agreement and the Tax Matters Agreement. The guarantees primarily relate to certain contingent tax liabilities included in the Tax Matters Agreement. However, of the $0.9 million of unrecognized tax benefits, none are covered under the terms of the Tax Matters Agreement.

Due to the uncertainty and complexity relating to the settlement of tax matters, including the difficulty in predicting the conclusion of tax audits around the world, we are unable to make reliable estimates of the timing and amount of the remaining cash outflows, if any, relating to these liabilities. Accordingly, the remaining uncertain tax positions are classified as payments due after five years, although actual timing of payments may be sooner. See Note 6 to our consolidated financial statements for additional information.

Inflation

Normally, inflation does not have a significant impact on our operations as our products are not generally sold on long-term contracts. Consequently, we can adjust our selling prices, to the extent permitted by competition, to reflect cost increases caused by inflation.

Recent Accounting Pronouncements

See Note 1 to our consolidated financial statements for a discussion of recent accounting pronouncements.

Item 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

We are exposed to certain financial risks, including fluctuations in foreign currency exchange rates, interest rates, and commodity prices. We manage our exposure to these market risks through internally established policies and procedures. Our policies do not allow speculation in derivative instruments for profit or execution of derivative instrument contracts for which there are no underlying exposures. We do not use financial instruments for trading purposes and we are not a party to any leveraged derivatives. We monitor our underlying market risk exposures on an ongoing basis and believe that we can modify or adapt our strategies as needed.

Interest Rate Risk

We are exposed to changes in interest rates as a result of our borrowing activities and our cash balances.

The Company entered into a second amended and restated revolving credit facility on December 30, 2015. Interest payable on the facility is based upon the Agent's prime rate, the Federal Funds rate or LIBOR, plus a spread. At December 31, 2018, the Company has $12.0 million borrowings outstanding under the revolving credit facility and $15.0 million in outstanding term loans.

At December 31, 2018, we have $90.2 million of cash and cash equivalents, which accrue interest at various variable rates.

Based on the debt and cash positions at December 31, 2018 and 2017, we would expect a 50 basis point increase or decrease in interest rates to increase or decrease our annualized net earnings by $0.2 million and $0.1 million in 2018 and 2017, respectively.

See Note 7 to our consolidated financial statements for additional information about our long-term debt.

Foreign Exchange Risk

We are exposed to foreign currency exchange rate risks, particularly due to market values of transactions in currencies other than the functional currencies of certain subsidiaries. Our significant foreign currency exposures are to the British pound, Canadian dollar, Chinese renminbi, euro, Indian rupee, Israeli shekel, Japanese yen, Swedish krona, and Taiwanese dollar.

Our operations in Europe, Canada, and certain locations in Asia primarily generate and expend cash in local currencies. Our operations in Israel and certain locations in Asia primarily generate cash in U.S. dollars, but these subsidiaries also have significant transactions in local currencies. Our exposure to foreign currency risk is mitigated to the extent that the costs incurred and the revenues earned in a particular currency offset one another. Our exposure to foreign currency risk, with respect to expenses, is more pronounced in Israel and India because the percentage of expenses denominated in Israeli shekels and Indian rupee to total expenses is much greater than the percentage of sales denominated in Israeli shekels and Indian rupee to total sales. Therefore, if the Israeli shekel and Indian rupee strengthen against all or most of our other major currencies, our operating profit is reduced. We also have a higher percentage of British pound-denominated sales than expenses. Therefore, when the British pound strengthens against all or most of our other major currencies, our operating profit is increased. VPG Canada has a secured term facility denominated in U.S. dollars. Therefore, we are exposed to potentially significant foreign exchange risk based on the valuation of this long-term debt related to the exchange rate between the U.S. dollar and the Canadian dollar.

We have performed a sensitivity analysis as of December 31, 2018 and 2017, respectively, using a model that measures the change in the values arising from a hypothetical 10% adverse movement in foreign currency exchange rates relative to the U.S. dollar, with all other variables held constant. The foreign currency exchange rates we used were based on market rates in effect at December 31, 2018 and 2017, respectively. The sensitivity analysis indicated that a hypothetical 10% adverse movement in foreign currency exchange rates would impact our net earnings by approximately $2.8 million and $2.5 million for the years ended December 31, 2018 and December 31, 2017, respectively, although individual line items in our consolidated statements of operations could be materially affected. For example, a 10% weakening in all foreign currencies would increase the U.S. dollar equivalent of operating income generated in foreign currencies, which would be offset by foreign exchange losses of our foreign subsidiaries that have significant transactions in U.S. dollars or have the U.S. dollar as their functional currency.

A change in the mix of the currencies in which we transact our business could have a material effect on the estimated impact of the hypothetical 10% movement in the value of the U.S. dollar. Furthermore, the timing of cash receipts and disbursements could result in materially different actual results versus the hypothetical 10% movement in the value of the U.S. dollar, particularly if there are significant changes in exchange rates in a short period of time.

Commodity Price Risk

Although most materials incorporated in our products are available from a number of sources, certain materials are available only from a relatively limited number of suppliers.

Some of the most highly specialized materials for our sensors are sourced from a single vendor. We maintain a safety stock inventory of certain critical materials at our facilities.

Certain metals used in the manufacture of our products are traded on active markets, and can be subject to significant price volatility.

Our results of operations may be materially and adversely affected if we have difficulty obtaining these raw materials, the quality of available raw materials deteriorates, or there are significant price changes for these raw materials. For periods in which the prices of these raw materials are rising, we may be unable to pass on the increased cost to our customers which would result in decreased margins for the products in which they are used. For periods in which the prices are declining, we may be required to write down our inventory carrying cost of these raw materials, since we record our inventory at the lower of cost or market. Depending on the extent of the difference between market price and our carrying cost, this write-down could have a material adverse effect on our net earnings. We also may need to record losses for adverse purchase commitments for these materials in periods of declining prices.

We estimate that a 10% increase or decrease in the costs of raw materials subject to commodity price risk would decrease or increase our net earnings by $1.5 million and $1.2 million for the years ended December 31, 2018 and December 31, 2017, respectively, assuming that such changes in our costs have no impact on the selling prices of our products, and that we have no pending commitments to purchase metals at fixed prices.

Item 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

The financial statements required by this Item are included herein, commencing on page F-1 of this report.

Item 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

None.

Item 9A. CONTROLS AND PROCEDURES

Disclosure Controls and Procedures

An evaluation was performed under the supervision and with the participation of our management, including the Chief Executive Officer ("CEO") and Chief Financial Officer ("CFO"), of the effectiveness of the design and operation of our disclosure controls and procedures, as such term is defined under Rule 13a-15(e) and Rule 15d-15(e) promulgated under the Securities Exchange Act of 1934, as amended (the "Exchange Act"). Based on that evaluation, our CEO and CFO concluded that our disclosure controls and procedures were effective as of the end of the period covered by this annual report to ensure that information required to be disclosed in reports that we file or submit under the Exchange Act are: (1) recorded, processed, summarized, and reported within the time periods specified in the SEC's rules and forms; and (2) accumulated and communicated to our management, including our CEO and CFO, as appropriate to allow timely decisions regarding required disclosure.

Our management, including our CEO and CFO, believes that any disclosure controls and procedures or internal controls and procedures, no matter how well conceived and operated, can provide only reasonable, not absolute, assurance that the objectives of the control system are met. Further, the design of a control system must consider the benefits of controls relative to their costs. Inherent limitations within a control system include the realities that judgments in decision-making can be faulty, and that breakdowns can occur because of a simple error or mistake. Additionally, controls can be circumvented by the individual acts of some persons, by collusion of two or more people, or by unauthorized override of the control. While the design of any system of controls is to provide reasonable assurance of the effectiveness of disclosure controls, such design is also based in part upon certain assumptions about the likelihood of future events, and such assumptions, while reasonable, may not take into account all potential future conditions. Accordingly, because of the inherent limitations in a cost effective control system, misstatements due to error or fraud may occur and may not be prevented or detected.

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Changes in Internal Controls over Financial Reporting

As previously disclosed, management identified a material weakness in our internal control over financial reporting as of December 31, 2017, due to the aggregation of certain internal control deficiencies related to the design, operating effectiveness and monitoring of various transaction and monitoring controls.

Since identifying these weaknesses, the Company created a steering committee which has overseen the remediation efforts. We conducted company-wide training sessions to re-educate the organization on internal controls, which included finance, information technology, human resources, and logistics personnel. We completed a comprehensive internal risk assessment to identify our internal control risks and the approach to address the risks identified. The result of the risk assessment was the foundation for the planned documentation reviews, which included flow charts, narratives, and risk and control matrices. Additionally, we created a standard set of controls, that at a minimum, must be included with in each legal entity's internal control framework. We established an Internal Audit function to provide monitoring feedback to management and the audit committee. The Company also implemented an internal control software to streamline our internal control documentation on a global platform for both management and internal audit.

As of December 31, 2018, our management has determined that the remedial steps described above have been satisfactorily implemented and tested and that the material weakness in our internal control over financial reporting identified as of December 31, 2017 no longer exists.

Except as disclosed above, there were no changes in our internal control over financial reporting during our last fiscal quarter that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Management’s Annual Report on Internal Control over Financial Reporting
Our management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Exchange Act Rules 13a-15(f) and 15d-15(f). Under the supervision and with the participation of our management, including our CEO and CFO, we conducted an evaluation of the effectiveness of our internal control over financial reporting as of December 31, 2018 based on the 2013 framework set forth in Internal Control - Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission. Based on that evaluation, our management concluded that our internal control over financial reporting was effective as of December 31, 2018.
Ernst & Young LLP has issued an attestation report on the effectiveness of our internal control over financial reporting, as stated in their report which is set forth on the next page.

Report of Independent Registered Public Accounting Firm

To the Shareholders and the Board of Directors of Vishay Precision Group, Inc.

Opinion on Internal Control over Financial Reporting

We have audited Vishay Precision Group, Inc.'s internal control over financial reporting as of December 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, Vishay Precision Group, Inc. (the Company) maintained, in all material respects, effective internal control over financial reporting as of December 31, 2018, based on the COSO criteria.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the 2018 consolidated financial statements of the Company and our report dated March 14, 2019 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
Philadelphia, Pennsylvania
March 14, 2019

Item 9B. OTHER INFORMATION

None.

PART III

Item 10. DIRECTORS, EXECUTIVE OFFICERS, AND CORPORATE GOVERNANCE

Certain information required under this Item with respect to our Executive Officers is contained under the heading "Executive Officers" in Item 1 hereof. Other information required under this Item will be contained under the heading "Nominees for Election as Directors" in our definitive proxy statement for the Company's 2019 Annual Meeting of Stockholders, which will be filed within 120 days of December 31, 2018, our most recent fiscal year end, and is incorporated herein by reference.

The Company has adopted codes of conduct that constitute "codes of ethics" as that term is defined in paragraph (b) of Item 406 of Regulation S-K and that apply to the Company's principal executive officer, principal financial officer, principal accounting officer or controller, and to any persons performing similar functions. Such codes of conduct are posted on the Company's internet website, the address of which is www.vpgsensors.com.

Item 11. EXECUTIVE COMPENSATION

Information required under this Item will be contained in our definitive proxy statement for the Company's 2019 Annual Meeting of Stockholders, which will be filed within 120 days of December 31, 2018, our most recent fiscal year end, and is incorporated herein by reference.

Item 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

Information required under this Item will be contained in our definitive proxy statement for the Company's 2019 Annual Meeting of Stockholders, which will be filed within 120 days of December 31, 2018, our most recent fiscal year end, and is incorporated herein by reference.

Item 13. CERTAIN RELATIONSHIPS AND RELATED PARTY TRANSACTIONS, AND DIRECTOR INDEPENDENCE

Information required under this Item will be contained in our definitive proxy statement for the Company's 2019 Annual Meeting of Stockholders, which will be filed within 120 days of December 31, 2018, our most recent fiscal year end, and is incorporated herein by reference.

Item 14. PRINCIPAL ACCOUNTING FEES AND SERVICES

Information required under this Item will be contained in our definitive proxy statement for the Company's 2019 Annual Meeting of Stockholders, which will be filed within 120 days of December 31, 2018, our most recent fiscal year end, and is incorporated herein by reference.

PART IV

Item 15. EXHIBITS, FINANCIAL STATEMENT SCHEDULES

(a) Documents Filed as part of Form 10-K

1) Financial Statements

The Consolidated Financial Statements for the year ended December 31, 2018 are filed herewith. See index to the Consolidated Financial Statements on page F-1 of this report.

2) Financial Statement Schedules

All financial statement schedules for which provision is made in the applicable accounting regulation of the Securities and Exchange Commission are not required under the related instructions or are inapplicable and therefore have been omitted.

3) Exhibits

Exhibit No.	Description
2.1	Asset Purchase Agreement, dated December 18, 2012, by and among Vishay Precision Group, Inc., Vishay Precision Group Canada ULC, George Kelk Corporation, Endevor Corporation and Peter Kelk (previously filed as an exhibit to the Registrant's Current Report on Form 8-K filed with the SEC on December 19, 2012 and incorporated herein by reference).
3.1	Amended and Restated Certificate of Incorporation of Vishay Precision Group, Inc., effective June 25, 2010 (previously filed as an exhibit to the Registrant's Current Report on Form 8-K filed with the SEC on July 1, 2010 and incorporated herein by reference).
3.2	Amendment no. 1 to Amended and Restated Certificate of Incorporation of Vishay Precision Group, Inc., effective June 2, 2011 (previously filed as an exhibit to the Registrant's Current Report on Form 8-K filed with the SEC on June 6, 2011 and incorporated herein by reference).
3.3	Second Amended and Restated Bylaws of Vishay Precision Group, Inc., adopted as of June 2, 2011 (previously filed as an exhibit to the Registrant's Current Report on Form 8-K filed with the SEC on June 6, 2011 and incorporated herein by reference).
10.1	Master Separation and Distribution Agreement, dated June 22, 2010, between Vishay Precision Group, Inc. and Vishay Intertechnology, Inc. (previously filed as an exhibit to the Registrant's Form 10 Registration Statement of Vishay Precision Group, Inc., filed with the Securities and Exchange Commission on June 22, 2010 and incorporated herein by reference).
10.2	Employee Matters Agreement, dated June 22, 2010, by and among Vishay Intertechnology, Inc. and Vishay Precision Group, Inc. (previously filed as an exhibit to the Registrant's Current Report on Form 8-K filed with the SEC on June 23, 2010 and incorporated herein by reference).
10.3	Tax Matters Agreement, dated July 6, 2010, between Vishay Precision Group, Inc. and Vishay Intertechnology, Inc. (previously filed as an exhibit to the Registrant's Current Report on Form 8-K filed with the SEC on July 7, 2010 and incorporated herein by reference).
10.4	Trademark License Agreement, dated July 6, 2010, between Vishay Precision Group, Inc. and Vishay Intertechnology, Inc. (previously filed as an exhibit to the Registrant's Current Report on Form 8-K filed with the SEC on July 7, 2010 and incorporated herein by reference).
10.5	Supply Agreement, dated July 6, 2010, between Vishay Advanced Technology, Ltd. and Vishay Dale Electronics, Inc. (previously filed as an exhibit to the Registrant's Current Report on Form 8-K filed with the SEC on July 7, 2010 and incorporated herein by reference).
10.6*	Patent License Agreement, dated July 6, 2010, between Vishay Precision Group, Inc. and Vishay Dale Electronics, Inc. (previously filed as an exhibit to the Registrant's Current Report on Form 8-K filed with the SEC on July 7, 2010 and incorporated herein by reference).
10.7*	Supply Agreement, dated July 6, 2010, between Vishay Dale Electronics, Inc. and Vishay Advanced Technology, Ltd. (previously filed as an exhibit to the Registrant's Current Report on Form 8-K filed with the SEC on July 7, 2010 and incorporated herein by reference).
10.8*	Lease Agreement, dated July 4, 2010, between Vishay Advanced Technology, Ltd. and V.I.E.C. Ltd. (previously filed as an exhibit to the Registrant's Current Report on Form 8-K filed with the SEC on July 7,

2010 and incorporated herein by reference).

Exhibit No.	Description
10.9*	Supply Agreement, dated July 6, 2010, between Vishay Measurements Group, Inc. and Vishay S.A. (previously filed as an exhibit to the Registrant's Current Report on Form 8-K filed with the SEC on July 7, 2010 and incorporated herein by reference).
10.10*	Manufacturing Agreement, dated July 6, 2010, between Vishay S.A. and Vishay Precision Foil GmbH (previously filed as an exhibit to the Registrant's Current Report on Form 8-K filed with the SEC on July 7, 2010 and incorporated herein by reference).
10.11	Intellectual Property License Agreement, dated July 6, 2010, between Vishay S.A. and Vishay Precision Foil GmbH (previously filed as an exhibit to the Registrant's Current Report on Form 8-K filed with the SEC on July 7, 2010 and incorporated herein by reference).
10.12*	Supply Agreement, dated July 6, 2010, between Vishay Precision Foil GmbH and Vishay S.A. (previously filed as an exhibit to the Registrant's Current Report on Form 8-K filed with the SEC on July 7, 2010 and incorporated herein by reference).
10.13	Intellectual Property License Agreement, dated July 6, 2010, between Vishay S.A. and Vishay Measurements Group, Inc. (previously filed as an exhibit to the Registrant's Current Report on Form 8-K filed with the SEC on July 7, 2010 and incorporated herein by reference).
10.14	Lease Agreement, between Alpha Electronics Corp. and Vishay Japan Co., Ltd. (previously filed as an exhibit to the Registrant's Current Report on Form 8-K filed with the SEC on July 7, 2010 and incorporated herein by reference).
10.15†	Amended and Restated 2010 Vishay Stock Incentive Program, adopted as of June 2, 2011 (previously filed as an exhibit to the Registrant's Current Report on Form 8-K filed with the SEC on June 6, 2011 and incorporated herein by reference).
10.16	Note Instrument, dated July 21, 2010, by Vishay Precision Group, Inc. (previously filed as an exhibit to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2010 and incorporated herein by reference).
10.17	Lease Agreement between Vishay Advanced Technologies Ltd and Mega Or Holdings Ltd, dated February 17, 2019 (previously filed as Exhibit 10.1 to the Registrant's Current Report on Form 8-K filed with the SEC on January 19, 2019 and incorporated herein by reference).
10.18†	Form of Stock Option Award Agreement (previously filed as an exhibit to the Registrant's Quarterly Report on Form 10-Q filed with the SEC on November 12, 2010 and incorporated herein by reference).
10.19†	Form of Restricted Stock Unit Award Agreement for Director Grants (previously filed as an exhibit to the Registrant's Quarterly Report on Form 10-Q filed with the SEC on November 12, 2010 and incorporated herein by reference).
10.20†	Form of Restricted Stock Unit Award Agreement for Employee Grants (previously filed as an exhibit to the Registrant's Quarterly Report on Form 10-Q filed with the SEC on November 12, 2010 and incorporated herein by reference).
10.21†	Employment Agreement, dated November 17, 2010, by and among Vishay Advanced Technology and Ziv Shoshani (previously filed as an exhibit to the Registrant's Current Report on Form 8-K filed with the SEC on November 23, 2010 and incorporated herein by reference).
10.22†	Employment Agreement, dated November 17, 2010, by and among Vishay Precision Group, Inc. and William M. Clancy (previously filed as an exhibit to the Registrant's Current Report on Form 8-K filed with the SEC on November 23, 2010 and incorporated herein by reference).
10.23†	Amendment to Employment Agreement, dated December 8, 2011 by and among Vishay Advanced Technologies, Ltd. and Ziv Shoshani (previously filed as an exhibit to the Registrant's Current Report on Form 8-K filed with the SEC on December 13, 2011 and incorporated herein by reference).
10.24†	Amendment to Employment Agreement, dated December 8, 2011 by and among Vishay Precision Group, Inc. and William M. Clancy (previously filed as an exhibit to the Registrant's Current Report on Form 8-K filed with the SEC on December 13, 2011 and incorporated herein by reference).

10.25†	Form of Performance Restricted Stock Unit Award Agreement for Employee Grants (previously filed as an exhibit to the Registrant's Current Report on Form 10-K filed with the SEC on March 12, 2013 and incorporated herein by reference).
10.26	Lease Agreement, between George Kelk Corporation and Anndale Properties Limited (and its successors), dated January 30, 1996 and as amended as of January 17, 2011 (previously filed as an exhibit to the Registrant's Quarterly Report on Form 10-Q filed with SEC on May 8, 2013 and incorporated herein by reference).
10.27	Vishay Precision Group, Inc. 2010 Stock Incentive Program, as Amended and Restated Effective May 21, 2013 (previously filed as an exhibit to the Registrant's Current Report on Form 8-K filed with the SEC on May 22, 2013 and incorporated herein by reference).

Exhibit No.	Description
10.28†	Amendment to Employment Agreement, dated November 7, 2013 by and among Vishay Advanced Technologies, Ltd. and Ziv Shoshani (previously filed as an exhibit to the Registrant’s Current Report on Form 8-K filed with the SEC on November 12, 2013 and incorporated herein by reference).
10.29†	Amendment to Employment Agreement, dated November 7, 2013 by and among Vishay Precision Group, Inc. and William Clancy (previously filed as an exhibit to the Registrant’s Current Report on Form 8-K filed with the SEC on November 12, 2013 and incorporated herein by reference).
10.30†	Lease agreement, dated January 26, 2014, by and among between Vishay Advanced Technologies, Inc. and Tefen Enterprises Ltd. (previously filed as an exhibit to the Registrant’s Quarterly Report on Form 10-Q filed with the SEC on May 7, 2014 and incorporated herein by reference).
10.31	Stock Purchase Agreement, dated December 14, 2015, by and among VPG Systems U.S., Inc., Stress-Tek, Inc., the shareholders of Stress-Tek, Inc., and Keith Reichow, as Representative (previously filed as an exhibit to the Registrant’s Current Report on Form 8-K filed with the SEC on December 15, 2015 and incorporated herein by reference).
10.32†	Amended and Restated Employment Agreement, dated December 23, 2015, by and among the Company and Thomas Kieffer (previously filed as an exhibit to the Registrant’s Current Report on Form 8-K filed with the SEC on December 29, 2015 and incorporated herein by reference).
10.33	Second Amended and Restated Credit Agreement, dated December 30, 2015, by and among Vishay Precision Group, Inc., Vishay Precision Group Canada ULC, JPMorgan Chase Bank, National Association, as agent, and lenders party thereto (previously filed as an exhibit to the Registrant’s Current Report on Form 8-K filed with the SEC on January 4, 2016 and incorporated herein by reference).
10.34	Stock Purchase Agreement, dated March 30, 2016, by and among Vishay Precision Group, Inc., Pacific Instruments, Inc., the shareholders of Pacific Instruments, Inc., John Hueckel and Norman Hueckel as Owners, and John Hueckel, as Representative (previously filed as an exhibit to the Registrant's Current Report on Form 8-K filed with the SEC on April 5, 2016 and incorporated herein by reference).
10.35†	Form of Indemnification Agreement with directors (previously filed as an exhibit to the Registrant's Quarterly Report on Form 10-Q filed with the SEC on May 11, 2016 and incorporated herein by reference).
10.36†	Employment agreement, dated January 1, 2016, by and among Vishay Precision Group, Inc. and Roland Desilets (previously filed as an exhibit to the Registrants' Quarterly Report on Form 10-Q filed with the SEC on August 10, 2016 and incorporated herein by reference).
10.37	Lease agreement, dated July 7, 2016, by and among between Vishay Advanced Technologies, Ltd. and Marshee Estates & Investments Ltd. (previously filed as an exhibit to the Registrant's Current Report on Form 10-K filed with the SEC on March 16, 2016 and incorporated herein by reference).
10.38	Agreement, dated March 24, 2017, between the Company and Nokomis Capital, L.L.C. (previously filed as Exhibit 10.1 to the Registrant’s Current Report on Form 8-K filed with the SEC on March 27, 2017).
10.39†	Amendment to Employment Agreement, dated May 8, 2017, by and among Vishay Precision Group, Inc. and William M. Clancy (previously filed as Exhibit 10.1 to the Registrant’s Quarterly Report on Form 10-Q filed with the SEC on May 9, 2017 and incorporated herein by reference).
10.40†	Amendment to Employment Agreement, dated May 8, 2017, by and among Vishay Precision Group, Inc. and Roland Desilets (previously filed as Exhibit 10.2 to the Registrant’s Quarterly Report on Form 10-Q filed with the SEC on May 9, 2017 and incorporated herein by reference).
10.41	Amendment, dated July 26, 2017, to that certain letter agreement, dated March 24, 2017, by and among Vishay Precision Group, Inc. and Nokomis Capital, L.L.C. (previously filed as Exhibit 10.1 to the Registrant’s Current Report on Form 8-K filed with the SEC on July 27, 2017).
10.42†	Amendment to Employment Agreement, dated August 7, 2017, by and among Vishay Advanced Technologies, Ltd. and Ziv Shoshani (previously filed as Exhibit 10.1 to the Registrant’s Quarterly Report on Form 10-Q filed with the SEC on August 8, 2017 and incorporated herein by reference).
10.43†	

	Vishay Precision Group, Inc. 2017 Non-Employee Director Compensation Plan (previously filed as Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q filed with the SEC on May 9, 2018 and incorporated herein by reference).
10.44†	Amendment to Employment Agreement, dated May 4, 2018, by and between Vishay Precision Group, Inc. and Roland Desilets (previously filed as Exhibit 10.2 to the Registrant's Quarterly Report on Form 10-Q filed with the SEC on May 9, 2018 and incorporated herein by reference).
10.45†	Amendment to Employment Agreement,dated March 10, 2019, by and among Vishay Advanced Technologies Ltd. and Ziv Shoshani.
10.46†	Amendment to Employment Agreement, dated March 11, 2019, by and among Vishay Precision Group, Inc. and William Clancy.
21.1	List of Subsidiaries.

Exhibit No.	Description
23.1	Consent of Ernst & Young LLP relating to the Registrant's financial statements.
31.1	Certification pursuant to Rule 13a-14(a) or 15d-14(a) under the Securities Exchange Act of 1934, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002 - Ziv Shoshani, Chief Executive Officer.
31.2	Certification pursuant to Rule 13a-14(a) or 15d-14(a) under the Securities Exchange Act of 1934, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002 - William M. Clancy, Chief Financial Officer.
32.1	Certification Pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002 - Ziv Shoshani, Chief Executive Officer.
32.2	Certification Pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002 - William M. Clancy, Chief Financial Officer.
101	Interactive Data File (Annual Report on Form 10-K, for the year ended December 31, 2018, furnished in XBRL (eXtensible Business Reporting Language)).

* Confidential treatment has been accorded to certain portions of this Exhibit. Omitted portions have been filed separately with the Securities and Exchange Commission.

† Denotes a management contract or compensatory plan, contract or arrangement.

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.

	VISHAY PRECISION GROUP, INC.
	By: /s/ Ziv Shoshani
	Ziv Shoshani
Date: March 14, 2019	President and Chief Executive Officer

POWER OF ATTORNEY

Vishay Precision Group, Inc., a Delaware corporation, and each person whose signature appears below constitutes and appoints each of Ziv Shoshani and William M. Clancy, and either of them, such person's true and lawful attorney-in-fact, with full power of substitution and resubstitution, for such person and in such person's name, place and stead, in any and all capacities, to sign on such person's behalf, individually and in each capacity stated below, any and all amendments to this Annual Report on Form 10-K and other documents in connection therewith, and to file the same and all exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact, and each of them, full power and authority to do and perform each and every act and thing necessary or desirable to be done in and about the premises, as fully to all intents and purposes as he or she might or could do in person, thereby ratifying and confirming all that said attorneys-in-fact, or any of them, or their or his or her substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, as amended, this Form 10-K has been signed by the following persons on behalf of the Registrant in the capacities and on the date indicated below.

Signature	Title	Date
/s/ Ziv Shoshani Ziv Shoshani	Chief Executive Officer and Director (Principal Executive Officer)	March 14, 2019
/s/ William M. Clancy William M. Clancy	Executive Vice President & Chief Financial Officer (Principal Financial and Accounting Officer)	March 14, 2019
/s/ Marc Zandman Marc Zandman	Director	March 14, 2019
/s/ Saul V. Reibstein Saul V. Reibstein	Director	March 14, 2019
/s/ Timothy V. Talbert Timothy V. Talbert	Director	March 14, 2019
/s/ Janet Clarke Janet Clarke	Director	March 14, 2019
/s/ Bruce Lerner Bruce Lerner	Director	March 14, 2019
/s/ Wesley Cummins Wesley Cummins	Director	March 14, 2019

Vishay Precision Group, Inc.

Index to Consolidated Financial Statements

Report of Independent Registered Public Accounting Firm
To the Shareholders and the Board of Directors of Vishay Precision Group, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Vishay Precision Group, Inc. (the Company) as of December 31, 2018 and 2017, the related consolidated statements of operations, comprehensive income (loss), equity, and cash flows for each of the three years in the period ended December 31, 2018, and the related notes (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 December 31, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2018, in conformity with 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 December 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 March 14, 2019 expressed an unqualified opinion thereon.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company’s financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB. We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

We have served as the Company’s auditor since 2009

/s/ Ernst & Young LLP
Philadelphia, Pennsylvania

March 14, 2019

VISHAY PRECISION GROUP, INC.
Consolidated Balance Sheets
(In thousands, except share amounts)

	December 31, 2018	December 31, 2017
Assets		
Current assets:		
Cash and cash equivalents	$90,159	$74,292
Accounts receivable, net of allowances for doubtful accounts of $517 and $578, respectively	53,156	46,789
Inventories:		
Raw materials	18,052	16,601
Work in process	22,007	23,160
Finished goods	22,182	20,174
Inventories, net	62,241	59,935
Prepaid expenses and other current assets	9,314	10,299
Total current assets	214,870	191,315
Property and equipment, at cost:		
Land	3,390	3,434
Buildings and improvements	51,055	50,276
Machinery and equipment	105,840	95,158
Software	8,532	7,955
Construction in progress	2,157	2,252
Accumulated depreciation	(111,555)	(103,401)
Property and equipment, net	59,419	55,674
Goodwill	16,141	19,181
Intangible assets, net	17,656	20,475
Other assets	18,297	19,906
Total assets	$326,383	$306,551

Continues on the following page.

VISHAY PRECISION GROUP, INC.
Consolidated Balance Sheets (continued)
(In thousands, except share amounts)

	December 31, 2018	December 31, 2017
Liabilities and equity		
Current liabilities:		
Trade accounts payable	$11,461	$13,678
Payroll and related expenses	17,757	15,892
Other accrued expenses	17,031	15,952
Income taxes	3,879	2,515
Current portion of long-term debt	4,654	3,878
Total current liabilities	54,782	51,915
Long-term debt, less current portion	22,421	28,477
Deferred income taxes	2,200	2,300
Other liabilities	13,545	14,131
Accrued pension and other postretirement costs	14,982	16,424
Total liabilities	107,930	113,247
Commitments and contingencies		
Equity:		
Preferred stock, par value $1.00 per share: authorized - 1,000,000 shares; none issued	—	—
Common stock, par value $0.10 per share: authorized - 25,000,000 shares; 12,449,253 shares outstanding as of December 31, 2018 and 12,266,407 shares outstanding as of December 31, 2017	1,307	1,288
Class B convertible common stock, par value $0.10 per share: authorized - 3,000,000 shares; 1,025,158 shares outstanding as of December 31, 2018 and December 31, 2017	103	103
Treasury stock, at cost - 619,667 shares held at December 31, 2018 and December 31, 2017	(8,765)	(8,765)
Capital in excess of par value	196,666	192,904
Retained earnings	66,569	43,076
Accumulated other comprehensive loss	(37,465)	(35,450)
Total Vishay Precision Group, Inc. stockholders' equity	218,415	193,156
Noncontrolling interests	38	148
Total equity	218,453	193,304
Total liabilities and equity	$326,383	$306,551

See accompanying notes.
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VISHAY PRECISION GROUP, INC.
Consolidated Statements of Operations
(In thousands, except per share amounts)

	Years ended December 31,		
	2018	2017	2016
Net revenues	$299,794	$254,350	$224,929
Costs of products sold	178,527	156,067	142,120
Gross profit	121,267	98,283	82,809
Selling, general, and administrative expenses	80,935	73,751	68,382
Acquisition costs	—	—	494
Impairment of goodwill and indefinite-lived intangibles	2,820	—	—
Restructuring costs	289	2,044	2,666
Operating income	37,223	22,488	11,267
Other income (expense):			
Interest expense	(1,738)	(1,842)	(1,486)
Other	(1,496)	(83)	(174)
Other (expense) income - net	(3,234)	(1,925)	(1,660)
Income before taxes	33,989	20,563	9,607
Income tax expense	10,344	6,169	3,199
Net earnings	23,645	14,394	6,408
Less: net earnings attributable to noncontrolling interests	(1)	49	4
Net earnings attributable to VPG stockholders	$23,646	$14,345	$6,404
Basic earnings per share attributable to VPG stockholders	$1.76	$1.08	$0.49
Diluted earnings per share attributable to VPG stockholders	$1.75	$1.07	$0.48
Weighted average shares outstanding - basic	13,439	13,262	13,187
Weighted average shares outstanding - diluted	13,535	13,471	13,419

See accompanying notes.
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VISHAY PRECISION GROUP, INC.
Consolidated Statements of Comprehensive Income (Loss)
(In thousands)

	Years ended December 31,		
	2018	2017	2016
Net earnings	$23,645	$14,394	$6,408
Other comprehensive loss, net of tax:			
Foreign currency translation adjustment	(3,929)	5,802	(4,488)
Pension and other postretirement actuarial items	1,914	(915)	(2,728)
Other comprehensive income (loss)	(2,015)	4,887	(7,216)
Comprehensive income (loss)	21,630	19,281	(808)
Less: comprehensive income attributable to noncontrolling interests	(1)	49	4
Comprehensive income (loss) attributable to VPG stockholders	$21,631	$19,232	$(812)

See accompanying notes.

VISHAY PRECISION GROUP, INC.
Consolidated Statements of Cash Flows
(In thousands)

	Years ended December 31,		
	2018	2017	2016
Operating activities			
Net earnings	$23,645	$14,394	$6,408
Adjustments to reconcile net earnings to net cash provided by operating activities:			
Impairment of goodwill and indefinite-lived intangibles	2,820	—	—
Depreciation and amortization	10,631	10,626	11,149
(Gain) loss on disposal of property and equipment	(120)	(195)	(823)
Share-based compensation expense	1,799	1,499	37
Inventory write-offs for obsolescence	1,876	2,065	1,755
Deferred income taxes	1,011	1,890	301
Other	819	893	(2,044)
Net changes in operating assets and liabilities, net of acquisition:			
Accounts receivable	(7,757)	(10,537)	1,322
Inventories	(5,095)	(4,307)	(1,968)
Prepaid expenses and other current assets	588	(3,260)	955
Trade accounts payable	(819)	2,009	237
Other current liabilities	5,981	7,652	(5,824)
Net cash provided by operating activities	35,379	22,729	11,505
Investing activities			
Capital expenditures	(14,521)	(6,960)	(10,425)
Proceeds from sale of property and equipment	132	541	4,203
Purchase of business	—	—	(10,626)
Net cash used in investing activities	(14,389)	(6,419)	(16,848)
Financing activities			
Principal payments on long-term debt	(5,603)	(2,628)	(2,133)
Proceeds from revolving facility	22,000	41,000	25,000
Payments on revolving facility	(19,000)	(41,000)	(20,000)
Distributions to noncontrolling interests	(109)	(75)	(15)
Payments of employee taxes on certain share-based arrangements	(801)	(303)	(85)
Net cash (used in) provided by financing activities	(3,513)	(3,006)	2,767
Effect of exchange rate changes on cash and cash equivalents	(1,610)	2,536	(1,613)
Increase (decrease) in cash and cash equivalents	15,867	15,840	(4,189)
Cash and cash equivalents at beginning of year	74,292	58,452	62,641
Cash and cash equivalents at end of year	$90,159	$74,292	$58,452
Supplemental disclosure of investing transactions:			
Capital expenditures purchased	$(13,239)	$(10,092)	$(10,425)
Supplemental disclosure of non-cash financing transactions:			
Conversion of exchangeable notes to common stock	$(2,794)	$(1,303)	$—

See accompanying notes.
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VISHAY PRECISION GROUP, INC.
Consolidated Statements of Equity
(In thousands, except share amounts)

	Common Stock	Class B Convertible Common Stock	Treasury Stock	Capital in Excess of Par Value	Retained Earnings	Accumulated Other Comprehensive Income (Loss)	Total VPG Inc. Stockholders Equity	Noncontrolling Interests	Total Equity
Balance at January 1, 2016	$ 1,276	$ 103	$ (8,765)	$ 190,436	$ 22,327	$ (33,121)	$ 172,256	$ 185	$ 172,441
Net loss	—	—	—	—	6,404	—	6,404	4	6,408
Other comprehensive loss	—	—	—	—	—	(7,216)	(7,216)	—	(7,216)
Share-based compensation expense	—	—	—	37	—	—	37	—	37
Restricted stock issuances (22,871 shares)	2	—	—	(100)	—	—	(98)	—	(98)
Distributions to noncontrolling interests	—	—	—	—	—	—	—	(15)	(15)
Balance at December 31, 2016	$ 1,278	$ 103	$ (8,765)	$ 190,373	$ 28,731	$ (40,337)	$ 171,383	$ 174	$ 171,557
Net earnings	—	—	—	—	14,345	—	14,345	49	14,394
Other comprehensive loss	—	—	—	—	—	4,887	4,887	—	4,887
Share-based compensation expense	—	—	—	1,499	—	—	1,499	—	1,499
Restricted stock issuances (41,322 shares)	4	—	—	(265)	—	—	(261)	—	(261)
Common stock issuance from conversion of exchangeable notes (57,729 shares)	6	—	—	1,297	—	—	1,303	—	1,303
Distributions to noncontrolling interests	—	—	—	—	—	—	—	(75)	(75)
Balance at December 31, 2017	$ 1,288	$ 103	$ (8,765)	$ 192,904	$ 43,076	$ (35,450)	$ 193,156	$ 148	$ 193,304
Net earnings	—	—	—	—	23,646	—	23,646	(1)	23,645
Other comprehensive income	—	—	—	—	—	(2,015)	(2,015)	—	(2,015)
Share-based compensation	—	—	—	1,799	—	—	1,799	—	1,799

expense									
Restricted stock issuances (59,038 shares)	7	—	—	(819)	—	—	(812)	—	(812)
Common stock issuance from conversion of exchangeable notes (123,808 shares)	12	—	—	2,782	—	—	2,794	—	2,794
Cumulative effect adjustment for adoption of ASU 2016-16	—	—	—	—	(153)	—	(153)	—	(153)
Distributions to noncontrolling interests	—	—	—	—	—	—	—	(109)	(109)
Balance at December 31, 2018	$ 1,307	$ 103	$ (8,765)	$ 196,666	$ 66,569	$ (37,465)	$ 218,415	$ 38	$ 218,453

See accompanying notes.
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Vishay Precision Group, Inc.
Notes to Consolidated Financial Statements
Note 1 – Background and Summary of Significant Accounting Policies
Background
Vishay Precision Group, Inc. (“VPG” or the “Company”) is an internationally recognized designer, manufacturer and marketer of sensors, and sensor-based measurement systems, as well as specialty resistors and strain gages based upon the Company's proprietary technology. The Company provides precision products and solutions, many of which are “designed-in” by its customers, specializing in the growing markets of stress, force, weight, pressure, and current measurements.
Principles of Consolidation
The consolidated financial statements include the accounts of the individual entities in which the Company maintained a controlling financial interest. For those subsidiaries in which the Company’s ownership is less than 100 percent, the outside stockholders’ interests are shown as noncontrolling interests in the accompanying consolidated balance sheets. All transactions, accounts, and profits between individual members comprising the Company have been eliminated in consolidation.
Use of Estimates
The preparation of financial statements in conformity with accounting principles generally accepted in the United States requires management to make estimates and assumptions that affect the amounts reported in the consolidated financial statements and accompanying notes. Actual results could differ significantly from those estimates.
Revenue Recognition
Revenue is recognized when obligations under the terms of a contract with our customer are satisfied, which generally occurs with the transfer of control of our products. For certain contracts with post-shipment obligations, revenue is recognized when the post-shipment obligation is satisfied. Revenue is measured as the amount of consideration expected to be received in exchange for transferring goods or providing post-shipment obligations. Sales, value add and other taxes collected concurrent with revenue-producing activities are excluded from revenue. Given the specialized nature of the Company's products, the Company generally does not allow product returns. Shipping and handling costs are recorded to Costs of product sold when control of the product has transferred to the customer. The Company offers standard product warranties. Warranty related costs continue to be recognized as expense when the products are sold.
Research and Development Expenses
Research and development costs are expensed as incurred. The amount charged to expense for research and development was $11.8 million, $11.7 million, and $11.1 million for the years ended December 31, 2018, 2017, and 2016, respectively.
Income Taxes
The Company accounts for income taxes under the asset and liability method, which requires the recognition of deferred tax assets and liabilities for the expected future tax consequences of events that have been included in the financial statements. Under this method, deferred tax assets and liabilities are determined based on the difference between the financial statement and tax basis of assets and liabilities using enacted tax rates in effect for the year in which the differences are expected to reverse. The effect of a change in tax rates on deferred tax assets and liabilities is recognized in income tax expense in the period that includes the enactment date.
The Company records net deferred tax assets to the extent it believes such assets will "more likely than not" be realized. In making this determination, the Company considers all positive and negative evidence, including historic earnings, projected future income, and cost-effective tax-planning strategies. When the Company determines that its ability to realize deferred tax assets is not "more likely than not", the Company adjusts its deferred tax asset valuation allowance, which increases income tax expense.
The Company records uncertain tax positions on the basis of a two-step process in which the Company first determines whether it is "more likely than not" that the tax positions will be sustained based on the technical merits of the position and then measures those tax positions that meet the more-likely-than-not recognition threshold. The Company recognizes the largest amount of tax benefit that is greater than 50 percent likely to be realized upon ultimate settlement with the tax authority.

Note 1 – Background and Summary of Significant Accounting Policies (continued)

The Company recognizes interest and penalties related to unrecognized tax benefits within income tax expense in the accompanying consolidated statements of operations. Accrued interest and penalties are included within the related tax liability line in the consolidated balance sheets.

On December 22, 2017, the SEC staff issued SAB 118 to address the application of U.S. GAAP in situations when a registrant does not have all the necessary information available to prepare and analyze the accounting treatment for the proper recognition of the tax impact of the 2017 Tax Act. In accordance with SAB 118 guidance, the Company had recorded the provisional tax impacts related to the deemed distribution of foreign earnings and the expense for the revaluation of deferred tax assets and liabilities in its consolidated financial statements for the year ended December 31, 2017. In accordance with SAB 118, the financial reporting impact of the 2017 Tax Act was completed in the fourth quarter of 2018 resulting in a net increase in tax expense of $0.8 million.

Cash and Cash Equivalents

Cash and cash equivalents include demand deposits and highly liquid investments with original maturities of three months or less when purchased. Highly liquid investments with maturities greater than three months are classified as short-term investments. There were no investments classified as short-term investments at December 31, 2018 or 2017.

Allowance for Doubtful Accounts

The Company maintains an allowance for doubtful accounts for estimated losses resulting from the inability of its customers to make required payments. The allowance is determined through an analysis of the aging of accounts receivable and assessments of risk that are based on historical trends and an evaluation of the impact of current and projected economic conditions. The Company evaluates the past-due status of its trade receivables based on contractual terms of sale. If the financial condition of the Company’s customers were to deteriorate, resulting in an impairment of their ability to make payments, additional allowances may be required. The allowance for doubtful accounts was $0.5 million and $0.6 million at December 31, 2018 and 2017, respectively. Bad debt expense was $0.0 million, $0.1 million, and $0.2 million for the years ended December 31, 2018, 2017, and 2016, respectively.

Inventories

Inventories are stated at the lower of cost, determined by the first-in, first-out method, or market based on net realizable value. Inventories are adjusted for estimated excess and obsolescence and written down to net realizable value based upon estimates of future demand, technology developments, and market conditions.

Property and Equipment

Property and equipment is carried at cost and is depreciated principally by the straight-line method based upon the estimated useful lives of the assets. Machinery and equipment are being depreciated over useful lives of seven to ten years. Buildings and building improvements are being depreciated over useful lives of twenty to forty years or the lease term. Software is being depreciated over useful lives of three to five years. Construction in progress is not depreciated until the assets are placed in service. Depreciation expense was $8.9 million, $8.7 million, and $9.3 million for the years ended December 31, 2018, 2017, and 2016, respectively, which included software depreciation expense of $0.5 million, $0.5 million, and $0.6 million for the years ended December 31, 2018, 2017, and 2016, respectively.

Business Combinations

The Company allocates the purchase price of an acquired company, including when applicable, the fair value of contingent consideration between tangible and intangible assets acquired and liabilities assumed from the acquired businesses based on estimated fair values, with any residual of the purchase price recorded as goodwill. Third party appraisal firms and other consultants are engaged to assist management in determining the fair values of certain assets acquired and liabilities assumed. Estimating fair values requires significant judgments, estimates and assumptions, including but not limited to: discount rates, future cash flows and the economic lives of trade names, technology, customer relationships, property, plant and equipment, as well as income taxes. These estimates are based on historical experience and information obtained from the management of the acquired companies, and are inherently uncertain.

Goodwill and Other Intangible Assets

Goodwill and indefinite-lived trademarks are tested for impairment at least annually, and whenever events or changes in circumstances occur indicating that it is "more likely than not" impairment may have been incurred. We have the option to first assess qualitative factors to determine whether it is "more likely than not" that the fair value of a reporting unit is less than its carrying amount as a basis for determining if it is necessary to perform the quantitative goodwill impairment test. However, if we conclude otherwise, then we are required to perform the quantitative impairment test by calculating the fair value of the reporting

Note 1 – Background and Summary of Significant Accounting Policies (continued)

unit and comparing it against its carrying amount. We estimate the fair value of our reporting units by considering both an income approach and a market approach to valuation. The income approach to valuation uses our estimates of the future cash flows of the reporting unit discounted to their net present value using a discount rate determined using the capital asset pricing model and adjusted for the forecast risk inherent in our projections of future cash flows. The income approach to valuation is dependent on inputs from management such as expected revenue growth, profitability, capital expenditures, and working capital requirements. The market approach to valuation uses the market capitalization of public companies similar to the reporting unit to calculate an implied EBITDA multiple, and we apply that calculated EBITDA multiple to the expected EBITDA of the reporting unit to estimate the fair value of the reporting unit, after consideration of appropriate control premiums. We weigh the results of the income approach and the market approach to arrive at the estimated fair value of the reporting unit. If the fair value exceeds the carrying value, no further evaluation is required and no impairment loss is recognized. An impairment charge would be recognized to the extent the carrying amount of goodwill exceeds the reporting unit fair value.

The Company's required goodwill annual impairment test is completed as of the first day of the fourth fiscal quarter each year. As more fully described in Note 4 to the consolidated financial statements, the 2018 annual impairment test resulted in an impairment charge in the fourth quarter of 2018. The 2017 and 2016 annual impairment tests resulted in no impairment.

The indefinite-lived trade names are tested for impairment by comparing the carrying value to the fair value based on current revenue projections of the related operations, under the relief from royalty method. Any excess carrying value over the applicable fair value is recognized as impairment. Any impairment would be recognized in the reporting period in which it has been identified. As more fully described in Note 4, the 2018 annual impairment test resulted in the Company recording an impairment charge in the fourth quarter of 2018. The 2017 and 2016 annual impairment tests resulted in no impairment.

Definite-lived intangible assets, such as customer relationships, patents and acquired technology, non-competition agreements, and certain trade names are amortized on a straight-line method over their estimated useful lives. Patents and acquired technology are being amortized over useful lives of seven to twenty years. Customer relationships are being amortized over useful lives of five to fifteen years. Trade names are being amortized over useful lives of seven to ten years. Non-competition agreements are being amortized over periods of five to ten years. The Company continually evaluates the reasonableness of the useful lives of these assets. Additionally, the Company reviews the carrying values of these assets for possible impairment whenever events or changes in circumstances indicate that the carrying value of the asset may not be recoverable based on undiscounted estimated cash flows expected to result from its use and eventual disposition.

Impairment of Long-Lived Assets

The carrying value of long-lived assets held-and-used, other than goodwill and indefinite-lived intangible assets, is evaluated when events or changes in circumstances indicate the carrying value may not be recoverable. The carrying value of a long-lived asset group is considered impaired when the total projected undiscounted cash flows from such asset group are separately identifiable and are less than the carrying value. In that event, a loss is recognized based on the amount by which the carrying value exceeds the fair market value of the long-lived asset group. Fair market value is determined primarily using present value techniques based on projected cash flows from the asset group. Losses on long-lived assets held-for-sale, other than goodwill and indefinite-lived intangible assets, are determined in a similar manner, except that fair market values are reduced for disposal costs.

Foreign Currency Translation

The Company has significant operations outside of the United States. The Company's operations in Europe, Canada, and certain locations in Asia primarily generate and expend cash in local currencies, and accordingly, these subsidiaries utilize the local currency as their functional currency. The Company’s operations in Israel and certain locations in Asia primarily generate cash in U.S. dollars, and accordingly, these subsidiaries utilize the U.S. dollar as their functional currency.

For those subsidiaries where the local currency is the functional currency, assets and liabilities in the consolidated balance sheets have been translated at the rate of exchange as of the balance sheet date. Revenues and expenses are translated at the average exchange rate for the year. Translation adjustments do not impact the consolidated statements of operations and are reported as a separate component of accumulated other comprehensive loss within the statement of comprehensive income. Foreign currency transaction gains and losses are included in the results of operations.

For those foreign subsidiaries where the U.S. dollar is the functional currency, all foreign currency financial statement amounts are remeasured into U.S. dollars. Exchange gains and losses arising from remeasurement of foreign currency-denominated monetary assets and liabilities are included in the consolidated statements of operations.

Note 1 – Background and Summary of Significant Accounting Policies (continued)

Share-Based Compensation

Compensation costs related to share-based payments are recognized in the consolidated financial statements. The amount of compensation cost is measured based on the grant-date fair value of the equity instruments issued. Compensation cost is recognized over the period that an officer, employee, or non-employee director provides service in exchange for the award. The Company recognizes forfeitures as they occur. For performance based awards, the Company recognizes compensation cost for awards that are expected to vest based on whether performance criteria are expected to be met. For options and restricted stock units subject to graded vesting, the Company recognizes expense over the service period for each separately vesting portion of the award as if the award was comprised of multiple awards.

Reclassifications

Certain prior year amounts have been reclassified to conform to the current financial statement presentation.

Commitments and Contingencies

Liabilities for loss contingencies arising from claims, assessments, litigation, fines, penalties, and other sources are recorded when it is probable that a liability has been incurred and the amount of the assessment and/or remediation can be reasonably estimated.

Recently Adopted Accounting Pronouncements

In May 2014, the Financial Accounting Standards Board ("FASB") issued Accounting Standards Update ("ASU") No. 2014-09 "Revenue from Contracts with Customers," and modified the standard thereafter. The objective of the ASU is to establish a single comprehensive model for entities to use in accounting for revenue arising from contracts with customers that will supersede most current revenue recognition guidance. The basis of the guidance is that an entity should recognize revenue to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods and services. The Company adopted this standard as of January 1, 2018 using the modified retrospective method. See Note 2 to the consolidated financial statements for additional details.

In August 2016, the FASB issued ASU No. 2016-15, "Classification of Certain Cash Receipts and Cash Payments." This ASU is intended to clarify the presentation of certain cash receipts and payments within the statement of cash flows. The Company adopted this standard effective January 1, 2018 and it did not have a material impact on the consolidated financial statements.

In October 2016, the FASB issued ASU No. 2016-16, "Intra-Entity Transfers of Assets Other Than Inventory." This ASU requires entities to recognize the income tax consequences of an intra-entity transfer of an asset other than inventory when the transfer occurs. The income tax consequences from the sale of inventory from one member of the consolidated entity to another will continue to be deferred until the inventory is sold to a third party. The Company's adoption of this standard on January 1, 2018 resulted in a $0.2 million cumulative effect adjustment to the 2018 beginning retained earnings.

In January 2017, the FASB issued ASU No. 2017 01, "Clarifying the Definition of a Business." This ASU provides a more robust framework to determine when a set of assets and activities constitutes a business. The Company adopted this standard effective January 1, 2018 and it did not have a material impact on the consolidated financial statements.

In January 2017, the FASB issued ASU No. 2017 04, "Simplifying the Test for Goodwill Impairment." This ASU eliminates the requirement to calculate the implied fair value of goodwill (second step) to measure a goodwill impairment charge. Under the guidance, an impairment charge will be measured based on the excess of the reporting unit's carrying amount over its fair value (first step). The Company early adopted this standard effective September 30, 2018, the date of the Company's annual impairment test for 2018. The Company's annual goodwill impairment test resulted in an impairment charge of $2.5 million utilizing the guidance in this ASU. See Note 4 to the consolidated financial statements for additional details.

In March 2017, the FASB issued ASU No. 2017-07, “Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost." This ASU requires the service cost component of net periodic benefit cost to be presented in the same income statement line item as other employee compensation costs. All other components of the net periodic benefit cost are presented outside of operating income. The Company adopted the new standard as of January 1, 2018 and recorded the non-service cost component of $1.7 million to Other income (expense) - other for the year ended December 31, 2018. Additionally, the non-service cost component of $0.9 million and $0.6 million was reclassified from Operating income to Other income (expense) - other for the years ended December 31, 2017 and 2016, respectively.

In May 2017, the FASB issued ASU No. 2017-09, “Scope of Modification Accounting." This ASU clarifies which changes to the terms or conditions of a share-based payment award will require modification accounting. The Company adopted this standard effective January 1, 2018 and it did not have a material impact on the consolidated financial statements.

Note 1 – Background and Summary of Significant Accounting Policies (continued)

Recent Accounting Pronouncements

In August 2018, the FASB issued ASU No. 2018-14, "Disclosure Framework - Changes to the Disclosure Requirements for Defined Benefit Plans." This ASU amends Accounting Standards Codification ("ASC") 715 to add, remove and clarify disclosure requirements related to defined benefit and pension and other postretirement plans. The amendments in this ASU are effective for annual periods beginning after December 15, 2020 and early adoption is permitted. The Company is evaluating the standard to determine the impact on the consolidated financial statements.

In August 2018, the FASB issued ASU No. 2018-13, "Fair Value Measurements (Topic 820)." This ASU modifies the disclosures on fair value measurements by removing the requirements to disclose the amount and reasons for transfers between Level 1 and Level 2 of the fair value hierarchy and the policy for timing of such transfers. The ASU expands the disclosure requirements for Level 3 fair value measurements, primarily focused on changes in unrealized gains and losses included in other comprehensive income. The amendments in this ASU are effective for interim and annual reporting periods beginning after December 15, 2019 and early adoption is permitted. The Company is evaluating the standard to determine the impact on the consolidated financial statements.

In January 2018, the FASB issued ASU No. 2018-02, "Income Statement - Reporting Comprehensive Income (Topic 220): Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income." This ASU gives entities the option to reclassify to retained earnings the tax effects resulting from the Tax Cuts and Jobs Act ("2017 Tax Act") related to items in accumulated other comprehensive income ("AOCI") that the FASB refers to as having been stranded in AOCI. The new guidance may be applied retrospectively to each period in which the effect of the 2017 Tax Act is recognized in the period of adoption. The Company must adopt this guidance for fiscal years beginning after December 15, 2018 and interim periods within those fiscal years. Early adoption is permitted for periods for which financial statements have not yet been issued or made available for issuance, including the period during which the 2017 Tax Act was enacted. The guidance, when adopted, will require new disclosures regarding a company’s accounting policy for releasing the tax effects in AOCI and permit the company the option to reclassify to retained earnings the tax effects resulting from the 2017 Tax Act that are stranded in AOCI. The Company is evaluating the standard to determine the impact on the consolidated financial statements.

In February 2016, the FASB issued ASU No. 2016-02, “Leases (Topic 842),” a comprehensive new lease standard that amends various aspects of existing accounting guidance for leases. The core principle of this ASU will require lessees to present the assets and liabilities that arise from leases on their balance sheets. The ASU is effective for public companies for annual periods beginning after December 15, 2018, and interim periods within those fiscal years. The Company adopted this ASU effective January 1, 2019 using a modified retrospective approach through a cumulative-effect adjustment to retained earnings as of the beginning of the period of adoption. The Company anticipates the adoption of the new standard will result in establishing approximately $10.5 million to $11.5 million of lease assets and liabilities on our consolidated balance sheet. The Company does not expect the adoption to have a material impact to its consolidated statement of operations or consolidated statement of cash flows.

Note 2 – Revenues

On January 1, 2018, the Company adopted ASC 606 using the modified retrospective method. As a result of the adoption, there was no cumulative effect adjustments. The Company has determined that the impact of adoption of ASC 606 does not have a material impact on the timing or amount of revenue that we recognize based on our business activities existing at the date of adoption.

The following table disaggregates net revenue by geographic region from contracts with customers based on net revenues generated by subsidiaries within that geographic location (in thousands):

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Note 2 – Revenues (continued)

	Year Ended December 31, 2018			
	Foil Technology Products	Force Sensors	Weighing and Control Systems	Total
United States	$61,132	$39,955	$ 23,818	$124,905
United Kingdom	3,666	11,787	14,296	29,749
Other Europe	31,431	10,678	18,741	60,850
Israel	11,028	517	—	11,545
Asia	33,752	10,249	7,442	51,443
Canada	—	—	21,302	21,302
	$141,009	$73,186	$ 85,599	$299,794

	Year Ended December 31, 2017			
	Foil Technology Products	Force Sensors	Weighing and Control Systems	Total
United States	$52,032	$34,108	$ 19,523	$105,663
United Kingdom	3,173	12,187	11,127	26,487
Other Europe	26,322	8,793	17,312	52,427
Israel	6,673	635	—	7,308
Asia	28,073	9,723	7,288	45,084
Canada	—	—	17,381	17,381
	$116,273	$65,446	$ 72,631	$254,350

	Year Ended December 31, 2016			
	Foil Technology Products	Force Sensors	Weighing and Control Systems	Total
United States	$47,414	$30,082	$ 18,423	$95,919
United Kingdom	3,770	12,232	10,843	26,845
Other Europe	22,969	8,087	15,345	46,401
Israel	4,719	751	27	5,497
Asia	22,070	9,082	3,731	34,883
Canada	—	—	15,384	15,384
	$100,942	$60,234	$ 63,753	$224,929

The following table disaggregates net revenue by market sector(in thousands):

	Years Ended December 31,		
	2018	2017	2016
Test & Measurement	$76,735	$64,798	$53,691
Avionics, Military & Space	26,743	22,378	19,801
Medical	9,868	8,769	8,459
Precision Weighing	93,734	81,439	84,455
Force Measurement	66,551	53,503	39,975
Steel	26,163	23,463	18,548
	$299,794	$254,350	$224,929

Arrangements with Multiple Performance Obligations

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Note 2 – Revenues (continued)

Contracts with our customers can include multiple performance obligations. For such arrangements, we allocate revenues to each performance obligation based on its relative standalone selling price which is determined based on the prices charged to customers when sold on a standalone basis.

Contract Assets & Liabilities

Contract assets are established when revenues are recognized prior to a contractual payment due from the customer. When a payment becomes due based on the contract terms, the Company will reduce the contract asset and record a receivable. Contract liabilities are deferred revenues that are recorded when cash payments are received or due in advance of our performance obligations. Our payment terms vary by the type and location of the products offered. The term between invoicing and when payment is due is not significant.

The outstanding contract assets and liability accounts were as follows (in thousands):

	Contract Asset	Contract Liability
	Unbilled Revenue	Accrued Customer Advances
Balance at December 31, 2017	$ 824	$ 3,229
Balance at December 31, 2018	$ 964	$ 5,328
Increase	$ 140	$ 2,099

The amount of revenue recognized during the year ended December 31, 2018 that was included in the contract liability balance at December 31, 2017 was $3.0 million.

Practical Expedients

The Company does not disclose the value of unsatisfied performance obligations for contracts that have a duration of one year or less and for contracts that are substantially complete. The Company treats shipping and handling activities as fulfillment costs.

Note 3 – Acquisition Activity

Pacific Instruments, Inc.

On April 6, 2016, the Company completed the acquisition of Pacific Instruments, Inc. ("Pacific") for an aggregate purchase price of $10.6 million. Pacific is a designer and manufacturer of high-performance data acquisition systems and has extensive experience integrating these systems. Pacific sells primarily to the aerospace, commercial aviation and defense markets in the United States. Pacific provides installation, facility integration, training, and on-going technical support for their manufactured products. Pacific products expanded the offerings of our Foil Technology Products reporting segment, which already offered data acquisition systems, primarily instruments in the field of strain measurement. The following table summarizes the fair values assigned to the assets and liabilities of Pacific as of April 6, 2016 (in thousands):

Note 3 – Acquisition Activity (continued)

Working capital [(a)]	$921
Property and equipment	26
Long-term deferred income tax liability	(1,903)
Intangible assets:	
Patents and acquired technology	1,300
Non-competition agreements	40
Customer relationships	3,500
Trade names	700
Total intangible assets	5,540
Fair value of acquired identifiable assets and liabilities	4,584
Purchase price	$10,626
Goodwill	$6,042

(a) Working capital accounts include accounts receivable, inventory, prepaid expenses and other current assets, trade accounts payable, accrued payroll, income taxes payable, and other accrued expenses.

The weighted average useful lives for the patents and acquired technology, non-competition agreements, and customer relationships are 20 years, 6.5 years, and 15 years, respectively. None of the goodwill associated with this transaction is deductible for income tax purposes.

The Company recorded acquisition costs associated with this transaction in its consolidated statements of operation as follows (in thousands):

	Year ended December 31, 2016
Accounting and legal fees	$ 369
Appraisal fees	41
Other	21
	$ 431

Stress-Tek, Inc.

On December 30, 2015, the Company completed the acquisition of Stress-Tek, Inc. ("Stress-Tek"), based in Kent, Washington, for an aggregate purchase price of $20.1 million. Stress-Tek is a designer and manufacturer of state-of-the-art, rugged and reliable strain gage-based load cells and force measurement systems primarily servicing the North American market. Their sensors and display systems are used in a wide range of industries, predominantly in transportation and trucking, for timber, refuse, aggregate, mining, and general trucking applications. Stress-Tek adds new products to the Company's Weighing and Control Systems reporting segment which enhances and broadens the Company's on-board weighing offerings with products that are recognized for high quality in their markets.

Note 3 – Acquisition Activity (continued)

The following table summarizes the fair values assigned to the assets and liabilities as of the December 30, 2015 acquisition date (in thousands):

Working capital [(a)]	$2,564
Property and equipment	6,338
Intangible assets:	
Patents and acquired technology	1,600
Non-competition agreements	60
Customer relationships	2,500
Trade names	700
Total intangible assets	4,860
Fair value of acquired identifiable assets	13,762
Purchase price	$20,073
Goodwill	$6,311

(a) Working capital accounts include cash, accounts receivable, inventory, prepaid expenses and other current assets, trade accounts payable, accrued payroll, and other accrued expenses.

The weighted average useful lives for the patents and acquired technology, non-competition agreements, and customer relationships are 20, 5, and 15 years, respectively. Most of the goodwill associated with this transaction will be deductible for income tax purposes.

The Company recorded acquisition costs associated with this transaction in its consolidated statements of operations as follows (in thousands):

	Year ended December 31, 2016
Accounting and legal fees	$ 51
Appraisal fees	12
Other	—
	$ 63

Note 4 – Goodwill and Other Intangible Assets

The Company performed the first step of the impairment test as of the first day of the fiscal 2018 fourth quarter by calculating the fair value of the reporting units and comparing it against its carrying amount. The Company estimated the fair value of its reporting units by considering both an income approach and a market approach to valuation. The income approach to valuation used the Company’s estimates of the future cash flows of the reporting unit discounted to their net present value applying a discount rate determined using the capital asset pricing model and adjusted for the forecast risk inherent in the Company’s projections of future cash flows. The income approach to valuation is dependent on inputs from management such as expected revenue growth, profitability, capital expenditures and working capital requirements. The market approach to valuation used the market capitalization of public companies similar to the reporting unit to calculate an implied EBITDA multiple. The Company applied that calculated EBITDA multiple to the expected EBITDA of the reporting unit to estimate the fair value of the reporting unit. Both of these approaches to estimating the fair value of the unit use inputs that are considered “Level 3” inputs to the fair value estimate (see Note 15 for a definition of Level 3 valuation inputs within the fair value hierarchy). The Company equally weighted the results of the income approach and the market approach to arrive at the estimated fair value of the reporting units.

After completing the impairment test, the Company determined that the carrying value of the instrumentation reporting unit

Note 4 – Goodwill and Other Intangible Assets (continued)

exceeded the fair value and recorded an impairment charge of $2.5 million. The impairment was primarily from lower margins on the forecasted projections due to product mix related to the Pacific acquisition. The impairment test for the remaining reporting units resulted in the fair value exceeding the carrying value, passing the quantitative impairment test. The Company's analysis in 2017 and 2016 resulted in the fair value exceeding the carrying value for all reporting units.

The determination of the fair value of the reporting unit and the allocation of that value to individual assets and liabilities within the reporting unit requires the Company to make significant estimates and assumptions. These estimates and assumptions include the selection of appropriate peer group companies, control premiums appropriate for acquisitions in the industries in which the Company competes, the discount rate, terminal growth rates, and forecasts of revenue, operating income, depreciation and amortization, and capital expenditures.

Due to the inherent uncertainty involved in making these estimates, actual financial results could differ from those estimates. Changes in assumptions concerning future financial results or other underlying assumptions could have a significant impact on either the fair value of the reporting unit or the amount of the goodwill impairment charges.

The change in the carrying amount of goodwill by segment is as follows (in thousands):

	Total	Weighing and Control Systems Segment		Foil Technology Products Segment
		KELK Acquisition	Stress-Tek Acquisition	Pacific Instruments
Balance at January 1, 2017	18,717	6,364	6,311	6,042
Foreign currency translation adjustment	464	464	—	—
Balance at December 31, 2017	19,181	6,828	6,311	6,042
Impairment charges	(2,500)	—	—	(2,500)
Foreign currency translation adjustment	(540)	(540)	—	—
Balance at December 31, 2018	16,141	6,288	6,311	3,542

Intangible assets were as follows (in thousands):

	December 31, 2018	December 31, 2017
Intangible assets subject to amortization (Definite-lived):		
Patents and acquired technology	$9,067	$9,439
Customer relationships	20,941	21,810
Trade names	1,674	1,693
Non-competition agreements	11,820	12,084
	43,502	45,026
Accumulated amortization:		
Patents and acquired technology	(4,103)	(3,839)
Customer relationships	(10,399)	(9,657)
Trade names	(1,674)	(1,688)
Non-competition agreements	(11,748)	(11,850)
	(27,924)	(27,034)
Net intangible assets subject to amortization	$15,578	$17,992

Intangible assets not subject to amortization (Indefinite-lived):

Trade names	2,078	2,483
	$17,656	$20,475

Note 4 – Goodwill and Other Intangible Assets (continued)

Certain intangible assets are subject to foreign currency translation.
The Company performed an impairment test on the indefinite-lived trade names as of the first day of the fiscal 2018 fourth quarter and determined there was an impairment and recorded an impairment charge of $0.3 million related to the Pacific acquisition. The impairment was primarily from lower margins on the forecasted projections due to product mix. The value of the trade names was determined using an income approach, where the Company estimated the future cash flows associated with the trade names and discounted those cash flows back to their net present value. Due to the decline in cash flows as a result of the lower margins, the Company reduced the royalty rate, under the relief of royalty method, when performing the income approach valuation.

The Company's annual impairment test on the indefinite-lived trade names in 2017 and 2016 resulted in no impairment.
Amortization expense was $1.7 million, $1.9 million, and $1.8 million, for the years ended December 31, 2018, 2017, and 2016, respectively.
Estimated annual amortization expense for each of the next five years is as follows (in thousands):

2019	$1,530
2020	1,499
2021	1,450
2022	1,449
2023	1,349

Note 5 – Restructuring Costs
Restructuring costs reflect the cost reduction programs implemented by the Company. Restructuring costs are expensed during the period in which the Company determines it will incur those costs and all requirements for accrual are met. Because these costs are recorded based upon estimates, actual expenditures for the restructuring activities may differ from the initially recorded costs. If the initial estimates are too low or too high, the Company could be required to either record additional expense in future periods or to reverse part of the previously recorded charges.
The Company recorded restructuring costs of $0.3 million, $2.0 million, and $2.7 million during the years ended December 31, 2018, 2017, and 2016, respectively. Restructuring costs were comprised primarily of employee termination costs, including severance and statutory retirement allowances, and were incurred in connection with various cost reduction programs.
The following table summarizes the activity to date related to these programs. The accrued restructuring liability balance as of December 31, 2018 and 2017, respectively, is included in other accrued expenses in the accompanying consolidated balance sheets (in thousands):

	December 31,		
	2018	2017	2016
Balance at beginning of year	$254	$1,333	$2,827
Restructuring charges	289	2,044	2,666
Cash payments	(384)	(3,122)	(4,152)
Foreign currency translation	—	(1)	(8)
Balance at end of year	159	254	1,333

Note 6 – Income Taxes

For financial reporting purposes, income before taxes includes the following components (in thousands):

	Years ended December 31,		
	2018	2017	2016
Domestic	$(7,897)	$(3,552)	$(5,285)
Foreign	41,886	24,115	14,892
	$33,989	$20,563	$9,607

The expense (benefit) for income taxes is comprised of (in thousands):

	Years ended December 31,		
	2018	2017	2016
Current:			
Federal	$189	$(425)	$(18)
State and local	162	89	30
Foreign	8,982	4,615	2,886
	9,333	4,279	2,898
Deferred:			
Federal	197	(257)	(1,176)
State and local	(35)	(1)	(9)
Foreign	849	2,148	1,486
	1,011	1,890	301
Total income tax expense	$10,344	$6,169	$3,199

A reconciliation of income tax expense (benefit) at the U.S. federal statutory income tax rate to the actual income tax provision is as follows (in thousands):

	Years ended December 31,		
	2018	2017	2016
Tax at statutory rate	$7,138	$7,197	$3,362
State income taxes, net of U.S. federal tax benefit	89	93	(15)
Effect of foreign operations	611	(1,137)	(1,418)
Change in valuation allowance	498	(397)	1,266
Change in unrecognized tax benefits, net	258	105	(899)
Impairment of goodwill	525	—	—
Specialty tax credits	(295)	(139)	(78)
Statutory rate changes	272	(470)	(180)
Effect of foreign exchange	321	(1,292)	88
Prior period deferred tax adjustments	—	—	817
2017 Tax Act:			
Effects of U.S. tax reform	(135)	11,311	—
Change in valuation allowance	945	(9,093)	—
Other	117	(9)	256
Total income tax expense	$10,344	$6,169	$3,199

Note 6 – Income Taxes (continued)

On December 22, 2017, the Tax Cuts and Jobs Act ("2017 Tax Act") was enacted. The 2017 Tax Act significantly changed U.S. tax law by, among other things, lowering the corporate tax rate, implementing a modified territorial tax system, and imposing a one-time transition tax on post 1986 undistributed foreign earnings as of December 31, 2017. The 2017 Tax Act permanently reduces the U.S. tax rate from a maximum of 35% to a flat 21%, effective January 1, 2018. Under U.S. GAAP, changes in tax rates and tax law are accounted for in the period of enactment and deferred tax assets and liabilities are measured at the enacted tax rate expected to apply to taxable income in the years in which the temporary differences are expected to recover or be settled.

Also on December 22, 2017, the SEC staff issued SAB 118 which provides for a measurement period of one year from the enactment date to finalize the accounting for effects of the 2017 Tax Act. Consistent with that guidance, the Company had provisionally determined the tax cost of the one-time transition tax under the 2017 Tax Act to be approximately $2.2 million. This amount included the tax benefit from the net operating loss of approximately $3.9 million. As a result of the implementation of a modified territorial tax system, the Company reassessed its assertion with respect to certain subsidiaries that the earnings of those subsidiaries are indefinitely reinvested and in 2017 recorded a deferred tax liability of $1.8 million withholding tax associated with a planned cash distribution of approximately $25.5 million of previously unremitted earnings. The deferred tax liability of $1.8 million was included in the provisional tax of $2.2 million for 2017. As of December 31, 2018, the remaining planned cash distribution amount is approximately $17.5 million with a remaining deferred tax liability of approximately $1.6 million. In accordance with SAB 118, the financial reporting impact of the 2017 Tax Act was completed in the fourth quarter of 2018 resulting in a net $0.8 million increase in tax expense caused by a decrease in the transition tax and an increase in the valuation allowance.

The 2017 Tax Act subjects a U.S. shareholder to tax on global intangible low-taxed income (“GILTI”) earned by certain foreign subsidiaries. The FASB Staff Q&A, Topic 740, No. 5, Accounting for Global Intangible Low-Taxed Income, states that an entity can make an accounting policy election to either recognize deferred taxes for temporary basis differences expected to reverse as GILTI in the future years or provide for tax expense related to GILTI in the year the tax is incurred. The Company has elected to recognize tax expense related to GILTI in the year the tax is incurred.

For the year-ended December 31, 2018, the Company recognized approximately $15.6 million of GILTI income. The U.S. tax on the GILTI income was fully offset by foreign tax credits associated with GILTI and U.S. operating losses exclusive of GILTI. Any excess foreign tax credits associated with GILTI are lost and cannot be carried forward to future years. The Company would have generated a net operating loss for U.S. federal income tax purposes but for the effects of the GILTI provision. The state tax treatment of GILTI is still evolving as not all states have provided guidance on how they will treat GILTI income. Our current treatment of GILTI may change as additional guidance is provided.

Deferred income taxes represent the net tax effects of temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes and the amounts for income tax purposes.
Significant components of the Company’s deferred tax assets and liabilities are as follows (in thousands):

Note 6 – Income Taxes (continued)

	December 31,	
	2018	2017
Deferred tax assets:		
Pension and other postretirement costs	$3,600	$4,295
Inventories	2,103	1,800
Net operating/capital loss carryforwards	9,536	9,523
Tax credit carryforwards	748	—
Deferred compensation	2,009	2,142
Other accruals and reserves	3,547	3,192
Book over tax depreciation	12	—
Total gross deferred tax assets	21,555	20,952
Less: valuation allowance	(14,455)	(12,434)
	7,100	8,518
Deferred tax liabilities:		
Tax over book depreciation	—	(125)
Investment in subsidiary	(1,983)	(2,214)
Intangible assets, including tax deductible goodwill	(884)	(713)
Total gross deferred tax liabilities	(2,867)	(3,052)
Net deferred tax assets	$4,233	$5,466

In 2015, the Company established a valuation allowance with respect to substantially all of its U.S. deferred tax assets due to uncertainty regarding the realization of these assets. Throughout 2017 and 2018, the Company reassessed its ability to realize its U.S. and other deferred tax assets by considering both positive and negative evidence regarding realization. The most significant negative evidence is continuing cumulative operating losses in the U.S. The impact of the acquisitions of Stress-Tek and Pacific was also considered in determining the realization of the U.S. deferred tax assets. The Pacific acquisition resulted in the establishment of deferred tax liabilities which allowed the Company to adjust its previously established valuation allowance by $1.6 million. Other aspects, such as operating results, additional interest expense and additional tax deductions related to the Stress-Tek acquisition, were also considered. The Company also considered positive evidence such as tax planning strategies and the projected benefits of our restructuring efforts. However, there was insufficient positive evidence to overcome the negative evidence.

Overall, the cumulative losses and the acquisition impacts still indicate that realization of our U.S. deferred tax assets remains uncertain such that the Company cannot conclude that it is "more likely than not" that the deferred tax assets will be recoverable. We will continue to monitor the realization of U.S. deferred tax assets and reduce the valuation allowance if, and when, sufficient positive evidence of realization exists. At December 31, 2018 and 2017, the valuation allowance on U.S. deferred tax assets was approximately $12.3 million and $10.1 million, respectively. The net change in valuation allowance was approximately $2.2 million.

The valuation allowance related to state taxes was $1.0 million and $2.1 million expense for the years ended December 31, 2018 and 2017, respectively. Of the total $2.1 million expense, $1.0 million related to the 2017 Tax Act.

The Company also has valuation allowances of $2.2 million and $2.3 million at December 31, 2018 and 2017, respectively, with respect to certain foreign net operating loss and capital loss carryforwards. The valuation allowance related to Israel capital losses was reduced during 2016 as a result of the sale of the Karmiel facility because the sale triggered a capital gain.

Note 6 – Income Taxes (continued)

Significant valuation allowances are as follows (in thousands):

	December 31,	
Jurisdiction	2018	2017
U.S. federal	$4,240	$3,040
U.S. state (net of U.S. federal tax benefit)	8,057	7,092
Israel - capital losses	1,457	1,622

The following table summarizes significant net operating losses and credit carryforwards as of December 31, 2018 (in thousands):

Jurisdiction	December 31, 2018	Expiring
U.S. foreign tax credit	748	2024-2028
U.S state net operating losses	85,137	2022-2038
Israel net operating losses	3,202	No expiration

Undistributed earnings of the Company’s foreign subsidiaries amounted to approximately $143.0 million at December 31, 2018 compared to $112.1 million at December 31, 2017. As a result of the 2017 Tax Act, in 2017 the Company had provided for a deferred tax liability of approximately $1.8 million of withholding tax associated with a planned cash distribution of approximately $25.5 million. As of December 31, 2018, other than the planned cash distribution of $17.5 million, substantially all of the remaining undistributed earnings are considered to be indefinitely reinvested and accordingly no provision has been made with respect to these earnings for incremental foreign income taxes, state income taxes or foreign withholding taxes. If those earnings were distributed to the U.S., the Company could be subject to incremental foreign income taxes, state income taxes, and withholding taxes. Determination of the amount of unrecognized deferred tax liability is not practicable because of the uncertainty regarding the timing of any such distribution and the impact on existing valuation allowances. In addition to the $1.8 million, additional withholding taxes of approximately $17.6 million are estimated to be payable upon remittance of the remaining previously unremitted earnings as of December 31, 2018.

Net income taxes paid were $7.3 million, $4.1 million, and $3.9 million for the years ended December 31, 2018, 2017, and 2016, respectively.

The Company and its subsidiaries are subject to income taxes imposed by the U.S., various states, and the foreign jurisdictions in which we operate. Each jurisdiction establishes rules that set forth the years which are subject to examination by its tax authorities. While the Company believes the tax positions taken on its tax returns for each jurisdiction are supportable, they may still be challenged by the jurisdiction's tax authorities. In anticipation of such challenges, the Company has established reserves for tax-related uncertainties. These liabilities are based on the Company’s best estimate of the potential tax exposures in each respective jurisdiction. It may take a number of years for a final tax liability in a jurisdiction to be determined, particularly in the event of an audit. If an uncertain matter is determined favorably, there could be a reduction in the Company’s tax expense. An unfavorable determination could increase tax expense and could require a cash payment, including interest and penalties.

Note 6 – Income Taxes (continued)

The following table summarizes changes in the Company's gross liabilities, excluding interest and penalties, associated with unrecognized tax benefits (in thousands):

	December 31,		
	2018	2017	2016
Balance at beginning of year	$823	$772	$1,506
Addition based on tax positions related to current year	189	163	63
Addition based on tax positions related to prior years	182	—	66
Reduction based on tax positions related to prior years	(98)	(12)	—
Addition related to acquired company	—	—	297
Currency translation adjustments	(28)	14	16
Reduction for settled tax examinations	—	—	(906)
Reduction for lapses of statute of limitations	(156)	(114)	(270)
Balance before indemnification receivable	912	823	772
Receivable from Vishay Intertechnology for indemnification	—	(12)	(57)
Balance at end of year	$912	$811	$715

The Company recognizes accrued interest and penalties related to unrecognized tax benefits as a component of income tax expense. Related to the unrecognized tax benefits noted above, the Company accrued total penalties and interest of $0.1 million as of December 31, 2018, none of which was included in the indemnification receivable. As of December 31, 2017 and December 31, 2016, the Company accrued total penalties and interest of $0.1 million and $0.3 million, respectively.

Included in the balance of unrecognized tax benefits as of December 31, 2018, 2017, and 2016 is $0.9 million, $0.8 million, and $0.7 million, respectively, of tax benefits that, if recognized, would impact the effective tax rate. The Company believes that it is reasonably possible that an increase in unrecognized tax benefits related to foreign exposures of between $0.1 million and $0.2 million may be necessary in 2019. As of December 31, 2018, the Company anticipates that it is reasonably possible that it will reverse up to $0.2 million of its current unrecognized tax benefits within the calendar year due to the expiration of the statute of limitations in certain jurisdictions. In addition, the Company believes it is reasonably possible that it may pay up to $0.2 million to tax authorities to settle current unrecognized tax benefits within the next year. None of the unrecognized tax benefits the Company expects to reverse in 2019 due to statute lapses are covered by the Tax Matters Agreement.

The Company and its subsidiaries file U.S. federal income tax returns, as well as income tax returns in various state, local, and foreign jurisdictions. The Company files federal, state, and local income tax returns on a combined, unitary, or stand-alone basis. The statute of limitations in those jurisdictions generally ranges from 3 to 4 years. Additionally, the Company's foreign subsidiaries file income tax returns in the countries in which they have operations and the statutes of limitations in those jurisdictions generally range from 3 to 10 years.

During the fourth quarter of 2018, the Company concluded a tax examination in Germany for one of its subsidiaries, covering the years 2015 and 2016. The conclusion of the tax examination resulted in no significant change in tax. During the fourth quarter of 2017, the Company concluded a tax examination in Japan for one of its subsidiaries, covering the years 2014 through 2016. The conclusion of the tax examination resulted in no significant change in tax. During 2016, the Company concluded a tax examination in Israel for the years 2012-2014.

The Company is subject to ongoing income tax audits, administrative appeals and judicial proceedings in India spanning a number of years.

Note 7 – Long-Term Debt

Long-term debt consists of the following (in thousands):

	December 31,	
	2018	2017
2015 Credit Agreement - Revolving Facility	$12,000	$9,000
2015 Credit Agreement - U.S. Closing Date Term Facility	2,967	3,664
2015 Credit Agreement - U.S. Delayed Draw Term Facility	7,253	8,956
2015 Credit Agreement - Canadian Term Facility	4,798	7,880
Exchangeable Unsecured Notes, due 2102	—	2,794
Other debt	279	401
Deferred financing costs	(222)	(340)
	27,075	32,355
Less: current portion	4,654	3,878
	$22,421	$28,477

2015 Credit Agreement

On December 30, 2015, the Company entered into a Second Amended and Restated Credit Agreement (the “2015 Credit Agreement”) among the Company, VPG Canada, the lenders, Citizens Bank, National Association and Wells Fargo Bank, National Association as joint book-runners and JPMorgan Chase Bank, National Association as agent for such lenders (the “Agent”), pursuant to which the terms of the Company’s multi-currency, secured credit facility were revised and expanded to provide for the following facilities: (1) a secured revolving facility (the “2015 Revolving Facility”) in an aggregate principal amount of $30.0 million, with a sublimit of $10.0 million which can be used for letters of credit for the account of the Company or its U.S. and Canadian subsidiaries, the proceeds of which may be used for working capital and general corporate purposes, and a portion of which was used to fund the Stress-Tek and Pacific acquisitions; (2) a secured closing date term facility for the Company (the “2015 U.S. Closing Date Term Facility”) in an aggregate principal amount of $4.5 million, the proceeds of which were used by the Company to refinance indebtedness under its existing term loan; (3) a secured delayed draw term facility for the Company (the "2015 U.S. Delayed Draw Term Facility") in an aggregate principal amount of $11.0 million, the proceeds of which were used to fund a portion of the Stress-Tek acquisition; and (4) a secured term facility for VPG Canada (the “2015 Canadian Term Facility”) in an aggregate principal amount of $9.5 million, the proceeds of which were used by VPG Canada to refinance indebtedness under its existing term loan. The aggregate principal amount of the 2015 Revolving Facility may be increased by a maximum of $15.0 million upon the request of the Company, subject to the terms of the 2015 Credit Agreement. The 2015 Credit Agreement terminates on December 30, 2020. The term loans are being repaid in quarterly installments.

Interest payable on amounts borrowed under the 2015 Revolving Facility, the 2015 U.S. Closing Date Term Facility, the 2015 U.S. Delayed Draw Term Facility, and the 2015 Canadian Term Facility (collectively, the “Facilities”) is based upon, at the Company’s option, (1) the greatest of: the Agent’s prime rate, the Federal Funds rate, or a LIBOR floor (the “Base Rate”), or (2) LIBOR plus a specified margin. An interest margin of 0.25% is added to Base Rate loans. Depending upon the Company’s leverage ratio, an interest rate margin ranging from 2.00% to 3.50% per annum is added to the applicable LIBOR rate to determine the interest payable on the Facilities. The Company is required to pay a quarterly commitment fee of 0.30% per annum to 0.50% per annum on the unused portion of the 2015 Revolving Facility, which is determined based on the Company’s leverage ratio each quarter. Additional customary fees apply with respect to letters of credit. The total interest rates at December 31, 2018 and December 31, 2017, were 4.82% and 4.19%, respectively, for the 2015 Revolving and U.S. Delayed Draw Term Facilities and 4.82% and 4.19%, respectively, for the 2015 U.S. Closing Date Term and 2015 Canadian Term Facilities.

The obligations of the Company and VPG Canada under the 2015 Credit Agreement are secured by pledges of stock in certain domestic and foreign subsidiaries, as well as guarantees by substantially all of the Company’s domestic subsidiaries and of the Company (with respect to the 2015 Canadian Term Facility). The obligations of the Company and the guarantors under the 2015 Credit Agreement are secured by substantially all the assets (excluding real estate) of the Company and such guarantors. The 2015 Canadian Term Facility is secured by substantially all the assets of VPG Canada and by a secured guarantee by the Company and its domestic subsidiaries. The 2015 Credit Agreement restricts the Company from paying cash dividends and requires the Company to comply with other customary covenants, representations, and warranties, including the maintenance of specific financial ratios. The financial maintenance covenants include a tangible net worth ratio, a leverage ratio, and a fixed charges coverage ratio. The Company was in compliance with its financial maintenance covenants at December 31, 2018. If the Company is not in compliance

Note 7 – Long-Term Debt (continued)

with any of these covenant restrictions, the credit facility could be terminated by the lenders, and all amounts outstanding pursuant to the credit facility could become immediately payable.

Other Lines of Credit

In addition to the 2015 Revolving Facility discussed above, certain subsidiaries of the Company had committed short-term lines of credit with a foreign bank aggregating approximately $3.0 million and $3.0 million at December 31, 2018 and 2017, respectively. The Company had outstanding letters of credit under these short-term lines of credit of $0.9 million and $1.2 million at December 31, 2018 and 2017, respectively.

Exchangeable Unsecured Notes, due 2102

By reason of the spin-off, Vishay Intertechnology was required to take action so that the existing exchangeable notes of Vishay Intertechnology were deemed exchanged as of the date of the spin-off, for a combination of new notes of Vishay Intertechnology and notes issued by VPG. VPG assumed the liability for an aggregate $10.0 million principal amount of exchangeable notes effective July 6, 2010. The maturity date of the notes was December 13, 2102. Effective February 26, 2018, the holder of the Company's exchangeable notes exercised its option to exchange the remaining $2.8 million principal amount of the notes for 123,808 shares of VPG common stock at the contractual put/call rate of $22.57 per share. Following these transactions, all exchangeable notes have been canceled and VPG has no further obligations pursuant to such notes. (See also Note 13).

Other Debt

Other debt consists of debt held by VPG’s Japanese subsidiary and is payable monthly over the next 3 years at a zero percent interest rate.

Aggregate annual maturities of long-term debt are as follows (in thousands):

2019	$4,654
2020	22,626
2021	17
2022	—
2023	—
Thereafter	—

Interest paid on third-party debt was $1.6 million, $1.7 million, and $1.3 million during the years ended December 31, 2018, 2017, and 2016, respectively.

Note 8 – Stockholders’ Equity

The Company’s Class B convertible common stock carries ten votes per share. The common stock carries one vote per share. Class B shares are transferable only to certain permitted transferees while the common stock is freely transferable. Class B shares are convertible on a one-for-one basis at any time into shares of common stock. Transfers of Class B shares other than to permitted transferees result in the automatic conversion of the Class B shares into common stock.

The Board of Directors may only declare dividends or other distributions with respect to the common stock or the Class B convertible common stock if it grants such dividends or distributions in the same amount per share with respect to the other class of stock. As discussed in Note 7, the Company is restricted from paying cash dividends. Stock dividends or distributions, on any class of stock, are payable only in shares of stock of that class. Shares of either common stock or Class B convertible common stock cannot be split, divided, or combined unless the other is also split, divided, or combined equally.

The Board of Directors is authorized, without further stockholder approval, to issue from time to time up to an aggregate of 1,000,000 shares of preferred stock in one or more series. The Board of Directors may fix or alter the designation, preferences, rights and any qualification, limitations, restrictions of the shares of any series, including the dividend rights, dividend rates, conversion rights, voting rights, redemption terms and prices, liquidation preferences and the number of shares constituting any series. No shares of the Company’s preferred stock are currently outstanding.

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Note 8 – Stockholders' Equity (continued)

Other Comprehensive Income (Loss)

The cumulative balance of each component of other comprehensive income (loss) and the income tax effects allocated to each component are as follows (in thousands):

	Beginning Balance	Before-Tax Amount	Tax Effect	Net-of-Tax Amount	Ending Balance
December 31, 2016					
Pension and other postretirement actuarial items	$(4,417)	$ (3,505)	$544	$ (2,961)	$(7,378)
Reclassification adjustment for recognition of actuarial items		271	(38)	233	233
Foreign currency translation adjustment	(28,704)	(4,488)	—	(4,488)	(33,192)
	$(33,121)	$ (7,722)	$506	$ (7,216)	$(40,337)
December 31, 2017					
Pension and other postretirement actuarial items	$(7,145)	$ (1,465)	$112	$ (1,353)	$(8,498)
Reclassification adjustment for recognition of actuarial items		583	(145)	438	438
Foreign currency translation adjustment	(33,192)	5,654	148	5,802	(27,390)
	$(40,337)	$ 4,772	$115	$ 4,887	$(35,450)
December 31, 2018					
Pension and other postretirement actuarial items	$(8,060)	$ 1,392	$(18)	$ 1,374	$(6,686)
Reclassification adjustment for recognition of actuarial items		685	(145)	540	540
Foreign currency translation adjustment	(27,390)	(3,857)	(72)	(3,929)	(31,319)
	$(35,450)	$ (1,780)	$(235)	$ (2,015)	$(37,465)

Reclassifications of pension and other postretirement actuarial items out of accumulated other comprehensive income (loss) are included in the computation of net periodic benefit cost (see Note 9).

Note 9 – Pensions and Other Postretirement Benefits

Defined Benefit Plans

Employees of the Company participate in various defined benefit pension and other postretirement benefit plans.

U.S. Pension Plan

The Vishay Precision Group Non-Qualified Retirement Plan, like all nonqualified plans, is considered to be unfunded. The Company maintains a nonqualified trust, referred to as a "rabbi" trust, to fund benefits under this plan. Rabbi trust assets are subject to creditor claims under certain conditions and are not the property of employees. Therefore, they are accounted for as other noncurrent assets within the consolidated balance sheets. The assets held in the rabbi trust are invested in money market funds and company-owned life insurance policies. The consolidated balance sheets include assets held in trust related to the nonqualified pension plan of $1.6 million at December 31, 2018 and $1.7 million at December 31, 2017, and the related liabilities of $2.2 million and $2.3 million at December 31, 2018 and 2017, respectively.

The Vishay Precision Group Non-Qualified Retirement Plan is frozen. Accordingly, no new employees may participate in the plan, no further participant contributions are permitted, and no further benefits accrue. Benefits accumulated prior to the freezing of the U.S. pension plan will be paid to employees upon retirement, and the Company will likely need to make additional cash contributions to the rabbi trust to fund this accumulated benefit obligation.

Non-U.S. Pension Plans

The Company provides pension and similar benefits to employees of certain non-U.S. subsidiaries consistent with local practices. Pension benefits earned are generally based on years of service and compensation during active employment.

In 2018, the Company undertook several measures to de-risk the UK pension plan. The first measure was to freeze the plan, with no new participants permitted and no further benefits accrue. The second measure was to execute an enhanced transfer value

Note 9 – Pensions and Other Postretirement Benefits (continued)

exercise to transfer pension benefits outside of the plan. As s result, the Company incurred $0.7 million related to these de-risking measures.

Other Postretirement Benefit Plans

In the U.S., the Company maintains two unfunded non-pension other postretirement benefit plans (“OPEB”) which are funded as costs are incurred. These plans provide medical and death benefits to retirees.

The following table sets forth a reconciliation of the benefit obligation, plan assets, and funded status related to pension and other postretirement benefit plans (in thousands):

	December 31, 2018		December 31, 2017	
	Pension Plans	OPEB Plans	Pension Plans	OPEB Plans
Change in benefit obligation:				
Benefit obligation at beginning of year	$28,617	$4,726	$25,187	$3,833
Service cost (adjusted for actual employee contributions)	477	108	513	96
Interest cost	686	152	674	142
Contributions by participants	21		35	—
Actuarial (gains) losses	(1,568)	(97)	673	900
Benefits paid	(1,042)	(244)	(564)	(245)
Curtailments and settlements	(3,362)	—	—	—
Plan amendments and other	1,107	—	—	—
Currency translation	(1,014)	—	2,099	—
Benefit obligation at end of year	$23,922	$4,645	$28,617	$4,726
Change in plan assets:				
Fair value of plan assets at beginning of year	$17,454	$—	$14,553	$—
Actual return on plan assets	(343)	—	957	—
Company contributions	1,495	244	1,013	245
Contributions by participants	21	—	35	—
Benefits paid	(1,042)	(244)	(564)	(245)
Curtailments and settlements	(2,429)	—	—	—
Plan amendments and other	202	—	—	—
Currency translation	(857)	—	1,460	—
Fair value of plan assets at end of year	$14,501	$—	$17,454	$—
Funded status at end of year	$(9,421)	$(4,645)	$(11,163)	$(4,726)

Amounts recognized in the consolidated balance sheets consist of the following pre-tax amounts (in thousands):

	December 31, 2018		December 31, 2017	
	Pension Plans	OPEB Plans	Pension Plans	OPEB Plans
Accrued pension and other postretirement costs	$(9,421)	$(4,645)	$(11,163)	$(4,726)

Unrecognized actuarial gains and losses arise from several factors, including experience and assumption changes with respect to the obligations and from the difference between expected returns and actual returns on plan assets. Actuarial items consist of the following (in thousands):

Note 9 – Pensions and Other Postretirement Benefits (continued)

	December 31, 2018		December 31, 2017	
	Pension Plans	OPEB Plans	Pension Plans	OPEB Plans
Unrecognized net actuarial loss	$5,237	$2,095	$8,169	$2,370
Unrecognized prior service cost	9	—	2	—
Unamortized transition obligation	2	—	3	—
	$5,248	$2,095	$8,174	$2,370

The following table sets forth additional information regarding the projected and accumulated benefit obligations for the pension plans (in thousands):

	December 31,	
	2018	2017
Accumulated benefit obligation, all plans	$23,040	$26,907
Plans for which the accumulated benefit obligation exceeds plan assets:		
Projected benefit obligation	$22,552	$27,317
Accumulated benefit obligation	22,155	26,074
Fair value of plan assets	13,256	16,274

Unrecognized gains and losses are amortized into future net periodic pension cost using the 10% corridor method over the expected remaining service life of the employee group. The following table sets forth the components of net periodic cost of pension and other postretirement benefit plans (in thousands):

	Years ended December 31,					
	2018		2017		2016	
	Pension Plans	OPEB Plans	Pension Plans	OPEB Plans	Pension Plans	OPEB Plans
Annual service cost	$498	$ 108	$548	$ 96	$445	$ 100
Less: employee contributions	21	—	35	—	42	—
Net service cost	477	108	513	96	403	100
Interest cost	686	152	674	142	784	130
Expected return on plan assets	(549)	—	(536)	—	(630)	—
Amortization of actuarial losses	507	177	463	119	192	75
Amortization of transition obligation	1	—	1	—	5	—
Curtailment and settlement losses	708	—	—	—	—	—
Net periodic benefit cost	$1,830	$ 437	$1,115	$ 357	$754	$ 305

See Note 8 for the pre-tax, tax effect, and after tax amounts included in other comprehensive income during the years ended December 31, 2018, 2017, and 2016. The estimated actuarial items that will be amortized from accumulated other comprehensive loss into net periodic pension cost during 2019 is $0.4 million.

The following weighted-average assumptions were used to determine benefit obligations at December 31 of the respective years:

	2018		2017	
	Pension Plans	OPEB Plans	Pension Plans	OPEB Plans
Discount rate	2.61%	3.99%	2.42%	3.33%
Rate of compensation increase	3.08%	N/A	2.66%	N/A
Expected return on plan assets	2.70%	N/A	3.46%	N/A

Note 9 – Pensions and Other Postretirement Benefits (continued)

The following weighted-average assumptions were used to determine the net periodic pension costs for the years ended December 31, 2018 and 2017:

	2018		2017	
	Pension Plans	OPEB Plans	Pension Plans	OPEB Plans
Discount rate	2.42 %	3.33 %	2.59 %	3.77 %
Rate of compensation increase	2.66 %	N/A	2.63 %	N/A
Expected return on plan assets	3.46 %	N/A	4.49 %	N/A
Health care trend rate	N/A	17.25 %	N/A	6.36 %

The health care trend ultimate rate is 4.00% per the terms of the plan. The impact of a one-percentage-point change in assumed health care cost trend rates on the net periodic benefit cost and postretirement benefit obligation is not material.

The plans' expected return on assets is based on management's expectation of long-term average rates of return to be achieved by the underlying investment portfolios. In establishing this assumption, management considers historical and expected returns for the asset classes in which the plans are invested, advice from pension consultants and investment advisors, and current economic and capital market conditions.

The investment mix between equity securities and fixed income securities is based upon achieving a desired return, balancing higher return, more volatile equity securities, and lower return, less volatile fixed income securities. The target allocation of plan assets approximates the actual allocation of plan assets at December 31, 2018 and 2017.

Plan assets are comprised of:

	December 31, 2018		December 31, 2017	
	Pension Plans	OPEB Plans	Pension Plans	OPEB Plans
Equity securities	50 %	—	53 %	—
Fixed income securities	37 %	—	38 %	—
Cash and cash equivalents	13 %	—	9 %	—
Total	100 %	—	100 %	—

The Company maintains defined benefit retirement plans in certain of its subsidiaries. The assets of the plans are measured at fair value.

Equity securities held by the defined benefit retirement plans consist of equity securities that are valued based on quoted market prices on the last business day of the year. The fair value measurement of the equity securities is considered a Level 1 measurement within the fair value hierarchy.

Fixed income securities held by the defined benefit retirement plans consist of government bonds and corporate notes that are valued based on quoted market prices on the last business day of the year. The fair value measurement of the fixed income securities is considered a Level 1 measurement within the fair value hierarchy.

Cash held by the defined benefit retirement plans consists of deposits on account in various financial institutions. The carrying amount of the cash approximates its fair value. A summary of the Company's pension plan assets for each fair value hierarchy level are as follows for the periods presented (see Note 15 for further description of the levels within the fair value hierarchy (in thousands)):

Note 9 – Pensions and Other Postretirement Benefits (continued)

As of December 31, 2018	Total Fair Value	Fair value measurements at reporting date using: Level 1 Inputs	Level 2 Inputs	Level 3 Inputs
Defined benefit pension plan assets				
Equity securities	$7,221	$7,221	$ —	$ —
Fixed income securities	5,309	5,309	—	—
Cash and cash equivalents	1,971	1,971	—	—
	$14,501	$14,501	$ —	$ —

As of December 31, 2017	Total Fair Value	Fair value measurements at reporting date using: Level 1 Inputs	Level 2 Inputs	Level 3 Inputs
Defined benefit pension plan assets				
Equity securities	$9,271	$9,271	$ —	$ —
Fixed income securities	6,629	6,629	—	—
Cash and cash equivalents	1,554	1,554	—	—
	$17,454	$17,454	$ —	$ —

Estimated future benefit payments are as follows (in thousands):

	Pension Plans	OPEB Plans
2019	$ 757	$ 272
2020	572	345
2021	673	434
2022	662	418
2023	1,048	336
2024 - 2027	4,142	1,704

The Company anticipates making contributions to its funded and unfunded pension and postretirement benefit plans of approximately $1.3 million during 2019.

Other Retirement Obligations

The Company participates in various other defined contribution and government-mandated retirement plans based on local law or custom. The Company periodically makes required contributions for certain of these plans. At December 31, 2018 and 2017, the consolidated balance sheets include $1.3 million and $1.2 million, respectively, within accrued pension and other postretirement costs related to these plans.

Most of the Company’s U.S. employees are eligible to participate in 401(k) savings plans which provide company matching under various formulas. The Company’s matching expense for the plans was $0.7 million, $0.7 million, and $0.7 million for the years ended December 31, 2018, 2017, and 2016, respectively. No material amounts are included in the consolidated balance sheets related to unfunded 401(k) contributions.

Certain key employees participate in a nonqualified deferred compensation plan, which allows these employees to defer a portion of their compensation until retirement, or elect shorter deferral periods. The accompanying consolidated balance sheets include a liability within other noncurrent liabilities related to these deferrals. The Company maintains a nonqualified trust, referred to as a “rabbi” trust, to fund payments under this plan. Rabbi trust assets are subject to creditor claims under certain conditions and are not the property of employees. Therefore, they are accounted for as other noncurrent assets within the consolidated balance sheets. The assets held in the rabbi trust are invested in money market funds and company-owned life insurance policies. The consolidated balance sheets include assets held in trust related to the nonqualified deferred compensation plan of $3.1 million at December 31, 2018 and $3.3 million at December 31, 2017, and the related liabilities of $4.2 million and $4.4 million at December 31, 2018 and 2017, respectively.

Note 10 – Share-Based Compensation

The Amended and Restated Vishay Precision Group, Inc. Stock Incentive Plan (as amended and restated, the "Plan") permits the issuance of up to 1,000,000 shares of common stock. At December 31, 2018, the Company had reserved 413,234 shares of common stock for future grant of equity awards (restricted stock, unrestricted stock, restricted stock units ("RSUs"), or stock options). If any outstanding awards are forfeited by the holder, the underlying shares would be available for future grants under the Plan.

Stock Options

In connection with the spin-off, VPG agreed to issue certain replacement awards to VPG employees holding equity-based awards of Vishay Intertechnology based on VPG's common stock. The vesting schedule, expiration date, and other terms of these awards are generally the same as those of the Vishay Intertechnology equity-based awards they replaced.

As of December 31, 2016, there were 18,000 options outstanding at a weighted average exercise price of $18.92. The fair value of those option awards was estimated on the date of grant using the Black-Scholes option-pricing model. No options were exercised during the year ended December 31, 2017, and the options expired. There were no options granted in 2018, 2017, or 2016.

Restricted Stock Units

Pursuant to the Plan, the Company issued RSUs to board members, executive officers, and certain employees of the Company during 2018. The amount of compensation cost related to share-based payment transactions is measured based on the grant-date fair value of the equity instruments issued. VPG determines compensation cost for RSUs based on the grant-date fair value of the underlying common stock. Compensation cost is recognized over the period that the participant provides service in exchange for the award. The Company recognizes compensation cost for RSUs that are expected to vest and for which performance criteria are expected to be met.

On February 16, 2018, VPG's three executive officers were granted annual equity awards in the form of RSUs, of which 75% are performance-based. The awards have an aggregate target grant-date fair value of $1.3 million were comprised of 52,166 RSUs. Twenty-five percent of these awards will vest on January 1, 2021, subject to the executives' continued employment. The performance-based portion of the RSUs will also vest on January 1, 2021, subject to the executives' continued employment and the satisfaction of certain performance objectives relating to three-year cumulative "free cash" and net earnings goals, each weighted equally. The awards issued in 2017 and 2016 have similar allocations and vesting criteria.

On March 21, 2018, certain VPG employees were granted annual equity awards in the form of RSUs, of which 75% are performance-based. The awards have an aggregate target grant-date fair value of $0.4 million and were comprised of 13,215 RSUs. Twenty-five percent of these awards will vest on January 1, 2021 subject to the employees' continued employment. The performance-based portion of the RSUs will also vest on January 1, 2021, subject to the employee's continued employment and the satisfaction of certain performance objectives relating to three-year cumulative earnings goals and cash flow goals.

On May 17, 2018, the Board of Directors approved the issuance of an aggregate of 9,294 RSUs to the independent board members of the Board of Directors and to the non-executive Chairman of the Board of Directors. The awards have an aggregate grant-date fair value of $0.3 million and will vest on the earlier of the Annual Stockholders meeting or May 17, 2019, subject to the directors' continued service on the Board of Directors.

RSU activity is presented below (number of RSUs in thousands):

	Years ended December 31,					
	2018		2017		2016	
	Number of RSUs	Weighted Average Grant-date Fair Value	Number of RSUs	Weighted Average Grant-date Fair Value	Number of RSUs	Weighted Average Grant-date Fair Value
Outstanding:						
Beginning of year	417	$ 14.57	377	$ 14.04	278	$ 15.04
Granted	74	28.20	98	16.75	129	11.69
Vested	(86)	16.75	(58)	14.78	(30)	13.15

Forfeited	(140)	14.70	—	—	—	—
End of year	265	$ 17.64	417	$ 14.57	377	$ 14.04

Note 10 – Share-Based Compensation (continued)

The fair value of the RSUs vested during 2018 is $2.7 million. Included in the 2018 activity are RSU's forfeited as a result of performance objectives not being met. These awards are therefore available for future grants under the Plan. RSUs with performance-based vesting criteria are expected to vest as follows (number of RSUs in thousands):

Vesting Date	Expected to Vest	Not Expected to Vest	Total
January 1, 2019	33	51	84
January 1, 2020	55	3	58
January 1, 2021	47	2	49

Share-Based Compensation Expense

The following table summarizes pre-tax share-based compensation expense recognized (in thousands):

	Years ended December 31,		
	2018	2017	2016
Restricted stock units	$1,799	$1,499	$ 37

Share-based compensation expense is recognized ratably over the vesting period of the awards and for RSUs with performance criteria, is recognized for RSU's that are expected to vest and for which performance criteria are expected to be met.

During 2017, it was determined that certain performance objectives associated with awards granted in 2015 were likely to be met, when share based compensation expense related to these performance objectives had been reduced in prior years. This necessitated an increase to share-based compensation expense associated with those awards in 2017. However, it was also determined that certain performance objectives associated with awards granted in 2016 and 2017 were not likely to be fully met, necessitating a reversal of certain compensations expense associated with those awards. As a net result, adjustments increasing share based compensation expense totaling $0.4 million were recorded during the year based on anticipated performance levels..

During 2016, it was determined that certain performance objectives associated with awards granted in 2014, 2015, and 2016 to executives and certain other employees were not likely to be fully met. As a result, adjustments reducing share-based compensation expense totaling $1.4 million were recorded during the year based on anticipated performance levels.

The deferred tax benefit on share-based compensation expense was $0.0 million, $0.1 million, and $0.0 million for the years ended December 31, 2018, 2017, and 2016, respectively.

As of December 31, 2018, the Company had $1.7 million of unrecognized share-based compensation expense related to share-based awards that will be recognized over a weighted-average period of approximately 1.6 years.

Note 11 – Commitments, Contingencies, and Concentrations

Leases

The Company uses various leased facilities and equipment in its operations. In the normal course of business, operating leases are generally renewed or replaced by other leases. Certain operating leases include escalation clauses. Total rental expense under operating leases was $3.6 million, $3.6 million, and $3.6 million for the years ended December 31, 2018, 2017, and 2016, respectively.

Future minimum lease payments for operating leases (excluding related party leases as described in Note 16) with initial or remaining noncancellable lease terms in excess of one year are as follows (in thousands):

2019	$3,580
2020	2,126
2021	997
2022	725
2023	503
Thereafter	336

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Note 11 – Commitments, Contingencies, and Concentrations (continued)

Litigation

The Company is subject to various legal proceedings that constitute ordinary, routine litigation incidental to its business. The Company is of the opinion that the disposition of these proceedings will not have a material adverse effect on its business or its financial condition, results of operations, and cash flows.

Executive Employment Agreements

The Company has employment agreements with its executive officers which outline base salary, incentive compensation, and equity-based compensation. The employment agreements with the Company's executive officers also provide for incremental compensation in the event of termination without cause or resignation for good reason. On May 4, 2018, the Company amended the employment agreement of its general counsel to increase the cash bonus opportunity and annual equity award beginning with the 2018 fiscal year.

Sources of Supplies

Although most materials incorporated in the Company’s products are available from a number of sources, certain materials are available only from a relatively limited number of suppliers.

Some of the most highly specialized materials for the Company’s sensors are sourced from a single vendor. The Company maintains a safety stock inventory of certain critical materials at its facilities.

Certain metals used in the manufacture of the Company’s products are traded on active markets, and can be subject to significant price volatility.

Market Concentrations

No single customer comprises greater than 5% of net revenues.

The vast majority of the Company’s products are used in the broad industrial market, with selected uses in military and aerospace, medical, agriculture, and construction. Within the broad industrial segment, the Company’s products serve wide applications in the waste management, bulk hauling, logging, scale manufacturing, engineering systems, pharmaceutical, oil, chemical, steel, paper, and food industries.

Credit Risk Concentrations

Financial instruments with potential credit risk consist principally of cash and cash equivalents, accounts receivable, and notes receivable. The Company maintains cash and cash equivalents with various major financial institutions. Concentrations of credit risk with respect to receivables are generally limited due to the Company’s large number of customers and their dispersion across many countries and industries. At December 31, 2018 and 2017, the Company had no significant concentrations of credit risk.

Geographic Concentrations

At December 31, 2018 and 2017, a significant percentage of the Company’s cash and cash equivalents are held outside the United States. See the following table for the percentage of cash and cash equivalents by region at December 31, 2018 and December 31, 2017:

	December 31,	
	2018	2017
Asia	28 %	28 %
United States	7 %	7 %
Israel	35 %	37 %
Europe	13 %	15 %
United Kingdom	12 %	5 %
Canada	5 %	8 %
Total	100 %	100 %

Note 12 – Segment and Geographic Data

VPG reports in three product segments: the Foil Technology Products segment, the Force Sensors segment, and the Weighing and Control Systems segment. The Foil Technology Products reporting segment is comprised of the foil resistor and strain gage operating segments. The Force Sensors reporting segment is comprised of transducers, load cells, and modules. The Weighing and Control Systems reporting segment is comprised of complete systems which include load cells and instrumentation for weighing, force control and force measurement for a variety of uses such as process control and on-board weighing applications.

VPG evaluates reporting segment performance based on multiple performance measures including gross profits, revenues, and operating income, exclusive of certain items. Management believes that evaluating segment performance, excluding items such as restructuring and severance costs, and other items is meaningful because it provides insight with respect to the intrinsic operating results of VPG. The accounting policies of the segments are the same as those described in the summary of significant accounting policies (see Note 1). Reporting segment assets are the owned or allocated assets used by each segment. Products are transferred between segments on a basis intended to reflect, as nearly as practicable, the market value of the products.

The following table sets forth reporting segment information (in thousands):

	Foil Technology Products	Force Sensors	Weighing and Control Systems	Corporate/ Other	Total
2018					
Net third-party revenues	$ 141,009	$73,186	$ 85,599	$ —	$299,794
Intersegment revenues	3,878	1,365	577	(5,820)	—
Gross profit	61,562	20,001	39,704	—	121,267
Segment operating income (loss)	38,404	10,514	20,508	(32,203)	37,223
Impairment of goodwill and indefinite-lived intangibles	2,820	—	—	—	2,820
Restructuring costs	—	289	—	—	289
Depreciation and amortization expense	5,173	2,323	2,121	1,014	10,631
Capital expenditures	9,239	2,483	1,370	147	13,239
Total assets	132,918	82,637	95,954	14,874	326,383
2017					
Net third-party revenues	$ 116,272	$65,446	$ 72,632	$ —	$254,350
Intersegment revenues	2,316	1,346	911	(4,573)	—
Gross profit	47,755	18,192	32,336	—	98,283
Segment operating income (loss)	26,426	9,274	14,770	(27,982)	22,488
Restructuring costs	85	849	602	508	2,044
Depreciation and amortization expense	4,946	2,537	2,133	1,010	10,626
Capital expenditures	4,519	4,297	823	453	10,092
Total assets	119,175	77,756	97,007	12,613	306,551
2016					
Net third-party revenues	$ 100,942	$60,234	$ 63,753	$ —	$224,929
Intersegment revenues	2,340	1,954	818	(5,112)	—
Gross profit	39,368	15,632	27,809	—	82,809
Segment operating income (loss)	20,391	7,056	10,221	(26,401)	11,267
Acquisition costs	427	—	67	—	494
Restructuring costs	1,137	413	837	279	2,666
Depreciation and amortization expense	4,894	2,924	2,323	1,008	11,149
Capital expenditures	6,516	2,179	1,551	179	10,425
Total assets	99,411	64,934	90,447	15,718	270,510

Note 12 – Segment and Geographic Data (continued)

The “Corporate/Other” column for segment operating income (loss) includes unallocated selling, general, and administrative expenses and certain items which management excludes from segment results when evaluating segment performance, as follows (in thousands):

	Years ended December 31,		
	2018	2017	2016
Unallocated selling, general, and administrative expenses	$(29,094)	$(25,938)	$(23,241)
Acquisition costs	—	—	(494)
Impairment of goodwill and indefinite-lived intangibles	(2,820)	—	—
Restructuring costs	(289)	(2,044)	(2,666)
	$(32,203)	$(27,982)	$(26,401)

The following geographic data includes property and equipment based on physical location (in thousands):

	December 31,	
Property and Equipment - Net	2018	2017
United States	$10,933	$11,932
United Kingdom	3,960	4,385
Other Europe	1,430	1,427
Israel	22,682	18,895
Asia	19,090	18,100
Canada and Other	1,324	935
	$59,419	$55,674

Note 13 – Earnings Per Share

Basic earnings per share are computed using the weighted average number of common shares outstanding during the periods presented. Diluted earnings per share is computed using the weighted average number of common shares outstanding, adjusted to include the potentially dilutive effect of stock options and restricted stock units (see Note 10), and other potentially dilutive securities.

Note 13 – Earnings Per Share (continued)

The following table sets forth the computation of basic and diluted earnings per share attributable to VPG stockholders (in thousands, except earnings per share):

	Years ended December 31,		
	2018	2017	2016
Numerator:			
Numerator for basic earnings per share:			
Net earnings attributable to VPG stockholders	$23,646	$14,345	$6,404
Adjustment to the numerator for net earnings:			
Interest savings assuming conversion of dilutive exchangeable notes, net of tax	6	24	18
Numerator for diluted earnings per share:			
Net earnings attributable to VPG stockholders	$23,652	$14,369	$6,422
Denominator:			
Denominator for basic earnings per share:			
Weighted average shares	13,439	13,262	13,187
Effect of dilutive securities:			
Exchangeable notes	22	145	181
Restricted stock units	74	64	51
Dilutive potential common shares	96	209	232
Denominator for diluted earnings per share:			
Adjusted weighted average shares	13,535	13,471	13,419
Basic earnings per share attributable to VPG stockholders	$1.76	$1.08	$0.49
Diluted earnings per share attributable to VPG stockholders	$1.75	$1.07	$0.48

Diluted earnings per share for the periods presented do not reflect the following weighted average potential common shares, as the effect would be antidilutive (in thousands):

	Years ended December 31,		
	2018	2017	2016
Weighted average employee stock options	——		18

Note 14 – Additional Financial Statement Information

The caption “Other” on the consolidated statements of operations consists of the following (in thousands):

	Years ended December 31,		
	2018	2017	2016
Foreign exchange gain (loss)	$(279)	$(724)	$449
Interest income	506	167	179
Pension expense	(1,682)	(863)	(556)
Other	(41)	1,337	(246)
	$(1,496)	$(83)	$(174)

Note 14 – Additional Financial Statement Information (continued)

Foreign currency exchange gains and losses represent the impact of changes in foreign currency exchange rates. The change in foreign exchange gains/(losses) during the period, as compared to the prior year period, is primarily due to fluctuations in the Israeli shekel, the Euro, and the Canadian dollar.
Pension expense represents the net periodic benefit cost excluding the service cost. Additionally in 2018, the Company recognized a settlement loss of $0.7 million related to measures taken to de-risk the UK pension schemes as discussed in Note 9 to the consolidated financial statements.
Included within Other, for the year ended December 31, 2017, is net proceeds of $1.5 million related to a lease termination payment at the Company's Tianjin, People's Republic of China location. The relocation of operation in Tianjin has been completed and the majority of the expenses associated with the move have been incurred.
Other accrued expenses consist of the following (in thousands):

	December 31,	
	2018	2017
Customer advance payments	$5,328	$3,229
Accrued restructuring	159	254
Goods received, not yet invoiced	1,819	4,060
Accrued taxes, other than income taxes	2,293	1,680
Accrued commissions	2,203	1,694
Accrued professional fees	1,775	1,731
Other	3,454	3,304
	$17,031	$15,952

Israeli Severance Pay

The Israeli Severance Pay Law, 1963 ("Severance Pay Law"), specifies that employees of our Israeli subsidiary are entitled to severance payment, following the termination of their employment. Under the Severance Pay Law, the severance payment is calculated as one month salary for each year of employment, or a portion thereof.

Part of the subsidiary's liability for severance pay is covered by the provisions of Section 14 of the Severance Pay Law ("Section 14"). Under Section 14 employees are entitled to monthly deposits, at a rate of 8.33% of their monthly salary, contributed on their behalf to their insurance funds. Payments in accordance with Section 14 release the subsidiary from any future severance payments in respect of those employees. As a result, the Company does not recognize any liability for severance pay due to these employees and the deposits under Section 14 are not recorded as an asset in the Company's balance sheet.

For the subsidiary's employees in Israel who are not subject to Section 14, the Company calculated the liability for severance pay pursuant to the Severance Pay Law based on the most recent salary of these employees multiplied by the number of years of employment as of the balance sheet date. The Company recorded as expenses the increase in the severance liability, net of earnings (losses) from the related investment fund. The subsidiary's liability was partially funded by monthly payments deposited with insurers and the value of these deposits is recorded as an asset on the Company's balance sheet. Any unfunded amounts would be paid from operating funds and are covered by a provision established by the subsidiary. The accompanying consolidated balance sheets at December 31, 2018 and December 31, 2017 include a $7.7 million and $7.8 million liability, respectively, associated with Israeli severance requirements in other liabilities.

Sale Leaseback

In the fourth quarter of 2016, the Company sold its Karmiel, Israel facility for $3.7 million and entered into a five year lease for a portion of the building. The Company recorded a $1.7 million gain on the sale of the facility, of which $0.8 million was recognized immediately in earnings, with the remaining $0.9 million ratably recognized in earnings over the five year lease term.

Note 15 – Fair Value Measurements

ASC Topic 820, Fair Value Measurements and Disclosures, establishes a valuation hierarchy of the inputs used to measure fair value. This hierarchy prioritizes the inputs to valuation techniques used to measure fair value into three broad levels. The following is a brief description of those three levels:

Level 1: Observable inputs such as quoted prices (unadjusted) in active markets for identical assets or liabilities.

Level 2: Inputs other than quoted prices that are observable for the asset or liability, either directly or indirectly. These include quoted prices for similar assets or liabilities in active markets and quoted prices for identical or similar assets or liabilities in markets that are not active.

Level 3: Unobservable inputs that reflect the Company's own assumptions.

An asset or liability's classification within the hierarchy is determined based on the lowest level input that is significant to the fair value measurement.

The following tables provide the financial assets and liabilities carried at fair value measured on a recurring basis (in thousands):

As of December 31, 2018		Fair value measurements at reporting date using:		
	Total Fair Value	Level 1 Inputs	Level 2 Inputs	Level 3 Inputs
Assets:				
Assets held in rabbi trusts	$4,641	$87	$4,554	$ —

As of December 31, 2017		Fair value measurements at reporting date using:		
	Total Fair Value	Level 1 Inputs	Level 2 Inputs	Level 3 Inputs
Assets:				
Assets held in rabbi trusts	$4,988	$364	$4,624	$ —

The Company maintains nonqualified trusts, referred to as "rabbi" trusts, to fund payments under deferred compensation and nonqualified pension plans. Rabbi trust assets consist primarily of marketable securities, classified as available-for-sale money market funds at December 31, 2018 and December 31, 2017, and company-owned life insurance assets. The marketable securities held in the rabbi trusts are valued using quoted market prices on the last business day of the year. The company-owned life insurance assets are valued in consultation with the Company's insurance brokers using the value of underlying assets of the insurance contracts. The fair value measurement of the marketable securities held in the rabbi trust is considered a Level 1 measurement and the measurement of the company-owned life insurance assets is considered a Level 2 measurement within the fair value hierarchy.

The fair value of the long-term debt at December 31, 2018 and December 31, 2017 is approximately $27.1 million and $33.4 million, respectively, compared to its carrying value of $27.1 million and $32.4 million, respectively. The Company estimates the fair value of its long-term debt using a combination of quoted market prices for similar financing arrangements and expected future payments discounted at risk-adjusted rates. The fair value measurement of long-term debt is considered a Level 2 measurement.

The Company's financial instruments include cash and cash equivalents, accounts receivable, short-term notes payable, and accounts payable. The carrying amounts for these financial instruments reported in the consolidated balance sheets approximate their fair values.

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Note 16 – Related Party Transactions

Until July 6, 2010, VPG was part of Vishay Intertechnology, and the assets and liabilities consisted of those that Vishay Intertechnology attributed to its precision measurement and foil resistor businesses. Following the spin-off on July 6, 2010, VPG is an independent, publicly-traded company, and Vishay Intertechnology does not retain any ownership interest in VPG, although a common group of stockholders control a significant portion of the voting power of each company and the companies have three common board members.

Subsequent to the spin-off, VPG and Vishay Intertechnology continue to share certain manufacturing locations. VPG owns one location in Japan at which it leases space to Vishay Intertechnology. Vishay Intertechnology owns one location in the United States, at which it leases space to VPG. Lease receipts and payments related to the shared facilities are immaterial.

Note 17 – Subsequent Events

Executive RSU grant

On March 13, 2019, VPG’s three current executive officers were granted annual equity awards in the form of RSUs, of which 75% are performance-based. The awards have an aggregate target grant-date fair value of $1.8 million and were comprised of 38,860 RSUs. Twenty-five percent of these awards will vest on January 1, 2022, subject to the executives continued employment. The performance-based portion of the RSUs will also vest on January 1, 2022, subject to the executives continued employment and the satisfaction of certain performance objectives relating to three-year cumulative “free cash” and net earnings goals.

Lease Agreement

On February 17, 2019, one of the Company's indirect wholly-owned subsidiaries entered into a lease agreement as tenant related to a property in Israel. Such lease agreement provides that we will lease a new building containing approximately 121,400 square feet that will be built by the landlord. For more information, refer to the Form 8-K filed by the Company on February 19, 2019.

Note 18 – Summary of Quarterly Financial Information (Unaudited)

(in thousands, except per share amounts)	2018				2017			
	First	Second	Third	Fourth	First	Second	Third	Fourth
Statement of Operations data:								
Net revenues	$73,091	$74,231	$75,490	$76,982	$59,787	$62,319	$62,805	$69,439
Gross profit	28,505	31,366	30,580	30,816	22,517	24,759	24,267	26,740
Operating income	8,186	11,315	10,631	7,091	3,945	5,853	5,530	7,160
Net earnings	4,958	7,683	7,567	3,437	2,003	3,616	4,325	4,450
Less: net earnings attributable to noncontrolling interests	(30)	(10)	20	19	8	(3)	70	(26)
Net earnings attributable to VPG stockholders	4,988	7,693	7,547	3,418	1,995	3,619	4,255	4,476
Per Share Data: (b)								
Basic earnings per share	$0.37	$0.57	$0.56	$0.25	$0.15	$0.27	$0.32	$0.34
Diluted earnings per share	$0.37	$0.57	$0.56	$0.25	$0.15	$0.27	$0.32	$0.33
Certain Items Recorded during the Quarters:								
Acquisition purchase accounting adjustments	$—	$—	$—	$—	$—	$—	$42	$49
Net proceeds from lease termination	—	—	—	—	—	—	(1,544)	—
Tax rebate	—	—	—	—	—	—		189
Impairment of goodwill and indefinite-lived intangibles	—	—	—	2,820	—	—	—	—
UK pension settlement	—	—	—	673	—	—	—	—
Restructuring costs	—	61	228	—	554	315	423	752
Tax effect of reconciling items and discrete tax items	—	9	35	(377)	42	13	(394)	165

(a) The Company reports interim financial information for the 13-week periods beginning on a Sunday and ending on a Saturday, except for the first fiscal quarter, which always begins on January 1, and the fourth fiscal quarter, which always ends on December 31. The first, second, third, and fourth quarters of 2018 ended on March 31, June 30, September 29, and December 31, respectively. The first, second, third, and fourth quarters of 2017 ended on April 1, July 1, September 30, and December 31, respectively.

(b) Quarterly amounts may not agree in total to the corresponding annual amounts due to rounding.