
**UNITED STATES
SECURITIES AND EXCHANGE COMMISSION**
Washington, D.C. 20549

FORM 10-K

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

For the fiscal year ended December 31, 2019.

or

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

For the transition period from to

Commission file number: 000-26966

ADVANCED ENERGY INDUSTRIES, INC.

(Exact name of registrant as specified in its charter)

Delaware
(State or other jurisdiction of incorporation or organization)
1595 Wynkoop Street, Suite 800, Denver, CO
(Address of principal executive offices)

84-0846841
(I.R.S. Employer Identification No.)
80202
(Zip Code)

Registrant's telephone number, including area code: (970) 407-4670

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

Title of each class
Common Stock, \$0.001 par value

Trading Symbol(s)
AEIS

Name of each exchange on which registered
NASDAQ Global Select Market

Securities registered pursuant to section 12(g) of the Act: None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act: Yes No

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

Indicate by check mark whether the registrant: (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes No

Indicate by check mark whether the registrant has submitted every electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files).

Yes No

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer Accelerated filer Non-accelerated filer Smaller reporting company Emerging growth company
(Do not check if a smaller reporting company)

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

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

The aggregate market value of voting and non-voting common stock held by non-affiliates of the registrant was \$2,135,524,772 as of June 28, 2019, based upon the price at which such common stock was last sold on such date.

As of February 28, 2020, there was 38,407,225 shares of the registrant's common stock outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Part III of this Annual Report on Form 10-K incorporates information by reference from the registrant's definitive proxy statement for its 2020 Annual Meeting of Stockholders (to be filed with the Commission under Regulation 14A no later than 120 days after the end of the registrant's fiscal year ended December 31, 2019).

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Special Note Regarding Forward-Looking Statements

This Annual Report on Form 10-K includes or incorporates by reference “forward-looking statements” within the meanings of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended. All statements contained or incorporated by reference in this Annual Report on Form 10-K, other than statements of historical fact, are “forward-looking statements.” For example, statements relating to our beliefs, expectations, plans, projections, forecasts, goals, and estimates are forward-looking statements, as are statements that specified actions, conditions, or circumstances will continue or change. Forward-looking statements involve risks and uncertainties. In some cases, forward-looking statements can be identified by the inclusion of words such as “believe,” “expect,” “plan,” “anticipate,” “estimate,” “may,” “might,” “could,” “should,” “will,” “continue,” “intend,” “goal,” and similar words.

Some of the forward-looking statements in this Annual Report on Form 10-K are, or reflect, our expectations or projections relating to:

- our future revenues;
- our future sales, including backlog orders;
- our ability to be successful in the design win process with our customers;
- unanticipated costs in fulfilling our warranty obligations for solar inverters;
- our future gross profit;
- our competition;
- market acceptance of, and demand for, our products;
- the fair value of our assets and financial instruments;
- research and development expenses;
- selling, general, and administrative expenses;
- sufficiency and availability of capital resources;
- capital expenditures;
- our production and factory strategy;
- our share repurchase program;
- our tax assets and liabilities;
- our other commitments and contingent liabilities;
- adequacy of our reserve for excess and obsolete inventory;
- adequacy of our warranty reserves;
- our estimates of goodwill and related fair value of assets acquired;
- restructuring activities and expenses;
- the integration of our acquisitions;
- general global political and economic conditions; and
- industry trends.

Our actual results could differ materially from those projected or assumed in our forward-looking statements because forward-looking statements by their nature are subject to risks and uncertainties. Factors that could contribute to these differences or prove our forward-looking statements, by hindsight, to be overly optimistic or unachievable include the factors described in Item 1A “Risk Factors.” Other factors might also contribute to the differences between our forward-looking statements and our actual results. We assume no obligation to update any forward-looking statement or the reasons why our actual results might differ.

Market and Industry Data

The market and industry data used in this Annual Report on Form 10-K are based on independent industry publications, customers, trade or business organizations, reports by market research firms and other published statistical information from third parties, as well as information based on management's good faith estimates, which we derive from our review of internal information and independent sources. Although we believe these sources to be reliable, we have not independently verified the accuracy or completeness of the information.

PART I

Unless the context otherwise requires, as used in this Form 10-K, references to “Advanced Energy”, “the Company”, “we”, “us” or “our” refer to Advanced Energy Industries, Inc. and its consolidated subsidiaries.

ITEM 1. BUSINESS

Overview

Advanced Energy provides highly-engineered, mission-critical, precision power conversion, measurement and control solutions to our global customers. We design, manufacture, sell and support precision power products that transform, refine, and modify the raw electrical power from the utility and convert it into various types of highly-controllable, usable power that is predictable, repeatable and customizable. Our power solutions enable innovation in complex semiconductor and thin film plasma processes such as dry etch, strip, chemical and physical deposition, high and low voltage applications such as process control, computing, networking, telecommunication, analytical instrumentation, medical equipment, industrial technology and temperature-critical thermal applications such as material and chemical processing. We also supply related instrumentation products for advanced temperature measurement and control, electrostatic instrumentation products for test and measurement applications, and gas sensing and monitoring solutions for multiple industrial markets. Our network of global service support centers provides local repair and field service to our customers in key regions as well as upgrade and refurbishment services, and sales of used equipment to businesses that use our products. Our products are primarily sold into the semiconductor equipment, industrial and medical, data center computing, and telecom networking markets. Our recently-launched PowerInsight software product uses data analytics and advanced algorithms to provide our customers with actionable information, such as predictive failure, preventive maintenance and process performance. Advanced Energy operates in a single segment structure for power electronics conversion products, and we operate in four vertical markets or applications to enable tracking of market trends.

We incorporated in Colorado in 1981 and reincorporated in Delaware in 1995. Our executive offices are located at 1595 Wynkoop Street, Suite 800, Denver, Colorado 80202, and our telephone number is 970-407-4670.

Recent Acquisitions

In September 2019, we completed the acquisition of Artesyn Embedded Technologies, Inc.’s (“Artesyn”) Embedded Power business. Artesyn’s Embedded Power business is one of the world’s largest providers of highly engineered, application-specific AC-DC and DC-DC power supplies for demanding applications. This acquisition diversifies our product portfolio and gave us access to attractive growth markets, including hyperscale data centers, telecom infrastructure in next generation 5G networks, embedded industrial power applications and medical diagnostic and treatment applications.

In September 2018, we acquired LumaSense Technologies Holdings, Inc. (“LumaSense”). LumaSense designs, manufactures and sells a line of photonic-based measurement and monitoring solutions that are synergistic with the Company’s precision power control technologies in both semiconductor and industrial markets allowing customers’ the ability to better control critical parameters of thermal and material processes. The acquisition of LumaSense complements our leading pyrometry solutions with additional fiber optic thermometry for an extended range of semiconductor applications, provides integrated industrial temperature control and metrology applications for both thin films coating and thermal processing, and adds complementary industrial pyrometry and gas sensing technologies to our portfolio of solutions to the semiconductor and industrial markets.

In May 2018, we acquired the electrostatic technology and product line from Monroe Electronics, Inc. located in Lyndonville, New York. The electrostatic detection and measurement instrumentation products serve specific areas of testing and monitoring of ionization systems across a variety of applications. In addition, the non-contact electrostatic

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voltmeters and field meters complement those of Trek. Production of these electrostatic products has been integrated into Trek's manufacturing facility in nearby Lockport, New York.

In February 2018, we acquired Trek Holding Co., Ltd ("Trek"), a privately held company with operations in Tokyo, Japan and Lockport, New York. Trek has a 95% ownership interest in its U.S. subsidiary which is also its primary operation. Trek designs, manufactures and sells high-voltage amplifiers, power supplies and generators, high-performance electrostatic measurement instruments and electrostatic discharge (ESD) sensors and monitors to the global marketplace. Trek's standard and custom-OEM products are used in production and research in aerospace, automotive, electronics, electrostatics, medical, military, nanotechnology, photovoltaic/solar, plasma, semiconductor and test and measurement applications. Trek's comprehensive portfolio of power supply products strengthens and accelerates Advanced Energy's growth in high voltage applications.

For additional information, see *Note 2. Business Acquisitions* in Part II, Item 8 "Financial Statements and Supplementary Data".

Products and Services

PRODUCTS

Our precision power products and solutions are designed to enable new process technologies, improve productivity, lower the cost of ownership, and provide critical power capabilities for our customers. These products must meet demanding requirements in efficiency, flexibility, performance and reliability. We also provide repair and maintenance services for our products.

We principally serve global original equipment manufacturers ("OEM") and end customers in a wide range of semiconductor and industrial technology applications with a broad range of advanced and embedded power products. Our advanced power products are solutions that are designed to deliver precise power, control and measurements of processes used in a diverse set of applications in semiconductor device manufacturing, thin film deposition of advanced materials, thermal power control, instrumentation and gas detection and monitoring. Our embedded power products are solutions designed to provide stable and efficient power in mission critical applications across a variety of industrial technology applications such as telecommunication and networking equipment, servers and storage systems, medical equipment, robotics, motion control and test and measurement equipment.

Our process power solutions include direct current ("DC"), pulsed DC, low frequency alternating current ("AC"), high voltage, and radio frequency ("RF") power supplies, RF matching networks, remote plasma sources for reactive gas applications and RF instrumentation. These solutions are used in a wide range of thin film processes across multiple semiconductor applications and for deposition of advanced materials in adjacent industries such as flat panel display, solar cell manufacturing, thin film coating, and hard coatings.

Our power control modules and thermal instrumentation products are used in the semiconductor and adjacent industries, in which time-temperature cycles affect material properties, productivity, and yield. These products are used in processes such as rapid thermal processing, chemical vapor deposition and crystal growing, which require non-contact temperature measurement. They are also used in many industrial production applications for chemical processing, metal and glass manufacturing, and numerous other general industrial power applications.

Our gas detection and monitoring products are based on proven infrared technologies to detect and analyze gases in a wide range of industrial applications, including automotive, energy, environmental controls, aerospace, medical and research. Our products offer cost-effective online monitoring, allowing our customers to automate manual monitoring or sampling processes that will achieve process efficiency, waste reduction, and lower costs of maintenance.

Our embedded power products are designed to maximize energy conversion efficiency, minimize physical sizes, and to meet a variety of standards, such as IEC 60601-1 for medical equipment or IEC 60950-1 for information technology equipment. Our low-voltage AC-DC and DC-DC power supplies are used in a wide variety of end markets such as data center computing, telecom, networking, medical equipment, and broad industrial electronics. These

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products feature industry-leading efficiency and density, to maximize performance, lower energy costs, and minimize the form factor. These products target applications where energy usage is high, such as data centers, but also applications that require a highly reliable and rugged design for use in demanding climate conditions, such as a wireless cellular tower.

Our high and lower voltage DC-DC products are designed to meet the demanding requirements of OEMs worldwide. Our DC-DC solutions and custom-built power conversion products offer high and low voltage topology, providing wide input and output operating ranges while retaining excellent stability and efficiencies ranging from benchtop and rackmount systems to micro-size printed circuit board mount modules. The high voltage DC-DC products target applications including semiconductor wafer processing and metrology, electrostatic clamping of substrates, scientific instrumentation, mass spectrometry, and analytical x-ray systems for industrial and analytical applications. The low voltage DC-DC board mounted solutions are designed for a wide range of industrial applications such as healthcare, telecommunications, test and measurement, instrumentation, industrial equipment and distributed power in server and storage systems.

Our big data analytics solution transforms the data acquired from our power delivery systems into useable insights, through a combination of enhanced data sets and advanced analytics. These capabilities allow our customers to maximize performance, reduce costs and improve yield in their manufacturing processes.

GLOBAL SUPPORT

Our global support services group offers in-warranty and out-of-warranty repair services in the regions in which we operate, providing us with revenue opportunities from repair, upgrades and retrofit offerings to our installed base. Our customers continue to pursue low cost of ownership of their capital equipment and are increasingly sensitive to the significant costs of system downtime. They expect suppliers to offer comprehensive local repair service and customer support. In addition to product repairs our customers look for upgrade and retrofit offerings to extend the useable life of their capital equipment for additional technology generations. To meet these market requirements, we maintain a worldwide support organization comprising both direct and indirect activities through partnership with local distributors primarily in the United States ("U.S."), the People's Republic of China ("PRC"), Japan, South Korea, Taiwan, Israel, Germany, and United Kingdom.

As of December 31, 2015, we discontinued the production, engineering, and sales of our solar inverter product line representing a strategic shift in our business. As such, all inverter revenues, costs, assets and liabilities are reported in Discontinued Operations for all periods presented herein and we currently report as a single unit. However, extended warranties historically sold and reflected as "Deferred Revenue" on our Consolidated Balance Sheets, represent future revenue and service costs to be incurred by our global services group and are reflected as continuing operations for historical periods and future periods. In May of 2019, we divested the US central inverter repair and support business to Bold Renewables. See *Note 4. Disposed and Discontinued Operations* in Part II, Item 8 "Financial Statements and Supplementary Data."

Markets

Our products compete in markets for high tech applications using capital equipment. The majority of our markets are not generally subject to significant seasonality; however, these markets are cyclical due to sudden changes in customers' manufacturing capacity requirements and spending, which depend in part on capacity utilization, demand for customers' products, inventory levels relative to demand, government incentives and subsidies, and access to affordable capital. Other factors, such as global economic and market conditions and technological advances in the applications we serve can also have an impact on our financial results, both positively and negatively. For more information related to the markets in which we compete and the current environment in those markets, see *Business Environment and Trends* in Part II, Item 7 "Management's Discussion and Analysis of Financial Condition and Results of Operations."

SEMICONDUCTOR EQUIPMENT MARKET

Customers in the semiconductor capital equipment market incorporate our products into equipment that make integrated circuits. Our process power conversion products and systems provide the energy to enable thin film plasma-based processes, such as dry etch, strip, chemical and physical deposition. Precise control over the energy delivered to plasma-based processes enables the production of integrated circuits with reduced feature sizes and increased speed and performance. Our high voltage products are used in applications such as ion implant, wafer inspection and metrology, electrostatic measurement, and electrostatic clamping of the wafers. Our thermal instrumentation products measure the temperature of the processed substrate or the process chamber. Our power control modules are used in thermal processing applications and for epitaxial growth of photonics or microelectronic devices. Our remote plasma sources deliver ionized gases for reactive chemical processes used in cleaning, surface treatment, and gas abatement. Our low voltage power products deliver stable, clean, and reliable power and are used in semiconductor Automatic Test Equipment (ATE), wafer processing equipment, back-end assembly equipment, and auxiliary equipment such as wafer handling equipment. Our strategy in the semiconductor market is to expand our content of power related products and grow share.

INDUSTRIAL & MEDICAL MARKETS

Customers in the Industrial & Medical markets incorporate our advanced power, embedded power and measurement products into a wide variety of equipment used in applications such as advanced material fabrication, medical devices, analytical instrumentation, test and measurement equipment, robotics, motor drives and connected light-emitting diodes.

OEM customers design equipment utilizing our process power technologies in a variety of industrial applications including glass coating, glass manufacturing, flat panel displays, photovoltaics solar cell manufacturing, and similar thin film manufacturing, including data storage, and decorative, hard and optical coatings. These applications employ similar technologies to those used in the semiconductor market to deposit films on non-semiconductor substrates. Our strategy around these applications is to leverage our thin film deposition technologies into an expanded set of new materials and applications in adjacent markets.

We serve Industrial & Medical markets with mission-critical power components that deliver high reliability, precise, low noise or differentiated power to the equipment they serve. Examples of products sold into Industrial & Medical markets include high voltage products for analytical instrumentation, and medical equipment, low voltage power supplies used in applications for medical devices, test and measurement, medical lasers, scientific instrumentation and industrial equipment, and power control modules and thermal instrumentation products for material fabrication, processing and treatment. Our gas monitoring products serve multiple applications in the energy market, air quality monitoring and automobile emission monitoring and testing. Our strategy in the Industrial & Medical markets is to grow and expand our addressable market both organically through our global distribution channels and through acquisitions of products and technologies that are complimentary and adjacent to our core power conversion applications.

DATA CENTER COMPUTING MARKETS

As a result of the acquisition of Artesyn in September 2019, we entered the Data Center Computing market with industry-leading products and low-voltage power conversion technologies. We sell to many data center server and storage manufacturers, original design manufacturers of server and storage systems and cloud service providers or hyperscalers, who are designing and deploying their own data center server and storage equipment. Our power systems, power shelves, AC-DC and DC-DC power conversion products feature industry-leading performance and are used in a variety of computing applications such as server rack power, back-up power and CPRS server power supply, including a wide range of standard and custom power solutions used in data center racks, server and storage systems. We offer our customers industry-leading technology with a strong reputation and deep customer relationships. Our strategy in data center computing is to penetrate the growing hyperscale market and leverage our leading capabilities in power density and efficiency to grow share in the broader data center market.

TELECOM & NETWORKING MARKETS

The acquisition of Artesyn in September 2019 brought us a portfolio of products and technologies that are used across the Telecommunications & Networking markets. Our customers include many leading vendors and original design manufacturers of wireless and wireline infrastructure equipment, telecommunication equipment and computer networking. Our products serving telecom and networking applications are differentiated by their rugged design and high reliability, even in harsh outdoor environments. Our wide range of AC-DC power supplies/rectifiers and DC-DC conversion modules are used by leading developers of telecom systems across fixed, mobile and converged network applications. Our products are designed into many wireless infrastructure applications such as remote radio head, RF power amplifier in base stations and multi-access edge computing equipment. In networking, our products are designed into many core and edge networking systems, including gateways, application servers, switches, routers and wireless networking. Our strategy in Telecom & Networking is to target growing applications related to 5G investments, create new designs in next generation computer networking equipment, and leverage our customer relationships and differentiated capability in rugged design to grow market share.

Customers

Our products are sold worldwide to OEMs, integrators, distributors and directly to end users. Our ten largest customers accounted for approximately 57.3% of our sales in 2019, 62.5% of our sales in 2018, and 70.4% of our sales in 2017. We expect that the sale of products to our largest customers will continue to account for a significant percentage of our sales for the foreseeable future.

Applied Materials Inc., our largest customer, accounted for 20.9% of our sales in 2019, 35.9% of our sales in 2018, and 33.5% of our sales in 2017. Lam Research Corp. accounted for 11.2% of our sales in 2019, 15.2% of our sales in 2018, and 23.1% of our sales in 2017. No other customer accounted for greater than 10% of our sales in 2019, 2018, or 2017. The loss of Applied Materials, Inc. or Lam Research Corp. as a customer could have a material adverse effect on our results of operations.

Backlog

Our backlog was approximately \$258.9 million at December 31, 2019, a 246.6% increase from \$74.7 million at December 31, 2018. Backlog increased primarily due to the Artesyn acquisition, which added new backlog in the Data Center Computing and Telecom & Networking markets and incremental backlog in Industrial & Medical, as well as strengthening demand for semiconductor equipment late in the fiscal year. For more information related to our expectations for the markets we serve, see *Business Environment and Trends* in Item 7 "Management's Discussion and Analysis of Financial Condition and Results of Operations." Backlog orders are firm orders scheduled to be filled and shipped in the next 12 months.

Backlog orders are not necessarily an indicator of future sales levels because of variations in lead times and customer production demand pull systems, which are not reflected in orders or backlog. Customers may delay delivery of products or cancel orders prior to shipment, subject to possible cancellation penalties. Delays in delivery schedules and/or customer changes to backlog orders during any particular period could cause a decrease in sales and have a material adverse effect on our business and results of operations.

Marketing, Sales and Distribution

We sell our products through direct and indirect sales channels in North America, Europe and Asia. Our sales operations are primarily located in the United States, the PRC, the United Kingdom, Germany, Israel, Japan, South Korea, India, Singapore, Philippines, Hong Kong, Ireland and Taiwan. In addition to a direct sales force, we have independent sales representatives, channel partners and distributors that support our selling efforts. We maintain customer service offices at many of the locations listed above, as well as other sites near our customers' locations. We believe that customer service and technical support are important competitive factors and are essential to building and maintaining close, long-term relationships with our customers.

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The following table presents our sales by geographic region for the years ended December 31, 2019, 2018, and 2017. Sales are attributed to individual countries based on customer location (in thousands).

	Years Ended December 31,					
	2019		2018		2017	
North America	\$ 373,634	47.4 %	\$ 372,834	51.8 %	\$ 377,347	56.2 %
Asia	295,155	37.4	250,574	34.9	221,690	33.1
Europe	119,427	15.1	94,793	13.2	71,796	10.7
Other	732	0.1	691	0.1	179	—
Total	<u>\$ 788,948</u>	<u>100.0 %</u>	<u>\$ 718,892</u>	<u>100.0 %</u>	<u>\$ 671,012</u>	<u>100.0 %</u>

Total sales to all countries outside of the U.S. totaled \$467.1 million, \$348.1 million, and \$295.1 million in the years ended December 31, 2019, 2018, and 2017, respectively.

See Item 1A "Risk Factors" for a discussion of certain risks related to our foreign operations.

Manufacturing

The manufacturing of our products is primarily performed in major sites in the PRC and the Philippines. We have begun pilot production and expect to open an additional major manufacturing site in Penang, Malaysia in 2020. In addition, we perform limited specialty manufacturing for some of our products in the United States of America, United Kingdom, Germany and Denmark. Manufacturing in these locations, primarily the PRC, exposes us to risks, such as exchange controls and currency restrictions, changes in local economic conditions, changes in laws and regulations, government actions, political conditions, and other regional risks including natural disasters and health risks, and an inability to meet customer demands if one of our facilities becomes impaired.

Manufacturing requires raw materials, including a wide variety of mechanical and electrical components, to be manufactured to our specifications. We use numerous companies, including contract manufacturers, to supply parts for the manufacture and support of our products. Although we make reasonable efforts to assure that parts are available from multiple qualified suppliers, some key parts may be obtained from a sole supplier or a limited group of suppliers. We seek to reduce costs and to lower the risks of production and service interruptions, as well as shortages of key parts by:

- selecting and qualifying alternate suppliers for key parts using rigorous technical and commercial evaluation of suppliers' products and business processes including testing their components' performance, quality, and reliability on our power conversion product at our customers' and their customers' processes. The qualification process for our process power products, particularly as it pertains to semiconductor customers, follows semiconductor industry standard practices, such as "copy exact";
- monitoring the financial condition and overall performance of key suppliers;
- maintaining appropriate inventories of key parts, including making last time purchases of key parts when notified by suppliers that they are ending the supply of those parts;
- qualifying new parts on a timely basis and in geographies that reduce costs without degradation in quality;
- locating certain manufacturing operations in areas that are closer to suppliers and customers; and
- competitively sourcing parts through electronic bidding tools to ensure the lowest total cost is achieved for the parts needed in our products.

Intellectual Property

We seek patent protection for inventions governing new products or technologies as part of our ongoing research and development. We currently hold 273 United States patents and 341 foreign issued patents, and have 119 patent applications pending in the United States, Europe and Asia. A substantial majority of our patents are related to our process power products and solutions business. Generally, our efforts to obtain international patents have been concentrated in the industrialized countries within Europe and Asia because there are other manufacturers and developers of power conversion and control systems in those countries, as well as customers for those systems for which our intellectual property applies.

Litigation may, from time to time, be necessary to enforce patents issued to us, to protect trade secrets or know-how owned by us, to defend us against claimed infringement of the rights of others, or to determine the scope and validity of the proprietary rights of others. See "*We are highly dependent on our intellectual property*" in Item 1A "Risk Factors."

Competition

The markets we serve are highly competitive and characterized by rapid technological development and changing customer requirements. We face a wide variety of competitors and no single company dominates any of our markets. Significant competitive factors in our markets include product performance, compatibility with adjacent products, price, quality, reliability, and level of customer service and support.

We encounter substantial competition from foreign and domestic companies for each of our product lines. Our list of competitors has increased over the past year due to the acquisition of Artesyn's Embedded Power business, which competes in different markets and against different competitors. Some of our competitors have greater financial and other resources than we do. In some cases, competitors are smaller than we are, but are well established in specific product niches. Adtec Plasma Tech. Co., Ltd., COMET Holding AG., Daihen Corp., Kyosan Electric Mfg. Co., Ltd., MKS Instruments, Inc., New Power Plasma Co., Ltd. and TRUMPF Hüttinger GmbH + Co. KG. are primary competitors to our power conversion products for semiconductor and thin film processing. Competitors to our low voltage AC-DC and DC-DC embedded power conversion offerings include, but are not limited to ABB Ltd., Acbel Polytech Inc., Cosel Co., Ltd., Delta Electronics, Inc., Flex Ltd., Lite-On Technology Corp., Murata Manufacturing, MEAN WELL Enterprises, TDK-Lambda Americas Inc. and XP Power Ltd. In high voltage DC-DC, our competitors include, but are not limited to Crane Co., Matsusada Precision, Inc., and Spellman High Voltage Electronics Corp. CD Automation, Control Concepts Inc., Eurotherm and Spang Power Electronics offer products that compete with our power control modules. BASF SE., Fluke Corp., LayTec AG. and Photon Control Inc. offer products that compete with our thermal measurement and instrumentation products. Honeywell International, Inc., Morgan Schaffer Ltd., Qualitrol Corp. and Williamson Corp. offer products that compete with our gas detection and monitoring products.

In addition, a focus on local content is causing new competitors to emerge around the world, with strong support from local governments, industry leaders, and investors. Our ability to continue to compete successfully in these markets depends on our ability to make timely introduction of new products and enhancements to existing products, to localize these development and production activities in key world regions close to our customers, and to produce high quality products. We expect our competitors will continue to improve the design and performance of their products and introduce new products with competitive performance characteristics. We believe that we compete effectively with respect to these factors, although we cannot assure that we will be able to compete effectively in the future.

Research and Development

The market for our products is characterized by ongoing technological changes and evolving customer requirements. We believe that continued and timely development of new highly-differentiated products and enhancements to existing products to support end user and OEM requirements is necessary for us to maintain a competitive position in the markets we serve. Accordingly, we continue to devote a significant portion of our personnel and financial resources to research and development projects and seek to maintain close relationships with our key customers and other industry leaders in order to remain responsive to their product requirements now and in the future.

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Research and development expenses were \$101.5 million in 2019, \$76.0 million in 2018, and \$58.0 million in 2017, representing 12.9% of our sales in 2019, 10.6% of our sales in 2018, and 8.6% of our sales in 2017.

Employees

As of December 31, 2019, we had a total of 10,917 employees. Our employees are not represented by unions, except for statutory organization rights applicable to our employees in the PRC and Germany. We believe that our continued success depends, in part, on our ability to attract and retain qualified personnel. We consider our relations with our employees to be good.

Environmental Matters

We are subject to federal, state, and local environmental laws and regulations, as well as the environmental laws and regulations of the foreign federal and local jurisdictions in which we have manufacturing and service facilities. We believe we are in material compliance with all such laws and regulations.

Compliance with federal, state, and local laws and regulations has not had, and is not expected to have, an adverse effect on our capital expenditures, competitive position, financial condition, or results of operations.

Available Information

Our website address is www.advancedenergy.com. We make available, free of charge on our website, our Annual Report on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, and all amendments to these reports as soon as reasonably practicable after filing such reports with, or furnishing them to, the Securities and Exchange Commission (“SEC”). Such reports are also available at www.sec.gov. Information contained on our website is not incorporated by reference in, or otherwise part of, this Annual Report on Form 10-K nor any of our other filings with the SEC.

ITEM 1A. RISK FACTORS

Our business, financial condition, operating results and cash flows can be impacted by a number of factors, including, but not limited to, those set forth below, any of which could cause our results to be adversely impacted and could result in a decline in the value or loss of an investment in our common stock. Other factors may also exist that we cannot anticipate or that we currently do not consider to be significant based on information that is currently available. These risks and uncertainties have the potential to materially affect our business, financial condition, results of operations, cash flows and future results. Such risks and uncertainties may also impact the accuracy of forward-looking statements included in this Form 10-K and other reports we file with the SEC.

COVID-19 (“Coronavirus”) and the Impact on our Business

As we have grown our locations worldwide, our risk to regional and worldwide viruses and diseases has also grown. For example, the continuing spread in early 2020 of the Coronavirus and related government actions may adversely affect our manufacturing locations in China and worldwide. If the Coronavirus continues on its current path, we may see adverse impact on our ability (a) to manufacture, test, service and ship our products, (b) to get required materials and sub-assemblies to build and service our products and (c) to staff labor and management for manufacturing, research and development, supply chain, service and administrative operations. Further, we may experience adverse impact with our global supply chain partners and transportation service providers. Our customers may also delay orders should our products be included as a subsystem into their systems. The Coronavirus could adversely impact our near-term and long-term revenues, earnings and cash flow and will require expenditures in the short-term to address the current situation in Asia. This situation is developing rapidly, and other impacts may arise that we are not aware of currently. We have created a rapid response team to mitigate risks we are aware of and as they arise.

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The industries in which we compete are subject to volatile and unpredictable cycles.

As a supplier to the global semiconductor equipment, telecom & networking, data center computing and industrial & medical industries, we are subject to business cycles, the timing, length, and volatility of which can be difficult to predict. Certain of these industries historically have been cyclical due to sudden changes in customers' manufacturing capacity requirements and spending, which depend in part on capacity utilization, demand for customers' products, inventory levels relative to demand, and access to affordable capital. These changes have affected the timing and amounts of customers' purchases and investments in technology, and continue to affect our orders, net sales, operating expenses, and net income. In addition, we may not be able to respond adequately or quickly to the declines in demand by reducing our costs. We may be required to record significant reserves for excess and obsolete inventory as demand for our products changes.

To meet rapidly changing demand in each of the industries we serve, we must effectively manage our resources and production capacity. During periods of decreasing demand for our products, we must be able to appropriately align our cost structure with prevailing market conditions, effectively manage our supply chain, and motivate and retain key employees. During periods of increasing demand, we must have enough manufacturing capacity and inventory to fulfill customer orders, effectively manage our supply chain, and attract, retain, and motivate a sufficient number of qualified individuals. If we are not able to timely and appropriately adapt to changes in our business environment or to accurately assess where we are positioned within a business cycle, our business, financial condition, or results of operations may be materially and adversely affected. For example, following record levels of demand in the first half of 2018, the semiconductor equipment market experienced a decline, and, as a result, Advanced Energy's revenue from the semiconductor equipment market declined 24.5% during 2019, as compared to 2018. Although the semiconductor equipment market improved during the fourth quarter of 2019, it is unclear at this time if the market will recover to previous levels. In addition, the market may be characterized in the future with more "mini-ramps" rather than sustained growth periods as experienced during 2015-2017. In addition, our Data Center Computing and Telecom Networking markets are characterized by large program investments, which can cause variations in quarterly or annual revenues.

Deterioration of economic conditions could negatively impact our business.

Our business may be adversely affected by changes in national or global economic conditions, including inflation, interest rates, availability of capital markets, consumer spending rates, energy availability and costs (including fuel surcharges) and the effects of government initiatives to manage economic conditions. Any such changes could adversely affect the demand for our products both in domestic and export markets, or the cost and availability of our needed raw materials and packaging materials, thereby negatively affecting our financial results.

A disruption in credit and other financial markets and deterioration of national and global economic conditions, could, among other things:

- negatively impact global demand for our products, which could result in a reduction of sales, operating income and cash flows;
- make it more difficult or costly for us to obtain financing for our operations or investments or to refinance our debt in the future;
- cause our lenders to depart from prior credit industry practice and make more difficult or expensive the granting of any technical or other waivers under our debt agreements to the extent we may seek them in the future;
- decrease the value of our investments; and impair the financial viability of our insurers.

Our long-term success and results of operations depend on our ability to successfully integrate Artesyn's business and operations and realize the anticipated benefits from the acquisition.

In September 2019, we acquired Artesyn Embedded Technologies, Inc.'s ("Artesyn") Embedded Power business, and we are currently in the early stages of combining Artesyn's Embedded Power business with our business. The acquisition of Artesyn's Embedded Power business has significantly increased our embedded power product offerings, increased our exposure to the industrial and medical, datacenter computing, and telecom networking end markets, and significantly increased the number of employees and facilities. We believe there is minimal product overlap

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between Artesyn's Embedded Power business and our other acquisitions, including the acquisition of Excelsys Technologies in 2017. To realize the anticipated benefits of the acquisition, we must successfully combine our businesses in an efficient and effective manner and realize our synergy and cost-savings targets. Integrating Artesyn's Embedded Power business and operations with ours will require significant management attention, efforts and expenditures, and we may not be able to achieve the integration in an effective, complete, timely or cost-efficient manner.

Potential risks related to our acquisition of Artesyn's Embedded Power business include our ability to:

- maintain and improve Artesyn's financial and operating results while integrating and optimizing our combined sales, marketing, manufacturing and corporate administrative organizations;
- avoid lost revenue due to customer confusion, alienation or misinformation regarding the transaction, and retain and expand Artesyn's customer base with aligning our sales efforts;
- avoid lost revenue resulting from the distraction or confusion of our personnel as a consequence of the acquisition and ongoing integration efforts;
- optimize our combined worldwide manufacturing footprint while utilizing Artesyn's vertically integrated manufacturing model for a broader set of company products;
- realize expected synergies and cost savings across the organization while managing our existing businesses, contracts and relationships;
- successfully eliminate fixed costs previously absorbed by other businesses prior to the transaction;
- recognize and capitalize on anticipated product sales and technology enhancement opportunities presented by our combined businesses;
- expand our financial and management controls and reporting systems and procedures to integrate and manage Artesyn;
- integrate our information technology systems to mitigate cyber-security risks and enable the management and operation of the combined business;
- effectively manage risks related to Artesyn's foreign operations, including foreign currency risk, geographic risks, and local employee related risks;
- integrate Artesyn into our global tax structure and manage the related impact on our current and future tax rates as a result of the acquisition;
- identify and retain key Artesyn personnel and transition their critical knowledge;
- adequately familiarize us with Artesyn's products and technology and certain of its markets and customer base such that we can manage Artesyn's business effectively;
- successfully integrate our respective corporate cultures such that we achieve the benefits of acting as a unified company; and
- meet target deadlines in achieving regulatory compliance.

Other potential risks related to our acquisition of Artesyn's Embedded Power business include:

- the assumption of unknown or contingent liabilities, or other unanticipated events or circumstances; and
- the potential to incur or record significant cash or non-cash charges or write down the carrying value of intangible assets and goodwill obtained in the Artesyn acquisition, which could adversely impact our cash flow or lower our earnings in the period or periods for which we incur such charges or write down such assets.

If we are unable to successfully or timely integrate the operations of Artesyn's Embedded Power business into our business, we may be unable to realize the revenue growth, synergies, cost-savings and other anticipated benefits resulting from the acquisition and our business could be adversely affected. Additionally, we have incurred and will continue to incur transaction-related costs, including legal, regulatory and other costs associated with implementing integration plans, including facilities and systems consolidation costs and employment-related costs. Although we expect that the elimination of duplicative costs, as well as the realization of other efficiencies related to the integration of the businesses, should allow us to offset transaction and integration-related costs over time, this net benefit may not be achieved in the near term, or at all. Further, we may not realize the expected benefits from the acquisition. Artesyn's

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Embedded Power business and operations may not achieve the anticipated revenues and operating results. Any of the foregoing risks could materially harm our business, financial condition and results of operations.

Our debt obligations and the restrictive covenants in the agreements governing our debt could limit our ability to operate our business or pursue our business strategies, could adversely affect our business, financial condition, results of operations, and cash flows, and could significantly reduce stockholder benefits from a change of control event.

As of December 31, 2019, our total debt was \$341.3 million, excluding unamortized debt issuance costs, of which \$17.5 million was classified as current. We are contractually obligated to make quarterly payments of \$4.4 million, plus accrued interest, with any outstanding balance due in September 2024. Our debt obligations could make us more vulnerable to general adverse economic and industry conditions and could limit our flexibility in planning for, or reacting to, changes in our business and the industries in which we operate, thereby placing us at a disadvantage to our competitors that have less indebtedness.

Our debt obligations impose financial covenants on us and our subsidiaries that require us to maintain a certain leverage ratio. The financial covenants place certain restrictions on our business that may affect our ability to execute our business strategy successfully or take other actions that we believe would be in the best interests of our Company. These restrictions include limitations or restrictions, among other things, on our ability and the ability of our subsidiaries to:

- incur additional indebtedness;
- pay dividends or make distributions on our capital stock or certain other restricted payments or investments;
- make domestic and foreign investments and extend credit;
- engage in transactions with affiliates;
- transfer and sell assets;
- effect a consolidation or merger or sell, transfer, lease, or otherwise dispose of all or substantially all of our assets; and
- create liens on our assets to secure debt.

Our debt obligations contain certain customary events of default. Any breach of the covenants or other event of default could cause a default on our debt obligations, which could restrict our ability to borrow under our revolving credit facility. If there were an event of default under certain provisions of our debt arrangements that was not cured or waived, the holders of the defaulted debt may be able to cause all amounts outstanding with respect to the debt instrument, plus any required settlement costs, to be due and payable immediately. Our assets and cash flow may not be sufficient to fully repay borrowings under our outstanding debt instruments if accelerated upon an event of default. If we are unable to repay, refinance, or restructure our indebtedness as required, or amend the covenants contained in these agreements, the lenders can exercise all rights and remedies available under such outstanding debt instruments or applicable laws or equity. Any of these events could have a material adverse effect on our business, financial condition, results of operations, and cash flows.

Significant developments stemming from recent U.S. government actions and proposals concerning tariffs and other economic proposals could have a material adverse effect on us.

Recent U.S. government actions are imposing greater restrictions and economic disincentives on international trade impacting imports and exports. The U.S. government has adopted changes, and intends to adopt further changes, to trade policy and in some cases, to renegotiate, or potentially terminate, certain existing bilateral or multi-lateral trade agreements. It has initiated the imposition of additional tariffs on certain foreign goods, including steel and aluminum, semiconductor manufacturing equipment and spare parts thereof. Additionally, the government may also propose export rule changes that lower the percentage of permissible U.S. content for certain non-U.S. manufactured goods being sold to companies on the U.S. Entity List, further restrict the sale of foreign-made goods that are based on U.S. technology, and regulate the use of any U.S. origin content in certain manufacturing equipment used to produce goods for certain companies.

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Examples of recent actions are tariffs on steel and aluminum product imports announced by the U.S. Department of Commerce in March 2018, the scope of which increased on Feb. 8, 2020, 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. These supplemental lists issued by the USTR added an additional 25% on certain semiconductor equipment and parts originating in China that are sold by us or used in our business in the United States. In August 2018, the second list was made effective with a 25% tariff and in September 2018 the third list was made effective with a 10% tariff, increasing to 25% in May 2019. A fourth list was proposed by USTR in May 2019 for all remaining items originating in China. A portion of the fourth list (“4a”), was made effective September 1, 2019, with an additional tariff of 15%, reduced to 7.5% on February 14, 2020. The remainder of the fourth list (“4b”) was scheduled to have an additional tariff of 15% go into effect on December 15, 2019, however on December 13, 2019, the tariffs for list 4b were suspended after the U.S. announced it would enter into a trade agreement with China (the “Phase 1 Agreement”). The Phase 1 Agreement is expected to have no impact on the tariffs imposed on Company products. Any increase in the cost of importing such goods and parts could decrease our margins, reduce the competitiveness of our products, or inhibit our ability to sell products or purchase necessary parts, which could have a material adverse effect on our business results, results of operations, or financial condition.

The U.S. Department of Commerce is currently considering proposed rules that decrease the amount of U.S. origin content allowed for non-U.S. manufactured products that are sold to companies on the U.S. Entity List, expand the restrictions on the sale of foreign-made goods that are based on U.S. technology or software, and regulate the use of U.S. origin semiconductor manufacturing equipment that produces semiconductor devices for certain companies. At this time, the potential rule changes are not anticipated to impact the Company’s sales of non-U.S. products; however, the developments in this area are fast-moving and any unpredicted rule changes could adversely affect our business results, operations or financial condition.

Changes in U.S. trade policy could result in one or more U.S. trading partners adopting responsive trade policy making it more difficult or costly for us to export our products to those countries. As indicated above, these measures could also result in increased costs for goods imported into the U.S. This in turn could require us to increase prices to our customers which may reduce demand, or, if we are unable to increase prices, result in lowering our margin on goods and services sold. To the extent that trade tariffs and other restrictions imposed by the U.S. increase the price of semiconductor equipment and related parts imported into the U.S., the cost of our materials may be adversely affected and the demand from customers for products and services may be diminished, which could adversely affect our revenues and profitability.

We cannot predict future trade policy, the terms of any renegotiated trade agreements or additional imposed tariffs and their impact on our business. The adoption and expansion of trade restrictions, the occurrence of a trade war, or other governmental action related to tariffs or trade agreements or policies has the potential to adversely impact demand for our products, our costs, our customers, our suppliers, and the U.S. economy, which in turn could adversely impact our business, financial condition and results of operations.

Changes in U.S. social, political, regulatory and economic conditions or in laws and policies governing foreign trade, manufacturing, development and investment in the territories and countries where we currently develop and sell products, and any negative sentiments towards the United States as a result of such changes, could adversely affect our business. In addition, negative sentiments towards the United States among non-U.S. customers and among non-U.S. employees or prospective employees could adversely affect sales or hiring and retention, respectively.

Our operations in the People’s Republic of China are subject to significant political and economic uncertainties over which we have little or no control and we may be unable to alter our business practice in time to avoid reductions in revenues.

A significant portion of our operations outside the United States are located in the PRC, which exposes us to risks, such as exchange controls and currency restrictions, changes in local economic conditions, changes in customs regulations and tariffs, changes in tax policies, changes in PRC laws and regulations, possible expropriation or other

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PRC government actions, and unsettled political conditions including potential changes in U.S. policy regarding overseas manufacturing. In addition, Artesyn added a significant additional footprint in both facilities and resources in the PRC. These factors may have a material adverse effect on our operations, business, results of operations, and financial condition. See "We are exposed to risks associated with worldwide financial markets and the global economy" risk factor below.

The PRC's economy differs from the economies of most developed countries in many respects, including with respect to the amount of government involvement, level of development, rate of growth, control of foreign exchange and allocation of resources. While the economy of the PRC has experienced significant growth in the past 20 years, growth has been uneven across different regions and amongst various economic sectors of the PRC. The PRC government has implemented various measures to encourage economic development and guide the allocation of resources. Strikes by workers and picketing in front of the factory gates of certain companies in Shenzhen have caused unrest among some workers seeking higher wages, which could impact our manufacturing facility in Shenzhen. While some of the government's measures may benefit the overall economy of the PRC, they may have a negative effect on us. For example, our financial condition and results of operations may be materially and adversely affected by government control over capital investments or changes in tax regulations that are applicable to us as well as work stoppages.

We are subject to risks inherent in international operations.

Sales to our customers outside the United States were approximately 59.2% and 48.4% of our total sales for the year ended December 31, 2019 and 2018, respectively. The international acquisitions have increased our presence in international locations. Our success producing goods internationally and competing in international markets is subject to our ability to manage various risks and difficulties, including, but not limited to:

- our ability to effectively manage our employees at remote locations who are operating in different business environments from the United States;
- our ability to develop and maintain relationships with suppliers and other local businesses;
- compliance with product safety requirements and standards that are different from those of the United States;
- variations and changes in laws applicable to our operations in different jurisdictions, including enforceability of intellectual property and contract rights;
- trade restrictions, political instability, disruptions in financial markets, and deterioration of economic conditions;
- customs regulations and the import and export of goods (including customs audits in various countries that occur from time to time);
- the ability to provide enough levels of technical support in different locations;
- our ability to obtain business licenses that may be needed in international locations to support expanded operations;
- timely collecting accounts receivable from foreign customers including significant balances in accounts receivable from foreign customers as of December 31, 2019;
- collection of accounts receivable from foreign customers can also be unexpectedly delayed beyond our payment terms if the project itself is delayed and/or government funded. For example, tariffs and slower growth have impacted certain of our Chinese markets which have delayed projects. If these projects are permanently delayed or cancelled it could have a negative impact on our financial results or projections;
- changes in tariffs, taxes, and foreign currency exchange rates; and
- recent protests and rioting in Hong Kong have affected travel in the region and may result in governmental actions that could impact business in the region.

Our profitability and ability to implement our business strategies, maintain market share and compete successfully in international markets will be compromised if we are unable to manage these and other international risks successfully.

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Our product lines are manufactured only at a few sites and our sites are not generally interchangeable.

Our power products for the semiconductor industry are manufactured in Shenzhen, PRC. Our high voltage products are manufactured in Ronkonkoma and Lockport, New York, Littlehampton, United Kingdom and Shenzhen, PRC. Our thermal instrumentation products are manufactured in Vancouver, Washington, Santa Clara, California, Littlehampton, United Kingdom and Frankfurt, Germany. Our pyrometry solutions are manufactured in Ballerup, Denmark and Santa Clara, California. Our Telecom & Networking and Data Center Computing products are manufactured in Zhongshan, PRC, Rosario, Philippines and Santa Rosa, Philippines. Some of Artesyn's Embedded Power business' products will be contract manufactured by the carved-out former Artesyn consumer group at their Luoding, China facility until September 2020. Each facility is under operating lease and interruptions in operations could be caused by early termination of existing leases by landlords or failure by landlords to renew existing leases upon expiration, including the possibility that suitable operating locations may not be available in proximity to existing facilities which could result in labor or supply chain risks. Each facility manufactures different products, and therefore, is not interchangeable. Natural, uncontrollable occurrences or other operational issues at any of our manufacturing facilities could significantly reduce our productivity at such site and could prevent us from meeting our customers' requirements in a timely manner, or at all. For example, recent concerns regarding the spread of the Coronavirus and related government actions may result in temporary shut-down of our facilities and impact availability of materials supply and manufacturing employees, particularly in our China operations. Any potential losses from such occurrences could significantly affect our relationship with customers, operations and results of operations for a prolonged period. As a result, we are investing in additional production options in Malaysia. We believe this investment will help to mitigate our exposure to regional risks, improve our business continuity profile and lower costs over time.

Our restructuring and other cost reduction efforts have included transitioning manufacturing operations to our facility in Shenzhen from other manufacturing facilities, such as Fort Collins, Colorado and Littlehampton, United Kingdom, which renders us increasingly reliant upon our Shenzhen facility. We have been notified that we will be required to relocate our Shenzhen, PRC manufacturing facility by December 2021. A disruption in manufacturing at our Shenzhen facility, from whatever cause, could have a significantly adverse effect on our ability to fulfill customer orders, our ability to maintain customer relationships, our costs to manufacture our products and, as a result, our results of operations and financial condition. To mitigate these risks, we are investing in a dual manufacturing facility in Penang, Malaysia that will be capable of manufacturing our semiconductor and other products. We have begun pilot production for qualification and expect to open the facility in 2020.

Our evolving manufacturing footprint may increase our risk.

The nature of our manufacturing is evolving as we continue to grow by acquisition. Historically, our principal manufacturing location has been in Shenzhen, PRC; however, we have also added specialized manufacturing at our Littlehampton, United Kingdom, Ballerup, Denmark, Frankfurt, Germany, Ronkonkoma and Lockport, New York and Santa Clara, California facilities. From time to time we may be required to or we may choose to relocate manufacturing or migrate manufacturing of specific products between facilities or to third party manufacturers as part of our cost consolidation efforts. A disruption in supply because of these manufacturing relocations could have a significantly adverse effect on our ability to fulfill customer orders. We have been notified that we will be required to relocate our Shenzhen, PRC manufacturing facility by December 2021. If we do not successfully coordinate the timely manufacturing and distribution of our products during this time, we may have insufficient supply of products to meet customer demand, we could lose sales, we may experience a build-up in inventory, or we may incur additional costs. In addition, we are investing in a second factory in Malaysia to help mitigate business continuity, geopolitical and other risks. If we do not successfully implement this factory it could result in increased expenses and disruption of supply to our customers during the transition period.

In addition, the acquisition of Artesyn's Embedded Power business added significant vertically integrated manufacturing sites in China and the Philippines. These sites represent large fixed costs which are difficult to flex as economic and other conditions change. If we do not successfully integrate these operations and operate them in an efficient manner, we could experience greater losses in times of revenue reduction.

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With the acquisition of Artesyn, our strategy is to optimize and reduce our manufacturing footprint over the next several years primarily in China and the Philippines. Our strategy will require the expenditure on facilities, employee severance and other related operations. If we are not successful in this strategy, we may impact our manufacturing capability and not reduce long-term costs as we had planned.

Raw material, part, component, and subassembly shortages, exacerbated by our dependence on sole and limited source suppliers, could affect our ability to manufacture products and systems and could delay our shipments.

Our business depends on our ability to manufacture products that meet the rapidly changing demands of our customers. Our ability to timely manufacture our products depends in part on the timely delivery of raw materials, parts, components, and subassemblies from suppliers. We rely on sole and limited source suppliers for some of our raw materials, parts, components, and subassemblies that are critical to the manufacturing of our products.

This reliance involves several risks, including the following:

- the inability to obtain an adequate supply of required parts, components, or subassemblies;
- supply shortages, if a sole or limited source provider ceases operation;
- the need to fund the operating losses of a sole or limited source provider;
- reduced control over pricing and timing of delivery of raw materials and parts, components, or subassemblies;
- the need to qualify alternative suppliers;
- suppliers that may provide parts, components or subassemblies that are defective, contain counterfeit goods or are otherwise misrepresented to us in terms of form, fit or function;
- the inability of our suppliers to develop technologically advanced products to support our growth and development of new products;
- the impact of geopolitical issues or tariffs that could affect the cost and availability of required parts, components, or subassemblies; and
- the impact of regional or global health issues and related actions could affect the availability of required parts, components, or subassemblies.

From time to time, our sole or limited source suppliers have given us notice that they are ending supply of critical parts, components, and subassemblies that are required for us to deliver product. If we cannot qualify alternative suppliers before ending supply of critical parts from the sole or limited source suppliers, we may be required to make a last-time-buy(s) and take possession of material amounts of inventory in advance of customer demand. In some instances, the last-time-buy materials required to be purchased may be for several years which in turn exposes us to additional excess and obsolescence risk. If we cannot qualify alternative suppliers before the last-time-buy materials are utilized in our products or legacy inverter warranty operations, we may be unable to deliver further product or legacy inverter warranty service to our customers.

Qualifying alternative suppliers could be time consuming and lead to delays in, or prevention of delivery of products to our customers, as well as increased costs. If we are unable to qualify additional suppliers and manage relationships with our existing and future suppliers successfully, if our suppliers experience financial difficulties including bankruptcy, or if our suppliers cannot meet our performance or quality specifications or timing requirements, we may experience shortages, delays, or increased costs of raw materials, parts, components, or subassemblies. This in turn could limit or prevent our ability to manufacture and ship our products, which could materially and adversely affect our relationships with our current and prospective customers and our business, financial condition, and results of operations.

Our orders of raw materials, parts, components, and subassemblies are based on demand forecasts.

We place orders with many of our suppliers based on our customers' quarterly forecasts and our annual forecasts. These forecasts are based on our customers' and our expectations as to demand for our products. As the quarter and the year progress, such demand can change rapidly or we may realize that our customers' expectations were overly optimistic or pessimistic, especially when industry or general economic conditions change. Orders with our

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suppliers cannot always be amended in response. In addition, in order to assure availability of certain components or to obtain priority pricing, we have entered into contracts with some of our suppliers that require us to purchase a specified amount of components and subassemblies each quarter, even if we are not able to use such components or subassemblies. Moreover, we have obligations to some of our customers to hold a minimum amount of finished goods in inventory, in order to fulfill just in time orders, regardless of whether the customers expect to place such orders. We currently have firm purchase commitments and agreements with various suppliers to ensure the availability of components. If demand for our products does not continue at current levels, we might not be able to use all of the components that we are required to purchase under these commitments and agreements, and our reserves for excess and obsolete inventory may increase, which could have a material adverse effect on our results of operations. If demand for our products exceeds our customers' and our forecasts, we may not be able to timely obtain enough raw materials, parts, components, or subassemblies, on favorable terms or at all, to fulfill the excess demand.

Increased governmental action on income tax regulations could negatively impact our business.

International governments have heightened their review and scrutiny of multinational businesses like ours which could increase our compliance costs and future tax liability to those governments. As governments continue to look for ways to increase their revenue streams, they could increase audits of companies to accelerate the recovery of monies perceived as owed to them under current or past regulations. Such an increase in audit activity could have a negative impact on companies which operate internationally, as we do.

Activities necessary to integrate acquisitions may result in costs in excess of current expectations or be less successful than anticipated.

We have completed acquisitions in the past and we may acquire other businesses in the future. The success of such transactions will depend on, among other things, our ability to integrate assets and personnel acquired in these transactions and to apply our internal controls process to these acquired businesses. The integration of acquisitions may require significant attention from our management, and the diversion of management's attention and resources could have a material adverse effect on our ability to manage our business. Furthermore, we may not realize the degree or timing of benefits we anticipated when we first entered into the acquisition transaction. If actual integration costs are higher than amounts originally anticipated, if we are unable to integrate the assets and personnel acquired in an acquisition as anticipated, or if we are unable to fully benefit from anticipated synergies, our business, financial condition, results of operations, and cash flows could be materially adversely affected. Additionally, our efforts to optimize our manufacturing footprint through consolidation and relocation resulting from acquisitions may result in a disruption in our ability to supply our customers which could adversely affect our operations.

We have historically made acquisitions and divestitures. However, we may not find suitable acquisition candidates in the future and we may not be able to successfully integrate and manage acquired businesses. In either an acquisition or a divestiture, we may be required to make fundamental changes in our ERP, business processes and tools which could disrupt our core business and harm our financial condition.

In the past, we have made strategic acquisitions of other corporations and entities, as well as asset purchases, and we continue to evaluate potential strategic acquisitions of complementary companies, products, and technologies. We have also divested businesses. In the future, we could:

- issue stock that would dilute our current stockholders' percentage ownership;
- pay cash that would decrease our working capital;
- incur debt;
- assume liabilities; or
- incur expenses related to impairment of goodwill and amortization.

Acquisitions and divestitures also involve numerous risks, including:

- problems combining or separating the acquired/divested operations, systems, technologies, or products;
- an inability to realize expected sales forecasts, operating efficiencies or product integration benefits;

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- difficulties in coordinating and integrating geographically separated personnel, organizations, systems, and facilities;
- difficulties integrating business cultures;
- unanticipated costs or liabilities;
- diversion of management's attention from our core business;
- adverse effects on existing business relationships with suppliers and customers;
- potential loss of key employees, particularly those of purchased organizations;
- incurring unforeseen obligations or liabilities in connection with either acquisitions or divestitures; and
- the failure to complete acquisitions even after signing definitive agreements which, among other things, would result in the expensing of potentially significant professional fees and other charges in the period in which the acquisition or negotiations are terminated.

We may not be able to successfully identify appropriate acquisition candidates, to integrate any businesses, products, technologies, or personnel that we might acquire in the future or achieve the anticipated benefits of such transactions, which may harm our business.

We may be unable to realize expected benefits from our cost reduction and restructuring efforts

In order to operate more efficiently and control costs, we announce from time to time restructuring plans, which include workforce reductions, global facility optimizations or consolidations and other cost reduction initiatives. These plans are intended to generate operating expense savings through reductions in direct and indirect expenses as well as improved efficiencies. These types of cost reduction and restructuring activities are complex. If we do not successfully manage our current restructuring activities, or any future restructuring activities, expected efficiencies and benefits might be delayed or not realized, and our operations and business could be disrupted.

Changes in tax laws, tax rates, or mix of earnings in tax jurisdictions in which we do business, could impact our future tax liabilities and related corporate profitability

We are subject to income taxes in the U.S. (federal and state) and numerous foreign jurisdictions. Tax laws, regulations, and administrative practices in various jurisdictions may be subject to significant change due to economic, political, and other conditions, and significant judgment is required in evaluating and estimating our provision and accruals for these taxes. There are many transactions that occur during the ordinary course of business for which the ultimate tax determination is uncertain. Our effective tax rates could be adversely affected by earnings being lower than anticipated in jurisdictions where we have lower statutory rates and earnings higher than anticipated in jurisdictions where we have higher statutory rates, losses incurred in jurisdictions for which we are not able to realize the related tax benefit, changes in foreign currency exchange rates, entry into new businesses and geographies and changes to our existing businesses, acquisitions (including integrations) and investments, changes in our deferred tax assets and liabilities and their valuation, and changes in the relevant tax, accounting, and other laws, regulations, administrative practices, principles, and interpretations, including fundamental changes to the tax laws applicable to corporate multinationals. The U.S., many countries in the European Union, and several other countries are actively considering changes in this regard. The acquisition of Artesyn may change our mix of earnings in various tax jurisdictions and may impact our overall current or future tax rate.

Changes in our provision for income taxes or adverse outcomes resulting from examination of our income tax returns could adversely affect our results

Our provision for income taxes is subject to volatility and could be adversely affected by earnings being lower than anticipated in countries that have lower tax rates and higher than anticipated in countries that have higher tax rates; by changes in the valuation of our deferred tax assets and liabilities; by changes, regulations, and interpretations of foreign-derived intangible income (FDII), global intangible low-tax income (GILTI) and base erosion and anti-abuse tax laws (BEAT); by expiration of or lapses in tax incentives; by transfer pricing adjustments, including the effect of acquisitions on our legal structure; by tax effects of nondeductible compensation; by tax costs related to intercompany realignments; by changes in accounting principles; or by changes in tax laws and regulations, treaties, or interpretations thereof, including changes to the taxation of earnings of our foreign subsidiaries, the deductibility of expenses

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attributable to foreign income, and the foreign tax credit rules. Significant judgment is required to determine the recognition and measurement attribute prescribed in the accounting guidance for uncertainty in income taxes. The Organization for Economic Cooperation and Development (OECD), an international association comprised of 36 countries, including the United States, has made changes to numerous long-standing tax principles. There can be no assurance that these changes, once adopted by countries, will not have an adverse impact on our provision for income taxes. Further, as a result of certain of our ongoing employment and capital investment actions and commitments, our income in certain countries is subject to reduced tax rates. Our failure to meet these commitments could adversely impact our provision for income taxes. In addition, we are subject of regular examination of our income tax returns by tax authorities. We regularly assess the likelihood of adverse outcomes resulting from these examinations to determine the adequacy of our provision for income taxes. There can be no assurance that the outcomes from these continuous examinations will not have an adverse effect on our operating results and financial condition.

We are exposed to risks associated with worldwide financial markets and the global economy.

Our business depends on the expansion of manufacturing capacity in our end markets and the installation base for the products we sell. In the past, severe tightening of credit markets, turmoil in the financial markets, and a weakening global economy have contributed to slowdowns in the industries in which we operate. Some of our key markets depend largely on consumer spending. Economic uncertainty, such as that recently experienced in the PRC, exacerbates negative trends in consumer spending and may cause our customers to push out, cancel, or refrain from placing orders.

Difficulties in obtaining capital and uncertain market conditions may also lead to a reduction of our sales and greater instances of nonpayment. These conditions may similarly affect our key suppliers, which could affect their ability to deliver parts and result in delays for our products. Further, these conditions and uncertainty about future economic conditions could make it challenging for us to forecast our operating results and evaluate the risks that may affect our business, financial condition, and results of operations. As discussed in "Our orders of raw materials, parts, components, and subassemblies are based on demand forecasts," a significant percentage of our expenses are relatively fixed and based, in part, on expectations of future net sales. If a sudden decrease in demand for our products from one or more customers were to occur, the inability to adjust spending quickly enough to compensate for any shortfall would magnify the adverse impact of a shortfall in net sales on our results of operations. Conversely, if market conditions were to unexpectedly improve and demand for our products were to increase suddenly, we might not be able to respond quickly enough, which could have a negative impact on our results of operations and customer relations.

Our results of operations could be affected by natural disasters and other events in the locations in which we or our customers or suppliers operate.

We have manufacturing and other operations in locations subject to natural occurrences such as severe weather and geological events including earthquakes or tsunamis that could disrupt operations. In addition, our suppliers and customers also have operations in such locations. A natural disaster, fire, explosion, public health issue (for example, an outbreak of a pandemic disease such as Coronavirus, avian influenza, measles or Ebola) or other event that results in a prolonged disruption to our operations, or the operations of our customers or suppliers, may materially adversely affect our business, results of operations, or financial condition.

We transitioned a significant amount of our supply base to Asian suppliers.

We transitioned the purchasing of a substantial portion of components for our products to Asian suppliers to lower our materials costs and shipping expenses. These components might require us to incur higher than anticipated testing or repair costs, which would have an adverse effect on our operating results. Customers who have strict and extensive qualification requirements might not accept our products if these lower-cost components do not meet their requirements. A delay or refusal by our customers to accept such products, as well as an inability of our suppliers to meet our purchasing requirements, might require us to purchase higher-priced components from our existing suppliers or might cause us to lose sales to these customers, either of which could lead to decreased revenue and gross margins and have an adverse effect on our results of operations.

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We must continually design and introduce new products into the markets we serve to respond to competition and rapid technological changes.

We operate in a highly competitive environment where innovation is critical, our future success depends on many factors, including the effective commercialization and customer acceptance of our products and services. The development, introduction and support of a broadening set of products is critical to our continued success. Our results of operations could be adversely affected if we do not continue to develop new products (including software and firmware capabilities), improve and develop new applications for existing products, and differentiate our products from those of competitors resulting in their adoption by customers.

We must achieve design wins to retain our existing customers and to obtain new customers, although design wins achieved do not necessarily result in substantial sales.

Driven by continuing technology migration and changing customers demand the markets we serve are constantly changing in terms of advancement in applications, core technology and competitive pressures. New products we design for capital equipment manufacturers typically have a lifespan of five to ten years. Our success and future growth depend on our products being designed into our customers new generations of equipment as they develop new technologies and applications. We must work with these manufacturers early in their design cycles to modify, enhance and upgrade our products or design new products that meet the requirements of their new systems. The design win process is highly competitive, and we may win or lose new design wins for our existing customers or new customers next generations of equipment. In case existing or new customers do not choose our products as a result of the development, evaluation and qualification efforts related to the design win process, our market share will be reduced, the potential revenues related to the lifespan of our customers' products, which can be five to ten years, will not be realized, and our business, financial condition and results of operations would be materially and adversely impacted.

We generally have no long-term contracts with our customers requiring them to purchase any specified quantities from us.

Our sales are primarily made on a purchase order basis, and we generally have no long-term purchase commitments from our customers, which is typical in the industries we serve. As a result, we are limited in our ability to predict the level of future sales or commitments from our current customers, which may diminish our ability to allocate labor, materials, and equipment in the manufacturing process effectively. In addition, we may purchase inventory in anticipation of sales that do not materialize, resulting in excess and obsolete inventory write-offs.

If we are unable to adjust our business strategy successfully for some of our product lines to reflect the increasing price sensitivity on the part of our customers, our business and financial condition could be harmed.

Our business strategy for many of our product lines has been focused on product performance and technology innovation to provide enhanced efficiencies and productivity. As a result of recent economic conditions and changes in various markets that we serve, our customers have experienced significant cost pressures. We have observed increased price sensitivity on the part of our customers. If competition against any of our product lines should come to focus solely on price rather than on product performance and technology innovation, we will need to adjust our business strategy and product offerings accordingly, and if we are unable to do so, our business, financial condition, and results of operations could be materially and adversely affected.

Our competitive position could be weakened if we are unable to convince end users to specify that our products be used in the equipment sold by our customers.

The end users in our markets may direct equipment manufacturers to use a specified supplier's product in their equipment at a particular facility. This occurs with frequency because our products are critical in manufacturing process control for thin-film applications. Our success, therefore, depends in part on our ability to have end users specify that our products be used at their facilities. In addition, we may encounter difficulties in changing established relationships of competitors that already have a large installed base of products within such facilities.

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The markets we operate in are highly competitive.

We face substantial competition, primarily from established companies, some of which have greater financial, marketing, and technical resources than we do. We expect our competitors will continue to develop new products in direct competition with ours, improve the design and performance of their products, and introduce new products with enhanced performance characteristics including software and firmware capabilities. In order to remain competitive, we must improve and expand our products and product offerings. In addition, we may need to maintain a high level of investment in research and development and expand our sales and marketing efforts, particularly outside of the United States. We might not be able to make the technological advances and investments necessary to remain competitive. If we were unable to improve and expand our products and product offerings, our business, financial condition, and results of operations could be materially and adversely affected.

A significant portion of our sales and accounts receivable are concentrated among a few customers.

Our ten largest customers accounted for 57.3%, 62.5% and 70.4% of our sales for the year ended December 31, 2019, 2018 and 2017, respectively. During the year ended December 31, 2019, sales to Applied Materials, Inc. and Lam Research were \$164.7 million and \$88.3 million, respectively. During the year ended December 31, 2018 sales to Applied Materials, Inc., and Lam Research were \$258.0 million and \$109.0 million, respectively. During the year ended December 31, 2017, sales to Applied Materials, Inc., and Lam Research were \$224.8 million and \$155.3 million, respectively. A new customer, Nidec Motor Corporation, acquired in connection with the acquisition of Artesyn's Embedded Power business, had a \$38.1 million accounts receivable balance as of December 31, 2019. Applied Material, Inc. had a \$36.8 million and \$34.3 million accounts receivable balance as of December 31, 2019 and December 31, 2018, respectively. In addition, the Company has several large customers in China dependent on the Chinese government for project funding. A significant decline in sales from these or other large customers, or the Company's inability to collect on these sales, could materially and adversely impact our business, results of operations and financial condition.

We maintain significant amounts of cash in international locations.

Given the global nature of our business, we have both domestic and international concentrations of cash and investments. The value of our cash, cash equivalents, and marketable securities can be negatively affected by liquidity, credit deterioration, financial results, economic risk, political risk, sovereign risk or other factors. The Company intends to utilize its foreign cash to expand our international operations through internal growth and strategic acquisitions. If our intent changes or if these funds are needed for our U.S. operations, or we are negatively impacted by any of the factors above, our financial condition and results of operations could be materially adversely affected.

Globalization of sales increases risk of compliance with policy.

We operate in an increasingly complex sales environment around the world which places greater importance on our global control environment and imposes additional oversight risk. Such increased complexity could adversely affect our operating results by increasing compliance costs in the near-term and by increasing the risk of control failures in the event of non-compliance.

Market pressures and increased low-cost competition may reduce or eliminate our profitability.

Our customers continually exert pressure on us to reduce our prices and extend payment terms. Given the nature of our customer base and the highly competitive markets in which we compete, we may be required to reduce our prices or extend payment terms to remain competitive. We have recently seen pricing pressure from our largest customers due in part to low-cost competition and market consolidation. As a result of the competitive markets we serve, from time to time we may enter into long term pricing agreements with our largest customers that results in reduced product pricing. Such reduced product pricing may result in product margin declines unless we are successful in reducing our product costs ahead of such price reductions. In addition, our newly acquired business competes in markets that are more price competitive which may include dual or multi sourcing. We believe some of our Asian competitors benefit from local governmental funding incentives and purchasing preferences from end-user customers in their

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respective countries. Moreover, in order to be successful in the current competitive environment, we are required to accelerate our investment in research & development to meet time-to-market, performance and technology adoption cycle needs of our customers simply in order to compete for design wins, and if successful, receive potential purchase orders. Given such up-front investments we must make and the competitive nature of our markets, we may not be able to reduce our expenses in an amount enough to offset potential margin declines or loss of business and may not be able to meet customer product time-line expectations. The potential decrease in cash flow could materially and adversely impact our financial condition.

We are highly dependent on our intellectual property.

Our success depends significantly on our proprietary technology. We attempt to protect our intellectual property rights through patents and non-disclosure agreements; however, we might not be able to protect our technology, and competitors might be able to develop similar technology independently. In addition, the laws of some foreign countries might not afford our intellectual property the same protections as do the laws of the United States. Our intellectual property is not protected by patents in several countries in which we do business, and we have limited patent protection in other countries, including the PRC. The cost of applying for patents in foreign countries and translating the applications into foreign languages requires us to select carefully the inventions for which we apply for patent protection and the countries in which we seek such protection. Generally, our efforts to obtain international patents have been concentrated in the European Union and certain industrialized countries in Asia, including Korea, Japan, and Taiwan. If we are unable to protect our intellectual property successfully, our business, financial condition, and results of operations could be materially and adversely affected.

The PRC commercial law is relatively undeveloped compared to the commercial law in the United States. Limited protection of intellectual property is available under PRC law. Consequently, manufacturing our products in the PRC may subject us to an increased risk that unauthorized parties may attempt to copy our products or otherwise obtain or use our intellectual property. We may not be able to protect our intellectual property rights effectively. Additionally, we may not have adequate legal recourse if we encounter infringements of our intellectual property in the PRC.

Our legacy inverter products may suffer higher than anticipated litigation, damage or warranty claims.

Our legacy inverter products (of which we discontinued the manufacture, engineering, and sale in December 2015 and which are reflected as Discontinued Operations in this filing) contain components that may contain errors or defects and were sold with original product warranties ranging from one to ten years with an option to purchase additional warranty coverage for up to 20 years. If any of our products are defective or fail because of their design, we might be required to repair, redesign or recall those products or to pay damages (including liquidated damages) or warranty claims, and we could suffer significant harm to our reputation. We are experiencing increasing claims from customers and suppliers and increasing litigation related to the legacy inverter product line. We review such claims and vigorously defend against such lawsuits in the ordinary course of our business. We cannot assure that any such claims or litigation brought against us will not have a material adverse effect on our business or financial statements. Our involvement in such litigation could result in significant expense to us and divert the efforts of our technical and management personnel. We also accrue a warranty reserve for estimated costs to provide warranty services including the cost of technical support, product repairs, and product replacement for units that cannot be repaired. Our estimate of costs to fulfill our warranty obligations is based on historical experience and expectation of future conditions. To the extent we experience increased warranty claim activity or increased costs associated with servicing those claims, our warranty accrual will increase, resulting in additional expenses in the line "Income (loss) from discontinued operations, net of tax" on our Consolidated Statement of Operations in future periods. We plan to continue supporting inverter customers with service maintenance and repair operations. This includes performing service to fulfill obligations under existing service maintenance contracts. There is no certainty that these can be performed profitably and could be adversely affected by higher than anticipated product failure rates, loss of critical service technician skills, an inability to obtain service parts, customer demands and disputes and cost of repair parts, among other factors. See *Note 4. Disposed and Discontinued Operations* in Part II, Item 8 "Financial Statements and Supplementary Data" contained herein.

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Our products may suffer from defects or errors leading to damage or warranty claims.

Our products use complex system designs and components that may contain errors or defects, particularly when we incorporate new technology into our products or release new versions. If any of our products are defective or fail because of their design, we might be required to repair, redesign or recall those products, pay damages (including liquidated damages) or warranty claims, and we could suffer significant harm to our reputation. We accrue a warranty reserve for estimated costs to provide warranty services including the cost of technical support, product repairs, and product replacement for units that cannot be repaired. Our estimate of costs to fulfill our warranty obligations is based on historical experience and expectation of future conditions. To the extent we experience increased warranty claim activity or increased costs associated with servicing those claims, our warranty accrual will increase, resulting in decreased gross profit. In recent years, we have experienced increased warranty costs for our legacy inverter product lines, which is reflected in "Income from discontinued operations, net of income taxes." See *Note 4. Disposed and Discontinued Operations* in Part II, Item 8 "Financial Statements and Supplementary Data" contained herein.

Unfavorable currency exchange rate fluctuations may lead to lower operating margins, or may cause us to raise prices, which could result in reduced sales.

Currency exchange rate fluctuations could have an adverse effect on our sales and results of operations, and we could experience losses with respect to forward exchange contracts into which we may enter. Unfavorable currency fluctuations could require us to increase prices to foreign customers, which could result in lower net sales by us to such customers. Alternatively, if we do not adjust the prices for our products in response to unfavorable currency fluctuations, our results of operations could be materially and adversely affected. In addition, most sales made by our foreign subsidiaries are denominated in the currency of the country in which these products are sold and the currency in which they receive payment for such sales could be less valuable at the time of receipt as a result of exchange rate fluctuations. Given recent acquisitions in Europe and Asia, our exposure to fluctuations in the value of the Euro and Chinese Yuan is becoming more significant. From time to time, we enter into forward exchange contracts and local currency purchased options to reduce currency exposures related to likely or pending transactions including those arising from intercompany sales of inventory. However, we cannot be certain that our efforts will be adequate to protect us against significant currency fluctuations or that such efforts will not expose us to additional exchange rate risks, which could materially and adversely affect our results of operations.

Recent developments relating to the United Kingdom's referendum vote in favor of leaving the European Union and related actions could adversely affect us.

On June 23, 2016, the United Kingdom (UK) held a referendum in which voters approved an exit from the European Union ("EU"). On January 23, 2020, the UK left the EU, which is commonly referred to as "Brexit". The UK and the EU are now in a transitional period through the end of 2020. Negotiation on the UK's withdrawal from the EU as well as its relationship with the EU going forward, including the terms of trade between the UK and the EU, is unclear. Although it is unknown what those terms will be, it is possible that there will be greater restrictions on imports and exports between the UK and EU countries and increased regulatory complexities. These changes may adversely affect our sales, operations and financial results. Our operations in the UK may be adversely affected by extreme fluctuations in the UK exchange rates. Moreover, the imposition of any import restrictions and duties levied on our UK products as imported for EU customers may make our products more expensive for such customers and less competitive from a pricing perspective.

Changes in the value of the Chinese yuan could impact the cost of our operation in the PRC and our sales growth in our PRC markets.

The PRC government is continually pressured by its trading partners to allow its currency to float in a manner like other major currencies. Any change in the value of the Chinese yuan may impact our ability to control the cost of our products in the world market. Specifically, the decision by the PRC government to allow the yuan to begin to float against the United States dollar could significantly increase the labor and other costs incurred in the operation of our Shenzhen and Zhongshan facilities and the cost of raw materials, parts, components, and subassemblies that we source in the PRC, thereby having a material and adverse effect on our financial condition and results of operations.

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Difficulties with our enterprise resource planning ("ERP") system and other parts of our global information technology system could harm our business and results of operation.

Like many multinational corporations, we maintain a global information technology system, including software products licensed from third parties. The acquisition of Artesyn's Embedded Power business adds additional information systems that are initially different from current systems. Any system, network or Internet failures, misuse by system users, government intervention, the hacking into or disruption caused by unauthorized access or loss of license rights could disrupt our ability to timely and accurately manufacture and ship products or to report our financial information in compliance with the timelines mandated by the SEC. Any such failure, misuse, hacking, unauthorized access, disruptions or loss would likely cause a diversion of management's attention from the underlying business and could harm our operations. In addition, a significant failure of our global information technology system could adversely affect our ability to complete an evaluation of our internal controls and attestation activities pursuant to Section 404 of the Sarbanes-Oxley Act of 2002.

If our network security measures are breached and unauthorized access is obtained to a customer's data or our data or our information technology systems, we may incur significant legal and financial exposure and liabilities.

As part of our day-to-day business, we store our data and certain data about our customers in our global information technology system. Unauthorized access to our data, including any regarding our customers, could expose us to a risk of loss of this information, loss of business, litigation and possible liability. These security measures may be breached by intentional misconduct by computer hackers, as a result of third-party action, employee error, malfeasance or otherwise. Additionally, third parties may attempt to fraudulently induce employees or customers into disclosing sensitive information such as usernames, passwords or other information in order to gain access to our customers' data or our data, including our intellectual property and other confidential business information, or our information technology systems. Because the techniques used to obtain unauthorized access, or to sabotage systems, change frequently and generally are not recognized until launched against a target, we may be unable to anticipate these techniques or to implement adequate preventative measures. Any security breach could result in a loss of confidence by our customers, damage our reputation, disrupt our business, lead to legal liability and negatively impact our future sales.

Our business is subject to complex and evolving U.S. and international laws and regulations regarding privacy and data protection. Many of these laws and regulations are subject to change and uncertain interpretation and could result in claims, changes to our business practices, penalties, increased cost of operations, or declines in user growth or engagement, or otherwise harm our business.

Regulatory authorities around the world are considering several legislative and regulatory proposals concerning data protection, including measures to ensure that encryption of users' data does not hinder law enforcement agencies' access to that data. In addition, the interpretation and application of consumer and data protection laws in the U.S., Europe and elsewhere are often uncertain and in flux. It is possible that these laws may be interpreted and applied in a manner that is inconsistent with our data practices. These legislative and regulatory proposals, if adopted, and such interpretations could, in addition to the possibility of fines, result in an order requiring that we change our data practices, which could have an adverse effect on our business and results of operations. Complying with these various laws could cause us to incur substantial costs or require us to change our business practices in a manner adverse to our business.

Recent legal developments in Europe have created compliance uncertainty regarding certain transfers of personal data from Europe to the United States. For example, the General Data Protection Regulation ("GDPR"), effective in the EU starting on May 25, 2018, applies to all our activities conducted from an establishment in the EU or related to products and services that we offer to EU users. The GDPR creates a range of new compliance obligations, which could cause us to change our business practices, and will significantly increase financial penalties for noncompliance (including possible fines of up to 4% of global annual turnover for the preceding financial year or €20 million (whichever is higher) for the most serious infringements). Moreover, the China cybersecurity law enacted in 2017 and subsequent regulations and interpretations create compliance and data access risks for multinational corporations such as our Company.

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The loss of any of our key personnel could significantly harm our results of operations and competitive position.

Our success depends to a significant degree upon the continuing contributions of our key management, technical, marketing, and sales employees. We may not be successful in retaining our key employees or attracting or retaining additional skilled personnel as required. Failure to retain or attract key personnel could significantly harm our results of operations and competitive position. Our success in hiring and retaining employees depends on a variety of factors, including the attractiveness of our compensation and benefit programs, global economic or political and industry conditions, our organizational structure, our reputation, culture and working environment, competition for talent and the availability of qualified employees, the availability of career development opportunities, and our ability to offer a challenging and rewarding work environment. We must develop our personnel to provide succession plans capable of maintaining continuity during the inevitable unpredictability of personnel retention. While we have plans for key management succession and long-term compensation plans designed to retain our senior employees, if our succession plans do not operate effectively, our business could be adversely affected.

We have been, and in the future may again be, involved in litigation. Litigation is costly and could result in further restrictions on our ability to conduct business or make use of market relationships we have developed, or an inability to prevent others from using technology.

Litigation may be necessary to enforce our commercial or property rights, to defend ourselves against claimed violations of such rights of others, or to protect our interests in regulatory, tax, customs, commercial, and other disputes or similar matters. In particular, we have been experiencing increased litigation related to our legacy inverter product line and an adverse court ruling in any of our cases could adversely affect our financial condition and results of operations. Litigation often requires a substantial amount of our management's time and attention, as well as financial and other resources, including:

- substantial costs in the form of legal fees, fines, and royalty payments;
- restrictions on our ability to sell certain products or in certain markets;
- an inability to prevent others from using technology we have developed; and
- a need to redesign products or seek alternative marketing strategies.

Any of these events could have a significant adverse effect on our business, financial condition, and results of operations.

Return on investments or interest rate declines on plan investments could result in additional unfunded pension obligations for our pension plans.

We currently have unfunded obligations to our pension plans. The extent of future contributions to the pension plan depends heavily on market factors such as the discount rate used to calculate our future obligations and the actual return on plan assets which enable future payments. We estimate future contributions to the plans using assumptions with respect to these and other items. Changes to those assumptions could have a significant effect on future contributions. Additionally, a material deterioration in the funded status of the plan could increase pension expenses and reduce our profitability. See *Note 17. Pension Liability* in Part II, Item 8 "Financial Statements and Supplementary Data" contained herein.

Funds associated with our marketable securities that we have traditionally held as short-term investments may not be liquid or readily available.

In the past, certain of our investments have been affected by external market conditions that impacted the liquidity of the investment. We do not currently have investments with reduced liquidity, but external market conditions that we cannot anticipate or mitigate may impact the liquidity of our marketable securities. Any changes in the liquidity associated with these investments may require us to borrow funds at terms that are not favorable or repatriate cash from international locations at a significant cost. We cannot be certain that we will be able to borrow funds or continue to repatriate cash on favorable terms, or at all. If we are unable to do so, our available cash may be reduced until those investments can be liquidated. The lack of available cash may prevent us from taking advantage of business

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opportunities that arise and may prevent us from executing some of our business plans, either of which could cause our business, financial condition or results of operations to be materially and adversely affected.

Our intangible assets may become impaired.

As of December 31, 2019, we have \$202.9 million of goodwill and \$184.0 million in intangible assets. We periodically review the estimated useful lives of our identifiable intangible assets, taking into consideration any events or circumstances that might result in either a diminished fair value, or for intangible assets, a revised useful life. The events and circumstances include significant changes in the business climate, legal factors, operating performance indicators, and competition. Any impairment or revised useful life could have a material and adverse effect on our financial position and results of operations and could harm the trading price of our common stock.

We are subject to numerous governmental regulations.

We are subject to federal, state, local and foreign regulations, including environmental regulations and regulations relating to the design and operation of our products and control systems and regulations governing the import, export and customs duties related to our products. We might incur significant costs as we seek to ensure that our products meet safety and emissions standards, many of which vary across the states and countries in which our products are used. In the past, we have invested significant resources to redesign our products to comply with these directives. Compliance with future regulations, directives, and standards could require us to modify or redesign some products, make capital expenditures, or incur substantial costs. Also, we may incur significant costs in complying with the numerous imports, exports and customs regulations as we seek to sell our products internationally. If we do not comply with current or future regulations, directives, and standards:

- we could be subject to fines and penalties;
- our production or shipments could be suspended; and
- we could be prohibited from offering particular products in specified markets.

If we were unable to comply with current or future regulations, directives and standards, our business, financial condition and results of operations could be materially and adversely affected.

Financial reform legislation will result in new laws and regulations that may increase our costs of operations.

The Dodd-Frank Wall Street Reform and Consumer Protection Act (the "Dodd-Frank Act") requires various federal agencies to adopt a broad range of new implementing rules and regulations, and to prepare numerous studies and reports for Congress. On August 22, 2012, under the Dodd-Frank Act, the SEC adopted new requirements for companies that use certain minerals and metals, known as conflict minerals, in their products, whether or not these products are manufactured by third parties. These requirements require companies to perform due diligence, disclose and report whether or not such minerals originate from the Democratic Republic of Congo and adjoining countries. We must perform sufficient due diligence to determine whether such minerals are used in the manufacture of our products. With regard to our acquisition of Artesyn, we will need to complete due diligence over the minerals used in the manufacture of those products. In addition, we incur costs to comply with the disclosure requirements, including costs related to determining the source of any of the relevant minerals and metals used in our products. Since our supply chain is complex, we may not be able to sufficiently verify the origins for these minerals and metals used in our products through the due diligence procedures that we implement, which may harm our reputation. In such event, we may also face difficulties in satisfying customers who require that all the components of our products are certified as conflict mineral free.

The market price of our common stock has fluctuated and may continue to fluctuate for reasons over which we have no control.

The stock market has from time to time experienced, and is likely to continue to experience, extreme price and volume fluctuations. Prices of securities of technology companies have been especially volatile and have often fluctuated for reasons that are unrelated to their operating performance. In the past, companies that have experienced volatility in

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the market price of their stock have been the subject of securities class action litigation. If we were the subject of securities class action litigation, it could result in substantial costs and a diversion of management's attention and resources.

Our operating results are subject to fluctuations, and if we fail to meet the expectations of securities analysts or investors, our share price may decrease significantly.

Our annual and quarterly results may vary significantly depending on various factors, many of which are beyond our control. Because our operating expenses are based on anticipated revenue levels, our sales cycle for development work is relatively long, and a high percentage of our expenses are fixed for the short term, a small variation in the timing of recognition of revenue can cause significant variations in operating results from period to period. If our earnings do not meet the expectations of securities analysts or investors, the price of our stock could decline.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

Information concerning our principal properties at December 31, 2019 is set forth below:

Location	Principal Activity	Ownership
Denver, CO	Corporate headquarters, general and administrative	Leased
Fort Collins, CO	Research and development, distribution, sales, and service	Leased
Lockport, NY	Manufacturing, distribution, service, and research and development	Leased
Milpitas, CA	Research and development, sales, and service	Leased
Ronkonkoma, NY	Manufacturing, distribution, service, and research and development	Leased
Vancouver, WA	Research and development, manufacturing, distribution, sales, and service	Leased
Georgetown, MA	Sales	Leased
Eden Prairie, MN	Engineering, and research and development	Leased
Tempe, AZ	Sales and administration	Leased
Beijing, China	Sales	Leased
Shanghai, China	Sales and distribution	Leased
Shenzhen, China	Manufacturing, distribution, service, and research and development	Leased
Xian, China	Service	Leased
Zhongshan, China	Manufacturing	Leased
Pune, India	Sales	Leased
Tokyo, Japan	Sales and service	Leased
Seoul, South Korea	Sales and service	Leased/Owned
Bukit Minak, Malaysia	Manufacturing and distribution	Leased
Quezon, Philippines	Engineering, research and development, administration and support	Leased
Rosario, Philippines	Manufacturing	Leased
Santa Rosa, Philippines	Manufacturing	Leased
Singapore, Singapore	Sales and service	Leased
Taipei, Taiwan	Sales, distribution, and service	Leased
Hong Kong, Hong Kong	Distribution and general & administrative	Leased
Ballerup, Denmark	Manufacturing, distribution, sales, service, and research and development	Leased
Erstein, France	Sales	Leased
Metzingen, Germany	Distribution, sales, and service	Leased
Warstein-Belecke, Germany	Research and development, distribution, sales, and service	Leased
Frankfurt, Germany	Manufacturing, distribution, sales, service, and research and development	Leased
Magdeburg, Germany	Manufacturing and distribution	Leased
Cork, Ireland	Sales, service, and research and development	Leased
Caesarea, Israel	Research and development and service	Leased
Villaz-St-Pierre, Switzerland	Research and development	Leased
Littlehampton, United Kingdom	Manufacturing, distribution, sales, service, and research and development	Leased

We consider the properties that we own or lease as adequate to meet our current and future requirements. We regularly assess the size, capability, and location of our global infrastructure and periodically make adjustments based on these assessments.

ITEM 3. LEGAL PROCEEDINGS

We are presently involved in disputes and legal actions arising in the normal course of our business. While we currently believe that the amount of any ultimate loss would not be material to our financial position, the outcome of these actions is inherently difficult to predict. In the event of an adverse outcome, the ultimate loss could have a material adverse effect on our financial position or reported results of operations. An unfavorable decision in patent litigation could require material changes in production processes and products or result in our inability to ship products or components found to have violated third-party patent rights. An unfavorable decision in a collection action against a customer we sold products to, or a claim or counterclaim from a customer related to alleged product failures, could also have a material adverse effect on our financial position or reported results of operations. We are engaged presently in such disputes and legal actions with customers and supplier for the inverter product line. We accrue loss contingencies in connection with our commitments and contingencies, including litigation, when it is probable that a loss has occurred, and the amount of the loss can be reasonably estimated. For further information see *Note 19. Commitments and Contingencies* in Part II, Item 8 “Financial Statements and Supplementary Data.”

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

Principal Market

Our common stock is listed on the NASDAQ Global Select Market under the symbol "AEIS." At February 28, 2020, the number of common stockholders of record was 303.

Dividend Policy

We have not declared or paid any cash dividends on our capital stock in our history as a public company. We currently intend to retain all future earnings to finance our business or make stock repurchases and do not anticipate paying cash or other dividends on our common stock in the foreseeable future.

Purchases of Equity Securities by the Issuer

In September 2015, our Board of Directors (the "Board") authorized a program to repurchase up to \$150.0 million of our stock over a thirty-month period. In November 2017, the Board approved an extension of the share repurchase program to December 2019 from its original maturity of March 2018. In May 2018, the Board approved a \$50 million increase in the repurchase authorization.

On December 18, 2019, the Board authorized to remove the expiration date from the repurchase program and increased the balance available for stock repurchase by \$25.1 million. As of December 31, 2019, the Company was authorized to repurchase shares of the Company's common stock of up to a total of \$50.0 million.

The following table summarizes the stock repurchase activity for the three months ended December 31, 2019 (in thousands, except per share amounts):

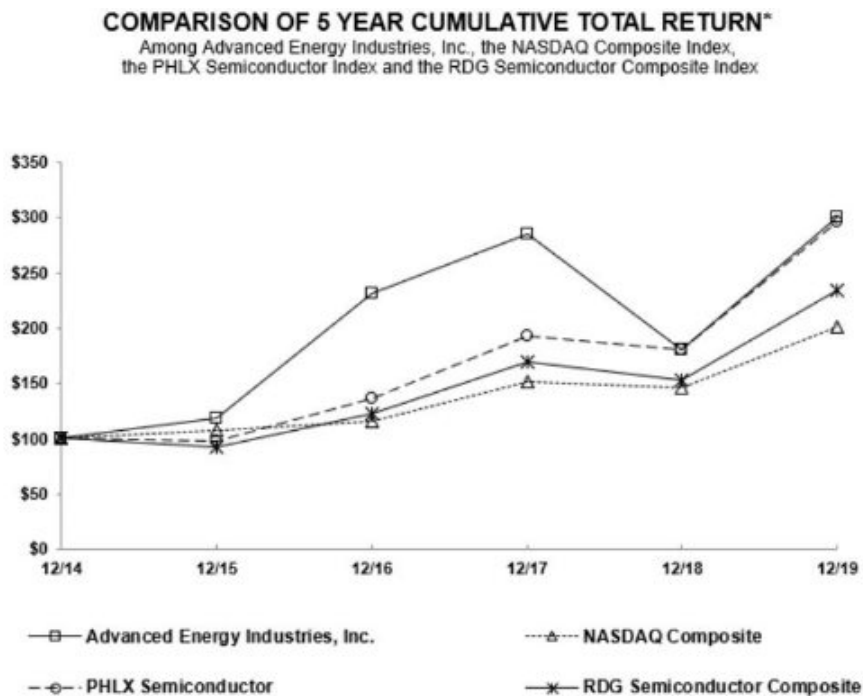
	Total Number of Shares Purchased	Average Price Paid per Share	Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs	Maximum Dollar Value of Shares that May Yet be Purchased Under the Plans or Programs
October 1, 2019 - October 31, 2019	—	\$ —	—	\$ 24,902
November 1, 2019 - November 30, 2019	—	—	—	24,902
December 1, 2019 - December 31, 2019	—	—	—	50,000
Total	—	\$ —	—	\$ 50,000

In order to execute the repurchase of shares of our common stock, the Company periodically enters into stock repurchase agreements. All shares repurchased were executed in the open market, and no shares were repurchased from related parties. Repurchased shares are retired and assumed the status of authorized and unissued shares. Accordingly, the associated cost of the repurchased shares was recognized as a reduction to additional paid-in capital.

Performance Graph

The performance graph below shows the five-year cumulative total stockholder return on our common stock during the period from December 31, 2014 through December 31, 2019. This is compared with the cumulative total

return of the NASDAQ Composite Index and the Philadelphia Semiconductor Index (PHLX) over the same period. The comparison assumes \$100 was invested on December 31, 2014 in Advanced Energy common stock and in each of the foregoing indices and assumes reinvestment of dividends, if any. Dollar amounts in the graph are rounded to the nearest whole dollar. The performance shown in the graph represents past performance and should not be considered an indication of future performance.



(1) \$100 invested on 12/31/2014 in our stock or index, including reinvestment of dividends. Indices and our stock performance are calculated on a calendar year-end basis.

	12/14	12/15	12/16	12/17	12/18	12/19
Advanced Energy Industries, Inc.	\$ 100.00	\$ 119.11	\$ 231.01	\$ 284.73	\$ 181.14	\$ 300.42
NASDAQ Composite	100.00	106.96	116.45	150.96	146.67	200.49
PHLX Semiconductor	100.00	98.41	137.10	192.69	181.04	295.57
RDG Semiconductor Composite	100.00	91.76	122.76	169.41	153.35	234.06

Information relating to compensation plans under which our equity securities are authorized for issuance is set forth in Part III, Item 12 of this Annual Report on Form 10-K.

ITEM 6. SELECTED FINANCIAL DATA

The selected Consolidated Statements of Operations and related Consolidated Balance Sheets data were derived from our audited Consolidated Financial Statements. The information below is not necessarily indicative of results of future operations and should be read in conjunction with Item 7 “Management’s Discussion and Analysis of Financial

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Condition and Results of Operations” of this Form 10-K in order to understand more fully the factors that may affect the comparability of the information presented below (in thousands, except per share amounts):

	Years Ended December 31,				
	2019	2018	2017	2016	2015
Consolidated Statements of Operations Data:					
Sales, net ^{(1) (2) (3)}	\$ 788,948	\$ 718,892	\$ 671,012	\$ 483,704	\$ 414,811
Operating income	\$ 54,388	\$ 171,553	\$ 200,770	\$ 126,857	\$ 106,656
Income from continuing operations before income taxes	\$ 67,194	\$ 172,376	\$ 198,191	\$ 128,076	\$ 105,442
Income from continuing operations, net of income taxes ⁽⁴⁾	\$ 56,495	\$ 147,149	\$ 136,101	\$ 116,948	\$ 83,482
Income (loss) from discontinued operations, net of income taxes ⁽⁵⁾	\$ 8,480	\$ (38)	\$ 1,760	\$ 10,506	\$ (241,968)
Net income (loss)	\$ 64,975	\$ 147,111	\$ 137,861	\$ 127,454	\$ (158,486)
Income from continuing operations attributable to noncontrolling interest	\$ 34	\$ 86	\$ —	\$ —	\$ —
Net income (loss) attributable to Advanced Energy Industries, Inc.	\$ 64,941	\$ 147,025	\$ 137,861	\$ 127,454	\$ (158,486)
Earnings per Share:					
Continuing Operations:					
Basic earnings per share	\$ 1.47	\$ 3.76	\$ 3.42	\$ 2.94	\$ 2.05
Diluted earnings per share	\$ 1.47	\$ 3.74	\$ 3.39	\$ 2.92	\$ 2.03
Discontinued Operations:					
Basic earnings (loss) per share	\$ 0.22	\$ —	\$ 0.04	\$ 0.26	\$ (5.94)
Diluted earnings (loss) per share	\$ 0.22	\$ —	\$ 0.04	\$ 0.26	\$ (5.94)
Net Income (Loss):					
Basic earnings (loss) per share	\$ 1.70	\$ 3.76	\$ 3.47	\$ 3.21	\$ (3.89)
Diluted earnings (loss) per share	\$ 1.69	\$ 3.74	\$ 3.43	\$ 3.18	\$ (3.89)
Basic weighted-average common shares outstanding	38,281	39,081	39,754	39,720	40,746
Diluted weighted-average common shares outstanding	38,495	39,352	40,176	40,031	41,077
Consolidated Balance Sheets Data:					
Total assets	\$ 1,532,406	\$ 816,484	\$ 733,308	\$ 571,529	\$ 462,503
Total long-term liabilities	\$ 534,814	\$ 98,873	\$ 106,548	\$ 84,409	\$ 95,024

- (1) Included in sales for 2019 is \$220.3 million related to the acquisition of all outstanding shares of Artesyn as of September 10, 2019.
- (2) Included in sales for 2018 is \$17.4 million related to the acquisition of all outstanding shares of LumaSense Technologies Holdings, Inc. as of September 1, 2018 and \$21.3 million related to the acquisition of all the outstanding shares of Trek Holding Co. Ltd as of February 2, 2018 and the acquisition of the electrostatic technology and product line from Monroe Electronics, Inc as of May 1, 2018.
- (3) Included in sales for 2017 is \$7.6 million related to the acquisition of all the outstanding shares of Excelsys Holding Ltd. as of July 1, 2017.
- (4) We recognized tax expense of \$5.7 million, or \$0.14 per diluted share, and \$72.9 million, or \$1.81 per diluted share, for 2018 and 2017, respectively, associated with the impacts of the enactment of the U.S. Tax Cuts and Jobs Act legislation in December 2017. We recognized a tax benefit of \$33.8 million, or \$0.84 per diluted share, in 2017 related to the continued wind down of our solar inverter business which was discontinued in 2015.

(5) In 2015, we discontinued the development, sales and distribution of our solar inverter product line.

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

Certain statements set forth below under this caption constitute forward-looking statements. See "*Special Note Regarding Forward-Looking Statements*" in this Annual Report on Form 10-K for additional factors relating to such statements and see "*Risk Factors*" in Item 1A for a discussion of certain risks applicable to our business, financial condition and results of operations.

This section of this Form 10-K discusses and compares the results of operations for 2019 and 2018. The discussion and analysis comparing the results of operations for 2017 to 2018 are not included in this Form 10-K and can be found within Part II, Item 7, Management's Discussion and Analysis for Financial Condition and Results of Operations in our 2018 Form 10-K for the fiscal year ended December 31, 2018.

Overview

We design, manufacture, sell, and support power conversion products that transform power into various usable forms. Our highly-engineered, mission-critical, precision power conversion, measurement and control solutions enable innovative complex semiconductor manufacturing processes, power medical equipment, control industrial manufacturing processes, provide high efficiency power to data center equipment and deliver efficient and reliable power to communication infrastructure and to a wide range of industrial equipment. Our network of global service support centers provides a recurring revenue opportunity as we offer repair services, conversions, upgrades, and refurbishments and used equipment to companies using our products.

Driven by continuing technology migration and changing customer demands, the markets we serve are constantly changing in terms of advancement in applications, core technology and competitive pressures. New products we design for capital equipment manufacturers typically have a lifespan of five to ten years. Our success and future growth depend on our products being designed into our customers' new generations of equipment as they develop new technologies and applications. We work with these original equipment manufacturers early in their design cycles to modify, enhance and upgrade our products or design new products that meet the requirements of their new systems. The design win process is highly competitive, and we may win or lose new designs for our existing customers' or new customers' next generations of equipment. If existing or new customers do not choose our products as a result of the development, evaluation and qualification efforts related to the design win process, our market share may be reduced, our potential revenues related to the lifespan of our customers' products, which can be 5-10 years, may not be realized, and our business, financial condition and results of operations may be materially and adversely impacted.

CRITICAL ACCOUNTING ESTIMATES

The preparation of Consolidated Financial Statements and related disclosures in conformity with accounting principles generally accepted in the United States of America ("U.S. GAAP") requires us to make judgments, assumptions, and estimates that affect the amounts reported. *Note 1. Operations and Summary of Significant Accounting Policies and Estimates* in Part II, Item 8 "Financial Statements and Supplementary Data" describes the significant accounting policies used in the preparation of our Consolidated Financial Statements. The accounting positions described below are significantly affected by critical accounting estimates. Such accounting positions require significant judgments, assumptions, and estimates to be used in the preparation of the Consolidated Financial Statements, actual results could differ materially from the amounts reported based on variability in factors affecting these statements.

Defined Benefit Pension Plans

Accounting for pension plans requires that we make assumptions that involve considerable judgment which are significant inputs in the actuarial models that measure our net pension obligations and ultimately impact our earnings. These include the discount rate, long-term expected rate of return on assets, compensation trends, inflation considerations,

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health care cost trends and other assumptions, as well as determining the fair value of assets in our funded plans. Specifically, the discount rates, as well as the expected rates of return on assets and plan asset fair value determination, are important assumptions used in determining the plans' funded status and annual net periodic pension and benefit costs. We evaluate these critical assumptions at least annually on a plan and country-specific basis. We also, with the help of actuaries, periodically evaluate other assumptions involving demographic factors, such as retirement age, mortality and turnover, and update them to reflect our experience and expectations for the future. The Company believes the accounting estimates related to our pension plans are critical accounting estimates because they are highly susceptible to change from period to period based on the performance of plan assets, actuarial valuations, market conditions and contracted benefit changes. While we believe that our assumptions are appropriate, significant differences in our actual experience or significant changes in our assumptions may materially affect our net pension and postretirement benefit obligations and related expense.

Revenue Recognition

We recognize revenue when we have satisfied our performance obligations which typically occurs when control of the products or completion of services have been transferred to our customers. The transaction price is based upon the standalone selling price. In most transactions, we have no obligations to our customers after the date products are shipped, other than pursuant to warranty obligations. Revenue is recognized net of any taxes collected from customers, which are subsequently remitted to governmental authorities. Shipping and handling fees, if any, are recognized as revenue. The related shipping and handling costs are recognized in cost of sales. Support services include warranty and non-warranty repair services, upgrades, and refurbishments on the products we sell. Repairs that are covered under our standard warranty do not generate revenue.

We maintain a credit approval process and we make significant judgments in connection with assessing our customers' ability to pay. Despite this assessment, from time to time, our customers are unable to meet their payment obligations. We continuously monitor our customers' credit worthiness and use our judgment in establishing a provision for estimated credit losses based upon our historical experience and any specific customer collection issues that we have identified. While such credit losses have historically been within our expectations and the provisions established, a significant change in the liquidity or financial position of our customers could have a material adverse impact on the collectability of accounts receivable and our future operating results. Additionally, if our credit loss rates prove to be greater than we currently estimate, we record additional reserves for doubtful accounts.

Business Combinations

We record the assets acquired and liabilities assumed in a business combination at their acquisition date fair values. Fair values of assets acquired, and liabilities assumed are based upon available information and may involve engaging an independent third party to perform an appraisal. Estimating fair values can be complex and subject to significant business judgment. We must also identify and include in the allocation all acquired tangible and intangible assets that meet certain criteria, including assets that were not previously recorded by the acquired entity. The estimates most commonly involve property, plant and equipment and intangible assets, including those with indefinite lives. The estimates also include the fair value of contracts including commodity purchase and sale agreements, storage contracts, and transportation contracts. The excess of the purchase price over the net fair value of acquired assets and assumed liabilities is recorded as goodwill, which is not amortized but instead is evaluated for impairment at least annually. Pursuant to GAAP, an entity is allowed a reasonable period of time (not to exceed one year) to obtain the information necessary to identify and measure the fair value of the assets acquired and liabilities assumed in a business combination.

Inventory

We value our inventory at the lower of cost (first-in, first-out method) or net realizable value. We regularly review inventory quantities on hand and record a provision to write-down excess and obsolete inventory to its estimated net realizable value, if less than cost, based primarily on our estimated forecast of product demand. Our industry is subject to technological change, new product developments, and changes in end-user demand for our products which can fluctuate significantly. Any significant changes in end-user demand, technology or new product developments could have a significant impact on the value of our inventory and our reported operating results.

Warranty Costs

We offer warranty coverage for a majority of our products for periods typically ranging from 12 to 24 months after shipment. We provided warranties on our inverter products for five to ten years and also provided the option to purchase additional warranty coverage up to 20 years. Our standard inverter product warranty expense is reported within discontinued operations. We estimate the anticipated costs of repairing our products under such warranties based on the historical costs of the repairs. The assumptions we use to estimate warranty accruals are reevaluated periodically, in light of actual experience, and when appropriate, the accruals are adjusted. Should product failure rates differ from our estimates, actual costs could vary significantly from our expectations. See *Note 4. Disposed and Discontinued Operations* in Part II, Item 8 "Financial Statements and Supplementary Data" for more information on our discontinued operations and *Note 15. Warranties* in Part II, Item 8 "Financial Statements and Supplementary Data" for more information.

Contingencies and Legal Reserves

Contingencies and legal reserves are recorded, when probable, using our best estimate of loss. Estimates of loss, when required, are made based on an evaluation of the range of loss related to such matters and where the amount and range can be reasonably estimated. Any such matters are generally resolved over future periods and only when one or more future events occur or fail to occur. Following our initial determination, we regularly reassess and revise the potential liability related to any pending matters as new information becomes available. We disclose pending loss contingencies when the loss is deemed reasonably possible, which requires significant judgment. As a result of the inherent uncertainty of these matters, the ultimate conclusion and actual cost of settlement may materially differ from our estimates. We did not record any significant contingencies or legal reserves during the years ended December 31, 2019 or 2018. See *Note 18. Commitments and Contingencies* in Part II, Item 8 "Financial Statements and Supplementary Data" for further information.

Goodwill, Intangible and Other Long-Lived Assets

We evaluate the carrying value of our goodwill for impairment at least annually or when an interim triggering event occurs that would indicate that impairment may have taken place. Our annual impairment test was performed as of December 31st, the last day of our last fiscal quarter. We evaluate our other definite-lived intangible assets for impairment when evidence exists that certain events or changes in circumstances indicate that the carrying amount of these assets may not be recoverable. Significant judgments and assumptions are required in such impairment evaluations.

The annual impairment test of goodwill may be performed using an assessment of qualitative factors if it is considered more likely than not that goodwill is not impaired. If this qualitative assessment indicates that it is more likely than not that goodwill is impaired, then the next step of impairment testing compares the fair value of a reporting unit to its carrying value. If fair value exceeds carrying value, then we conclude that no goodwill impairment has occurred. Conversely, if carrying value exceeds fair value, we recognize an impairment loss.

We evaluate definite-lived intangible assets and other long-lived assets whenever there is an indicator of impairment. When we determine that the carrying value of intangibles or other long-lived assets may not be recoverable based upon the existence of one or more indicators of impairment, we use the projected undiscounted cash flow method to determine whether an impairment exists, and then measure the impairment using discounted cash flows. If our expectations of future results and cash flows are significantly diminished, intangible assets, long-lived assets, and goodwill may be impaired and the resulting charge to operations may be material. Changes in these estimates could result in significant revisions to the carrying value of these assets and may result in material charges to our results of operations.

Income Taxes

We are subject to income taxes in the United States and numerous foreign jurisdictions. Significant judgment is required in determining our provision for income taxes and income tax assets and liabilities, including evaluating uncertainties in the application of accounting principles and complex tax laws. We record a provision for income taxes

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for the anticipated tax consequences of the reported results of operations using the asset and liability method. Under this method, we recognize deferred tax assets and liabilities for the expected future tax consequences of temporary differences between the financial reporting and tax bases of assets and liabilities, as well as for operating loss and tax credit carryforwards. Deferred tax assets and liabilities are measured using the tax rates that are expected to apply to taxable income for the years in which those tax assets and liabilities are expected to be realized or settled. We calculate tax expense consistent with intraperiod tax allocation methodology resulting in an allocation of current year tax expense/benefit between continuing operations and discontinued operations. We record a valuation allowance to reduce our deferred tax assets to the net amount that we believe is more likely than not to be realized. We recognize tax benefits from uncertain tax positions only if we believe that it is more likely than not that the tax position will be sustained on examination by the taxing authorities based on the technical merits of the position. Although we believe that we have adequately reserved for our uncertain tax positions, we can provide no assurance that the final tax outcome of these matters will not be materially different. We adjust these reserves when facts and circumstances change, such as the closing of a tax audit or the refinement of an estimate. To the extent that the final tax outcome of these matters is different than the amounts recorded, such differences will affect the provision for income taxes in the period in which such determination is made and could have a material impact on our financial condition and operating results. The provision for income taxes includes the effects of any reserves that we believe are appropriate, as well as the related net interest and penalties. For more details see *Note. 5 Income Taxes* in Part II, Item 8 "Financial Statements and Supplementary Data."

On December 22, 2017, the U.S. enacted the Tax Act into law. Due to the complexity and scope of the Tax Act, the SEC issued SAB 118, which provided for a one-year measurement period from the date of enactment in which to complete the associated tax analysis. This analysis included finalization of the transition tax, re-measuring our U.S. deferred tax assets and liabilities based on the reduction of the corporate income tax rate to 21%, as well as reassessing our indefinite reinvestment position. The analysis of the impact of the Tax Act was completed within the SAB 118 measurement period and are included in the results of operations as of December 31, 2019.

Business Environment and Trends

Advanced Energy operates in a single segment structure for power electronics conversion products. The acquisition of Artesyn's Embedded Power business added additional products and market verticals to our business. Following the acquisition, we have continued to be organized on a global, functional basis in order to achieve the anticipated synergies associated with the acquisition. We operate in four vertical markets or applications and provide revenue information to enable tracking of market trends. We also provide information on an organic basis, which is comprised of the Company without Artesyn and LumaSense, and on an inorganic basis, which consists of Artesyn and LumaSense, to improve comparability during the interim periods.

The demand environment in each of our markets is impacted by various market trends, customer buying patterns, design wins, macro-economic and other factors. In the fourth quarter of 2019 we saw strengthening demand in semiconductor and datacenter computing markets and weakening demand in our telecom networking market. See below for a further discussion of our market trends.

In the beginning of the first quarter of 2020, we began to see an impact of COVID-19 on our operations particularly in China, which has affected both our own workforce and supply chain. This situation is developing rapidly and may continue to affect our operations. See further discussion in *Risk Factors* above.

SEMICONDUCTOR MARKET

Growth in the semiconductor market is driven by growing integrated circuits (IC) content across many industries, increased demand for processing and storage in advanced applications such as artificial intelligence or autonomous vehicles, and the rapid adoption of advanced mobile connectivity solutions such as 5G, enhancing existing and enabling new wireless applications. To address the long-term growing demand for semiconductor devices, the industry continues to invest in production capacities for advanced logic devices at the 14nm technology node and beyond, the latest memory devices including 3D-NAND, DRAM and new emerging memories such as MRAM, and back-end test and advanced wafer-level packaging. The industry's transition to advanced technology nodes in logic and

DRAM and to increased layers in 3D memory devices is requiring an increased number of etch and deposition process tools and higher content of our advanced power solutions per tool. As etching and deposition face new challenges such as increasing aspect ratios in advanced 3D devices, more advanced radio frequency (RF) and direct current (DC) technologies are needed, and we are meeting these challenges by providing a broader range of more complex RF and DC power solutions. Beyond etch and deposition processes, the growing complexity at the advanced nodes also drive a higher number of other processes across the fab, including inspection, metrology, thermal, ion implantation, and semiconductor test, where Advanced Energy is actively participating as a critical technology provider. In addition, our global support services group offers comprehensive local repair service, upgrade and retrofit offerings to extend the useable life of our customers' capital equipment for additional technology generations. The acquisition of Artesyn's Embedded Power business in September 2019 expanded Advanced Energy's reach within the Semiconductor Equipment market by targeting back-end test and assembly equipment makers and providing low voltage embedded power content used in auxiliary power applications in semiconductor equipment.

Starting in the second half of 2018 and continuing into the first half of 2019, the semiconductor industry went through a period of weakening equipment investment as a result of slowing growth in end market demand for semiconductor devices, ongoing digestion of equipment capacity, and consumption of existing inventory. In the second half of 2019, demand from the semiconductor equipment markets improved from the first half of 2019 as a result of increased investments in advanced logic and foundry equipment and by increased investment by Chinese fabricators, which drove higher demand for our products. Based on limited visibility, we expect demand from the Semiconductor Equipment markets will continue to improve in 2020. However, it is difficult to determine when or if overall market investment in semiconductor capital equipment will return to first half 2018 levels.

INDUSTRIAL & MEDICAL MARKETS

Customers in the Industrial & Medical markets incorporate our industrial advanced power, embedded power and measurement products into a wide variety of equipment used in applications such as advanced material fabrication, medical devices, analytical instrumentation, test and measurement equipment, robotics, motor drives and connected light-emitting diodes.

OEM customers design equipment utilizing our process power technologies in a variety of industrial applications including glass coating, glass manufacturing, flat panel displays, photovoltaics solar cell manufacturing, and similar thin film manufacturing, including data storage and decorative, hard and optical coatings. These applications employ similar technologies to those used in the semiconductor market to deposit films on non-semiconductor substrates. Our strategy around these applications is to leverage our thin film deposition technologies into an expanded set of new materials and applications in adjacent markets.

Advanced Energy serves Industrial & Medical markets with mission-critical power components that deliver high reliability, precise, low noise or differentiated power to the equipment they serve. Examples of products sold into Industrial & Medical markets include high voltage products for analytical instrumentation, medical equipment, low voltage power supplies used in applications for medical devices, test and measurement, medical lasers, scientific instrumentation and industrial equipment, and power control modules and thermal instrumentation products for material fabrication, processing and treatment. Our gas monitoring products serve multiple applications in the energy market, air quality monitoring and automobile emission monitoring and testing. Our strategy in the Industrial & Medical markets is to grow and expand our addressable market both organically through our global distribution channels and through acquisitions of products and technologies that are complimentary and adjacent to our core power conversion applications.

In 2019 we saw weakening demand for our thin film industrial products driven by macro weakness offset by improvements in medical and other embedded power products and the addition of Artesyn Embedded Power products during the third and fourth quarter of 2019.

DATA CENTER COMPUTING MARKETS

Following the acquisition of Artesyn's Embedded Power business in September 2019, Advanced Energy entered the Data Center Computing market with industry-leading products and low-voltage power conversion technologies. We sell to many data center server and storage manufacturers, original design manufacturers of server and storage systems, and cloud service providers, or hyperscalers, who are designing and deploying their own data center server and storage equipment. Driven by the growing adoption of cloud computing and increased consumer internet traffic, market demand for server and storage equipment has shifted from enterprise on-premise computing to the data center. This trend drove a strong year of data center investments in 2018, but the industry moderated investments in the first half of 2019 before recovering in the second half of 2019. With a growing presence at both cloud service providers, hyperscalers, and industry-leading data center server and storage vendors, we believe Advanced Energy is well positioned to continue to capitalize on the ongoing shift towards cloud computing. We generated revenue from the Data Center Computing market during the third and fourth quarters of 2019.

TELECOM & NETWORKING MARKETS

The acquisition of Artesyn's Embedded Power business in September 2019 brought us a portfolio of products and technologies that are used across the Telecom & Networking markets. Our customers include many leading vendors and original design manufacturing of wireless and wireline infrastructure equipment, telecommunication equipment and computer networking. The wireless telecom market continues to evolve with more advanced mobile standards. 5G wireless technology promises to drive substantial growth opportunities for the telecom industry as it enables new advanced applications such as autonomous vehicles and virtual/augmented reality. Telecom service providers have started to invest in 5G, and this trend is expected to drive demand of our products into the Telecom & Networking markets. In networking, demand is driven by networking investments by telecom service providers and enterprises upgrading of their network, as well as cloud data center networking investments. In the third and fourth quarters of 2019, we generated revenue from the Telecom & Networking markets following the acquisition of Artesyn.

Results of Continuing Operations

The analysis presented below is organized to provide the information we believe will facilitate an understanding of our historical performance and relevant trends going forward, and should be read in conjunction with our Consolidated Financial Statements, including the notes thereto, in Item 8 "Financial Statements and Supplementary Data" of this Annual Report on Form 10-K.

The following table sets forth, for the periods indicated, certain data derived from our Consolidated Statements of Operations (in thousands):

	Year Ended December 31,	
	2019	2018
Sales	\$ 788,948	\$ 718,892
Gross profit	315,652	365,607
Operating expenses	261,264	194,054
Operating income from continuing operations	54,388	171,553
Other income (expense), net	12,806	823
Income from continuing operations before income taxes	67,194	172,376
Provision for income taxes	10,699	25,227
Income from continuing operations, net of income taxes	\$ 56,495	\$ 147,149

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The following table sets forth, for the periods indicated, the percentage of sales represented by certain items reflected in our Consolidated Statements of Operations:

	Year Ended December 31,	
	2019	2018
Sales	100.0 %	100.0 %
Gross profit	40.0	50.9
Operating expenses	33.1	27.0
Operating income from continuing operations	6.9	23.9
Other income (expense), net	1.6	0.1
Income from continuing operations before income taxes	8.5	24.0
Provision for income taxes	1.4	3.5
Income from continuing operations, net of income taxes	7.2 %	20.5 %

SALES, NET

The following tables summarize annual sales and percentages of sales, by product line, for each of the years ended 2019 and 2018 (in thousands):

	Years Ended December 31,		Change 2019 v. 2018	
	2019	2018	Dollar	Percent
Semiconductor Equipment	\$ 403,018	\$ 533,770	\$ (130,752)	(24.5)%
Industrial & Medical	245,992	185,122	60,870	32.9
Data Center Computing	91,438	—	91,438	—
Telecom & Networking	48,500	—	48,500	—
Total	\$ 788,948	\$ 718,892	\$ 70,056	9.7 %

	Years Ended December 31,	
	2019	2018
Semiconductor Equipment	51.1 %	74.2 %
Industrial & Medical	31.2	25.8
Data Center Computing	11.6	-
Telecom & Networking	6.1	-
Total	100.0 %	100.0 %

OPERATING EXPENSE

The following table summarizes our operating expense as a percentage of sales for the years ended December 31, 2019 and 2018 (in thousands):

	Years Ended December 31,			
	2019		2018	
Research and development	\$ 101,503	12.9 %	\$ 76,008	10.6 %
Selling, general, and administrative	142,555	18.1	108,033	15.0
Amortization of intangible assets	12,168	1.5	5,774	0.8
Restructuring charges	5,038	0.6	4,239	0.6
Total operating expenses	\$ 261,264	33.1 %	\$ 194,054	27.0 %

2019 Results Compared To 2018

SALES

Total sales for the year ended December 31, 2019 increased 9.7% to \$788.9 million from \$718.9 million for the year ended December 31, 2018. Revenue in fiscal 2019 benefited from \$220.3 million in inorganic sales from the acquisition of Artesyn's Embedded Power business and \$38.0 million associated with our acquisition of LumaSense. Organic sales in fiscal 2019 decreased \$170.8 million primarily due to the overall decline in demand in the semiconductor capital equipment market and lower sales of our industrial thin film products due to a weaker overall macroeconomic environment. Sales in fiscal 2018 includes \$17.4 million associated with our acquisition of LumaSense.

In 2019, sales to the semiconductor equipment market decreased 24.5% to \$403.0 million from \$533.8 million in 2018, and decreased to 51.1% of total sales compared to 74.2% of total sales in 2018. The decrease in sales during 2019 is primarily due to an overall decrease in production and demand for semiconductor equipment used in deposition and etch applications, related to advanced memory, and the timing of new technology investment. This was partially offset by strengthening demand for foundry logic equipment late in the fiscal year.

Sales to the industrial & medical markets increased 32.9% to \$246.0 million in 2019 from \$185.1 million in 2018. Our customers in these markets are primarily global and regional original equipment and device manufacturers. Inorganic growth contributed \$111.7 million in 2019, while organic sales in the industrial and medical markets decreased \$35.8 million, or 21.1%. The decrease in organic sales was primarily due to slowing macro-economic conditions and lower demand in the consumer hard coating and flat panel display markets impacting our thin film deposition markets partially offset by growth in medical and other embedded power products.

Sales in the data center computing market were \$91.4 million in fiscal 2019 and \$0.0 million in fiscal 2018. The increase in data center computing sales is due to the addition of new product verticals through inorganic growth.

Sales in the telecom and networking market were \$48.5 million in fiscal 2019 and \$0.0 million in fiscal 2018. The increase in telecom and networking sales is due to the addition of new product verticals through inorganic growth.

Sales to Applied Materials Inc. and Lam Research Corp., our two largest customers, decreased \$114.1 million to \$253.0 million, and 31.9% of sales, in 2019 from \$367.0 million, and 51.1% of sales in 2018. Our sales to Applied Materials Inc. and Lam Research Corp. included sales for the semiconductor capital equipment market, as well as industrial capital equipment used in the solar and flat panel display markets.

Backlog

Our backlog was \$258.9 million at December 31, 2019 as compared to \$74.7 million at December 31, 2018. Backlog increased primarily due to the Artesyn acquisition, which added new backlog in the Data Center Computing and Telecom & Networking markets and incremental backlog in Industrial & Medical, as well as strengthening demand for semiconductor equipment late in the fiscal year.

GROSS PROFIT

Gross profit decreased \$50.0 million to \$315.6 million, or 40.0%, in 2019 as compared to \$365.6 million, or 50.9%, in 2018. The decrease in gross profit as a percent of revenue is due primarily to the mix of products from Artesyn, which carry a lower gross margin, as well as the impact of lower volume, organic product mix and higher freight and customs costs. Gross profit in fiscal 2019 includes \$44.8 million and \$22.7 million, respectively, from our acquisitions of Artesyn and LumaSense. Gross profit in fiscal 2018 includes 8.3 million associated with our acquisition of LumaSense.

OPERATING EXPENSE

Research and Development

We perform research and development of products to develop new or emerging applications, technological advances to provide higher performance, lower cost, or other attributes that we may expect to advance our customers' products. We believe that continued development of technological applications, as well as enhancements to existing products and related software to support customer requirements, are critical for us to compete in the markets we serve. Accordingly, we devote significant personnel and financial resources to the development of new products and the enhancement of existing products, and we expect these investments to continue.

Research and development expenses in 2019 increased \$25.5 million to \$101.5 million, from \$76.0 million in 2018, and increased as a percentage of total revenue to 12.9% in 2019 from 10.6% in 2018. Research and development expenses include \$14.2 million and \$7.4 million, respectively, from our acquisitions of Artesyn and LumaSense. Research and development expenses in fiscal 2018 include \$3.0 million from our acquisition of LumaSense. The increase in research and development expenses is primarily due to increased headcount and material costs as we invest in new programs to maintain and increase our technological leadership and provide solutions to our customers' evolving needs.

Selling, General and Administrative

Our selling expenses support domestic and international sales and marketing activities that include personnel, trade shows, advertising, third-party sales representative commissions, and other selling and marketing activities. Our general and administrative expenses support our worldwide corporate, legal, tax, financial, governance, administrative, information systems, and human resource functions in addition to our general management, including acquisition-related activities.

Selling, general and administrative ("SG&A") expenses increased \$34.6 million to \$142.6 million in 2019 as compared to \$108.0 million in 2018. SG&A expenses include \$19.3 million and \$11.3 million, respectively, from our acquisitions of Artesyn's Embedded Power business and LumaSense. SG&A expenses in 2018 include \$6.1 million from our acquisition of LumaSense. Organic SG&A expenses increased by \$8.4 million for legal, professional, and transition costs primarily related to the acquisition of Artesyn's Embedded Power business, as well as a \$4.2 million increase in allowance for doubtful accounts related to exposure in China as a result of deferred programs due in part to the recent Coronavirus. Excluding these items, SG&A decreased \$2.6 million primarily due to reductions in travel, selling expenses and other outside services as we were able to implement certain cost reduction measures while still preserving recent infrastructure investments in personnel and geographic footprint.

Amortization of Intangibles

Amortization expense increased \$6.4 million to \$12.2 million in 2019 from \$5.8 million in 2018. The increase in 2019 is primarily driven by incremental amortization of intangible assets related to our acquisition of LumaSense and Artesyn, which we acquired in September of 2018 and 2019, respectively.

Restructuring

In connection with the restructuring actions management previously put in place to optimize our manufacturing footprint to lower-cost regions, and improvements in operating efficiencies and synergies related to our recent acquisitions including Artesyn, during 2019, we recognized \$2.6 million in restructuring charges primarily related to employee termination benefits and recognition of excess lease space as we optimize our facility footprint. During 2019, we paid approximately \$5.0 million in severance related costs.

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Other Income (Expense), net

Other income (expense), net consists primarily of interest income and expense, foreign exchange gains and losses, gains and losses on sales of fixed assets, and other miscellaneous items. Other income (expense), net was \$12.8 million in 2019, as compared to \$0.8 million in 2018. In May 2019 we sold our central solar inverter repair and service operation and recorded a one-time gain of \$14.8 million. Other income (expense) excluding the effect of the sale of the central inverter service and repair business was \$2.0 million of expense in 2019 as compared to \$0.8 million of income in 2018. The decrease in other income is primarily due to higher interest expenses in the second half of 2019 related to the debt issued in connection with the acquisition of Artesyn's Embedded Power business.

Provision for Income Taxes

In 2019, we recorded income tax expense for our continuing operations of \$10.7 million or an effective tax rate of 15.9%. Income tax expense in 2018 was \$25.2 million or an effective tax rate of 14.6%. Included in our 2018 tax expense is \$5.7 million of expense associated with finalization of the Tax Act items within the SAB 118 measurement period. After giving consideration to the above item, tax expense in 2018 for our continuing operations would have been \$19.5 million or an effective tax rate of 11.3%. The 2019 effective tax rate differs from the federal statutory rate of 21% primarily due to the benefit of tax credits and earnings in foreign jurisdictions which are subject to lower tax rates, offset by additional GILTI tax in the US and withholding taxes.

Discontinued Operations

In December 2015, we completed the wind down of engineering, manufacturing and sales of our solar inverter product line (the "inverter business"). Accordingly, the results of our inverter business have been reflected as "Income (loss) from discontinued operations, net of income taxes" on our Consolidated Statements of Operations for all periods presented herein.

The effect of our sales of the remaining extended inverter warranties to our customers continues to be reflected in deferred revenue in our Consolidated Balance Sheets. Deferred revenue for extended inverter warranties and the associated costs of warranty service will be reflected in Sales and Cost of goods sold, respectively, from continuing operations in future periods in our Consolidated Statement of Operations, as the deferred revenue is earned and the associated services are rendered. Extended warranties related to the inverter product line are no longer offered.

In May 2019, we divested our grid-tied central solar inverter repair and service operation. In conjunction with the divestiture, the initial product warranty for the previously sold grid-tied central solar inverters was transferred to the buyer. Accordingly, a gain of \$8.6 million net of tax expense of \$2.4 million was recognized in Other income (expense) and Provision (benefit) for income taxes, respectively, in our discontinued operations for the year December 31, 2019. Operating income from discontinued operations for the year ended December 31, 2019 and 2018, also includes the impacts of changes in our estimated product warranty liability, the recovery of accounts receivable and foreign exchange gain or (losses).

Income (loss) from discontinued operations, net of income taxes (in thousands):

	Years Ended December 31,	
	2019	2018
Sales	\$ —	\$ —
Cost of sales	(901)	(88)
Total operating expense	1,022	96
Operating income (loss) from discontinued operations	(121)	(8)
Other income (expense)	10,895	(24)
Income (loss) from discontinued operations before income taxes	10,774	(32)
Provision (benefit) for income taxes	2,294	6
Income (loss) from discontinued operations, net of income taxes	\$ 8,480	\$ (38)

Non-GAAP Results

Management uses non-GAAP operating income and non-GAAP EPS to evaluate business performance without the impacts of certain non-cash charges and other charges which are not part of our usual operations. We use these non-GAAP measures to assess performance against business objectives, make business decisions, including developing budgets and forecasting future periods. In addition, management's incentive plans include these non-GAAP measures as criteria for achievements. These non-GAAP measures are not in accordance with U.S. GAAP and may differ from non-GAAP methods of accounting and reporting used by other companies. However, we believe these non-GAAP measures provide additional information that enables readers to evaluate our business from the perspective of management. The presentation of this additional information should not be considered a substitute for results prepared in accordance with U.S. GAAP.

The non-GAAP results presented below exclude the impact of non-cash related charges, such as stock-based compensation and amortization of intangible assets. In addition, they exclude discontinued operations and other non-recurring items such as acquisition-related costs and restructuring expenses, as they are not indicative of future performance. The tax effect of our non-GAAP adjustments represents the anticipated annual tax rate applied to each non-GAAP adjustment after consideration of their respective book and tax treatments and effect of adoption of the Tax Act.

Reconciliation of Non-GAAP measure - operating expenses and operating income from continuing operations, excluding certain items (in thousands)

	Years Ended December 31,	
	2019	2018
Gross profit from continuing operations, as reported	\$ 315,652	\$ 365,607
Adjustments to gross profit:		
Stock-based compensation	525	742
Facility expansion and relocation costs	3,891	1,328
Acquisition-related costs	8,290	569
Non-GAAP gross profit	328,358	368,246
Non-GAAP gross margin	41.6%	51.2%
Operating expenses from continuing operations, as reported	261,264	194,054
Adjustments:		
Amortization of intangible assets	(12,168)	(5,774)
Stock-based compensation	(6,803)	(8,961)
Acquisition-related costs	(12,002)	(1,726)
Facility expansion and relocation costs	(948)	(518)
Restructuring charges	(5,038)	(4,239)
Non-GAAP operating expenses	224,305	172,836
Non-GAAP operating income	\$ 104,053	\$ 195,410
Non-GAAP operating margin	13.2%	27.2%

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Reconciliation of Non-GAAP measure - income from continuing operations, excluding certain items	Years Ended December 31,	
	2019	2018
Income from continuing operations, less non-controlling interest, net of income taxes	\$ 56,461	\$ 147,063
Adjustments:		
Amortization of intangible assets	12,168	5,774
Acquisition-related costs	20,263	2,295
Facility expansion and relocation costs	4,838	1,846
Restructuring charges	5,038	4,239
Tax Cuts and Jobs Act Impact	—	5,703
Central inverter services business sale	(13,737)	—
Tax effect of non-GAAP adjustments	3,206	(2,344)
Non-GAAP income, net of income taxes, excluding stock-based compensation	88,237	164,576
Stock-based compensation, net of taxes	5,627	7,421
Non-GAAP income, net of income taxes	\$ 93,864	\$ 171,997
Non-GAAP diluted earnings per share	\$ 2.44	\$ 4.37

Impact of Inflation

In recent years, inflation has not had a significant impact on our operations. However, we continuously monitor operating price increases, particularly in connection with the supply of component parts used in our manufacturing process. To the extent permitted by competition, we pass increased costs on to our customers by increasing sales prices over time. Sales price increases, however, were not significant in any of the years presented herein.

Liquidity and Capital Resources

LIQUIDITY

We believe that adequate liquidity and cash generation is important to the execution of our strategic initiatives. Our ability to fund our operations, acquisitions, capital expenditures, and product development efforts may depend on our ability to generate cash from operating activities which is subject to future operating performance, as well as general economic, financial, competitive, legislative, regulatory, and other conditions, some of which may be beyond our control. Our primary sources of liquidity are our available cash, investments and, cash generated from current operations.

At December 31, 2019, we had \$346.4 million in cash, cash equivalents, and marketable securities. We believe that adequate liquidity and cash generation will be important to the execution of our strategic initiatives. We believe that our current cash levels and our cash flows from future operations will be adequate to meet anticipated working capital needs, anticipated levels of capital expenditures, and contractual obligations for the next twelve months.

At December 31, 2019, we had \$125.1 million in cash, cash equivalents, and marketable securities held by foreign subsidiaries. As a result of the recent Tax Act, we have provided for U.S. tax on all foreign unremitted earnings. Accordingly, cash related to these unremitted earnings could be repatriated to the U.S. with minimal additional taxes. Additional taxes would include foreign withholding taxes and U.S. state income taxes. During 2018 and 2019, the Company changed its policy regarding indefinite investment of unremitted earnings, and recognized the tax expense associated with this change in election. Consistent with the Company's capital deployment initiatives, the Company intends to utilize foreign cash to expand our operations through internal growth and strategic acquisitions, provide for service of existing debt, and opportunistically return cash to stockholders.

Credit Facility

In connection with the acquisition of Artesyn's Embedded Power business in 2019, the Company entered into a credit agreement ("Credit Agreement") that provided aggregate financing of \$500.0 million, consisting of a \$350.0 million senior unsecured term loan facility (the "Term Loan Facility") and a \$150.0 million senior unsecured revolving

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facility ("Revolving Facility"). Both the Term Loan Facility and Revolving Facility mature on September 10, 2024. At December 31, 2019, we had \$150.0 million in available funding under the Revolving Facility.

In connection with the entry into the Credit Agreement, the Company terminated its then-existing Loan Agreement, as amended (the "Loan Agreement"), which previously provided a revolving line of credit of up to \$150.0 million subject to certain funding conditions. The Company expensed all unused line of credit fees at the time of termination of the Loan Agreement. See *Note 22. Credit Facility* in Part II, Item 8 "Financial Statements and Supplemental Data" for additional information.

Share Repurchase

On December 18, 2019, the Board of Directors authorized to remove the expiration date to the Company's common stock share repurchase program and increase the authorized amount by \$25.1 million increasing the authorization to repurchase shares up to a total of \$50.0 million. As of December 31, 2019, a total of \$50.0 million remained available for future share repurchases. We repurchased 1.7 million shares for \$95.1 million and 0.4 million shares for \$30.0 million in fiscal 2018 and 2017, respectively. There were no shares repurchased in fiscal 2019.

CASH FLOWS

A summary of our cash provided by and used in operating, investing, and financing activities is as follows (in thousands):

	Years Ended December 31,	
	2019	2018
Net cash provided by (used in) operating activities from continuing operations	\$ 47,899	\$ 151,427
Net cash provided by (used in) operating activities from discontinued operations	493	(156)
Net cash provided by (used in) operating activities	48,392	151,271
Net cash provided by (used in) investing activities from continuing operations	(393,847)	(113,592)
Net cash provided by (used in) financing activities from continuing operations	338,840	(97,134)
EFFECT OF CURRENCY TRANSLATION ON CASH	(1,496)	(1,030)
INCREASE (DECREASE) IN CASH AND CASH EQUIVALENTS	(8,111)	(60,485)
CASH AND CASH EQUIVALENTS, beginning of period	354,552	415,037
CASH AND CASH EQUIVALENTS, end of period	346,441	354,552
Less cash and cash equivalents from discontinued operations	—	5,251
CASH AND CASH EQUIVALENTS FROM CONTINUING OPERATIONS, end of period	\$ 346,441	\$ 349,301

2019 Compared To 2018

Net cash provided by operating activities

Net cash provided by operating activities in 2019 was \$48.4 million, a decrease of \$102.9 million, or 68.0% compared to \$151.3 million in 2018. The decrease in net cash flows from operating activities was primarily due to overall decreases in sales to the semiconductor equipment market resulting in decreased earnings from continuing operations.

Net cash provided by operating activities in the fourth quarter and full year of 2019 was impacted by net payments due to acquisition related activities and assumed liabilities of approximately \$27.0 million, partially offset by receipt of approximately \$10.0 million in cash related to the transfer of inventory and other current assets to Smart Global Holdings, Inc. in connection with the completion of the pre-acquisition carve-out of the Embedded Computing business.

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Net cash used in investing activities

Net cash used in investing activities in 2019 was \$393.8 million, compared to \$113.6 million in 2018. In 2019, we used \$366.1 million for the acquisition of Artesyn's Embedded Power business, as compared to \$93.8 million used in 2018 to acquire LumaSense, Trek and the electrostatic technology and product line from Monroe Electronics, Inc. Capital expenditures increased \$5.0 million from \$20.3 million in 2018 to \$25.3 million in 2019 to support new facilities and manufacturing operations.

Net cash used in financing activities

Net cash provided by financing activities in 2019 was \$338.8 million and included the effect of cash proceeds of \$350.0 million, net of financing costs of \$2.5 million, from our Term Loan Facility, partially offset by \$8.8 million in principal repayments. Net cash used in financing activities in 2018 was \$97.1 million, which included \$95.1 million for the repurchase of company stock.

Off-Balance Sheet Arrangements

As of December 31, 2019, we did not have any off-balance sheet arrangements, as defined in Item 303(a)(4)(ii) of Regulation S-K.

Contractual Obligations

The following table sets forth our future payments due under contractual obligations as of December 31, 2019 (in thousands):

	Total	Less than 1 year	1-3 years	3-5 years	More than 5 years
Debt obligations ⁽¹⁾	\$ 341,250	\$ 17,500	35,000	288,750	—
Interest payments associated with debt obligations ⁽¹⁾	36,555	8,532	15,726	12,297	—
Operating lease obligations ⁽²⁾	152,778	22,727	33,275	20,387	76,389
Purchase obligations ⁽³⁾	192,981	192,803	178	—	—
Income tax obligations ⁽⁴⁾	11,724	1,117	2,234	4,884	3,489
Pension funding commitment ⁽⁵⁾	173,830	6,113	12,712	20,203	134,802
Total	\$ 909,118	\$ 248,792	\$ 99,125	\$ 346,521	\$ 214,680

- (1) Our debt obligations consist of principal and interest repayments due on our Credit Facility based on current interest rates.
- (2) Amounts represent the minimum contractual cash commitments, including the effects of fixed rental escalation clauses and deferred rent, exclusive of certain contingent rents that are not determinable for future periods.
- (3) Our purchase obligations consist of purchase commitments with various manufacturing suppliers to ensure the availability of components.
- (4) Income tax obligations are a result of the Tax Act and include a transition tax on unremitted foreign earnings and profits, of which we have elected to pay the estimated amount over an eight-year period.
- (5) Our pension funding commitments represent the amounts that we are required to pay to fund our pension plans.

Recent Accounting Pronouncements

From time to time, the Financial Accounting Standards Board ("FASB") or other standards setting bodies issue new accounting pronouncements. Updates to the FASB Accounting Standards Codification ("ASC") are communicated through issuance of an Accounting Standards Update ("ASU"). Unless otherwise discussed, we believe that the impact

of recently issued guidance, whether adopted or to be adopted in the future, is not expected to have a material impact on our Consolidated Financial Statements upon adoption.

To understand the impact of recently issued guidance, whether adopted or to be adopted, please review the information provided in *Note 1. Operations and Summary of Significant Accounting Policies and Estimates* in Part II, Item 8 "Financial Statements and Supplementary Data."

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Market Risk and Risk Management

In the normal course of business, we have exposures to interest rate risk from our investments, credit facility, and foreign exchange rate risk related to our foreign operations and foreign currency transactions.

Interest Rate Risk

Our market risk exposure relates to changes in interest rates in our investment portfolio and credit facility. We generally place our investments with high-credit quality issuers and by policy are averse to principal loss and seek to protect and preserve our invested funds by limiting default risk, market risk, and reinvestment risk.

As of December 31, 2019, our investments consisted primarily of certificates of deposit with maturity of less than 1 year. As a measurement of the sensitivity of our portfolio and assuming that our investment portfolio balances remain constant, a hypothetical decrease of 100 basis points (1%) in interest rates would decrease annual pre-tax earnings by a nominal amount.

As of December 31, 2019, we had \$341.3 million of borrowings under our Credit Facility at a rate based on a reserve adjusted Eurodollar Rate or a Base Rate plus an applicable margin. Our quarterly commitments of interest payments are impacted by an increase or decrease of interest rate fluctuations. If our \$341.3 million in borrowings had been outstanding for the full year ended December 31, 2019, a hypothetical increase of 100 basis points (1%) in interest rates would increase our commitments by \$3.4 million.

Foreign Currency Exchange Rate Risk

We are impacted by changes in foreign currency exchange rates through sales and purchasing transactions when we sell products and purchase materials in currencies different from the currency in which product and manufacturing costs were incurred. The functional currencies of our worldwide facilities primarily include the USD, EUR, KRW, TWD, ILS, GBP, and CNY. Our purchasing and sales activities are primarily denominated in the USD, JPY, EUR and CNY. We may be impacted by changes in the relative buying power of our customers, which may impact sales volumes either positively or negatively. As these currencies fluctuate against each other, and other currencies, we are exposed to foreign currency exchange rate risk on sales, purchasing transactions and labor.

Acquisitions are a large component of our capital deployment strategy. A significant number of acquisition target opportunities are located outside the U.S. and their value may be denominated in foreign currency. Changes in exchange rates therefore may have a material impact on their valuation in USD and therefore may impact our view of their attractiveness.

From time to time, we may enter into foreign currency exchange rate contracts to hedge against changes in foreign currency exchange rates on assets and liabilities expected to be settled at a future date, including foreign currency, which may be required for a potential foreign acquisition. Market risk arises from the potential adverse effects on the value of derivative instruments that result from a change in foreign currency exchange rates. We may enter into foreign currency forward contracts to manage the exchange rate risk associated with intercompany debt denominated in nonfunctional currencies. We minimize our market risk applicable to foreign currency exchange rate contracts by establishing and monitoring parameters that limit the types and degree of our derivative contract instruments. We enter

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into derivative contract instruments for risk management purposes only. We do not enter into or issue derivatives for trading or speculative purposes.

Our reported financial results of operations, including the reported value of our assets and liabilities, are also impacted by changes in foreign currency exchange rates. Assets and liabilities of substantially all of our subsidiaries outside the U.S. are translated at period end rates of exchange for each reporting period. Operating results and cash flow statements are translated at weighted-average rates of exchange during each reporting period. Although these translation changes have no immediate cash impact, the translation changes may impact future borrowing capacity, and overall value of our net assets.

Currency exchange rates vary daily and often one currency strengthens against the USD while another currency weakens. Because of the complex interrelationship of the worldwide supply chains and distribution channels, it is difficult to quantify the impact of a change in one or more particular exchange rates.

Effect of currency translation on cash

The effect of foreign currency translations on cash had a \$1.5 million unfavorable impact for the year ended December 31, 2019 compared to a \$1.0 million unfavorable impact for the year ended December 31, 2018. Our foreign operations primarily sell product and incur expenses in the related local currency. Exchange rate fluctuations could require us to increase prices to foreign customers, which could result in lower net sales by us to such customers. Alternatively, if we do not adjust the prices for our products in response to unfavorable currency fluctuations, our results of operations could be adversely impacted. The functional currencies of our worldwide operations include U.S. dollar ("USD"), Canadian Dollar ("CAD"), Swiss Franc ("CHF"), Chinese Yuan ("CNY"), Danish Krone ("DKK"), Euro ("EUR"), Pound Sterling ("GBP"), Israeli New Shekel ("ILS"), Indian Rupee ("INR"), Japanese Yen ("JPY"), Philippines Peso ("PHP"), South Korean Won ("KRW"), Singapore Dollar ("SGD") and New Taiwan Dollar ("TWD"). Our purchasing and sales activities are primarily denominated in USD, CNY, EUR, and JPY.

The change in these key currency rates during the years ended December 31, 2019 and 2018 are as follows:

From	To	Years Ended December 31,	
		2019	2018
CAD	USD	4.7 %	(7.9)%
CHF	USD	1.7 %	(0.8)%
CNY	USD	(1.3)%	(5.4)%
DKK	USD	(2.1)%	(4.7)%
EUR	USD	(2.0)%	(4.5)%
GBP	USD	3.5 %	(5.6)%
ILS	USD	8.5 %	(7.2)%
INR	USD	(2.5)%	(8.2)%
JPY	USD	1.2 %	2.4 %
KRW	USD	(3.6)%	(4.2)%
PHP	USD	3.5 %	N/A
SGD	USD	1.3 %	(2.0)%
TWD	USD	N/A	(2.9)%

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

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REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Stockholders and the Board of Directors of Advanced Energy Industries, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheet of Advanced Energy Industries, Inc. (the Company) as of December 31, 2019, the related consolidated statements of operations, comprehensive income, stockholders' equity and cash flows for the year ended December 31, 2019, 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, 2019, and the results of its operations and its cash flows for the year ended December 31, 2019, 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, 2019, 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 2, 2020 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 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 the financial statements are free of material misstatement, whether due to error or fraud. Our audit 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 audit 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 audit provides a reasonable basis for our opinion.

Critical Audit Matters

The critical audit matters communicated below are matters arising from the current period audit of the consolidated financial statements that were communicated or required to be communicated to the audit committee and that: (1) relate to accounts or disclosures that are material to the consolidated financial statements and (2) involved our especially challenging, subjective or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matters below, providing separate opinions on the critical audit matters or on the accounts or disclosures to which they relate.

Accounting for the acquisition of Artesyn

Description of the Matter

As described in Note 2 to the consolidated financial statements, during the year ended December 31, 2019, the Company completed the acquisition of Artesyn Embedded Technologies, Inc's Embedded Power business ("Artesyn") for a total purchase price of \$361.3 million. The transaction was accounted for as a business combination.

Auditing the Company's accounting for its acquisition of Artesyn was complex due to the significant estimation required by management in determining the fair value of the identified intangible assets, which primarily consisted of customer relationships of \$75.0 million, technology of \$28.0 million and tradenames of \$21.0 million. The significant estimation was primarily due to the judgmental nature of the inputs to the valuation models used to measure the fair value of these intangible assets, as well as the sensitivity of the respective fair values to the

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underlying significant assumptions. The significant assumptions used to estimate the fair value of the intangible assets included customer attrition, revenue growth rates, technology obsolescence rates and economic useful lives. These significant assumptions are forward-looking and could be affected by future economic and market conditions.

How We Addressed the Matter in Our Audit

We obtained an understanding, evaluated the design and tested the operating effectiveness of the controls over the Company's accounting for the acquisition. For example, we tested controls over the valuation of intangible assets, including management's review of the valuation model and underlying assumptions used to develop the estimated fair value of the intangible assets.

To test the estimated fair value of the intangible assets, we performed audit procedures that included, among others, evaluating the Company's valuation methodology and testing the significant assumptions used in the model, as described above, including the completeness and accuracy of the underlying data. For example, we compared the significant assumptions to current industry and market trends, as well as historical results. We also considered how the significant assumptions, specifically technology obsolescence rates, compared to the Company's prior acquisitions and to Artesyn's own products. We involved our valuation specialists to assist with our evaluation of the methodology used by the Company and significant assumptions included in the fair value estimates.

Accounting for income taxes

Description of the Matter

As described in Notes 1 and 5 to the consolidated financial statements, the Company is subject to income taxes in the U.S. and numerous foreign jurisdictions, which affect the Company's provision for income taxes. Specifically, the Company is entitled to claim US foreign tax credits for taxes paid in international tax paying jurisdictions. The Company is also subject to taxation of global intangible low-taxed income (GILTI) earned by foreign subsidiaries. For the year ended December 31, 2019, the Company's provision for income taxes was \$10.7 million.

Auditing the Company's provision for income taxes, particularly the effects of foreign tax credits and GILTI, was especially challenging because interpretation of the relevant foreign tax regulations and the application of these interpretations to the calculation of the foreign tax credits and GILTI is highly complex.

How We Addressed the Matter in Our Audit

We obtained an understanding, evaluated the design and tested the operating effectiveness of the controls over the Company's accounting for income taxes. For example, we tested controls over management's identification and assessment of changes in applicable tax regulations. We also tested controls over the calculation of the foreign tax credits and GILTI, including review of the completeness and accuracy of the inputs and underlying data.

To test the Company's provision for income taxes, we performed audit procedures that included, among others, evaluating the Company's assessment of applicable tax regulations and testing the calculation of the provision, including the completeness and accuracy of the underlying data. We also evaluated the Company's significant assumptions and the completeness and accuracy of the data used to determine the amount of the foreign tax credits and GILTI, including foreign earnings and profits, and tested the accuracy of such calculations. As part of these procedures, we engaged tax subject matter professionals with knowledge of and experience with international and local income tax laws to evaluate the application of these regulations to the Company's tax positions. We have also evaluated the Company's income tax disclosures included in Note 5 of the consolidated financial statements in relation to these matters.

/s/ Ernst & Young LLP

We have served as the Company's auditor since 2019.
Denver, Colorado
March 2, 2020

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

Board of Directors and Stockholders
Advanced Energy Industries, Inc.

Opinion on the financial statements

We have audited the accompanying consolidated balance sheet of Advanced Energy Industries, Inc. (a Delaware corporation) and subsidiaries (the “Company”) as of December 31, 2018, the related consolidated statements of operations, comprehensive income, stockholders’ equity, and cash flows for years ended December 31, 2018 and 2017, and the related notes (collectively referred to as the “financial statements”). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2018, and the results of its operations and its cash flows for the years ended December 31, 2018 and 2017, in conformity with accounting principles generally accepted in the United States of America.

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 Public Accounting Oversight Board (United States) (“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 supporting the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ GRANT THORNTON LLP
Denver, Colorado
February 21, 2019

ADVANCED ENERGY INDUSTRIES, INC.
Consolidated Balance Sheets
(In thousands, except per share amounts)

	December 31,	
	2019	2018
ASSETS		
Current assets:		
Cash and cash equivalents	\$ 346,441	\$ 349,301
Marketable securities	2,614	2,470
Accounts and other receivable, net of allowances of \$7,745 and \$1,856, respectively	246,564	100,442
Inventories	230,019	97,987
Income taxes receivable	4,245	2,220
Other current assets	36,825	10,173
Current assets from discontinued operations	30	5,855
Total current assets	866,738	568,448
Property and equipment, net	108,109	31,269
Operating lease right-of-use assets	105,404	—
Deposits and other assets	22,287	6,874
Goodwill	202,932	101,900
Intangible assets, net	184,011	54,910
Deferred income tax assets	42,656	47,099
Non-current assets from discontinued operations	269	5,984
TOTAL ASSETS	\$ 1,532,406	\$ 816,484
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	\$ 170,671	\$ 39,646
Income taxes payable	9,687	13,258
Accrued payroll and employee benefits	51,545	21,775
Other accrued expenses	40,777	22,999
Customer deposits and other	10,926	7,345
Current portion of long-term debt	17,500	—
Current portion of operating lease liabilities	18,312	—
Current liabilities from discontinued operations	914	5,286
Total current liabilities	320,332	110,309
Long-term debt	321,527	—
Operating lease liabilities	90,538	—
Pension benefits	68,169	19,407
Deferred income tax liabilities	9,952	6,988
Uncertain tax positions	16,055	14,318
Long-term deferred revenue	8,011	29,108
Other long-term liabilities	19,675	18,337
Non-current liabilities from discontinued operations	887	10,715
Total liabilities	855,146	209,182
Commitments and contingencies (Note 19)		
Stockholders' equity:		
Preferred stock, \$0.001 par value, 1,000 shares authorized, none issued and outstanding	—	—
Common stock, \$0.001 par value, 70,000 shares authorized; 38,358 and 38,164 issued and outstanding, respectively	38	38
Additional paid-in capital	104,849	97,418
Accumulated other comprehensive loss	(5,897)	(3,449)
Retained earnings	577,724	512,783
Advanced Energy stockholders' equity	676,714	606,790
Noncontrolling interest	546	512
Total stockholders' equity	677,260	607,302
TOTAL LIABILITIES AND STOCKHOLDERS' EQUITY	\$ 1,532,406	\$ 816,484

The accompanying notes are an integral part of these Consolidated Financial Statements

ADVANCED ENERGY INDUSTRIES, INC.
Consolidated Statements of Operations
(In thousands, except per share amounts)

	Years Ended December 31,		
	2019	2018	2017
Sales, net:			
Product	\$ 678,061	\$ 610,326	\$ 578,650
Services	110,887	108,566	92,362
Total sales, net	<u>788,948</u>	<u>718,892</u>	<u>671,012</u>
Cost of sales:			
Product	416,976	298,597	267,587
Services	56,320	54,688	47,044
Total cost of sales	<u>473,296</u>	<u>353,285</u>	<u>314,631</u>
Gross profit	315,652	365,607	356,381
Operating expenses:			
Research and development	101,503	76,008	57,999
Selling, general and administrative	142,555	108,033	93,262
Amortization of intangible assets	12,168	5,774	4,350
Restructuring expense	5,038	4,239	—
Total operating expenses	<u>261,264</u>	<u>194,054</u>	<u>155,611</u>
Operating income	54,388	171,553	200,770
Other income (expense), net	12,806	823	(2,579)
Income from continuing operations, before income taxes	67,194	172,376	198,191
Provision for income taxes	10,699	25,227	62,090
Income from continuing operations	56,495	147,149	136,101
Income (loss) from discontinued operations, net of income taxes	8,480	(38)	1,760
Net income	<u>\$ 64,975</u>	<u>\$ 147,111</u>	<u>\$ 137,861</u>
Income from continuing operations attributable to noncontrolling interest	34	86	—
Net income attributable to Advanced Energy Industries, Inc.	<u>\$ 64,941</u>	<u>\$ 147,025</u>	<u>\$ 137,861</u>
Basic weighted-average common shares outstanding	38,281	39,081	39,754
Diluted weighted-average common shares outstanding	38,495	39,352	40,176
Earnings per share:			
Continuing operations:			
Basic earnings per share	\$ 1.47	\$ 3.76	\$ 3.42
Diluted earnings per share	\$ 1.47	\$ 3.74	\$ 3.39
Discontinued operations:			
Basic earnings per share	\$ 0.22	\$ —	\$ 0.04
Diluted earnings per share	\$ 0.22	\$ —	\$ 0.04
Net income:			
Basic earnings per share	\$ 1.70	\$ 3.76	\$ 3.47
Diluted earnings per share	\$ 1.69	\$ 3.74	\$ 3.43

The accompanying notes are an integral part of these Consolidated Financial Statements.

ADVANCED ENERGY INDUSTRIES, INC.
Consolidated Statements of Comprehensive Income
(In thousands)

	Years Ended December 31,		
	2019	2018	2017
Net income	\$ 64,975	\$ 147,111	\$ 137,861
Other comprehensive income, net of income taxes			
Foreign currency translation	(2,523)	(5,285)	8,305
Unrealized loss on marketable securities	—	—	(2)
Minimum benefit retirement liability	75	(697)	1,163
Comprehensive income	<u>\$ 62,527</u>	<u>\$ 141,129</u>	<u>\$ 147,327</u>
Comprehensive income attributable to noncontrolling interest	34	86	—
Comprehensive income attributable to Advanced Energy Industries, Inc.	<u>\$ 62,493</u>	<u>\$ 141,043</u>	<u>\$ 147,327</u>

The accompanying notes are an integral part of these Consolidated Financial Statements.

ADVANCED ENERGY INDUSTRIES, INC.
Consolidated Statements of Stockholders' Equity
(In thousands)

	Common Stock		Accumulated Other Comprehensive Income (Loss)					Retained Earnings	Non-controlling Interest	Total Stockholders' Equity
	Shares	Amount	Additional Paid-in Capital	Foreign Currency Translation	Unrealized Gain (Loss) on Marketable Securities	Minimum Benefit Retirement Liability				
Balances, December 31, 2016	39,712	\$ 40	\$ 203,603	\$ (3,610)	\$ 2	\$ (3,325)	\$ 195,364	\$ —	\$ 392,074	
Stock issued from equity plans	314	—	(1,316)	—	—	—	—	—	(1,316)	
Stock-based compensation	—	—	12,549	—	—	—	—	—	12,549	
Stock buyback	(422)	—	(29,993)	—	—	—	—	—	(29,993)	
Comprehensive income (loss):										
Foreign currency translation	—	—	—	8,305	—	—	—	—	8,305	
Unrealized gain on marketable securities	—	—	—	—	(2)	—	—	—	(2)	
Minimum benefit retirement liability	—	—	—	—	—	1,163	—	—	1,163	
Net income	—	—	—	—	—	—	137,861	—	137,861	
Total comprehensive income (loss)	—	—	—	8,305	(2)	1,163	137,861	—	147,327	
Balances, December 31, 2017	39,604	\$ 40	\$ 184,843	\$ 4,695	\$ —	\$ (2,162)	\$ 333,225	\$ —	\$ 520,641	
Adoption of new accounting standards	—	—	—	—	—	—	32,533	—	32,533	
Non-controlling interest from acquisition	—	—	—	—	—	—	—	426	426	
Stock issued from equity plans	256	—	(2,005)	—	—	—	—	—	(2,005)	
Stock-based compensation	—	—	9,703	—	—	—	—	—	9,703	
Stock buyback	(1,696)	(2)	(95,123)	—	—	—	—	—	(95,123)	
Comprehensive income (loss):										
Foreign currency translation	—	—	—	(5,285)	—	—	—	—	(5,285)	
Unrealized loss on marketable securities	—	—	—	—	—	—	—	—	—	
Minimum benefit retirement liability	—	—	—	—	—	(697)	—	—	(697)	
Net income	—	—	—	—	—	—	147,025	86	147,111	
Total comprehensive income (loss)	—	—	—	(5,285)	—	(697)	147,025	86	141,129	
Balances, December 31, 2018	38,164	\$ 38	\$ 97,418	\$ (590)	\$ —	\$ (2,859)	\$ 512,783	\$ 512	\$ 607,302	
Stock issued from equity plans	194	—	104	—	—	—	—	—	104	
Stock-based compensation	—	—	7,327	—	—	—	—	—	7,327	
Comprehensive income (loss):										
Foreign currency translation	—	—	—	(2,523)	—	—	—	—	(2,523)	
Minimum benefit retirement liability	—	—	—	—	—	75	—	—	75	
Net income	—	—	—	—	—	—	64,941	34	64,975	
Total comprehensive income (loss)	—	—	—	(2,523)	—	75	64,941	34	62,527	
Balances, December 31, 2019	38,358	\$ 38	\$ 104,849	\$ (3,113)	\$ —	\$ (2,784)	\$ 577,724	\$ 546	\$ 677,260	

The accompanying notes are an integral part of these Consolidated Financial Statements.

ADVANCED ENERGY INDUSTRIES, INC.
Consolidated Statements of Cash Flows
(In thousands)

	Years Ended December 31,		
	2019	2018	2017
CASH FLOWS FROM OPERATING ACTIVITIES:			
Net income	\$ 64,975	\$ 147,111	\$ 137,861
Income (loss) from discontinued operations, net of income taxes	8,480	(38)	1,760
Income (loss) from continuing operations, net of income taxes	56,495	147,149	136,101
Adjustments to reconcile net income to net cash provided by (used in) operating activities:			
Depreciation and amortization	26,147	13,592	9,424
Stock-based compensation expense	7,327	9,703	12,549
Provision for deferred income taxes	1,015	5,618	28,765
Loss on foreign exchange hedge	—	—	3,489
Discount on notes receivable	1,100	—	—
Gain on sale of central inverter service business	(14,795)	—	—
Net loss on disposal of assets	700	481	122
Changes in operating assets and liabilities, net of assets acquired:			
Accounts and other receivable, net	(18,879)	3,445	(7,497)
Inventories	3,687	(11,276)	(19,261)
Other assets	23,544	(2,975)	(1,030)
Accounts payable	(16,094)	(12,618)	1,812
Other liabilities and accrued expenses	(12,486)	(3,239)	7,159
Income taxes	(9,862)	1,547	18,323
Net cash provided by (used in) operating activities from continuing operations	47,899	151,427	189,956
Net cash provided by (used in) operating activities from discontinued operations	493	(156)	(7,255)
Net cash provided by operating activities	48,392	151,271	182,701
CASH FLOWS FROM INVESTING ACTIVITIES:			
Purchases of marketable securities	—	(95)	(107)
Proceeds from sale of marketable securities	1,742	589	1,903
Acquisitions, net of cash acquired	(366,101)	(93,756)	(17,347)
Issuance of notes receivable	(4,300)	—	—
Purchase of foreign exchange hedge	—	—	(3,489)
Purchases of property and equipment	(25,188)	(20,330)	(9,042)
Net cash provided by (used in) investing activities from continuing operations	(393,847)	(113,592)	(28,082)
CASH FLOWS FROM FINANCING ACTIVITIES:			
Net proceeds from long-term borrowings	347,486	—	—
Payments on long-term borrowings	(8,750)	—	—
Purchase and retirement of common stock	—	(95,125)	(29,993)
Net payments related to stock-based award activities	104	(2,009)	(1,314)
Net cash provided by (used in) financing activities from continuing operations	338,840	(97,134)	(31,307)
EFFECT OF CURRENCY TRANSLATION ON CASH	(1,496)	(1,030)	2,208
INCREASE (DECREASE) IN CASH AND CASH EQUIVALENTS	(8,111)	(60,485)	125,520
CASH AND CASH EQUIVALENTS, beginning of period	354,552	415,037	289,517
CASH AND CASH EQUIVALENTS, end of period	346,441	354,552	415,037
Less cash and cash equivalents from discontinued operations	—	5,251	7,754
CASH AND CASH EQUIVALENTS FROM CONTINUING OPERATIONS, end of period	<u>\$ 346,441</u>	<u>\$ 349,301</u>	<u>\$ 407,283</u>
SUPPLEMENTAL DISCLOSURE OF CASH FLOW INFORMATION:			
Cash paid for interest	\$ 3,479	\$ 228	\$ 66
Cash paid for income taxes	18,594	16,190	5,314
Cash received for refunds of income taxes	1,762	1,135	1,448

The accompanying notes are an integral part of these Consolidated Financial Statements.

ADVANCED ENERGY INDUSTRIES, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
(in thousands, except per share amounts)

NOTE 1. OPERATIONS AND SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES AND ESTIMATES

Advanced Energy provides highly-engineered, mission-critical, precision power conversion, measurement and control solutions to our global customers. We design, manufacture, sell and support precision power products that transform, refine, and modify the raw electrical power from the utility and convert it into various types of highly-controllable usable power that is predictable, repeatable and customizable. We operate in a single segment structure for power electronics conversion products and we operate in four vertical markets or applications to enable tracking of market trends. Our power solutions enable innovation in complex semiconductor and thin film plasma processes such as dry etch, strip, chemical and physical deposition, high and low voltage applications such as process control, computing, networking, telecommunication, analytical instrumentation, medical equipment, industrial technology and temperature-critical thermal applications such as material and chemical processing. We also supply related instrumentation products for advanced temperature measurement and control, electrostatic instrumentation products for test and measurement applications, and gas sensing and monitoring solutions for multiple industrial markets. Our network of global service support centers provides local repair and field service capability in key regions as well as provide upgrades and refurbishment services, and sales of used equipment to businesses that use our products. As of December 31, 2015, we discontinued our Inverter production, engineering, and sales product line. As such, all Inverter revenues, costs, assets and liabilities are reported in Discontinued Operations for all periods presented herein. See *Note 4. Disposed and Discontinued Operations* for more information.

Principles of Consolidation — Our Consolidated Financial Statements include our accounts and the accounts of our wholly-owned subsidiaries. All intercompany accounts and transactions have been eliminated. Our Consolidated Financial Statements are stated in United States dollars and have been prepared in accordance with accounting principles generally accepted in the United States (“U.S. GAAP”).

Use of Estimates in the Preparation of the Consolidated Financial Statements — The preparation of our Consolidated Financial Statements in conformity with U.S. GAAP requires us to make estimates, assumptions and judgments that affect the reported amounts of assets and liabilities, and disclosure of contingent liabilities at the date of the financial statements and the reported amounts of revenue and expenses during the reporting period. We believe that the significant estimates, assumptions, and judgments when accounting for items and matters such as allowances for doubtful accounts, excess and obsolete inventory, warranty reserves, acquisitions, asset valuations, asset life, depreciation, amortization, recoverability of assets, impairments, deferred revenue, stock option and restricted stock grants, taxes, and other provisions are reasonable, based upon information available at the time they are made. Actual results may differ from these estimates, making it possible that a change in these estimates could occur in the near term.

Foreign Currency Translation — The functional currency of certain of our foreign subsidiaries is the local currency. Assets and liabilities of these foreign subsidiaries are translated to the United States dollar at prevailing exchange rates at the balance sheet date; revenues and expenses are translated at the average exchange rates in effect for each period. Translation adjustments resulting from this process are reported as a separate component of Other Comprehensive Income.

For certain other subsidiaries the functional currency is the US Dollar. Foreign currency transactions are recorded based on exchange rates at the time such transactions arise. Subsequent changes in exchange rates for foreign currency denominated monetary assets and liabilities result in foreign currency transaction gains and losses which are reflected as unrealized (based on period end remeasurement) or realized (upon settlement of the transactions) in other income, net in our Consolidated Statements of Operations.

ADVANCED ENERGY INDUSTRIES, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS – (continued)
(in thousands, except per share amounts)

Fair Value — We value our financial assets and liabilities using fair value measurements.

U.S. GAAP for fair value establishes a hierarchy that prioritizes fair value measurements based on the types of inputs used for the various valuation techniques (market approach, income approach, and cost approach). The Company's financial assets and liabilities are measured using inputs from the three levels of the fair value hierarchy. The three levels of the hierarchy and the related inputs are as follows:

- Level 1 — Quoted prices (unadjusted) in active markets for identical assets or liabilities that the entity can access at the measurement date.
- Level 2 — Inputs other than quoted prices included within Level 1 that are observable for the asset or liability, either directly or indirectly.
- Level 3 — Unobservable inputs for the asset or liability.

The Company categorizes fair value measurements within the fair value hierarchy based upon the lowest level of the most significant inputs used to determine fair value. The carrying amounts of our cash and cash equivalents, accounts receivable, accounts payable and other current assets and liabilities approximate fair value as recorded due to the short-term nature of these instruments. The fair value of derivatives is estimated utilizing observable foreign exchange rates adjusted for non-performance credit risk associated with our counterparties. The fair value of contingent consideration and other acquired assets and liabilities associated with the acquisition of Artesyn, are based on Level 3 inputs. There were no transfers of financial assets or liabilities into or from Level 3. The fair value of borrowings approximates the recorded borrowing value based upon market interest rates for similar facilities. See *Note 8, Derivative Financial Instruments* and *Note 22, Credit Facility* for additional information.

The Company's non-financial assets, which primarily consist of property and equipment, goodwill, and other intangible assets, are not required to be carried at fair value on a recurring basis and are reported at carrying value. However, on a periodic basis or whenever events or changes in circumstances indicate that their carrying value may not be fully recoverable (and at least annually for goodwill and indefinite-lived intangible assets), non-financial instruments are assessed for impairment and, if applicable, written down to and recorded at fair value. See *Note 12, Goodwill* and *Note 13, Intangible Assets* for further discussion and presentation of these amounts.

Cash, Cash Equivalents, and Marketable Securities — We consider all amounts on deposit with financial institutions and highly liquid investments with an original maturity of three months or less to be cash equivalents, and those with stated maturities of greater than three months as marketable securities. Cash and cash equivalents are highly liquid investments that consist primarily of short-term money market instruments and demand deposits with insignificant interest rate risk and original maturities of three months or less at the time of purchase.

Sometimes we invest excess cash in money market funds not insured by the Federal Deposit Insurance Corporation. We believe that the investments in money market funds are on deposit with credit-worthy financial institutions and that the funds are highly liquid. The investments in money market funds are reported at fair value, with interest income recorded in earnings and are included in "Cash and cash equivalents."

Concentrations of Credit Risk — Financial instruments, which potentially subject us to credit risk, include cash and cash equivalents, marketable securities, and trade accounts receivable. To preserve capital and maintain liquidity, we invest with financial institutions we deem to be of high quality and sound financial condition. Our investments are in low-risk instruments and we limit our credit exposure in any one institution or type of investment instrument based upon criteria including creditworthiness.

ADVANCED ENERGY INDUSTRIES, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS – (continued)
(in thousands, except per share amounts)

We have established an allowance for doubtful accounts based upon factors surrounding the credit risk of specific customers, historical trends, and other information.

Accounts Receivable and Allowance for Doubtful Accounts — Accounts receivable are recorded at net realizable value. We maintain a credit approval process and we make significant judgments in connection with assessing our customers' ability to pay. Despite this assessment, from time to time, our customers are unable to meet their payment obligations. We continuously monitor our customers' credit worthiness and use our judgment in establishing a provision for estimated credit losses based upon our historical experience and any specific customer collection issues that we have identified. While such credit losses have historically been within our expectations and the provisions established, there is no assurance that we will continue to experience the same credit loss rates that we have in the past. For example, in the fourth quarter, we increased our allowance for doubtful accounts by \$4.2 million relating to a customer exposure in China resulting from economic softness and funding delays causing uncertainty in large program timing which uncertainty is now exacerbated by the spreading Coronavirus. A significant change in the liquidity or financial position of our customers could have a material adverse impact on the collectability of accounts receivable and our future operating results.

Changes in allowance for doubtful accounts are summarized as follows:

	<u>Years Ended December 31,</u>	
	<u>2019</u>	<u>2018</u>
Balances at beginning of period	\$ 1,856	\$ 1,748
Additions from acquisition	1,884	416
Additions - charged to expense	4,207	109
Deductions - write-offs, net of recoveries	(202)	(417)
Balances at end of period	<u>\$ 7,745</u>	<u>\$ 1,856</u>

Inventories — Inventories include costs of materials, direct labor, manufacturing overhead, in-bound freight, and duty. Inventories are valued at the lower of cost (first-in, first-out method) or net realizable value and are presented net of reserves for excess and obsolete inventory.

We regularly review inventory quantities on hand and record a provision to write-down excess and obsolete inventory to its estimated net realizable value, if less than cost, based primarily on historical usage and our estimated forecast of product demand. Demand for our products can fluctuate significantly. A significant decrease in demand could result in an increase in the charges for excess inventory quantities on hand.

In addition, our industry is subject to technological change, new product development, and product technological obsolescence that could result in an increase in the amount of obsolete inventory quantities on hand. Therefore, any significant unanticipated changes in demand or technological developments could have a significant impact on the value of our inventory and our reported operating results.

Property and Equipment — Property and equipment is stated at cost or estimated fair value if acquired in a business combination. Depreciation is computed over the estimated useful lives using the straight-line method. Estimated useful lives for financial reporting purposes are as follows: buildings, 20 to 40 years; machinery, equipment, furniture and fixtures and vehicles, 3 to 15 years; and computer and communication equipment, 3 years.

Amortization of leasehold improvements is calculated using the straight-line method over the lease term or the estimated useful life of the assets, whichever period is shorter. Leasehold additions and improvements are capitalized, while maintenance and repairs are expensed as incurred.

ADVANCED ENERGY INDUSTRIES, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS – (continued)
(in thousands, except per share amounts)

When depreciable assets are retired, or otherwise disposed of, the cost and related accumulated depreciation are removed from the accounts and any related gains or losses are included in other income, net, in our Consolidated Statements of Operations.

Purchase accounting — Business combinations are accounted for using the purchase method of accounting. Under the purchase method, assets and liabilities, including intangible assets, are recorded at their fair values as of the acquisition date. Acquisition costs in excess of amounts assigned to assets acquired and liabilities assumed are recorded as goodwill. Transaction related costs associated with business combinations are expenses as incurred.

Intangible Assets, Goodwill and Other Long-Lived Assets — As a result of our acquisitions, we identified and recorded intangible assets and goodwill. Intangible assets are valued based on estimates of future cash flows and amortized over their estimated useful lives. Goodwill is subject to annual impairment testing, as well as testing upon the occurrence of any event that indicates a potential impairment. Intangible assets and other long-lived assets are subject to an impairment test if there is an indicator of impairment. The carrying value and ultimate realization of these assets is dependent upon our estimates of future earnings and benefits that we expect to generate from their use. If our expectations of future results and cash flows are significantly diminished, intangible assets and goodwill may be impaired and the resulting charge to operations may be material. When we determine that the carrying value of intangibles or other long-lived assets may not be recoverable based upon the existence of one or more indicators of impairment, we use the projected undiscounted cash flow method to determine whether an impairment exists, and then measure the impairment using discounted cash flows.

The estimation of useful lives and expected cash flows requires us to make judgments regarding future periods that are subject to some factors outside of our control. Changes in these estimates can result in revisions to our carrying value of these assets and may result in material charges to our results of operations.

The annual impairment test for goodwill can be performed using an assessment of qualitative factors in determining if it is more likely than not that goodwill is impaired. If this assessment indicates that it is more likely than not that goodwill is impaired, the next step of impairment testing compares the fair value of a reporting unit to its carrying value. Goodwill would be impaired if the resulting implied fair value of goodwill was less than the recorded carrying value of the goodwill.

Debt Issuance Costs — The Company has incurred debt issuance costs in connections it its debt facilities. Amounts paid directly to lenders are classified as issuance costs. Commitment fees and other costs directly associated with obtaining credit facilities are deferred financing costs which are recorded in the Consolidated Balance Sheets and amortized over the term of the facility. The Company allocates deferred debt issuance costs incurred for its current credit facility between the revolver and term loan based on their relative borrowing capacity. Deferred debt issuance costs associated with the revolving credit facility are recorded within other assets and those associated with the term loan are recorded as a reduction of the carrying value of the debt on the Consolidated Balance Sheets. All deferred debt issuance costs are amortized using the effective interest rate method to interest expense within Other income (expense), net on the Company's Consolidated Statements of Operations. See *Note 22. Credit Facility* for additional details.

Revenue Recognition — We recognize revenue when we have satisfied our performance obligations which typically occurs when control of the products or services have been transferred to our customers. The transaction price is based upon the standalone selling price. In most transactions, we have no obligations to our customers after the date products are shipped, other than pursuant to warranty obligations. Revenue is recognized net of any taxes collected from customers, which are subsequently remitted to governmental authorities. Shipping and handling fees billed to customers, if any, are recognized as revenue. The related cost for shipping and handling fees are recognized in cost of sales. We expense incremental costs of obtaining contracts when the amortization period of the costs is less than 1 year. These costs are included in selling, general, and administrative expenses. Repairs that are covered under our standard warranty do not generate revenue.

ADVANCED ENERGY INDUSTRIES, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS – (continued)
(in thousands, except per share amounts)

We maintain a worldwide support organization in 10 countries, including the United States, the PRC, Japan, Korea, Taiwan, Germany, Ireland, Singapore, Israel and Great Britain. Support services include warranty and non-warranty repair services, upgrades, and refurbishments on the products we sell. Repairs that are covered under our standard warranty do not generate revenue.

As part of our ongoing service business, we satisfy our service obligations under extended warranties and preventive maintenance contracts. Extended warranties had previously been offered on our discontinued inverter products. Any up-front fees received for extended warranties or maintenance plans are deferred and recognized ratably over the service periods, as defined in the agreements.

Research and Development Expenses — Costs incurred to advance, test or otherwise modify our proprietary technology or develop new technologies are considered research and development costs and are expensed when incurred. These costs are primarily comprised of costs associated with the operation of our laboratories and research facilities, including internal labor, materials, and overhead.

Warranty Costs — We provide for the estimated costs to fulfill customer warranty obligations upon the recognition of the related revenue. We offer warranty coverage for a majority of our Precision Power products for periods typically ranging from 12 to 24 months after shipment. We warranted our inverter products for five to ten years and provided the option to purchase additional warranty coverage for up to 20 years. The warranty expense accrued related to our standard inverter product warranties is now considered part of our discontinued operations and is recorded as such on our Consolidated Balance Sheets. See *Note 4. Disposed and Discontinued Operations* for more information. See *Note 15. Warranties* for more information on our warranties from continuing operations. We estimate the anticipated costs of repairing our products under such warranties based on the historical costs of the repairs. The assumptions we use to estimate warranty accruals are reevaluated periodically, in light of actual experience, and when appropriate, the accruals are adjusted. Should product failure rates differ from our estimates, actual costs could vary significantly from our expectations.

Stock-Based Compensation — Accounting for stock-based compensation requires the measurement and recognition of compensation expense for all stock-based payment awards made to employees and directors based on estimated fair values. We have estimated the fair value of all stock options and awards on the date of grant using the Black-Scholes-Merton pricing model, which is affected by our stock price, as well as assumptions regarding a number of complex and subjective variables. These variables include our expected stock price volatility over the term of the awards, actual and projected employee option exercise behaviors, risk-free interest rates and expected dividends. We also estimate forfeitures at the time of grant and revise those estimates in subsequent periods if actual forfeitures differ from our estimates. Our expected volatility assumption is based on the historical daily closing price of our stock over a period equivalent to the expected life of the options.

Income Taxes — We follow the liability method of accounting for income taxes under which deferred tax assets and liabilities are recognized for future tax consequences. A deferred tax asset or liability is computed for both the expected future impact of differences between the financial statement and tax basis of assets and liabilities and for the expected future tax benefit to be derived from tax loss and tax credit carryforwards. Tax rate changes are reflected in the period such changes are enacted.

We assess the recoverability of our net deferred tax assets and the need for a valuation allowance on a quarterly basis. Our assessment includes a number of factors including historical results and taxable income projections for each jurisdiction. The ultimate realization of deferred income tax assets is dependent on the generation of taxable income in appropriate jurisdictions during the periods in which those temporary differences are deductible. We consider the scheduled reversal of deferred income tax liabilities, projected future taxable income, and tax planning strategies in determining the amount of the valuation allowance. Based on the level of historical taxable income and projections for

ADVANCED ENERGY INDUSTRIES, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS – (continued)
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future taxable income over the periods in which the deferred income tax assets are deductible, we determine if we will realize the benefits of these deductible differences.

Accounting for income taxes requires a two-step approach to recognize and measure uncertain tax positions. In general, we are subject to regular examination of our income tax returns by the Internal Revenue Service and other tax authorities. The first step is to evaluate the tax position for recognition by determining, if based on the technical merits, it is more likely than not that the position will be sustained upon audit, including resolutions of related appeals or litigation processes, if any. The second step is to measure the tax benefit as the largest amount that is more than 50% likely of being realized upon ultimate settlement. We regularly assess the likelihood of favorable or unfavorable outcomes resulting from these examinations to determine the adequacy of our provision for income taxes. This evaluation is based on factors including, but not limited to, changes in facts or circumstances, changes in tax law, effectively settled issues under audit, and new audit activity.

On December 22, 2017, the Tax Act was enacted into law and the new legislation contains several key tax provisions that affected us, including a one-time mandatory transition tax on accumulated foreign earnings and a reduction of the corporate income tax rate to 21%, among others. In conjunction with the Tax Act enactment, the SEC issued Staff Accounting Bulletin No. 118, *Income Tax Accounting Implications of the Tax Cuts and Jobs Act* ("SAB 118"), which allowed for the recording of provisional amounts related to the Tax Act and subsequent adjustments related to the Tax Act during an up to one-year measurement period. The Company recorded what it believed to be reasonable estimates during the SAB 118 measurement period which lasted from December 2017 to December 2018. During the quarter ended December 31, 2018, the Company finalized the accounting treatment of the income tax effects of the Tax Act. Although the SAB 118 measurement period has ended, there may be some aspects of the Tax Act that remain subject to future regulations and/or notices which may further clarify certain provisions of the Tax Act. Accordingly, the Company may need to adjust its previously recorded amounts to reflect the recognition and measurement of its tax accounting positions in accordance with Accounting Standards Codification Topic-740, "Income Taxes" which could be material.

Leases — We lease manufacturing and office space under non-cancelable operating leases. Our lease agreements generally contain lease and non-lease components and we combine fixed payments for non-lease components with lease payments and account for them together as a single lease component. Certain lease agreements may contain variable payments, which are expensed as incurred and not included in the right-of-use lease assets and operating lease liabilities.

Right-of-use assets and operating lease liabilities are recognized at the present value of the future lease payments at the lease commencement date. The interest rate used to determine the present value of the future lease payments is our incremental borrowing rate, because the interest rate implicit in our leases is not readily determinable. Our incremental borrowing rate is estimated to approximate the interest rate on a collateralized basis with similar terms and payments. Our lease terms include periods under options to extend or terminate the lease when it is reasonably certain that we will exercise that option. Right-of-use assets also include any prepaid lease payments and lease incentives. Operating lease expense is recognized on a straight-line basis over the lease term.

Commitments and Contingencies — From time to time we are involved in disputes and legal actions arising in the normal course of our business. While we currently believe that the amount of any ultimate loss would not be material to our financial position, the outcome of these actions is inherently difficult to predict. In the event of an adverse outcome, the ultimate loss could have a material adverse effect on our financial position or reported results of operations in a particular period. An unfavorable decision, particularly in patent litigation, could require material changes in production processes and products or result in our inability to ship products or components found to have violated third-party patent rights. We accrue loss contingencies when it is probable that a loss has occurred or will occur, and the amount of the loss can be reasonably estimated. Our estimates of probability of losses are subjective, involve significant judgment and uncertainties, and are based on the best information we have at any given point in time. Resolution of

ADVANCED ENERGY INDUSTRIES, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS – (continued)
(in thousands, except per share amounts)

these uncertainties in a manner inconsistent with our expectations could have a significant impact on our results of operations and financial condition

NEW ACCOUNTING STANDARDS

New Accounting Standards Adopted

In February 2018, the FASB issued ASU 2018-02, "Income Statement—Reporting Comprehensive Income" to give companies the option to reclassify the income tax effects on items within accumulated other comprehensive income resulting from the Tax Act to retained earnings. ASU 2018-02 is effective for fiscal years beginning after December 15, 2018, including interim periods within those years. We adopted ASU 2018-02 during the first quarter of fiscal year 2019 which did not materially impact our Consolidated Financial Statements.

In June 2018, the FASB issued ASU 2018-07, "Compensation-Stock Compensation (Topic 718)", Improvements to Non-employee Share-based Payments ("ASU 2018-07"). This ASU expands the scope of Topic 718 to include share-based payment transactions for acquiring goods and services from non-employees. ASU 2018-07 is effective for fiscal years beginning after December 15, 2018. The new guidance is required to be applied retrospectively with the cumulative effect recognized at the date of initial application. We adopted ASU 2018-07 during the first quarter of fiscal year 2019 which did not materially impact our Consolidated Financial Statements.

In February 2016, the FASB issued ASU 2016-02, "Leases (Topic 842)," to increase transparency and comparability among organizations by recognizing lease right-of-use assets and lease liabilities on the balance sheet and disclosing key information about leasing arrangements. ASU 2016-02 is effective for fiscal years beginning after December 15, 2018, including interim periods within the year of adoption. We adopted ASU 2016-02 using the modified retrospective approach and recorded \$38.2 million of operating lease right-of-use assets and \$38.4 million of operating lease liabilities as the cumulative-effect in the first quarter of fiscal year 2019. As of December 31, 2019, we had recorded \$105.4 million of operating lease right-of-use assets and \$108.9 million of operating lease liabilities. The adoption of ASU 2016-02 did not materially impact the Company's Consolidated Statement of Operations or Consolidated Statement of Cash Flows for the year ended December 31, 2019.

In May 2014, the FASB issued ASU 2014-09, "Revenue from Contracts with Customers" and has subsequently issued several supplemental and/or clarifying ASUs (collectively known as "ASC 606"). ASC 606 implements a five-step model for how an entity should recognize revenue in order to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. We adopted ASC 606 during the first quarter of fiscal year 2018 using the modified retrospective approach and recorded an adjustment to reflect the cumulative-effect of its adoption on all contracts with customers.

New Accounting Standards Issued But Not Yet Adopted

In June 2016, the FASB issued ASU 2016-13, "Financial Instruments—Credit Losses (Topic 326)", Measurement of Credit Losses on Financial Instruments ("ASU 2016-13"). This ASU changes the methodology for measuring credit losses on financial instruments and the timing of when such losses are recorded. ASU 2016-13 is effective for fiscal years, and interim periods within those years, beginning after December 15, 2019. Early adoption is permitted for fiscal years, and interim periods within those years, beginning after December 15, 2018. We are currently assessing the impact ASU 2016-13 will have on our Consolidated Financial Statements.

In August 2018, the FASB issued ASU 2018-13, "Fair Value Measurement (Topic 820)" ("ASU 2018-13"). ASU 2018-13 modifies the disclosure requirements on fair value measurements in Topic 820, Fair Value Measurement, based on the concepts in the Concepts Statement, including the consideration of costs and benefits. ASU 2018-13 is effective for fiscal years ending after December 15, 2019 and shall be applied to all periods presented on a

ADVANCED ENERGY INDUSTRIES, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS – (continued)
(in thousands, except per share amounts)

retrospective basis. Early adoption is permitted. We are currently assessing and do not believe ASU 2018-13 will have a significant impact on our fair value measurements disclosure requirements.

In August 2018, the FASB issued ASU 2018-14, "Compensation—Retirement Benefits—Defined Benefit Plans—General (Subtopic 715-20)" ("ASU 2018-14"). ASU 2018-14 eliminates requirements for certain disclosures and requires additional disclosures under defined benefit pension plans and other post-retirement plans. ASU 2018-14 is effective for fiscal years ending after December 15, 2020 and shall be applied to all periods presented on a retrospective basis. Early adoption is permitted. We are currently assessing and do not believe ASU 2018-14 will have a significant impact on our defined benefit plan disclosure requirements.

In December 2019, the FASB issued authoritative guidance intended to simplify the accounting for income taxes (ASU 2019-12, "Income Taxes (Topic 740): Simplifying the Accounting for Income Taxes"). This guidance eliminates certain exceptions to the general approach to the income tax accounting model, and adds new guidance to reduce the complexity in accounting for income taxes. This guidance is effective for annual periods after December 15, 2020, including interim periods within those annual periods. We are currently evaluating the potential impact of this guidance on our financial statements.

NOTE 2. BUSINESS ACQUISITIONS

2019 Acquisitions

In September 2019, we completed the acquisition of Artesyn pursuant to the Stock Purchase Agreement ("Acquisition Agreement"), as amended, dated May 14, 2019. Pursuant to the Acquisition Agreement, we acquired all of Artesyn's issued and outstanding shares for a preliminary purchase price of \$361.3 million, net of cash acquired, including the assumption of certain liabilities and subject to an adjustment for net working capital. The purchase price included the contingent consideration related to a potential payment back to the seller per the Acquisition Agreement for any tax benefit arising from the utilization of acquired net operating losses through 2021 at the federal income tax rate of 21.0%. The amount recorded represents our best estimate of the present value of the tax benefit we will achieve utilizing the acquired net operating losses through 2021. In connection with the Acquisition Agreement, we entered into a credit agreement that provided us with aggregate financing of \$500.0 million which was used to partially fund the Artesyn acquisition. See *Note 22. Credit Facility* for additional details related to the credit agreement. Advanced Energy is in the process of finalizing the assessment of fair value for the assets acquired and liabilities assumed related to the Artesyn acquisition.

Artesyn's Embedded Power business is one of the world's largest providers of highly engineered, application-specific power supplies for demanding applications. This acquisition will diversify our product portfolio and give us access to additional growth markets, including hyperscale data centers, telecom infrastructure in next generation 5G networks, embedded industrial power applications and medical power for diagnostic and treatment applications.

The components of the fair value of the total consideration transferred for the acquisition is as follows:

Cash paid for acquisition	\$ 389,326
Non-cash consideration	2,000
Contingent consideration and working capital adjustments	(6,848)
Total fair value of consideration transferred	384,478
Less cash acquired	(23,225)
Total purchase price	\$ 361,253

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS – (continued)
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The following table summarizes the estimated preliminary fair values of the assets acquired and liabilities assumed from the acquisition in 2019:

	Preliminary: September 10, 2019	Measurement Period Adjustments	Preliminary: December 31, 2019
Accounts and other receivable, net	\$ 128,221	\$ -	\$ 128,221
Inventories	140,678	(900)	139,778
Property and equipment	65,016	(1,984)	63,032
Operating lease right-of-use assets	60,217	(144)	60,073
Goodwill	143,262	(30,222)	113,040
Intangible assets	125,000	(1,000)	124,000
Deferred income tax assets	14,767	(14,767)	—
Other assets	61,511	2,507	64,018
Total assets acquired	738,672	(46,510)	692,162
Accounts payable	144,652	50	144,702
Operating lease liability	59,634	477	60,111
Pension liability	48,494	192	48,686
Deferred income tax liabilities	37,218	(31,372)	5,846
Other liabilities	80,876	(9,312)	71,564
Total liabilities assumed	370,874	(39,965)	330,909
Total fair value of net assets acquired	\$ 367,798	\$ (6,545)	\$ 361,253

A summary of the intangible assets acquired, amortization method and estimated useful lives are as follows:

	Artesyn	Amortization Method	Useful Life
Technology	\$ 28,000	Straight-line	5
Customer relationships	75,000	Straight-line	15
Tradename	21,000	Straight-line	10
Total	<u>\$ 124,000</u>		

Goodwill and intangible assets are recorded in the functional currency of the entity and are subject to changes due to translation at each balance sheet date. The goodwill represents expected operating synergies from combining operations with the acquired companies and the estimated value associated with the enhancements to our comprehensive product lines and access to new markets. Advanced Energy is still evaluating the fair value for the assets acquired and liabilities assumed related to the Artesyn acquisition. Accordingly, the purchase price allocation presented above is preliminary.

2018 Acquisitions

In September 2018, Advanced Energy acquired LumaSense Technologies Holdings, Inc. ("LumaSense"), a privately held company with primary operations in Santa Clara, California, Frankfurt, Germany, and Ballerup, Denmark for a purchase price of \$84.7 million, net of cash acquired.

In May 2018, Advanced Energy acquired the electrostatic technology and product line ("Electrostatic Product Line") from Monroe Electronics, Inc. ("Monroe"), a privately held electronics manufacturer in Lyndonville, New York for \$3.0 million in cash.

ADVANCED ENERGY INDUSTRIES, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS – (continued)
(in thousands, except per share amounts)

In February 2018, Advanced Energy acquired Trek Holding Co., LTD ("Trek"), a privately held company with operations in Tokyo, Japan and Lockport, New York, for \$6.1 million, net of cash acquired. Trek has a 95% ownership interest in its U.S. subsidiary which is also its primary operation.

The components of the fair value of the total consideration transferred for our 2018 acquisitions are as follows:

	Trek	Electrostatic Product Line	LumaSense	Total
Cash paid for acquisition	\$ 11,723	\$ 3,000	\$ 94,946	\$ 109,669
Less cash acquired	(5,651)	—	(10,262)	(15,913)
Total purchase price	\$ 6,072	\$ 3,000	\$ 84,684	\$ 93,756

In 2019, Advanced Energy finalized the assessment of fair value for the assets acquired and liabilities assumed related to the LumaSense acquisition. The following table summarizes the fair values of the assets acquired and liabilities assumed from the LumaSense acquisition, including measurement period adjustments.

	Preliminary: December 31, 2018	Measurement Period Adjustments	Adjusted: December 31, 2019
Accounts and other receivable, net	\$ 7,167	\$ -	\$ 7,167
Inventories	9,372	-	9,372
Property and equipment	1,353	-	1,353
Goodwill	48,032	(11,774)	36,258
Intangible assets	26,000	17,240	43,240
Deferred income tax assets	8,116	(1,785)	6,331
Other assets	5,126	878	6,004
Total assets acquired	105,166	4,559	109,725
Accounts payable	5,734	-	5,734
Deferred income tax liabilities	7,984	3,715	11,699
Other liabilities	6,764	844	7,608
Total liabilities assumed	20,482	4,559	25,041
Total fair value of net assets acquired	\$ 84,684	\$ -	\$ 84,684

During 2019, we adjusted the estimated values of the assets acquired and liabilities assumed based upon the final valuation report. These adjustments included additional liabilities, changes to deferred taxes and changes in the allocation of excess purchase price between goodwill and intangibles.

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS – (continued)
(in thousands, except per share amounts)

The final fair values of the assets acquired and liabilities assumed from our acquisitions in 2018 are as follows:

	<u>Trek</u>	<u>Electrostatic Product Line</u>	<u>LumaSense</u>	<u>Total</u>
Accounts and other receivable, net	\$ 2,818	\$ 77	\$ 7,167	\$ 10,062
Inventories	3,941	292	9,372	13,605
Property and equipment	594	50	1,353	1,997
Goodwill	—	1,220	36,258	37,478
Intangible assets	788	1,400	43,240	45,428
Deferred income tax assets	606	—	6,331	6,937
Other assets	854	—	6,004	6,858
Total assets acquired	9,601	3,039	109,725	122,365
Accounts payable	747	39	5,734	6,520
Deferred income tax liabilities	—	—	11,699	11,699
Other liabilities	2,782	—	7,608	10,390
Total liabilities assumed	3,529	39	25,041	28,609
Total fair value of net assets acquired	\$ 6,072	\$ 3,000	\$ 84,684	\$ 93,756

A summary of the intangible assets acquired in 2018, amortization method and estimated useful lives are as follows:

	<u>Trek</u>	<u>Electrostatic Product Line</u>	<u>LumaSense</u>	<u>Method and Useful life</u>	
				<u>Amortization Method</u>	<u>Useful Life</u>
Technology	\$ 671	\$ 1,200	\$ 35,530	Straight-line	10 - 15
Customer relationships	117	200	4,360	Straight-line	10
Tradename	—	—	3,350	Straight-line	10
Total	\$ 788	\$ 1,400	\$ 43,240		

Goodwill and intangible assets are recorded in the functional currency of the entity and are subject to changes due to translation at each balance sheet date. The goodwill represents expected operating synergies from combining operations with the acquired companies and the estimated value associated with the enhancements to our comprehensive product lines.

Pro forma results for Advanced Energy Inc. giving effect to the Artesyn Embedded Power Business and LumaSense Technologies Holdings, Inc. Transactions

The following unaudited pro forma financial information presents the combined results of operations of Advanced Energy, LumaSense and Artesyn as if each of the acquisitions had been completed at the beginning of the fiscal year prior to their acquisition. The unaudited pro forma financial information is presented for informational purposes and is not indicative of the results of operations that would have been achieved if the acquisitions had taken place at the beginning of the year prior to the acquisition dates, nor are they indicative of future results.

The unaudited pro forma financial information for the year ended December 31, 2019 includes Advanced Energy's results, including the post-acquisition results of LumaSense, since September 1, 2018 and the post-acquisition results of Artesyn, since September 10, 2019. The unaudited pro forma financial information for the year ended December 31, 2019 and 2018 combines Advanced Energy's results with the pre-acquisition results of Artesyn and LumaSense for that period.

ADVANCED ENERGY INDUSTRIES, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS – (continued)
(in thousands, except per share amounts)

The following table presents our unaudited pro forma results for the acquisitions of Artesyn and LumaSense:

	Year Ended December 31,			
	2019		2018	
	As Reported	Pro Forma	As Reported	Pro Forma
Total sales	\$ 788,948	\$ 1,202,790	\$ 718,892	\$ 1,350,037
Net income attributable to Advanced Energy Industries, Inc.	\$ 64,941	\$ 83,104	\$ 147,025	\$ 158,422
Earnings per share:				
Basic earnings per share	\$ 1.70	\$ 2.17	\$ 3.76	\$ 4.05
Diluted earnings per share	\$ 1.69	\$ 2.16	\$ 3.74	\$ 4.03

The unaudited pro forma results for all periods presented include adjustments made to account for certain costs and transactions that would have been incurred had the acquisitions been completed at the beginning of the year prior to the year of acquisition. These include adjustments to amortization charges for acquired intangible assets, interest and financing expenses, transaction costs, amortization of purchased gross profit and the alignment of various accounting policies. These adjustments are net of any applicable tax impact and were included to arrive at the pro forma results above.

Artesyn's operating results have been included in the Advanced Energy's operating results for the periods subsequent to the completion of the acquisition on September 10, 2019. During the year ended December 31, 2019, Artesyn contributed total sales of \$220.3 million and net income of \$7.1 million, including interest and other expense associated with the financing of the transaction.

NOTE 3. REVENUE

Revenue Recognition

We recognize revenue when we have satisfied our performance obligations which typically occurs when control of the products or services have been transferred to our customers. The transaction price is based upon the standalone selling price. In most transactions, we have no obligations to our customers after the date products are shipped, other than pursuant to warranty obligations. Shipping and handling fees billed to customers, if any, are recognized as revenue. The related shipping and handling costs are recognized in cost of sales. Support services include warranty and non-warranty repair services, upgrades, and refurbishments on the products we sell. Repairs that are covered under our standard warranty do not generate revenue.

Nature of goods and services

Products

Advanced Energy provides highly engineered, mission-critical, precision power conversion, measurement and control solutions to our global customers. We design, manufacture, sell and support precision power products that transform electrical power into various usable forms. Our power conversion products refine, modify and control the raw electrical power from a utility and convert it into power that is predictable, repeatable and customizable. Our products enable thin film manufacturing processes such as plasma enhanced chemical and physical deposition and etch for various semiconductor and industrial products, industrial thermal applications for material and chemical processes, and specialty power for critical industrial technology applications. We also supply thermal instrumentation products for advanced temperature measurement and control in these markets. As a result of the Artesyn acquisition, we now sell precision power conversion products into the telecom and networking, data center, and additional medical and industrial markets.

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Our products are designed to enable new process technologies, improve productivity, and lower the cost of ownership for our customers. We also provide repair and maintenance services for all our products. We principally serve original equipment manufacturers ("OEM") and end customers in the semiconductor, flat panel display, high voltage, solar panel, telecom and networking, data center, medical, and other industrial capital equipment markets. Our advanced power products are used in diverse markets, applications, and processes including the manufacture of capital equipment for semiconductor device manufacturing, thin film applications for thin film renewables and architectural glass, and for other thin film applications including flat panel displays, and industrial coatings. Our embedded power products are used in a wide range of applications, including 5G, datacenter including hyperscale and other industrial and medical applications.

Services

Our global support services group offers warranty and after-market repair services in the regions in which we operate, providing us with preventive maintenance opportunities. Our customers continue to pursue low cost of ownership of their capital equipment and are increasingly sensitive to the costs of system downtime. They expect that suppliers offer comprehensive local repair service and customer support. To meet these market requirements, we maintain a worldwide support organization comprising of both direct and indirect activities, through partnership with local distributors, primarily in the United States ("U.S."), the People's Republic of China ("PRC"), Japan, South Korea, Taiwan, Germany, Singapore and United Kingdom.

As part of our ongoing service business, we satisfy our service obligations under preventative maintenance contracts and extended warranties which had previously been offered on our discontinued inverter products. We record a contract liability for payments received for extended warranties or maintenance plans for which we have not yet provided the services. Revenue under these arrangements is recognized ratably over the underlying terms as we do not have historical information which would allow us to project the estimated service usage pattern at this time.

In May 2019, we sold our grid-tied central inverter repair and service operation to a third party. In connection with this sale, approximately \$22.0 million of deferred revenue related to extended warranties and service contracts, were transferred to the buyer. See *Note 4. Disposed and Discontinued Operations* below for additional information. Contract liabilities related to our extended warranties and service contracts were \$9.2 million as of December 31, 2019 and \$33.4 million as of December 31, 2018. We expect to recognize between \$0.2 million and \$1.0 million per year through 2031.

Disaggregation of Revenue

The following table presents our sales by product line, which includes certain reclassifications to prior comparative periods to conform to our current year presentation:

	Years Ended December 31,		
	2019	2018	2017
Semiconductor Equipment	\$ 403,018	\$ 533,770	\$ 554,063
Industrial & Medical	245,992	185,122	116,949
Data Center Computing	91,438	—	—
Telecom & Networking	48,500	—	—
Total	<u>\$ 788,948</u>	<u>\$ 718,892</u>	<u>\$ 671,012</u>

ADVANCED ENERGY INDUSTRIES, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS – (continued)
(in thousands, except per share amounts)

The following table presents our sales by geographic region:

	Years Ended December 31,					
	2019		2018		2017	
North America	\$ 373,634	47.4 %	\$ 372,834	51.8 %	\$ 377,347	56.2 %
Asia	295,155	37.4	250,574	34.9	221,690	33.1
Europe	119,427	15.1	94,793	13.2	71,796	10.7
Other	732	0.1	691	0.1	179	—
Total	\$ 788,948	100.0 %	\$ 718,892	100.0 %	\$ 671,012	100.0 %

The following table presents our net sales by extended warranty and service contracts recognized over time and our product and service revenue recognized at a point in time:

	Years Ended December 31,		
	2019	2018	2017
Product and service revenue recognized at point in time	\$ 786,918	\$ 715,055	\$ 667,440
Extended warranty and service contracts recognized over time	2,030	3,837	3,572
Total	\$ 788,948	\$ 718,892	\$ 671,012

NOTE 4. DISPOSED AND DISCONTINUED OPERATIONS

Disposed Operations

In May 2019, we sold our grid-tied central solar inverter services business to Bold Renewables Holdings, LLC (“Buyer”) for \$1.00 dollar and assumption of our initial product warranty and our extended warranty service obligations. In connection with this transaction, we entered into a Loan and Security Agreement with the Buyer. Under this agreement, we initially loaned \$2.8 million to the buyer at closing and loaned an additional \$1.5 million in the fourth quarter of 2019. We have made available an additional \$3.75 million that may be borrowed in the future, subject to certain operating and liquidity covenants, for operating needs over the next ten years. The borrowings under the Loan and Security Agreement bear interest at 0% for the first seven years and 5% thereafter. Additionally, the Loan and Security Agreement provides for early payment discounts of 50% during the first three years, 45% for years four and five and 40% thereafter up to 30 days prior to the maturity of the Loan and Security Agreement. A discount on the initial \$2.8 million funding under the Loan and Security Agreement of \$2.3 million has been recognized as a reduction to the gain recognized on the sale. As a result of the transaction, we reduced our liabilities held in discontinued operations approximately \$10.9 million related to initial product warranty and reduced Other liabilities of our continuing operations of approximately \$22.0 million related to extended warranty service obligations as well as other assets and liabilities associated with the continuing grid-tied central solar inverter service and repair business. A \$14.8 million non-cash gain was recognized in Other income (expense), net from continuing operations and an \$8.6 million non-cash gain, net of tax expense of \$2.4 million, was recognized in Income from discontinued operations.

Discontinued Operations

In December 2015, we completed the wind down of engineering, manufacturing and sales of our solar inverter product line (the “inverter business”). Accordingly, the results of our inverter business have been reflected as “Income (loss) from discontinued operations, net of income taxes” on our Consolidated Statements of Operations for all periods presented herein.

The effect of our sales of extended inverter warranties to our customers continues to be reflected in deferred revenue in our Consolidated Balance Sheets. Deferred revenue for extended inverter warranties and the associated costs of warranty service will be reflected in Sales and Cost of goods sold, respectively, from continuing operations in future

ADVANCED ENERGY INDUSTRIES, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS – (continued)
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periods in our Consolidated Statement of Operations, as the deferred revenue, is earned and the associated services are rendered. Extended warranties related to the inverter product line are no longer offered.

The significant items included in "Income (loss) from discontinued operations, net of income taxes" are as follows:

	Years Ended December 31,	
	2019	2018
Sales	\$ —	\$ —
Cost of sales	(901)	(88)
Total operating expense	1,022	96
Operating income (loss) from discontinued operations	(121)	(8)
Other income (expense)	10,895	(24)
Income (loss) from discontinued operations before income taxes	10,774	(32)
Provision (benefit) for income taxes	2,294	6
Income (loss) from discontinued operations, net of income taxes	<u>\$ 8,480</u>	<u>\$ (38)</u>

Assets and Liabilities of discontinued operations within the Consolidated Balance Sheets are comprised of the following:

	December 31,	
	2019	2018
Cash and cash equivalents	\$ —	\$ 5,251
Accounts and other receivables, net	—	406
Inventories	30	198
Current assets of discontinued operations	30	5,855
Other assets	—	67
Deferred income tax assets	269	5,917
Non-current assets of discontinued operations	269	5,984
Accounts payable and other accrued expenses	—	350
Accrued warranty	914	4,936
Current liabilities of discontinued operations	914	5,286
Accrued warranty	698	10,429
Other liabilities	189	286
Non-current liabilities of discontinued operations	<u>\$ 887</u>	<u>\$ 10,715</u>

NOTE 5. INCOME TAXES

The geographic distribution of pretax income from continuing operations is as follows:

	Years Ended December 31,		
	2019	2018	2017
Domestic	\$ (20,597)	\$ 22,325	\$ 29,088
Foreign	87,791	150,051	169,103
	<u>\$ 67,194</u>	<u>\$ 172,376</u>	<u>\$ 198,191</u>

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS – (continued)
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The provision for income taxes from continuing operations is summarized as follows:

	Years Ended December 31,		
	2019	2018	2017
Current:			
Federal	\$ (9,627)	\$ 1,423	\$ 26,550
State	882	12	601
Foreign	18,429	13,772	9,621
Total current provision	<u>\$ 9,684</u>	<u>\$ 15,207</u>	<u>\$ 36,772</u>
Deferred:			
Federal	\$ 3,822	\$ 4,021	\$ 28,297
State	(178)	2,363	(1,000)
Foreign	(2,629)	3,636	(1,979)
Total deferred provision	<u>1,015</u>	<u>10,020</u>	<u>25,318</u>
Total provision for income taxes	<u>\$ 10,699</u>	<u>\$ 25,227</u>	<u>\$ 62,090</u>

The Company's effective tax rates differ from the U.S. federal statutory rate of 21% for the years ended December 31, 2019 and December 31, 2018, primarily due to the benefit of tax credits and earnings in foreign jurisdictions which are subject to lower tax rates, offset by additional GILTI tax in the US and withholding taxes.

The Company's effective tax rate differs from the U.S. federal statutory rate of 35% for the year ended December 31, 2017, primarily due to the benefit related to the wind down of our solar inverter business and earnings in foreign jurisdictions, which are subject to lower tax rates, offset by the impact of U.S. tax reform. The principal causes of the difference between the federal statutory rate and the effective income tax rate for each the years below are as follows:

	Years Ended December 31,		
	2019	2018	2017
Income taxes per federal statutory rate	\$ 14,111	\$ 36,199	\$ 69,348
State income taxes, net of federal deduction	10	2,372	1,794
Transition tax - U.S. Tax Reform	—	1,174	61,690
Corporate tax rate changes - U.S. Tax Reform	—	(652)	11,177
Tax benefit associated with inverter business wind down	—	—	(33,837)
Stock based compensation	(97)	(974)	(5,263)
GILTI Tax	8,796	13,064	—
Tax effect of foreign operations	(13,086)	(19,162)	(47,482)
Uncertain tax position	(4,487)	(3,088)	4,948
Unremitted earnings	1,624	2,564	—
Tax credits	(6,280)	(9,844)	(658)
Change in valuation allowance	7,222	(1,306)	841
Withholding taxes	6,500	1,371	—
Other permanent items, net	(3,614)	3,509	(468)
Total provision for income taxes	<u>\$ 10,699</u>	<u>\$ 25,227</u>	<u>\$ 62,090</u>

ADVANCED ENERGY INDUSTRIES, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS – (continued)
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Deferred tax assets and liabilities are recognized for the future tax consequences of differences between the carrying amounts of assets and liabilities and their respective tax bases using enacted tax rates in effect for the year in which the differences are expected to be reversed. Significant deferred tax assets and liabilities consist of the following:

	Years Ended December 31,	
	2019	2018
Deferred tax assets		
Stock based compensation	\$ 1,757	\$ 1,337
Net operating loss and tax credit carryforwards	86,879	38,622
Interest expense limitation	7,620	—
Pension obligation	13,473	3,302
Excess and obsolete inventory	3,217	2,161
Deferred revenue	3,305	6,903
Employee bonuses and commissions	2,537	1,874
Depreciation and amortization	29,015	29,525
Operating lease liabilities	23,451	—
Other	9,685	9,961
Deferred tax assets	<u>180,939</u>	<u>93,685</u>
Less: Valuation allowance	(76,206)	(30,924)
Net deferred tax assets	<u>104,733</u>	<u>62,761</u>
Deferred tax liabilities		
Depreciation and amortization	41,549	17,723
Unremitted earnings	4,740	3,529
Operating lease right-of-use assets	22,774	—
Other	2,966	1,267
Deferred tax liabilities	<u>72,029</u>	<u>22,519</u>
Net deferred tax assets	<u>\$ 32,704</u>	<u>\$ 40,242</u>

Of the \$32.7 million and \$40.2 million net deferred tax asset at December 31, 2019 and 2018, respectively, \$42.7 million and \$47.1 million is reflected as a net non-current deferred tax asset and \$10.0 million and \$7.0 million is reflected as a long-term liability at December 31, 2019 and 2018, respectively.

As of December 31, 2019, the Company has recorded a valuation allowance on \$16.0 million of its U.S. domestic deferred tax assets, largely attributable to acquired federal capital loss carryforwards for which the Company does not have sufficient income in the character to realize that attribute, and state carryforward attributes that are expected to expire before sufficient income can be realized in those jurisdictions. The remaining valuation allowance on deferred tax assets approximates \$60.2 million and is associated primarily with operations in Austria, Germany, Hong Kong and Switzerland. As of December 31, 2019, there is not sufficient positive evidence to conclude that such deferred tax assets, presently reduced by a valuation allowance, will be recognized. The December 31, 2019 valuation allowance balance reflects an increase of \$45.3 million during the year. The change in the valuation allowance is primarily due to increases from acquired Artesyn positions and current year activity, partially offset by decreases due to foreign exchange movements

As of December 31, 2019, the Company had U.S., foreign and state tax loss carryforwards of \$54.4 million, \$206.8 million, and \$146.2 million, respectively. Additionally, the Company had \$40.7 million and \$32.9 million of capital loss and interest expense limitation carryforwards, respectively. Finally, the Company had U.S. and state tax credit carryforwards of \$3.8 million and \$1.8 million, respectively. The U.S. and state net operating losses, tax credits, and interest expense limitation are subject to various utilization limitations under Section 382 of the Internal Revenue Code and applicable state laws. These Section 382 limited attributes have various expiration periods through 2036 or, in

ADVANCED ENERGY INDUSTRIES, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS – (continued)
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the case of the interest expense limitation amount, no expiration period. The majority of the foreign jurisdiction, and \$4.6 million of the federal net operating loss carry forwards, have no expiration period.

We operate under a tax holiday in one of our foreign jurisdictions. This tax holiday is in effect through June 30, 2027. The tax holiday is conditional upon our meeting certain employment and investment thresholds. The impact of the tax holiday decreased foreign taxes by \$4.0 million and \$17.8 million for 2019 and 2018, respectively. The benefit of the tax holiday on earnings per diluted share was \$0.12 and \$0.47 for 2019 and 2018, respectively.

In the third quarter of 2019, following a review of our operations, liquidity and funding, tax implications of cash repatriation, political risk, and investment opportunities, we determined that the ability to access certain amounts of foreign earnings that were previously indefinitely reinvested would provide greater investment returns, treasury controls, and other working capital needs if repatriated to the U.S. Accordingly, in the third quarter of 2019, we withdrew the permanent reinvestment assertion on \$123.9 million of earnings generated by certain of our operations through December 2018. Resulting from this change in permanent reinvestment assertion, the Company recorded a deferred tax liability of \$2.9 million related to withholding and state income taxes.

There is no certainty as to the timing of when such foreign earnings will be distributed to the United States in whole or in part.

Certain foreign subsidiary earnings are subject to U.S. taxation under the U.S. Tax Act, which also repeals U.S. taxation on the subsequent repatriation of those earnings. We have not provided for U.S. state or foreign income taxes on \$26.5 million of our subsidiaries' undistributed earnings as of December 31, 2019. The \$26.5 million of undistributed foreign earnings continue to be reinvested in our foreign operations, as we have determined that these earnings are necessary to support our planned growth and strategic acquisitions in our foreign operations, and as a result, these earnings remain indefinitely reinvested in those operations. In making this decision, we considered cash needs for investing in our existing businesses, currency controls, and the tax cost of cash repatriation. Determination of the amount of unrecognized deferred income tax liability related to these earnings is not practicable.

We account for uncertain tax positions by applying a minimum recognition threshold to tax positions before recognizing these positions in the financial statements. The reconciliation of our total gross unrecognized tax benefits is as follows:

	Years Ended December 31,		
	2019	2018	2017
Balance at beginning of period	\$ 13,162	\$ 15,990	\$ 11,401
Additions based on tax positions taken during a prior period	484	94	1,258
Additions based on tax positions taken during a prior period - acquisitions	4,479	757	—
Additions based on tax positions taken during the current period	—	—	4,433
Reductions based on tax positions taken during a prior period	(4,295)	(153)	—
Reductions related to a lapse of applicable statute of limitations	(821)	(3,144)	(1,102)
Reductions related to a settlement with taxing authorities	—	(382)	—
Balance at end of period	<u>\$ 13,009</u>	<u>\$ 13,162</u>	<u>\$ 15,990</u>

The unrecognized tax benefits of \$13.0 million, if recognized, will impact the Company's effective tax rate. In accordance with our accounting policy, we recognize accrued interest and penalties related to unrecognized tax benefits as a component of tax expense. We had \$3.0 million and \$1.2 million of accrued interest and penalties at December 31, 2019 and 2018, respectively. We expect the total amount of tax contingencies will decrease by approximately \$3.5 million in 2020 based on statute of limitation expiration.

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With few exceptions, the Company is no longer subject to federal, state or foreign income tax examinations by tax authorities for years before 2016.

NOTE 6. EARNINGS PER SHARE

Basic earnings per share (“EPS”) is computed by dividing income available to common stockholders by the weighted-average number of common shares outstanding during the period. The computation of diluted EPS is similar to the computation of basic EPS except that the denominator is increased to include the number of additional common shares that would have been outstanding (using the if-converted and treasury stock methods), if our outstanding stock options and restricted stock units had been converted to common shares, and if such assumed conversion is dilutive.

The following is a reconciliation of the weighted-average shares outstanding used in the calculation of basic and diluted earnings per share for the years ended December 31, 2019, 2018 and 2017:

	Years Ended December 31,		
	2019	2018	2017
Income from continuing operations	\$ 56,495	\$ 147,149	\$ 136,101
Income from continuing operations attributable to noncontrolling interest	34	86	—
Income from continuing operations attributable to Advanced Energy Industries, Inc.	<u>\$ 56,461</u>	<u>\$ 147,063</u>	<u>\$ 136,101</u>
Basic weighted-average common shares outstanding	38,281	39,081	39,754
Assumed exercise of dilutive stock options and restricted stock units	214	271	422
Diluted weighted-average common shares outstanding	<u>38,495</u>	<u>39,352</u>	<u>40,176</u>
Continuing operations:			
Basic earnings per share	\$ 1.47	\$ 3.76	\$ 3.42
Diluted earnings per share	\$ 1.47	\$ 3.74	\$ 3.39

The following stock options and restricted units were excluded in the computation of diluted earnings per share because they were anti-dilutive:

	Years Ended December 31,		
	2019	2018	2017
Restricted stock units	—	2	—

Share Repurchase

In September 2015, our Board of Directors authorized a program to repurchase up to \$150.0 million of our common stock over a thirty-month period. In November 2017, our Board of Directors approved an extension of the share repurchase program to December 2019 from its original maturity of March 2018. In May 2018, our Board of Directors approved a \$50 million increase in its authorization to repurchase shares of our common stock under this same program.

On December 18, 2019, the Board of Directors authorized to remove the expiration date to the Company’s share repurchase program and increase the authorized amount by \$25.1 million. As of December 31, 2019, the Company is authorized to repurchase shares of the Company’s common stock of up to a total of \$50.0 million.

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS – (continued)
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In order to execute the repurchase of shares of our common stock, the Company periodically enters into stock repurchase agreements. During the years ended December 31, 2019, 2018 and 2017 the Company has repurchased the following shares of common stock:

(in thousands, except per share amounts)	Years Ended December 31,		
	2019	2018	2017
Amount paid to repurchase shares	\$ —	\$ 95,125	\$ 29,993
Number of shares repurchased	—	1,696	422
Average repurchase price per share	\$ —	\$ 56.07	\$ 71.07

NOTE 7. MARKETABLE SECURITIES

As of December 31, 2019, and December 31, 2018, our marketable securities consisted of certificates of deposit and, due to their short-term nature, the fair value of these securities approximated their carrying values which were \$2.6 million and \$2.5 million at December 31, 2019 and 2018, respectively.

The maturities of our certificates of deposit as of December 31, 2019 ranged from March 18, 2020 to October 17, 2020.

The value and liquidity of the marketable securities we hold are affected by market conditions, as well as the ability of the issuers of such securities to make principal and interest payments when due, and the functioning of the markets in which these securities are traded. As of December 31, 2019, we do not believe any of the underlying issuers of our marketable securities are at risk of default.

NOTE 8. DERIVATIVE FINANCIAL INSTRUMENTS

We are impacted by changes in foreign currency exchange rates. We may manage these risks through the use of derivative financial instruments, primarily forward contracts with banks. During the years ended December 31, 2018 and 2017, we entered into foreign currency exchange forward contracts to manage the exchange rate risk associated with intercompany debt denominated in nonfunctional currencies. These derivative instruments are not designated as hedges; however, they do economically offset the fluctuations of our intercompany debt due to foreign exchange rate changes. These forward contracts are typically for one-month periods. We did not have any currency exchange rate forward contracts outstanding as of December 31, 2019 and 2018. At December 31, 2017, we had outstanding Euro and Pound Sterling forward contracts.

The notional amount of foreign currency exchange forward contracts outstanding at December 31, 2017 was \$16.3 million and the fair value of these contracts was not significant at December 31, 2017.

During the years ended December 31, 2019, 2018, and 2017, the gains and losses recorded related to the foreign currency exchange rate forward contracts are as follows:

	Years Ended December 31,		
	2019	2018	2017
Foreign currency loss from foreign currency exchange rate forward contracts	\$ —	\$ (750)	\$ (1,438)

These gains and losses were offset by corresponding foreign currency gains and losses on the related intercompany debt and both are included as a component of Other income (expense), net, in our Consolidated Statements of Operations.

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS – (continued)
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During the first quarter of 2017, we entered into a foreign currency exchange rate forward contract at a cost of \$3.5 million, to mitigate the exchange rate risk associated with a planned offshore acquisition which was not consummated. The hedge expired upon maturity in the first quarter of 2017. The cost of the forward contract is recorded as a component of Other income (expense), net in our Consolidated Statement of Operations.

NOTE 9. ACCOUNTS AND OTHER RECEIVABLE

Accounts and other receivable are recorded at net realizable value. Components of accounts and other receivable, net of reserves, are as follows:

	<u>December 31,</u> <u>2019</u>	<u>December 31,</u> <u>2018</u>
Amounts billed, net	\$ 227,528	\$ 80,709
Unbilled receivables	19,036	19,733
Total receivables, net	<u>\$ 246,564</u>	<u>\$ 100,442</u>

Amounts billed, net consist of amounts that have been invoiced to our customers in accordance with terms and conditions, and are shown net of an allowance for doubtful accounts. These receivables are all short term in nature and do not include any financing components.

Unbilled receivables consist of amounts where we have satisfied our contractual obligations related to inventory stocking contracts with customers. Such amounts are typically invoiced to the customer upon their consumption of the inventory managed under the stocking contracts. We anticipate that substantially all unbilled receivables will be invoiced and collected over the next twelve months. These contracts do not include any financing components.

NOTE 10. INVENTORIES

Our inventories are valued at the lower of cost or net realizable value and computed on a first-in, first-out (FIFO) basis. Components of inventories are as follows:

	<u>December 31,</u>	
	<u>2019</u>	<u>2018</u>
Parts and raw materials	\$ 134,816	\$ 76,647
Work in process	10,269	6,644
Finished goods	84,934	14,696
Total	<u>\$ 230,019</u>	<u>\$ 97,987</u>

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS – (continued)
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NOTE 11. PROPERTY AND EQUIPMENT, NET

Property and equipment, net is comprised of the following:

	December 31,	
	2019	2018
Buildings and land	\$ 1,693	\$ 1,737
Machinery and equipment	108,945	41,330
Computer and communication equipment	29,106	24,051
Furniture and fixtures	4,119	3,203
Vehicles	262	282
Leasehold improvements	33,041	20,593
Construction in process	9,089	867
	<u>186,255</u>	<u>92,063</u>
Less: Accumulated depreciation	(78,146)	(60,794)
Property and equipment, net	<u>\$ 108,109</u>	<u>\$ 31,269</u>

Depreciation expense is recorded in continuing operations and allocated within Cost of Sales, Research and development expense and Selling, general and administrative expense in our Consolidated Statements of Operations as follows:

	Years Ended December 31,		
	2019	2018	2017
Depreciation expense	\$ 13,979	\$ 7,818	\$ 5,074

NOTE 12. GOODWILL

The following summarizes the changes in goodwill during the years ended December 31, 2019 and 2018:

December 31, 2017	\$ 53,812
Measurement period adjustments to preliminary purchase price allocation	—
Additions from acquisition	49,252
Foreign currency translation	(1,164)
December 31, 2018	101,900
Measurement period adjustments to preliminary purchase price allocation	(41,996)
Additions from acquisition	143,262
Foreign currency translation	(234)
December 31, 2019	\$ 202,932

Adjustments are the result of finalizing the LumaSense acquisition purchase price allocation along with measurement period adjustments to the purchase price allocation from the Artesyn acquisition with the residual adjustments getting recorded to goodwill.

Additions are the result of our acquisition of Artesyn during the year ended December 31, 2019 and our acquisitions of LumaSense, Trek and Monroe's electrostatic technology and product line during the year ended December 31, 2018, as described in *Note 2. Business Acquisitions*.

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NOTE 13. INTANGIBLE ASSETS

Intangible assets consisted of the following as of December 31, 2019 and 2018:

December 31, 2019	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount
Technology	\$ 83,368	\$ (14,250)	\$ 69,118
Customer relationships	108,995	(18,197)	90,798
Trademarks and other	26,888	(2,793)	24,095
Total	<u>\$ 219,251</u>	<u>\$ (35,240)</u>	<u>\$ 184,011</u>

December 31, 2018	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount
Technology	\$ 39,879	\$ (7,927)	\$ 31,952
Customer relationships	35,509	(13,484)	22,025
Trademarks and other	2,501	(1,568)	933
Total	<u>\$ 77,889</u>	<u>\$ (22,979)</u>	<u>\$ 54,910</u>

At December 31, 2019, the weighted average remaining useful life of intangibles subject to amortization was approximately 11.2 years.

Amortization expense related to intangible assets is as follows:

	Years Ended December 31,		
	2019	2018	2017
Amortization expense	\$ 12,168	\$ 5,774	\$ 4,350

Estimated amortization expense related to intangibles is as follows:

Year Ending December 31,	
2020	\$ 20,109
2021	20,009
2022	19,745
2023	19,727
2024	16,888
Thereafter	87,533
Total	<u>\$ 184,011</u>

NOTE 14. RESTRUCTURING COSTS

During the year ended December 31, 2019, we recorded a total pre-tax charge of \$5.0 million for severance and facility relocation associated with our manufacturing footprint consolidation and optimization, acquisition integration, and reorganization for business efficiency improvement. For the year ended December 31, 2018, we recorded total severance and related costs of \$4.2 million. The cumulative costs recognized under this restructuring plan are \$9.3 million.

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The table below summarizes the restructuring charges for the years ended:

	2019	2018	Cumulative Cost Through December 31, 2019
Severance and related charges	\$ 3,041	\$ 4,239	\$ 7,280
Facility relocation and closure charges	1,996	—	1,996
Total restructuring charges	<u>\$ 5,038</u>	<u>\$ 4,239</u>	<u>\$ 9,277</u>

The following table summarizes our restructuring liabilities at December 31, 2019:

	Balance at December 31, 2018	Cost Incurred and Charged to Expense	Cost Paid or Otherwise Settled	Effect of Changes in Exchange Rates	Balance at December 31, 2019
Total restructuring liabilities	<u>\$ 3,806</u>	<u>\$ 5,038</u>	<u>\$ (6,673)</u>	<u>\$ 1</u>	<u>\$ 2,172</u>

NOTE 15. WARRANTIES

Provisions of our sales agreements include customary product warranties, ranging from 12 months to 24 months following installation. The estimated cost of our warranty obligation is recorded when revenue is recognized and is based upon our historical experience by product, configuration and geographic region.

Our estimated warranty obligation is included in Other accrued expenses in our Consolidated Balance Sheets. Changes in our product warranty obligation are as follows:

	Years Ended December 31,		
	2019	2018	2017
Balances at beginning of period	\$ 2,084	\$ 2,312	\$ 2,329
Warranty acquired in business combinations	4,818	305	118
Increases to accruals	1,752	1,606	2,029
Warranty expenditures	(2,249)	(2,127)	(2,184)
Effect of changes in exchange rates	8	(12)	20
Balances at end of period	<u>\$ 6,413</u>	<u>\$ 2,084</u>	<u>\$ 2,312</u>

NOTE 16. LEASES

The Company adopted authoritative guidance related to leases effective January 1, 2019 using the modified retrospective method. The comparative information presented in the Consolidated Financial Statements was not restated and is reported under the accounting standards in effect for the periods presented. See the section Leases in *Note 1. Operations and Summary of Significant Accounting Policies and Estimates* for a discussion of the significant changes resulting from adoption of the guidance.

The Company's leases consist primarily of manufacturing and office space under non-cancelable operating leases expiring at various dates through 2033. Leases with an original term of twelve months or less are not reported in the Consolidated Balance Sheet; expense for these short-term leases is recognized on a straight-line basis over the lease term. Most leases include one or more options to renew. The exercise of these renewal options is at the Company's

ADVANCED ENERGY INDUSTRIES, INC.
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discretion. We regularly evaluate the renewal options and when they are reasonably certain of exercise, we include the renewal period in the lease term, the right-of-use assets and lease liabilities.

Due to the Company's centralized treasury function, the Company utilizes a portfolio approach to discount its lease obligations. The Company assesses the expected lease term at lease inception and discounts the lease using a fully secured annual incremental borrowing rate, adjusted for time value corresponding with the expected lease term.

New leases are negotiated and executed to meet business objectives on an on-going basis. During the first fiscal quarter of 2020, we expect to record additional right of use assets and related liabilities for facilities in Fort Collins, Colorado, USA. The lease extensions in Fort Collins, Colorado commenced in January 2020 and extended the expected lease terms to 16 years; the right of use asset and operating lease liability recorded at commencement will be \$21.8 million.

Components of operating lease cost were as follows:

	Year Ended December 31, 2019
Operating lease cost	\$ 11,052
Short-term and variable lease cost	4,726
Total operating lease cost	<u>\$ 15,778</u>

Maturities of our lease liabilities for all operating leases at December 31, 2019 are as follows:

Year Ending December 31,	
2020	\$ 22,351
2021	19,771
2022	13,503
2023	10,786
2024	9,601
Thereafter	56,355
Total lease payments	132,367
Less: Interest	(23,517)
Present value of lease liabilities	<u>\$ 108,850</u>

Other information related to leases, including supplemental cash flow information, consists of:

	Year Ended December 31, 2019
Weighted average remaining lease term (in years)	7.50
Weighted average discount rate	4.05 %
Cash paid for operating leases	\$ 12,101
Right-of-use assets obtained in exchange for operating lease liabilities ⁽¹⁾	\$ 84,551

(1) Included in 2019 are the right-of-use assets of \$60.1 million obtained in connection with the acquisition of Artesyn in September 2019. See *Note 2. Business Combinations* for more details.

ADVANCED ENERGY INDUSTRIES, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS – (continued)
(in thousands, except per share amounts)

Comparative Information as Reported Under Previous Accounting Standards

The following comparative information is reported based upon previous accounting standards in effect for the periods presented.

Future minimum lease payments under operating leases were:

Year Ending December 31,		
2019	\$	9,093
2020		7,561
2021		6,938
2022		3,862
2023		3,448
Thereafter		18,349
Total lease payments	\$	49,251

Rent expense for operating leases was approximately \$7.4 million and \$6.5 million during the years ended December 31, 2018 and 2017, respectively.

NOTE 17. EMPLOYEE RETIREMENT PLANS AND POSTRETIREMENT BENEFITS

Defined Contribution Plans

We have a 401(k) profit-sharing and retirement savings plan covering substantially all full-time U.S. employees. Participants may defer up to the maximum amount allowed as determined by law. Participants are immediately vested in their contributions. Profit-sharing contributions to the plan, which are discretionary, are approved by the Board of Directors. Vesting in the profit-sharing contribution account is based on years of service, with most participants fully vested after four years of credited service. For the years ended December 31, 2019, 2018, and 2017 our contribution for participants in our 401(k) plan was based on matching 50% of contributions made by employees up to 6% of the employee's compensation.

During the years ended December 31, 2019, 2018, and 2017 we recognized total defined contribution plan costs of \$1.6 million, \$1.4 million, and \$1.1 million, respectively.

Defined Benefit Plan

We maintain defined benefit pension plans for certain of our non-U.S. employees in the U.K., Germany, and Philippines. Each plan is managed locally and in accordance with respective local laws and regulations.

In order to measure the expense and related benefit obligation, various assumptions are made including discount rates used to value the obligation, expected return on plan assets used to fund these expenses and estimated future inflation rates. These assumptions are based on historical experience as well as facts and circumstances. An actuarial analysis is used to measure the expense and liability associated with pension benefits.

In connection with the acquisition of Artesyn in September of 2019, the Company acquired certain pension plans and, as a result, started including the related balances in its Consolidated Balance Sheets at December 31, 2019 and the expenses attributable to these plans for the period from September 10, 2019 to December 31, 2019 in its Consolidated Statement of Operations. See *Note 2. Business Acquisitions* for more details on this transaction.

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ADVANCED ENERGY INDUSTRIES, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS – (continued)
(in thousands, except per share amounts)

The information provided below includes one pension plan which is part of discontinued operations. As such, all related liabilities and expenses are reported in discontinued operations in the Company's Consolidated Balance Sheets and Consolidated Statements of Operations for all periods presented.

The Company's projected benefit obligation and plan assets for defined benefit pension plans at December 31, 2019 and 2018 and the related assumptions used to determine the related liabilities are as follows:

	<u>Years Ended December 31,</u>	
	<u>2019</u>	<u>2018</u>
Projected benefit obligation, beginning of year	\$ 33,178	\$ 34,498
Acquisition	48,350	1,063
Service cost	272	841
Interest cost	1,211	802
Actuarial loss	(193)	(988)
Benefits paid	(1,779)	(1,113)
Translation adjustment	2,223	(1,925)
Projected benefit obligation, end of year	<u>\$ 83,262</u>	<u>\$ 33,178</u>
Fair value of plan assets, beginning of year	\$ 13,433	\$ 14,181
Acquisitions	102	981
Actual return on plan assets	380	675
Contributions	644	828
Benefits paid	(1,176)	(1,086)
Actuarial gain	1,064	(1,357)
Translation adjustment	456	(789)
Fair value of plan assets, end of year	<u>\$ 14,903</u>	<u>\$ 13,433</u>
Funded status of plan	<u>\$ (68,359)</u>	<u>\$ (19,745)</u>

The components of net periodic pension benefit cost recognized in our Consolidated Statements of Operations for the periods presented are as follows:

	<u>Years Ended December 31,</u>		
	<u>2019</u>	<u>2018</u>	<u>2017</u>
Service cost	\$ 272	\$ 841	\$ —
Interest cost	1,211	802	809
Expected return on plan assets	(615)	(665)	(597)
Amortization of actuarial gains and losses	411	478	503
Net periodic pension cost	<u>\$ 1,279</u>	<u>\$ 1,456</u>	<u>\$ 715</u>

Assumptions used in the determination of the net periodic pension cost are:

	<u>Years Ended December 31,</u>		
	<u>2019</u>	<u>2018</u>	<u>2017</u>
Discount rate	2.7 %	2.8 %	2.6 %
Expected long-term return on plan assets	4.6 %	4.8 %	4.8 %

ADVANCED ENERGY INDUSTRIES, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS – (continued)
(in thousands, except per share amounts)

The fair value of the Company’s qualified pension plan assets by category for the years ended December 31, are as follows:

	December 31, 2019			
	Level 1	Level 2	Level 3	Total
Multi-Asset Fund	\$ —	\$ 4,825	\$ —	\$ 4,825
Diversified Growth Fund	—	4,855	—	4,855
Index-Linked Gilts	—	1,934	—	1,934
Corporate Bonds	—	2,090	—	2,090
Insurance Contracts	—	—	1,045	1,045
Cash	154	—	—	154
Total	\$ 154	\$ 13,704	\$ 1,045	\$ 14,903

	December 31, 2018			
	Level 1	Level 2	Level 3	Total
Multi-Asset Fund	\$ —	\$ 4,570	\$ —	\$ 4,570
Diversified Growth Fund	—	4,650	—	4,650
Index-Linked Gilts	—	2,044	—	2,044
Corporate Bonds	—	2,044	—	2,044
Insurance Contracts	—	—	72	72
Cash	53	—	—	53
Total	\$ 53	\$ 13,308	\$ 72	\$ 13,433

At December 31, 2019 our plan’s assets of \$14.9 million were invested in five separate funds including a multi-asset fund (32.4%), a diversified growth fund (32.6%), an index-linked gilt (13.0%), corporate bonds (14.0%), and insurance contracts (7%). The asset and growth funds aim to generate an ‘equity-like’ return over an economic cycle with significantly reduced volatility relative to equity markets and have scope to use a diverse range of asset classes, including equities, bonds, cash and alternatives, e.g. property, infrastructure, high yield bonds, floating rate debt, private, equity, hedge funds and currency. The bond fund and gilt fund are invested in index-linked gilts and corporate bonds. These investments are intended to provide a degree of protection against changes in the value of our plan’s liabilities related to changes in long-term expectations for interest rates and inflation expectations.

Expected future payments under defined benefit pension plans, based on foreign exchange rates as of December 31, 2019, are as follows:

Expected Future Benefit Payments

2020	\$ 6,113
2021	7,039
2022	5,673
2023	5,716
2024	14,487
Thereafter	134,802

ADVANCED ENERGY INDUSTRIES, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS – (continued)
(in thousands, except per share amounts)

NOTE 18. STOCK-BASED COMPENSATION

As of December 31, 2019, we had two active stock-based incentive compensation plans: the 2017 Omnibus Incentive Plan and the Employee Stock Purchase Plan ("ESPP"). All new equity compensation grants are issued under these two plans; however, outstanding awards previously issued under inactive plans will continue to vest and remain exercisable in accordance with the terms of the respective plans. Our stock plans are administered by the Board of Directors Compensation Committee. At December 31, 2019, there were 3.3 million shares reserved and 2.5 million shares available for future grant under our stock-based incentive plans.

On May 4, 2017, the stockholders approved the Company's 2017 Omnibus Incentive Plan ("the 2017 Plan") and reserved 5.2 million shares under the plan. The 2017 Plan replaced the 2008 Omnibus Incentive Plan ("the 2008 Plan"), and all awards previously granted under the 2008 Plan continue to vest and/or are exercisable under the 2017 Plan in accordance with their original terms and conditions. The 2017 Plan and 2008 Plan provide for the grant of stock options, stock appreciation rights, restricted stock, stock units (including deferred stock units), unrestricted stock, and dividend equivalent rights. Additionally, awards issued may be issued as performance-based awards to align stock compensation awards to the attainment of annual or long-term performance goals. As of December 31, 2019, there were 2.3 million shares available for grant under the 2017 Plan.

The Company grants restricted stock units and performance stock units. The grant date fair values of restricted stock units and performance stock units are based on the closing market price of our common stock on the grant date. Our restricted stock units vest based on continued service. Our performance stock units vest based on achievement of certain performance goals and certification of performance achievement by the Compensation Committee of the Board of Directors. Stock-based compensation expense, net of forfeitures, is recognized on a straight-line basis over the requisite service period. For performance stock units, compensation expense is updated for the Company's expected performance level against performance goals at the end of each reporting period, which involves judgment as to achievement of certain performance metrics.

Stock-based Compensation Expense

We recognize stock-based compensation expense based on the fair value of the awards issued and the functional area of the employee receiving the award. Stock-based compensation for the three years ended December 31 is as follows:

	<u>Years Ended December 31,</u>		
	<u>2019</u>	<u>2018</u>	<u>2017</u>
Stock-based compensation expense	\$ 7,327	\$ 9,703	\$ 12,549

Our stock-based compensation expense is based on the value of the portion of share-based payment awards that are ultimately expected to vest, assuming estimated forfeitures at the time of grant. Estimated forfeiture rates for our stock-based compensation expense applicable to stock options and restricted stock units ("RSU's") was approximately 10%, 10% and 17% for the years ended December 31, 2019, 2018 and 2017, respectively.

ADVANCED ENERGY INDUSTRIES, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS – (continued)
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Restricted Stock Units

The fair value of our Restricted Stock Units ("RSUs") is determined based upon the closing fair market value of our common stock on the grant date. Changes in the unvested RSU's during the years ended December 31, 2019, 2018 and 2017 were as follows:

	2019		2018		2017	
	Shares	Weighted-Average Grant Value	Shares	Weighted-Average Grant Value	Shares	Weighted-Average Grant Value
RSUs outstanding at beginning of period	352	\$ 58.17	386	\$ 51.06	354	\$ 29.60
RSUs granted	380	52.24	245	64.48	252	63.63
RSUs vested	(155)	50.95	(207)	54.94	(211)	30.62
RSUs forfeited	(43)	51.82	(72)	50.79	(9)	33.91
RSUs outstanding at end of period	<u>534</u>	<u>\$ 56.56</u>	<u>352</u>	<u>\$ 58.17</u>	<u>386</u>	<u>\$ 51.06</u>

The total intrinsic value of RSUs converted to shares for the years ended December 31, 2019, 2018 and 2017 were \$8.3 million, \$13.6 million and \$14.8 million, respectively. As of December 31, 2019, there was \$5.9 million of total unrecognized compensation cost, net of expected forfeitures related to non-vested RSUs granted, which is expected to be recognized through fiscal November 2022, with a weighted-average remaining vesting period of 1.3 years.

Stock Options

Stock option awards are generally granted with an exercise price equal to the market price of our stock at the date of grant and with either a three or four-year vesting schedule or performance-based vesting as determined at the time of grant. Stock option awards generally have a term of 10 years.

The fair value of options granted during the year ended December 31, 2015 was estimated on the date of grant using the Black-Scholes-Merton option pricing model using the following assumptions: the risk-free interest rate was 1.1% - 1.4%, the expected term was 4.3 years and expected volatility was 43%. The risk-free interest rate was based on the five-year U.S. Treasury Bill at the time of the grant. We utilize our historical experience in determining the expected term of our stock options and volatility of our common stock. We have not historically issued dividends.

Changes in our outstanding stock options during the years ended December 31, 2019, 2018 and 2017 were as follows:

	2019		2018		2017	
	Shares	Weighted-Average Exercise Price	Shares	Weighted-Average Exercise Price	Shares	Weighted-Average Exercise Price
Options outstanding at beginning of period	230	\$ 20.73	317	\$ 18.97	474	\$ 17.47
Options exercised	(42)	17.73	(83)	14.41	(152)	14.32
Options forfeited	—	—	—	—	(2)	26.32
Options expired	(3)	9.91	(4)	11.97	(3)	11.09
Options outstanding at end of period	<u>185</u>	<u>\$ 21.56</u>	<u>230</u>	<u>\$ 20.73</u>	<u>317</u>	<u>\$ 18.97</u>
Options vested during the year	—		2		9	

ADVANCED ENERGY INDUSTRIES, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS – (continued)
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The total intrinsic value of options exercised for the years ended December 31, 2019, 2018 and 2017 was \$1.6 million, \$4.1 million and \$9.7 million, respectively. All options outstanding at December 31, 2019 are vested and have aggregate intrinsic value of \$9.2 million and weighted-average remaining contractual life of 4.1 years.

The following table summarizes information about the stock options outstanding at December 31, 2019:

Range of Exercise Prices	Options Outstanding			Options Exercisable	
	Number Outstanding	Weighted-Average Remaining Contractual Life	Weighted-Average Exercise Price	Number Exercisable	Weighted-Average Exercise Price
9.51 - 13.85	23	1.42 years	\$ 12.00	23	\$ 12.00
14.21 - 16.25	20	0.72 years	15.06	20	15.06
18.77 - 18.77	43	4.75 years	18.77	43	18.77
26.32 - 26.32	99	5.10 years	26.32	99	26.32
9.51 - 26.32	<u>185</u>	4.09 years	\$ 21.56	<u>185</u>	\$ 21.56

Employee Stock Purchase Plan

The ESPP, a stockholder-approved plan, provides for the issuance of rights to purchase up to 1,000,000 shares of common stock. In May 2010, stockholders approved an increase from 500,000 to 1,000,000 shares authorized for sale under our ESPP. Employees below the Vice President level are eligible to participate in the ESPP if employed by us for at least 20 hours per week during at least five months per calendar year. Participating employees may contribute up to the lesser of 15% of their eligible earnings or \$5,000 during each plan period. Currently, the plan period is six months. The purchase price of common stock purchased under the ESPP is currently equal to the lower of: 1) 85% of the fair market value of our common stock on the commencement date of each plan period or 2) 85% of the fair market value of our common shares on each plan period purchase date. At December 31, 2019, 0.2 million shares remained available for future issuance under the ESPP.

Purchase rights granted under the ESPP are valued using the Black-Scholes-Merton model. As of December 31, 2019, there was \$0.2 million of total unrecognized compensation cost related to the ESPP that is expected to be recognized over a remaining period of five months. Total compensation expense was \$0.5 million for the year ended December 31, 2019 and \$0.4 million for the year ended December 31, 2018, and \$0.2 million for the year ended December 31, 2017.

The fair value of each purchase right granted under the ESPP was estimated on the date of grant using the Black-Scholes-Merton option pricing model with the following assumptions:

	2019	2018	2017
Risk-free interest rates	1.62% - 2.31 %	2.10% - 2.56 %	1.07% - 1.45 %
Expected dividend yield rates	— %	— %	— %
Expected term	0.5 years	0.5 years	0.5 years
Expected volatility	41.3 %	38.0 %	33.3 %

The risk-free interest rate is based on the six-month U.S. Treasury Bill at the time of the grant. We utilize our historical experience in determining the expected term of our stock options and volatility of our common stock. We have not historically issued dividends.

ADVANCED ENERGY INDUSTRIES, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS – (continued)
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NOTE 19. COMMITMENTS AND CONTINGENCIES

Disputes and Legal Actions

We are involved in disputes and legal actions arising in the normal course of our business. While we currently believe that the amount of any ultimate loss would not be material to our financial position, the outcome of these actions is inherently difficult to predict. In the event of an adverse outcome, the ultimate loss could have a material adverse effect on our financial position or reported results of operations. An unfavorable decision in patent litigation also could require material changes in production processes and products or result in our inability to ship products or components found to have violated third-party patent rights. We accrue loss contingencies in connection with our commitments and contingencies, including litigation, when it is probable that a loss has occurred, and the amount of the loss can be reasonably estimated. The Company is currently not a party to any legal action that the Company believes would reasonably have a material adverse impact on its business, financial condition, results of operations or cash flows.

NOTE 20. RELATED PARTY TRANSACTIONS

Members of our Board of Directors hold various executive positions and serve as directors at other companies, including companies that are our customers. During the years ended December 31, 2019, 2018, and 2017, we engaged in the following transactions with companies related to members of our Board of Directors, as described below:

	Years Ended December 31,		
	2019	2018	2017
Sales to related parties	\$ 1,340	\$ 1,028	\$ 1,425
Number of related party customers	1	1	1

Our accounts receivable balance from related party customers with outstanding balances as of December 31, 2019 and December 31, 2018 is as follows:

	December 31,	December 31,
	2019	2018
Accounts receivable from related parties	\$ —	\$ 109
Number of related party customers	1	1

We did not have any outstanding accounts payable with our related parties as of December 31, 2019 or December 31, 2018.

NOTE 21. GEOGRAPHIC AND SIGNIFICANT CUSTOMER INFORMATION

The following table summarizes sales, and percentages of sales, by customers that individually accounted for 10% or more of our sales for the years ended December 31, 2019 and 2018:

	Years Ended December 31,			
	2019		2018	
Applied Materials, Inc.	\$ 164,724	20.9 %	\$ 258,027	35.9 %
LAM Research	88,251	11.2 %	109,005	15.2 %

ADVANCED ENERGY INDUSTRIES, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS – (continued)
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The following table summarizes the accounts receivable balances, and percentages of the total accounts receivable, for customers that individually accounted for 10% or more of accounts receivable as of December 31, 2019 and December 31, 2018:

	Years Ended December 31,			
	2019		2018	
Applied Materials, Inc.	\$ 36,849	14.9 %	\$ 34,301	34.2 %
Nidec Motor Corporation	38,071	15.4	*	* %
LAM Research	*	* %	12,181	12.1 %

* Customer's balance was less than 10% of the total accounts receivable balance.

Our sales to Applied Materials, Inc., LAM Research, and Nidec Corporation include precision power products used in semiconductor processing and solar and flat panel display. No other customer accounted for 10% or more of our sales or accounts receivable balances during these periods.

The following table summarizes long-lived assets by geographic area as of December 31, 2019 and December 31, 2018:

	December 31,	
	2019	2018
United States	\$ 239,511	\$ 115,869
Asia	301,020	12,274
Europe	59,925	59,936
Total	<u>\$ 600,456</u>	<u>\$ 188,079</u>

Long-lived assets include property and equipment, operating lease right-of-use assets, goodwill and other intangible assets.

NOTE 22. CREDIT FACILITY

In September 2019, in connection with the Artesyn Acquisition Agreement, the Company entered into a credit agreement ("Credit Agreement") that provided aggregate financing of \$500.0 million, consisting of a \$350.0 million senior unsecured term loan facility (the "Term Loan Facility") and a \$150.0 million senior unsecured revolving facility (the "Revolving Facility"). Both the Term Loan Facility and Revolving Facility mature on September 10, 2024.

The Revolving Facility and Term Loan Facility bear interest, at the option of the Company, at a rate based on a reserve adjusted Eurodollar Rate or a Base Rate, as defined in the Credit Agreement, plus an applicable margin. Additionally, the Revolving Facility is subject to an unused line fee. As of December 31, 2019, the effective interest rate for the Revolving Facility and Term Loan Facility was 2.55% and the effective rate for the unused line fee was 0.10%. As of December 31, 2019, the Company had \$150.0 million available to withdraw on the Revolving Facility and was in compliance with all covenants.

The fair value of the Company's outstanding debt approximates its carrying value of \$339.0 million as of December 31, 2019.

In connection with the entering into of the Credit Agreement, the Company terminated the Loan Agreement, as amended (the "Loan Agreement") which previously provided a revolving line of credit of up to \$150.0 million subject to certain funding conditions. The Company expensed all unused line of credit fees at the time of termination of the Loan Agreement.

ADVANCED ENERGY INDUSTRIES, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS – (continued)
(in thousands, except per share amounts)

As of December 31, 2019, the debt obligation on our Consolidated Balance Sheets consists of the following:

Debt:	<u>Amount</u>
Term Loan Facility	\$ 341,250
Less: debt issuance costs	(2,223)
Total debt	339,027
Less current portion of debt	(17,500)
Total long-term debt	<u>\$ 321,527</u>

Contractual maturities of the Company's debt obligations, excluding amortization of debt issuance costs, as of are as December 31, 2019 follows:

	<u>Amount</u>
2020	\$ 17,500
2021	17,500
2022	17,500
2023	17,500
2024	271,250
Total	<u>\$ 341,250</u>

Interest expense and unused line of credit fees were recorded in Other income (expense), net, in our Consolidated Statements of Operations as follows:

	<u>Years Ended December 31,</u>		
	<u>2019</u>	<u>2018</u>	<u>2017</u>
Interest expense	\$ 2,994	\$ —	\$ —
Amortization of debt issuance costs	186	—	—
Unused line of credit fees and other	236	228	66
Total interest expense	<u>\$ 3,416</u>	<u>\$ 228</u>	<u>\$ 66</u>

ADVANCED ENERGY INDUSTRIES, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS – (continued)
(in thousands, except per share amounts)

NOTE 23. SUPPLEMENTAL QUARTERLY FINANCIAL DATA (UNAUDITED)

The following tables present unaudited quarterly results for each of the eight quarters in the periods ended December 31, 2019 and 2018, in thousands. We believe that all necessary adjustments have been included in the amounts stated below to present fairly such quarterly information. Due to the volatility of the industries in which our customers operate, the operating results for any quarter are not necessarily indicative of results for any subsequent period.

	Quarter Ended			
	December 31, 2019	September 30, 2019	June 30, 2019	March 31, 2019
Sales, net	\$ 338,268	\$ 175,127	\$ 134,810	\$ 140,743
Gross Profit	\$ 112,295	\$ 73,491	\$ 64,126	\$ 65,740
Restructuring Expense	\$ 1,418	\$ 152	\$ 1,795	\$ 1,673
Operating income	\$ 22,202	\$ 9,390	\$ 11,005	\$ 11,791
Income from continuing operations, net of income taxes	\$ 10,479	\$ 7,256	\$ 23,373	\$ 15,387
Loss (income) from discontinued operations, net of income taxes	\$ (210)	\$ 375	\$ 8,324	\$ (9)
Net Income	\$ 10,269	\$ 7,631	\$ 31,697	\$ 15,378
Income from continuing operations attributable to noncontrolling interest	\$ 5	\$ 10	\$ 11	\$ 8
Net income attributable to Advanced Energy Industries, Inc.	\$ 10,264	\$ 7,621	\$ 31,686	\$ 15,370
Earnings (Loss) Per Share:				
Continuing Operations:				
Basic earnings per share	\$ 0.27	\$ 0.19	\$ 0.61	\$ 0.40
Diluted earnings per share	\$ 0.27	\$ 0.19	\$ 0.61	\$ 0.40
Discontinued Operations:				
Basic loss per share	\$ (0.01)	\$ 0.01	\$ 0.22	\$ —
Diluted loss per share	\$ (0.01)	\$ 0.01	\$ 0.22	\$ —
Net Income:				
Basic earnings per share	\$ 0.27	\$ 0.20	\$ 0.83	\$ 0.40
Diluted earnings per share	\$ 0.27	\$ 0.20	\$ 0.82	\$ 0.40

ADVANCED ENERGY INDUSTRIES, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS – (continued)
(in thousands, except per share amounts)

	Quarter Ended			
	December 31, 2018	September 30, 2018	June 30, 2018	March 31, 2018
Sales, net	\$ 154,161	\$ 173,082	\$ 196,032	\$ 195,617
Gross Profit	\$ 75,188	\$ 85,539	\$ 101,235	\$ 103,645
Restructuring Expense	\$ 3,836	\$ 403	\$ —	\$ —
Operating income	\$ 19,570	\$ 39,862	\$ 56,018	\$ 56,103
Income from continuing operations, net of income taxes	\$ 19,222	\$ 35,157	\$ 46,400	\$ 46,370
Income (loss) from discontinued operations, net of income taxes	\$ 188	\$ (371)	\$ 5	\$ 140
Net Income	\$ 19,410	\$ 34,786	\$ 46,405	\$ 46,510
Income from continuing operations attributable to noncontrolling interest	\$ 4	\$ 7	\$ 44	\$ 31
Net income attributable to Advanced Energy Industries, Inc.	\$ 19,406	\$ 34,779	\$ 46,361	\$ 46,479
Earnings (Loss) Per Share:	\$			
Continuing Operations:				
Basic earnings per share	\$ 0.50	\$ 0.90	\$ 1.18	\$ 1.17
Diluted earnings per share	\$ 0.50	\$ 0.90	\$ 1.17	\$ 1.16
Discontinued Operations:				
Basic loss per share	\$ —	\$ (0.01)	\$ —	\$ —
Diluted loss per share	\$ —	\$ (0.01)	\$ —	\$ —
Net Income:				
Basic earnings per share	\$ 0.51	\$ 0.89	\$ 1.18	\$ 1.17
Diluted earnings per share	\$ 0.50	\$ 0.89	\$ 1.17	\$ 1.16

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

On March 25, 2019, the Audit Committee (the "Audit Committee") of the Board of Directors (the "Board") of Advanced Energy Industries, Inc. (the "Company") dismissed Grant Thornton LLP ("Grant Thornton") as the Company's independent registered public accounting firm, effective immediately, and provided Grant Thornton with notice of such dismissal. During the Company's two most recent fiscal years ended December 31, 2018 and December 31, 2017, and during the subsequent interim period through March 25, 2019, (i) there were no disagreements (as that term is described in Item 304(a)(1)(iv) of Regulation S-K and the related instructions) with Grant Thornton on any matter of accounting principles or practices, financial statement disclosure or auditing scope or procedure, which disagreement(s), if not resolved to Grant Thornton's satisfaction, would have caused Grant Thornton to make reference to the subject matter of the disagreement(s) in connection with its reports, and (ii) there were no "reportable events" (as that term is defined in Item 304(a)(1)(v) of Regulation S-K).

On March 27, 2019, the Company engaged Ernst & Young LLP ("E&Y") as the Company's independent registered public accounting firm for the fiscal year ending December 31, 2019, which engagement was approved by the Audit Committee and effective on March 27, 2019.

ITEM 9A. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

We have established disclosure controls and procedures, which are designed to ensure that information required to be disclosed in reports filed or submitted under the Securities Exchange Act of 1934 (the "Act") is recorded, processed, summarized, and reported, within the time periods specified in the Securities and Exchange Commission's rules and forms. These disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed in the reports that we file or submit under the Act is accumulated and communicated to management, including our Principal Executive Officer (Yuval Wasserman, Chief Executive Officer) and Principal Financial Officer (Paul Oldham, Chief Financial Officer & Executive Vice President), as appropriate, to allow timely decisions regarding required disclosures.

As of the end of the period covered by this report, we conducted an evaluation, with the participation of management, including our Chief Executive Officer and Chief Financial Officer, of the effectiveness of the design and operation of the disclosure controls and procedures pursuant to the Exchange Act Rule 13a-15(b). Based upon this evaluation, the Chief Executive Officer and Chief Financial Officer concluded that our disclosure controls and procedures were effective as of December 31, 2019. The conclusions of the Chief Executive Officer and Chief Financial Officer from this evaluation were communicated to the Audit Committee. We intend to continue to review and document our disclosure controls and procedures, including our internal controls and procedures for financial reporting, and may from time to time make changes aimed at enhancing their effectiveness and to ensure that our systems evolve with our business.

Management's Annual Report on Internal Control over Financial Reporting

It is management's responsibility to establish and maintain effective internal control over our financial reporting, which is a process designed under the supervision of our Chief Executive Officer and Chief Financial Officer and effected by our Board of Directors, management, and other personnel. Our internal control over financial reporting is designed to provide reasonable assurance concerning the reliability of our financial reporting and the preparation of our financial statements for external purposes in accordance with generally accepted accounting principles.

In September 2019, we acquired Artesyn Embedded Technologies, Inc.'s Embedded Power business ("Artesyn"), as discussed in *Note 2. Business Acquisitions* in Item 8 "Financial Statements and Supplementary Data." The objectives of Artesyn established internal controls over financial reporting is consistent, in all material

respects, with Advanced Energy's objectives. We are in the process of completing a more comprehensive review of Artesyn's internal control over financial reporting and will be implementing changes to better align their reporting and controls with the rest of Advanced Energy. As a result of the timing of the acquisition and the changes that are anticipated to be made, and in accordance with the general guidance issued by the SEC regarding exclusion of certain acquired businesses, we have excluded Artesyn from the December 31, 2019 assessment of Advanced Energy's internal controls over financial reporting. Artesyn accounted for approximately 45% of Advanced Energy's total assets at December 31, 2019, and 28% of Advanced Energy's total net sales for the fiscal year ended December 31, 2019.

Management, with the participation of our Chief Executive Officer and Chief Financial Officer, evaluated the effectiveness of our internal control over financial reporting as of December 31, 2019, using the criteria described in *Internal Control-Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission. Based upon this evaluation, management concluded that our internal control over financial reporting was effective as of December 31, 2019.

Ernst & Young LLP, an independent registered public accounting firm, has audited our Consolidated Financial Statements included in this Form 10-K, and as part of the audit, has issued an attestation report, included herein, on the effectiveness of our internal control over financial reporting as of December 31, 2019.

Changes in Internal Control over Financial Reporting

There was no change in our internal control over financial reporting that occurred during 2019 that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

Limitations on Controls and Procedures

Management has concluded that our disclosure controls and procedures and internal control over financial reporting provide reasonable assurance that the objectives of our control system are met. We do not expect, however, that our disclosure controls and procedures or internal control over financial reporting will prevent or detect all misstatements, errors, or fraud, if any. All control systems, no matter how well designed and implemented, have inherent limitations, and therefore no evaluation can provide absolute assurance that every misstatement, error, or instance of fraud, if any, or risk thereof, has been or will be prevented or detected. The occurrence of a misstatement, error, or fraud, if any, would not necessarily require a conclusion that our controls and procedures are not effective.

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Stockholders and the Board of Directors of Advanced Energy Industries, Inc.

Opinion on Internal Control Over Financial Reporting

We have audited Advanced Energy Industries, Inc.'s internal control over financial reporting as of December 31, 2019, 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, Advanced Energy Industries, Inc. (the Company) maintained, in all material respects, effective internal control over financial reporting as of December 31, 2019, based on the COSO criteria.

As indicated in the accompanying Management's Annual Report on Internal Control over Financial Reporting, management's assessment of and conclusion on the effectiveness of internal control over financial reporting did not include the internal controls of Artesyn Embedded Technologies, Inc.'s Embedded Power business which was acquired during the year ended December 31, 2019, which are included in the 2019 consolidated financial statements of the Company and constituted 45% of total assets as of December 31, 2019 and 28% of sales for the year then ended. Our audit of internal control over financial reporting of the Company also did not include an evaluation of the internal control over financial reporting of this entity.

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We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheet of the Company as of December 31, 2019, the related consolidated statements of operations, comprehensive income, stockholders' equity and cash flows for the year ended December 31, 2019, and the related notes and our report dated March 2, 2020 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 Annual 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
Denver, Colorado
March 2, 2020

ITEM 9B. OTHER INFORMATION

In an effort to address volatility in the markets the Company serves, on March 2, 2020 the Compensation Committee recommended and the Board of Directors approved changes to the Short Term Incentive Plan ("2020 STI Plan") to (1) provide for two six-month performance periods (January 1 - June 30 and July 1 – December 31) instead of a fiscal year performance period (January 1 – December 31), (2) replace the operational cash flow target to a realized acquisition synergies target, (3) change the weighting of the three performance targets such that revenue, non-GAAP operating income from continuing operations and realized acquisition synergies would be weighted 40%, 40% and 20%, respectively and (4) the funding of the realized acquisition synergies amount is not dependent on meeting any other

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financial threshold. As with prior short-term incentive plans, threshold, target and stretch performance goals have an opportunity for a 50%, 100% and 200% payout.

Eligible participants in the 2020 STI Plan must continue to be employees on the payment date which is expected to be within 90 days after the end of the 2020 fiscal year. The eligible participants in the 2020 STI Plan include senior management and the named executive officers at their respective bonus percentage targets. Specifically, for the named executive officers, the President & Chief Executive Officer, the Executive Vice President & Chief Financial Officer, the Executive Vice President & Chief Operating Officer and the Executive Vice President & General Counsel have a target bonus opportunity under the 2020 STI Plan of 100%, 70%, 70% and 60% of their 2020 base salary, respectively.

PART III

In accordance with General Instruction G(3) of Form 10-K, certain information required by this Part III is incorporated by reference to the definitive proxy statement relating to our 2020 Annual Meeting of Stockholders (the “2020 Proxy Statement”), as set forth below. The 2020 Proxy Statement will be filed with the Securities and Exchange Commission within 120 days after the end of our fiscal year.

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

The information set forth in the 2020 Proxy Statement under the heading “Proposal No. 1/Election of Directors” is incorporated herein by reference.

The Company has adopted a Code of Ethical Conduct that applies to all of the Company’s employees, including the Company’s Chief Executive Officer and Chief Financial Officer and other persons performing similar functions. The Company has posted a copy of the Code of Ethical Conduct on its website at www.advancedenergy.com, and such Code of Ethical Conduct is available, in print, without charge, to any stockholder who requests it from the Company’s Secretary. The Company intends to satisfy the disclosure requirements under Item 5.05 of Form 8-K regarding amendments to, or waivers from, the Code of Ethical Conduct by posting such information on its website at www.advancedenergy.com. The Company is not including the information contained on its website as part of, or incorporating it by reference into, this report.

Executive Officers

Our executive officers, their positions and their ages as of December 31, 2019 were as follows:

Yuval Wasserman, 65, has served as President & Chief Executive Officer, and as a director of Advanced Energy since October 2014. Mr. Wasserman joined us in August 2007 as Senior Vice President, Sales, Marketing and Service. In October 2007, Mr. Wasserman was promoted to Executive Vice President, Sales, Marketing and Service. In April 2009, he was promoted to Executive Vice President and Chief Operating Officer of the Company, and then in August 2011, he was promoted to President of the Thin Films Business Unit. Mr. Wasserman was on the Board of Directors of Synchroness, Inc., an outsourced engineering and product development company, from 2010 to 2017 when it was sold, and joined the Board of Directors of FARO Technologies, Inc., a publicly traded manufacturer of three-dimensional (3D) measurement, imaging and realization systems, in December 2017. Mr. Wasserman is a National Association of Corporate Directors (NACD) Governance Fellow. Mr. Wasserman has a BSc degree in chemical engineering from Ben Gurion University in Israel.

Paul Oldham, 56, joined the Company in May 2018 as its Executive Vice President & Chief Financial Officer. Previously Mr. Oldham served as the Senior Vice President of Administration, Chief Financial Officer and Corporate Secretary of Electro Scientific Industries, Inc., a developer and manufacturer of laser-based production equipment (“ESI”), from February 17, 2016 until December 4, 2017, and as the Vice President of Administration, Chief Financial Officer and Corporate Secretary of ESI from January 7, 2008 until February 16, 2016. Prior to joining ESI, Mr. Oldham was employed at Tektronix, Inc., a test, measurement, and monitoring company, since 1988, where he held several senior leadership positions, including Vice President Finance and Corporate Controller, Vice President - Treasurer and

Investor Relations and European Operations Controller. Mr. Oldham has a bachelor's degree in Accounting and an MBA in accounting and finance from Brigham Young University.

Neil Brinker, 44, joined the Company in June 2018 as its Executive Vice President & Chief Operating Officer. Previously, Mr. Brinker served as the Group President of the IDEX Corporation ("IDEX"), from July 2015, and was Platform President of IDEX's Material Processing Technologies from May 2014 to July 2015 and General Manager of IDEX's Fluid Management business from April 2012 to May 2014. Prior to IDEX, Mr. Brinker was a Director of Global Operations at Danaher Corporation ("Danaher") from July 2009 to April 2012 and held several other operations management leadership positions at Danaher from February 2007 to July 2009. Prior to Danaher, Mr. Brinker held various management positions at General Motors Company from 2001 to 2007. Mr. Brinker holds a B.S.M.E. degree from Michigan State University, a Master of Engineering from the University of Michigan and an MBA from Eastern Michigan University.

Thomas O. McGimpsey, 58, joined the Company in April 2009 and serves as its Executive Vice President - General Counsel, Government Affairs & Corporate Secretary. Mr. McGimpsey was the interim Chief Financial Officer from January to May in 2018, the Corporate Development M&A Officer from 2011 to 2015 and he managed the IT Department from 2010 to 2013, all while serving as General Counsel. Prior to joining the Company, Mr. McGimpsey was a Vice President of Operations at First Data Corporation from February 2008 to April 2009. During 2007, Mr. McGimpsey was a consultant and legal advisor to various companies. Prior to that, Mr. McGimpsey was the Executive Vice President of Business Development & Chief Legal Officer for McDATA Corporation from July 2000 to January 2007 when the company was sold. From February 1998 until its sale in June 2000, Mr. McGimpsey held the position of Director and Senior Corporate Attorney at US WEST, Inc. From 1991 to 1998, Mr. McGimpsey was in private practice at national law firms. From 1984 to 1988, Mr. McGimpsey was a Senior Engineer for Software Technology, Inc. (a Harris company). Mr. McGimpsey has been on the Board of Directors of CPP, Inc., an international engineering services company, since August 2015 and has been a Commissioner on the Colorado Commission on Higher Education since July 2015. Mr. McGimpsey received his MBA (with distinction) from Colorado State University, his Juris Doctor degree from the University of Colorado and his B.S. degree in Computer Science from Embry-Riddle Aeronautical University. Mr. McGimpsey was a National Association of Corporate Directors (NACD) Board Leadership Fellow and is licensed to practice law in New York, Colorado, Florida and before the U.S. Supreme Court.

ITEM 11. EXECUTIVE COMPENSATION

The information set forth in the 2020 Proxy Statement under the headings "Executive Compensation" is incorporated herein by reference.

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

The information set forth in the 2020 Proxy Statement under the headings "Security Ownership of Certain Beneficial Owners and Management" and "Equity Compensation Plan Information" is incorporated herein by reference.

Securities Authorized for Issuance under Equity Compensation Plans

The following table summarizes information about the equity incentive compensation plans as of December 31, 2019. All outstanding awards in the table shown below relate to our common stock.

Plan Category	(A) Number of securities to be issued upon exercise of outstanding options, warrants and rights	(B) Weighted average exercise price of outstanding options, warrants and rights	(C) Number of securities remaining available for future issuance under equity compensation plans (excluding securities reflected in column A)
Equity compensation plans approved by security holders	185,084	21.56	2,543,919 ⁽¹⁾
Equity compensation plans not approved by security holders	—	—	—
Total	185,084	21.56	2,543,919

⁽¹⁾ This number includes 236,628 shares available for future issuance under the Employee Stock Purchase Plan.

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS

The information is set forth in *Note 20. Related Party Transactions* in Item 8 "Financial Statements and Supplementary Data," and in the 2020 Proxy Statement under the captions "Election of Directors" and "Certain Relationships and Related Transactions" is incorporated herein by reference.

ITEM 14. PRINCIPAL ACCOUNTING FEES AND SERVICES

The information set forth in the 2020 Proxy Statement under the caption "Ratification of the Appointment of Ernst & Young LLP as Advanced Energy's Independent Registered Public Accounting Firm for 2020" is incorporated herein by reference.

PART IV

ITEM 15. EXHIBITS AND FINANCIAL STATEMENT SCHEDULES

(A) Documents filed as part of this Annual Report on Form 10-K are as follows:

1. Financial Statements:

Report of Ernst & Young LLP as of and for the year ended December 31, 2019

Report of Grant Thornton LLP as of December 31, 2018 and for the years ended December 31, 2018 and 2017

Consolidated Balance Sheets at December 31, 2019 and 2018

Consolidated Statements of Operations for the years ended December 31, 2019, 2018 and 2017

Consolidated Statements of Comprehensive Income for the years ended December 31, 2019, 2018 and 2017

Consolidated Statements of Stockholders' Equity for the years ended December 31, 2019, 2018 and 2017

Consolidated Statements of Cash Flows for the years ended December 31, 2019, 2018 and 2017

Notes to Consolidated Financial Statements

2. Financial Statement Schedules for the years ended December 31, 2019, 2018 and 2017

NOTE: All schedules have been omitted because they are either not applicable or the required information is included in the financial statements and notes thereto.

(B) Exhibits:

- 2.1 [Agreement and Plan of Merger by and among Advanced Energy Industries, Inc., Eclipse Merger Sub, Inc., LumaSense Technologies Holdings, Inc., and Shareholder Representative Services LLC, dated July 26, 2018. \(14\)**](#)
- 2.2 [Stock Purchase Agreement by and among Advanced Energy Industries, Inc., Artesyn Embedded Technologies, Inc., Pontus Intermediate Holdings II, LLC and Pontus Holdings, LLC, dated May 14, 2019. \(18\)**](#)
- 2.3 [First Amendment to the Stock Purchase Agreement by and among Advanced Energy Industries, Inc., Artesyn Embedded Technologies, Inc., Pontus Intermediate Holdings II, LLC and Pontus Holdings, LLC, dated September 9, 2019. \(20\)**](#)
- 3.1 [Amended and Restated Certificate of Incorporation of Advanced Energy Industries, Inc. \(19\)](#)
- 3.2 [Amended and Restated By-Laws of Advanced Energy Industries, Inc. \(17\)](#)
- 4.1 Form of Specimen Certificate for Common Stock. (1)
- 4.2 [Description of Advanced Energy Industries, Inc. Securities.](#)

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- 10.1 [Lease dated January 16, 2003, by and between China Great Wall Computer Shenzhen Co., Ltd., Great Wall Limited and Advanced Energy Industries \(Shenzhen\) Co., Ltd., for a building located in Shenzhen, China. \(2\)](#)
- 10.2 Form of Indemnification Agreement. (1)
- 10.3 [Form of Director Indemnification Agreement. \(4\)](#)
- 10.4 [Form of Notice of Grant for Restricted Stock Unit. \(7\)*](#)
- 10.5 [Form of Restricted Stock Unit Agreement. \(7\)*](#)
- 10.6 [Form of Notice of Grant of Stock Option. \(7\)*](#)
- 10.7 [Form of Incentive Stock Option Agreement. \(7\)*](#)
- 10.8 [Form of Non-Qualified Stock Option Agreement. \(7\)*](#)
- 10.9 [Form of LTI Notice of Grant. \(7\)*](#)
- 10.10 [Form of LTI Performance Stock Option Agreement pursuant to the 2008 Omnibus Incentive Plan. \(7\)*](#)
- 10.11 [Form of LTI Performance Stock Unit Agreement pursuant to the 2008 Omnibus Incentive Plan. \(7\)*](#)
- 10.13 [Form of 2020 Short-Term Incentive Plan.*](#)
- 10.14 [2017 Long-Term Incentive \(LTI\) Plan. \(10\)*](#)
- 10.15 [2017 Short-Term Incentive \(STI\) Plan. \(11\)*](#)
- 10.16 [2017 Omnibus Incentive Plan. \(10\)*](#)
- 10.17 [2008 Omnibus Incentive Plan, as amended May 4, 2010. \(5\)*](#)
- 10.18 Employee Stock Purchase Plan. (1)*
- 10.19 [Offer Letter, dated September 28, 2014, by and among Advanced Energy Industries, Inc. and Yuval Wasserman. \(8\)*](#)
- 10.20 [Global Supply Agreement by and between Advanced Energy Industries, Inc. and Applied Materials Inc. dated August 29, 2005. \(3\)+](#)
- 10.21 [Shipping Amendment to the Global Supply Agreement by and between Advanced Energy Industries, Inc. and Applied Materials Inc. dated August 29, 2005. \(3\)+](#)
- 10.22 [Bridge Amendment to the Global Supply Agreement by and between Advanced Energy Industries, Inc. and Applied Materials Inc. dated January 28, 2011. \(6\)+](#)
- 10.23 [Fixed Dollar Accelerated Share Repurchase Transaction, dated November 6, 2015, between Advanced Energy Industries, Inc. and Morgan Stanley & Co. LLC. \(9\)](#)
- 10.24 [Offer Letter to Paul Oldham, dated March 26, 2018. \(12\)](#)
- 10.25 [Offer Letter to Neil Brinker, dated May 7, 2018. \(13\)](#)

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10.26	Form of Executive Change in Control & General Severance Agreement. (15)
10.27	Credit Agreement, dated September 10, 2019, by and among Advanced Energy Industries, Inc., Bank of America N.A. as the Administrative Agent, Bank of America N.A., Bank of the West and HSBC Bank USA, N.A. as the Joint Lead Arrangers and Joint Book Runners, and Citibank N.A., as the Co-Manager. (20)
16.1	Letter from Grant Thornton LLP. (16)
21.1	Subsidiaries of Advanced Energy Industries, Inc.
23.1	Consent of Grant Thornton LLP, Independent Registered Public Accounting Firm.
23.2	Consent of Ernst & Young LLP, Independent Registered Public Accounting Firm.
31.1	Certification of the Chief Executive Officer Pursuant to Rule 13a-14(a) under the Securities Exchange Act of 1934, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
31.2	Certification of the Principal Financial Officer Pursuant to Rule 13a-14(a) under the Securities Exchange Act of 1934, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
32.1	Certification of the Chief Executive Officer Pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
32.2	Certification of the Chief Financial Officer Pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
101.INS	XBRL Instance Document
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document
101.LAB	XBRL Taxonomy Extension Label Linkbase Document
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document
104	Cover Page Interactive Data File

Attached as Exhibit 101 to this report are the following materials from Advanced Energy, Inc.'s Annual Report on Form 10-K for the year ended December 31, 2019, formatted in iXBRL (Inline eXtensible Business Reporting Language): (i) the Consolidated Statements of Operations, (ii) the Consolidated Statements of Comprehensive Income (Loss), (iii) the Consolidated Balance Sheets, (iv) the Consolidated Statements of Cash Flows, (v) the Consolidated Statements of Stockholders' Equity, and (vi) the Notes to the Consolidated Financial Statements.

-
- (1) Incorporated by reference to the Registrant's Registration Statement on Form S-1 (File No. 33-97188), filed September 21, 1995.
 - (2) Incorporated by reference to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2003 (File No. 000-26966), filed February 24, 2004.
 - (3) Incorporated by reference to the Registrant's Quarterly Report on Form 10-Q for the quarter ended September 30, 2005 (File No. 000-26966), filed November 7, 2005.

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- (4) Incorporated by reference to the Registrant's Current Report on Form 8-K (File No. 000-26966), filed December 14, 2009.
- (5) Incorporated by reference to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2010 (File No. 000-26966), filed March 2, 2011.
- (6) Incorporated by reference to the Registrant's Quarterly Report on Form 10-Q for the quarter ended March 31, 2011 (File No. 000-26966), filed May 6, 2011.
- (7) Incorporated by reference to the Registrant's Current Report on Form 8-K (File No. 000-26966) filed May 10, 2013.
- (8) Incorporated by reference to the Registrant's Current Report on Form 8-K (File No. 000-26966) filed October 1, 2014.
- (9) Incorporated by reference to the Registrant's Current Report on Form 8-K (File No. 000-26966) filed November 6, 2015.
- (10) Incorporated by reference to Appendix A of the Registrant's Proxy Statement for the Registrant's 2017 Annual Meeting of Stockholders (File No. 000-26966), filed March 14, 2017.
- (11) Incorporated by reference to Appendix B of the Registrant's Proxy Statement for the Registrant's 2017 Annual Meeting of Stockholders (File No. 000-26966), filed March 14, 2017.
- (12) Incorporated by reference to the Registrant's Current Report on Form 8-K (File No. 000-26966), filed March 29, 2018.
- (13) Incorporated by reference to the Registrant's Current Report on Form 8-K (File No. 000-26966), filed May 9, 2018.
- (14) Incorporated by reference to the Registrant's Current Report on Form 8-K (File No. 000-26966), filed July 30, 2018.
- (15) Incorporated by reference to the Registrant's Current Report on Form 8-K (File No. 000-26966), filed August 6, 2018.
- (16) Incorporated by reference to the Registrant's Current Report on Form 8-K (File No. 000-26966), filed March 27, 2019.
- (17) Incorporated by reference to the Registrant's Quarterly Report on Form 10-Q for the quarter ended March 31, 2019 (File No. 000-26966), filed May 6, 2019.
- (18) Incorporated by reference to the Registrant's Current Report on Form 8-K (File No. 000-26966), filed May 15, 2019.
- (19) Incorporated by reference to the Registrant's Quarterly Report on Form 10-Q for the quarter ended June 30, 2019 (File No. 000-26966), filed August 5, 2019.
- (20) Incorporated by reference to the Registrant's Current Report on Form 8-K (File No. 000-26966), filed September 10, 2019.

* Compensation Plan

** Schedules have been omitted pursuant to Item 601(b)(2) of Regulation S-K. Advanced Energy Industries, Inc. undertakes to furnish supplemental copies of any of the omitted schedules upon request by the Securities and Exchange Commission.

+ Confidential treatment has been granted for portions of this agreement.

ITEM 16. FORM 10-K SUMMARY

None.

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SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this Annual Report on Form 10-K to be signed on its behalf by the undersigned, thereunto duly authorized.

ADVANCED ENERGY INDUSTRIES, INC.
(Registrant)

/s/ Yuval Wasserman
Yuval Wasserman
Chief Executive Officer

Date: March 2, 2020

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

<u>Signatures</u>	<u>Title</u>	<u>Date</u>
<u>/s/ Yuval Wasserman</u> Yuval Wasserman	Chief Executive Officer and Director (Principal Executive Officer)	March 2, 2020
<u>/s/ Paul Oldham</u> Paul Oldham	Chief Financial Officer & Executive Vice President (Principal Financial and Accounting Officer)	March 2, 2020
<u>/s/ Grant H. Beard</u> Grant H. Beard	Chairman of the Board	March 2, 2020
<u>/s/ Frederick A. Ball</u> Frederick A. Ball	Director	March 2, 2020
<u>/s/ Tina M. Donikowski</u> Tina M. Donikowski	Director	March 2, 2020
<u>/s/ Ronald C. Foster</u> Ronald C. Foster	Director	March 2, 2020
<u>/s/ Edward C. Grady</u> Edward C. Grady	Director	March 2, 2020
<u>/s/ Thomas M. Rohrs</u> Thomas M. Rohrs	Director	March 2, 2020
<u>/s/ John A. Roush</u> John A. Roush	Director	March 2, 2020

DESCRIPTION OF THE REGISTRANT'S SECURITIES
REGISTERED PURSUANT TO SECTION 12 OF THE
SECURITIES EXCHANGE ACT OF 1934

We are authorized to issue 70,000,000 shares of our common stock, \$0.001 par value per share, and 1,000,000 shares of preferred stock, \$0.001 par value per share. The following description of our common stock is a summary and does not purport to be complete. The description is subject to and qualified in its entirety by reference to our Amended and Restated Certificate of Incorporation, as amended through July 5, 2019 (our "Certificate of Incorporation"), our Amended and Restated By-Laws (our "By-Laws") and applicable Delaware law.

Common Stock

The holders of our common stock are entitled to one vote for each share held of record on all matters submitted to a vote of stockholders. Approval of a matter submitted to the stockholders generally requires the affirmative vote of a majority of the shares being voted on that matter. The General Corporation Law of the State of Delaware imposes a greater approval requirement on certain matters that may be submitted to stockholders, such as business combinations or the sale of all or substantially all of our assets. Amendments to our Certificate of Incorporation relating to the personal liability of our directors or relating to the requirements applicable to amending our Certificate of Incorporation require the approval of the holders of at least 66 2/3% of the then outstanding voting stock. Our By-Laws may be amended only with the approval of a majority of our board of directors or the holders of at least 66 2/3% of the then outstanding voting stock.

Subject to preferences that may be applicable to any outstanding shares of preferred stock that may be issued, the holders of our common stock are entitled to receive ratably any dividends that may be declared from time to time by the board of directors out of funds legally available for the payment of dividends. The holders of our common stock are entitled to share ratably in all assets remaining after payment of liabilities and liquidation preferences of any outstanding shares of preferred stock in the event of our liquidation, dissolution or winding up. Holders of our common stock have no preemptive rights or rights to convert their common stock into any other securities. There are no redemption or sinking fund provisions applicable to our common stock. All outstanding shares of our common stock are fully paid and non-assessable.

Our common stock is quoted on the Nasdaq Global Select Market under the symbol "AEIS." The transfer agent and registrar for our common stock is American Stock Transfer & Trust Company.

Preferred Stock

Our board of directors has the authority, without further action by the stockholders, to issue up to 1,000,000 shares of preferred stock, in one or more series, and to fix the rights, privileges and preferences of such shares of preferred stock. The rights, privileges and preferences of any series of preferred stock likely will be greater than the rights, privileges and preferences of the common stock. The issuance of preferred stock could adversely affect the voting power of the common

stock and reduce the likelihood that the common stockholders will receive dividends or payments upon liquidation of our company. An issuance of preferred stock also may have the effect of delaying, deterring or preventing a change in control of the company.

Anti-takeover Effects of Section 203 of the Delaware General Corporation Law

We are subject to Section 203 of the Delaware General Corporation Law, an anti-takeover law. In general, Section 203 prohibits a Delaware corporation from engaging in any business combination with an “interested stockholder” for a period of three years following the date that the stockholder became an interested stockholder, subject to specified exceptions.

Section 203 defines an “interested stockholder” as a person who, together with affiliates and associates, owns, or, in some cases, within three years prior, did own, 15% or more of the corporation’s voting stock. Section 203 does not prohibit a business combination with an interested stockholder, if:

- prior to that date, the board of directors of the corporation approved either the business combination or the transaction that resulted in the stockholder becoming an interested stockholder;
- upon consummation of the transaction that resulted in the stockholder becoming an interested stockholder, the interested stockholder owned at least 85% of the voting stock of the corporation outstanding at the time the transaction commenced, excluding for purposes of determining the number of shares of voting stock outstanding (but not the voting stock owned by the interested stockholder) those shares owned by persons who are directors and also officers and by excluding employee stock plans in which employee participants do not have the right to determine confidentially whether shares held subject to the plan will be tendered in a tender or exchange offer; or
- on or subsequent to that date, the business combination is approved by the board of directors of the corporation and authorized at an annual or special meeting of stockholders, and not by written consent, by the affirmative vote of at least 66 2/3% of the outstanding voting stock that is not owned by the interested stockholder.

Section 203 defines a “business combination” to include the following:

- any merger or consolidation involving the corporation and the interested stockholder;
 - any sale, transfer, pledge or other disposition of 10% or more of the assets of the corporation involving the interested stockholder;
 - subject to certain exceptions, any transaction that results in the issuance or transfer by the corporation of any stock of the corporation to the interested stockholder;
 - any transaction involving the corporation that has the effect of increasing the proportionate share of the stock of any class or series of the corporation beneficially owned by the interested stockholder; or
 - the receipt by the interested stockholder of the benefit of any loans, advances, guarantees, pledges or other financial benefits provided by or through the corporation.
-



Form of 2020 Short-Term Incentive (STI) Plan

Purpose of the Plan

The purpose of the 2020 Short-Term Incentive Plan (the “**Plan**”) is to reward Selected Participants (defined below) of Advanced Energy Industries, Inc. and its subsidiaries (the “**Company**”) for the achievement of specific Company strategic goals.

Effective Date

The Plan is in effect from January 1, 2020 to December 31, 2020 (“**Plan Term**”) and supersedes all prior arrangements designed to provide annual incentive Bonus Awards.

Definitions

For the purposes of this document only, the following definitions will apply:

“**Board of Directors**” shall mean the Board of Directors of Advanced Energy Industries, Inc. that has delegated administration of the Plan to the Committee (defined below).

“**Bonus Award**” shall mean the actual award paid to a Selected Participant, as determined by the Committee, paid in cash following the end of the Plan Term but generally no later than 75 days from the end of the Fiscal Year during which the applicable Plan Term ends.

“**Committee**” shall mean the Compensation Committee as appointed by the Board of Directors to administer the Plan.

“**Company**” shall mean Advanced Energy Industries, Inc., a Delaware corporation, including all affiliate and subsidiary companies.

“**Fiscal Year**” shall mean the 12-month period over which the Company measures financial performance, and for purposes of this Plan, will extend from January 1, 2020 to December 31, 2020.

“**Performance Period(s)**” shall mean the two six-month performance measurement periods in the Plan Term, which are January 1, 2020 to June 30, 2020 and July 1, 2020 to December 31, 2020. For the avoidance of doubt, payout for the two Performance Periods would be made after the end of the Fiscal Year as defined in the term “**Bonus Award**” above.

“**Plan**” shall mean the 2020 Short-Term Incentive Plan whose terms and conditions are presented herein.

“**Selected Participant**” shall mean regular, full-time employees of the Company who are deemed eligible and selected by the Committee for named executive officers and management for others to participate in the Plan.

Eligibility

Participation is limited to Selected Participants who are not covered by any other short-term incentive or commission plan and are therefore eligible to participate in the Plan. Notwithstanding anything in the Plan to the contrary, and unless otherwise determined by the Committee, an individual shall not be eligible to participate in the Plan if such individual (a) performs services for the Company and is classified or paid as an independent contractor by the Company or (b) performs services for the Company pursuant to an agreement between the Company and any other person or entity including an employee leasing organization.

To earn and be eligible for a Bonus Award, if any, a Selected Participant must be actively employed in the eligible role as of October 1, 2020 and must be employed and continue to be employed and provide the services required of their position through the applicable Bonus Award payment date. Selected Participants who become eligible to participate in the Plan after the beginning of the Plan Term (promoted, hired, rehired or converted from a non-employee status) may be eligible for a Bonus Award payment on a prorated basis. If a Selected Participant’s tier changes during the Plan Term, the target percentage used in the calculation will be prorated between the lower target percentage and the higher target percentage dependent on the time worked in each role.

A condition precedent to earning any Bonus Award or prorated portion thereof is continuous active employment, which may include qualifying leaves of absence through the Bonus Award payment date. *Selected Participants must be actively employed by the Company on the date Bonus Awards are paid in order to earn a Bonus Award.* Please note that irrespective of the terms of this Plan, if the Selected Participant is subject to a Company-issued executive change of control agreement (“CIC Agreements”), those terms may take precedence in particular situations related to certain terminations and associated payment of a Bonus Award.

Failure to comply with the Company’s internal controls and policies, including but not limited to audit and control issues, or the delegation of authority policy, may result in a loss of Bonus Award eligibility and potentially termination of employment.

Measures of Performance

Generally, no later than 90 days after the beginning of the Performance Period, performance metrics have been or will be established by the Committee for such period based on the Company's 2020 Annual Operating Plan, as periodically updated. The performance metrics translate the business strategy into defined targets against which actual business results are measured during the Fiscal Year. Under the Plan, the corporate bonus pool for 2020 will be funded to the extent the Company achieves certain threshold, target or stretch levels of the pre-established performance metrics.

Each of these performance metrics carries a different weight in funding the corporate bonus pool (generally referred to herein as "corporate achievement"), which weights will be determined by the Committee no later than 90 days after the beginning of the Plan Term. Corporate achievement funds the bonus pool 50% at threshold, 100% at target, and 200% at stretch, each of which will be determined by the Committee. The Committee may determine that one or more performance metrics must be met to trigger pool funding for the remaining performance metrics. Achievement percentages between the threshold and target and between the target and stretch levels will be interpolated based on actual results in each category to determine the final achievement percentage to fund the pool. The Committee may also establish other individual achievement scales for Selected Participants.

For the 2020 Plan Term, based upon actual results in each of the pre-established performance metrics for the applicable Performance Period (Revenue, non-GAAP Operating Income from Continuing Operations, and Annual Synergies), the payout achievement scale for each performance metric is as follows:

	40% Weighted Payout Revenue	40% Weighted Payout Non-GAAP OI*	20% Weighted Payout Annual Synergy**
Stretch	200%	200%	200%
Target	100%	100%	100%
Threshold	50%	50%	50%

* Target based on total company operations for the Performance Period.

* Reflects Revenue, Non-GAAP Operating Income from Continuing Operations and Planned Realized Synergies**

* Non-GAAP Operating Income from Continuing Operations threshold must be met to trigger pool funding for the Revenue and Non-GAAP Operating Income from Continuing Operations. Non-GAAP Operating Income from Continuing Operations excludes non-cash related charges and non-recurring items.

** Synergies based on approved synergy plan consistent with Board approval of Artesyn acquisition. Measurement based on amounts realized. The funding of the annual synergies amount is not dependent on meeting any other financial threshold.

The Committee may, in its sole and absolute discretion, allocate a portion or all of any Selected Participant's bonus opportunity to discretionary determinations. The named executive officer's bonus opportunity is based solely on corporate achievement whereas other members of management below the executive officer level are additionally required to achieve individual performance goals that are separately communicated to those Selected Participants.

Bonus Award Calculation

Potential Bonus Awards are calculated as a percentage of the Selected Participant's year-end annualized base salary; provided, however, that, notwithstanding any other provisions of this Plan, the maximum amount of the Bonus Award that may be earned by and paid to any Selected Participant in respect of the Plan Term shall not exceed \$3 million (the "Maximum Payout"). The annual target Bonus Award will be determined for the various employment tiers (Tier 0 – CEO, Tier 1 – EVP, Tier 2 - Senior VP, Tier 3 – VP, etc.).

For those Selected Participants that are assigned to tier levels 2 or 3, the achievement of the Company performance metrics as set forth in this Plan shall only trigger the payment of a Bonus Award if that Selected Participant achieves the individual performance goals and objectives applicable to that particular Selected Participant (*i.e.*, pool funding according to corporate achievement plus achieving individual performance goals). For Selected Participants that are assigned to tier levels 0 or 1, the achievement of the corporate achievement metrics shall result in such Selected Participants being paid a Bonus Award, subject to the terms and conditions of the Plan.

At the end of each Performance Period within the Plan Term, the Committee will evaluate actual business results against each established performance metric in order to determine and certify the final achievement percentage.

Subject to meeting the conditions and terms of the Plan, the final Bonus Award payout percent will be multiplied by the Selected Participant's year-end annualized base salary resulting in a final Bonus Award payment. No Selected Participant shall receive a Bonus Award payment greater than the Maximum Payout.

Method and Timing of Payment

Bonus Award payments, if any, are paid after the Fiscal Year-end review, authorization of the payments by the Committee and after the filing of certain regulatory reports or other items, but generally no later than 75 days from the end of the Fiscal Year during which the applicable Plan Term ends. Selected Participants must be actively employed by the Company on the date Bonus Awards are paid in order to earn a Bonus Award. Bonus Awards

will be paid in cash. Bonus payouts are limited to the extent the bonus pool is funded by corporate achievement of performance metrics or achievement of individual performance goals as applicable.

The Bonus Award payment is subject to standard deductions and withholdings specific to the Selected Participant. Such deductions may include, but are not limited to, any participant elections made by the Selected Participant for deferrals through payroll into the relevant qualified employer-sponsored Plans. Any such deferrals will be made in accordance with the terms of the applicable tax qualified employer-sponsored Plans.

U.S. Only: Notwithstanding the foregoing, if the payment of any Bonus Award at the time specified herein would result in the adverse tax consequences described in Section 409A (a)(1) of the Internal Revenue Code (the “Code”) as a result of the recipient’s status as a “specified employee” (within the meaning of Section 409A of the Code), the time of such payment shall be amended to the minimum extent necessary to comply with Code Section 409A. If and to the extent permissible, the Company will withhold federal income tax at the appropriate IRS supplemental wage rate plus applicable employment taxes and state taxes for Bonus Award payments. For all benefits purposes such as Short-term Disability, Long-term Disability or Life Insurance, earnings and/or income is defined by the plan documents governing those plans. Bonus Awards are considered eligible earnings for 401(k) contributions if the Selected Participant has previously elected a bonus deferral percentage.

Administration

The Committee will be responsible for the administration of the Plan. The Committee is authorized to interpret the Plan, to prescribe, amend, and rescind rules and regulations deemed advisable, and to make all other administrative determinations necessary. Any decision of the Committee in the interpretation and administration of the Plan, as described herein, shall lie within its sole and absolute discretion and shall be final, conclusive and binding on all parties concerned.

General

The Committee reserves the right to define Company performance metrics, to determine and assign individual performance goals and objectives for Selected Participants, and to review, revise, amend, or terminate the Plan at any time without notice at its sole discretion. Among the performance metrics the Committee may use (some of which may be non-GAAP financial measures), are the following: (a) net earnings or net income; (b) operating earnings, operating income; (c) pretax earnings; (d) earnings per share; (e) earnings per share after applying a capital charge; (f) share price, including growth measures and total stockholder return; (g) earnings before interest and taxes and related margin; (h) earnings before interest, taxes, depreciation and/or amortization and related

margin; (i) sales or revenue growth, whether in general, by type of product, application or service, or by type of customer; (j) gross or operating profit or margins; (k) return measures, including return on assets, capital, investment, equity, sales or revenue; (l) economic value add (EVA) with or without a capital charge; (m) cash flow, including operational cash flow, free cash flow, cash flow return on equity and cash flow return on investment; (n) productivity ratios; (o) expense targets; (p) market share; (q) financial ratios as provided in credit agreements of the Company and its subsidiaries and interest expense; (r) working capital targets; (s) completion of acquisitions of businesses/companies or attainment of synergies; (t) completion of divestitures and asset sales; (u) operating metrics, design wins and inventory, and (v) any combination of any of the foregoing business criteria and associated margins, some of which may exclude restructuring charges, acquisition related costs, stock based compensation, amortization of intangibles, tax release items, certain one-time tax items and other one-time charges, and may be limited to continuing operations.

Although the Committee may use any of the above performance metrics, the Committee shall generally set one or more of such performance metrics for each potential Bonus Award not later than the 90th day after the beginning of the Performance Period. The Committee may determine to exclude certain adjustments, one-time taxes and other charges from the performance metrics to the extent they are determined to be excluded by the Committee generally no later than 90 days after the beginning of the Performance Period. Notwithstanding any other provision of the Plan, if the Committee determines that a potential Bonus Award need not be qualified as performance based compensation under Section 162(m) of the Internal Revenue Code, as amended, the Committee may modify the performance metrics, the weighting of performance metrics, the annual targets, threshold, target and stretch performance levels and any other terms of such potential Bonus Award at any time during the Plan Term, including after the first 90 days of a Plan Term. Furthermore, the Committee, in its sole and absolute discretion, may change Performance Periods based on market, business or other conditions.

Only the Committee has the ability to modify the Plan, and all modifications to the Plan related to the CEO must be reviewed by the Board of Directors. Except for certain limited exceptions with respect to CIC Agreements (as discussed above) and employment agreements (as discussed below), this Plan document supersedes any prior communications or previous document you may have received. In the event of any conflict between a Selected Participant's employment agreement with the Company and this Plan, the terms of the Participant's employment agreement will control for those provisions that do not relate to annual bonus incentive compensation.

The Company shall not be required to fund or otherwise segregate any cash or any other assets which may at any time be paid to Selected Participants under the Plan. The Plan shall constitute an “unfunded” plan of the Company.

In the event any provision of the Plan shall be held illegal or invalid for any reason, the illegality or invalidity shall not affect the remaining parts of the Plan, and the Plan shall be construed and enforced as if the illegal or invalid provision had not been included. Any questions regarding this Plan should be directed to the Human Resources department.

Terms and Conditions - United States Only

This Plan does not constitute a guarantee of work, job status or employment for any period of time. Your employment at Advanced Energy Industries, Inc. or its affiliate is at will and either you or the Company or affiliate may terminate the relationship at any time. This document is not intended to create a contract of employment or commitment of ongoing payment, express or implied.

SUBSIDIARIES OF THE REGISTRANT

Name	Jurisdiction of Incorporation or Organization
Advanced Energy Industries	China
Advanced Energy Industries (Shenzhen) Co., Ltd. (manufacturing)	China
Advanced Energy Industries AE - Israel Ltd.	Israel
Advanced Energy Industries GmbH	Germany
Advanced Energy Industries Limited	Hong Kong
Advanced Energy Industries U.K. Limited	United Kingdom
Advanced Energy Industries, Inc., Shanghai	China
Advanced Energy Japan K.K	Japan
Advanced Energy Services Pte. Ltd.	Singapore
Advanced Energy Singapore, Pte. Ltd.	Singapore
Advanced Energy Taiwan, Ltd.	Taiwan
Advanced Energy Xi'an Co., Ltd.	China
Advanced Energy Industries SDN. BHD.	Malaysia
AE Korea, Ltd.	South Korea
AE Precision Power Products Pvt. Ltd.	India
AEI Canada, Inc.	Canada
AEI Finance GmbH & Co., KG	Germany
AEI Finance Ltd.	Hong Kong
AEI Finance Verwaltungs GmbH	Germany
AEI Global Holdings CV	Netherlands
AEI Global Holdings LLC	Delaware
AEI Holdings, GmbH	Germany
AEI International Holdings CV	Netherlands
AEI Irish Holdings Ltd.	Ireland
AEI Korea Services, Ltd.	South Korea
AEI Power GmbH	Germany
AEI Power India Pvt. Ltd.	India
AEI US Subsidiary, LLC	Delaware
AES Global Holdings PTE Ltd.	Singapore
Artesyn Embedded Technologies (Hong Kong) Limited	Hong Kong
Artesyn Embedded Technologies (Hong Kong) Limited – South Korea	South Korea
Artesyn Embedded Technologies GmbH	Germany
Artesyn Embedded Technologies Philippines, Inc.	Philippines
Artesyn Embedded Technologies, Inc	Florida
Artesyn Holding GmbH	Austria
Artesyn Technologies Asia-Pacific Ltd.	Hong Kong
Astec Agencies Ltd.	Hong Kong

Astec Agencies Ltd (Philippines)	Philippines
Astec Agencies Ltd. (Taiwan)	Taiwan
Astec America, LLC	Delaware
Astec Custom Power Pte. Ltd.	Singapore
Astec Electronics Company Ltd.	China
Astec Electronics Company Ltd. (Beijing Branch)	China
Astec Electronics Company Ltd. (Shanghai Branch)	China
Astec Electronics Company Ltd. (Xi'an Branch)	China
Astec Europe Ltd.	United Kingdom
Astec Europe Ltd. (Austria Branch)	Austria
Astec Europe Ltd. (Italy Branch)	Italy
Astec Europe Ltd. (Ireland Branch)	Ireland
Astec International Ltd.	Hong Kong
Astec Power Philippines, Inc.	Philippines
Astec Power Supply Company Ltd.	China
Embedded Computing & Power Private Ltd.	India
Excelsys Group Ltd.	Ireland
Excelsys Holdings Ltd.	Ireland
Excelsys Technologies Ltd.	Ireland
Fuyogo Limited	Hong Kong
HiTek DB Pension Scheme Trustees Ltd.	England
HiTek Power GmbH	Germany
HiTek Power Ltd.	United Kingdom
LumaSense Equipment India Pvt. Ltd. Co.	India
LumaSense Europe GmbH	Germany
LumaSense Holdings	Cayman Islands
LumaSense International LP	Cayman Islands
LumaSense Sensor GmbH	Germany
LumaSense Technologies A/S	Denmark
LumaSense Technologies B.V.	Netherlands
LumaSense Technologies GmbH	Germany
LumaSense Technologies Holdings, Inc.	Delaware
LumaSense Technologies SARL	France
LumaSense Technologies, Inc.	Delaware
Microware Manufacturing Ltd.	United Kingdom
Sekidenko, Inc.	Washington
Siren Acquisition Sub, Inc.	New York
Solvix GmbH	Switzerland
Solvix LLC	Colorado
Stourbridge Holdings (UK), Ltd.	United Kingdom
String Inverter Repair Services, LLC	Colorado
Tamio Limited	Hong Kong
T.J. Acquisition Subsidiary, Inc.	New York

Trek Holding Co., Ltd.

Japan

Trek Japan K.K.

Japan

Trek, Inc.

New York

UltraVolt Group, Inc.

Delaware

UltraVolt, Inc.

New York

Wankia Limited

Hong Kong

Zhongshan Artesyn Technologies Co., Ltd.

China

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We have issued our report dated February 21, 2019, with respect to the consolidated financial statements for the years ended December 31, 2018 and 2017, included in the Annual Report of Advanced Energy Industries, Inc. on Form 10-K for the year ended December 31, 2019. We consent to the incorporation by reference of said report in the Registration Statements of Advanced Energy Industries, Inc. on Forms S-3, as amended (File Nos. 333-167027, 333-110534, 333-87720, 333-72748, 333-47114, 333-37378, 333-87455, 333-87459, and 333-34039) and on Forms S-8 (File Nos. 333-01616, 333-04073, 333-46705, 333-57233, 333-65413, 333-79425, 333-79429, 333-62760, 333-69148, 333-69150, 333-87718, 333-105367, 333-105366, 333-105365, 333-129859, 333-129858, 333-147289, 333-152865, 333-167741, 333-168519, and 333-221376).

/s/ GRANT THORNTON LLP

Denver, Colorado

March 2, 2020

Consent of Independent Registered Public Accounting Firm

We consent to the incorporation by reference in the following Registration Statements of Advanced Energy Industries, Inc.:

Registration Statements on Form S-3:

1. No. 333-167027;
2. No. 333-110534;
3. No. 333-87459; and
4. No. 333-34039

Registration Statements on Form S-8:

1. No. 333-221376;
2. No. 333-168519;
3. No. 333-167741;
4. No. 333-152865;
5. No. 333-129858;
6. No. 333-105367;
7. No. 333-87718;
8. No. 333-69150;
9. No. 333-69148;
10. No. 333-62760;
11. No. 333-79429;
12. No. 333-79425;
13. No. 333-65413;
14. No. 333-57233;
15. No. 333-46705;
16. No. 333-04073; and
17. No. 333-01616

of our reports dated March 2, 2020, with respect to the consolidated financial statements of Advanced Energy Industries, Inc. and the effectiveness of internal control over financial reporting of Advanced Energy Industries, Inc. included in this Annual Report (Form 10-K) of Advanced Energy Industries, Inc. for the year ended December 31, 2019.

/s/ Ernst & Young LLP

Denver, Colorado
March 2, 2020

SECTION 302 CERTIFICATION OF CHIEF EXECUTIVE OFFICER

I, Yuval Wasserman, certify that:

1. I have reviewed this annual report on Form 10-K for the period ended December 31, 2019 of Advanced Energy Industries, Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - a. Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b. Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, 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;
 - c. Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d. Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - a. All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - b. Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 2, 2020

/s/ Yuval Wasserman

Yuval Wasserman
Chief Executive Officer

SECTION 302 CERTIFICATION OF CHIEF FINANCIAL OFFICER

I, Paul Oldham, certify that:

1. I have reviewed this annual report on Form 10-K for the period ended December 31, 2019 of Advanced Energy Industries, Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - a. Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b. Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, 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;
 - c. Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d. Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - a. All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - b. Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 2, 2020

/s/ Paul Oldham

Paul Oldham

Chief Financial Officer & Executive Vice President

**WRITTEN STATEMENT OF CHIEF EXECUTIVE OFFICER
FURNISHED PURSUANT TO SECTION 906
OF THE SARBANES-OXLEY ACT OF 2002 (18 U.S.C. SECTION 1350)
AND FOR THE PURPOSE OF COMPLYING WITH RULE 13a-14(b)
OF THE SECURITIES EXCHANGE ACT OF 1934**

The undersigned, the Chief Executive Officer of Advanced Energy Industries, Inc. (the "Company"), hereby certifies that to his knowledge on the date hereof:

- a) the Annual Report on Form 10-K of the Company for the year ended December 31, 2019 filed on the date hereof with the Securities and Exchange Commission (the "Report") fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and
- b) information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: March 2, 2020

/s/ Yuval Wasserman

Yuval Wasserman

Chief Executive Officer

A signed original of this written statement required by Section 906, or other document authenticating, acknowledging, or otherwise adopting the signature that appears in typed form within the electronic version of this written statement required by Section 906, has been provided to the Company and will be retained by the Company and furnished to the Securities and Exchange Commission or its staff upon request.

**WRITTEN STATEMENT OF CHIEF FINANCIAL OFFICER
FURNISHED PURSUANT TO SECTION 906
OF THE SARBANES-OXLEY ACT OF 2002 (18 U.S.C. SECTION 1350)
AND FOR THE PURPOSE OF COMPLYING WITH RULE 13a-14(b)
OF THE SECURITIES EXCHANGE ACT OF 1934**

The undersigned, the Chief Financial Officer of Advanced Energy Industries, Inc. (the “Company”), hereby certifies that to his knowledge on the date hereof:

- a) the Annual Report on Form 10-K of the Company for the year ended December 31, 2019 filed on the date hereof with the Securities and Exchange Commission (the “Report”) fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and
- b) information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: March 2, 2020

/s/ Paul Oldham

Paul Oldham

Chief Financial Officer & Executive Vice President

A signed original of this written statement required by Section 906, or other document authenticating, acknowledging, or otherwise adopting the signature that appears in typed form within the electronic version of this written statement required by Section 906, has been provided to the Company and will be retained by the Company and furnished to the Securities and Exchange Commission or its staff upon request.
