

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

FORM 10-Q

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

For the quarterly period ended March 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)

1625 Sharp Point Drive, Fort Collins, CO

(Address of principal executive offices)

84-0846841

(I.R.S. Employer Identification No.)

80525

(Zip Code)

Registrant's telephone number, including area code: (970) 221-4670

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

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Stock, \$0.001 par value	AEIS	NASDAQ Global Select Market

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

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted 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 and post such files). Yes No

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer" and "smaller reporting 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

As of May 2, 2019 there were 38,235,782 shares of the registrant's Common Stock, par value \$0.001 per share, outstanding.

ADVANCED ENERGY INDUSTRIES, INC.
FORM 10-Q
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PART I FINANCIAL STATEMENTS**ITEM 1. UNAUDITED CONDENSED CONSOLIDATED FINANCIAL STATEMENTS**

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

	March 31,	December 31,
	2019	2018
ASSETS		
Current assets:		
Cash and cash equivalents	\$ 351,149	\$ 349,301
Marketable securities	2,516	2,470
Accounts and other receivable, net of allowances of \$2,115 and \$1,856 respectively	102,405	100,442
Inventories	99,070	97,987
Income taxes receivable	1,945	2,220
Other current assets	11,309	10,173
Current assets from discontinued operations	4,872	5,855
Total current assets	573,266	568,448
Property and equipment, net	31,058	31,269
Operating lease right-of-use assets	35,654	—
Deposits and other assets	9,378	6,874
Goodwill	101,306	101,900
Intangible assets, net	52,858	54,910
Deferred income tax assets	47,513	47,099
Non-current assets from discontinued operations	5,917	5,984
TOTAL ASSETS	\$ 856,950	\$ 816,484
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	\$ 44,028	\$ 39,646
Income taxes payable	12,584	13,258
Accrued payroll and employee benefits	16,528	21,775
Other accrued expenses	21,848	22,999
Customer deposits and other	5,510	7,345
Current portion of operating lease liability	7,298	—
Current liabilities from discontinued operations	4,254	5,286
Total current liabilities	112,050	110,309
Operating lease liability	29,596	—
Deferred income tax liabilities	6,592	6,988
Uncertain tax positions	9,987	14,318
Long term deferred revenue	28,148	29,108
Other long-term liabilities	37,947	37,744
Non-current liabilities from discontinued operations	10,486	10,715
Total liabilities	234,806	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; 38,236 and 38,164 issued and outstanding, respectively	38	38
Additional paid-in capital	98,910	97,418
Accumulated other comprehensive loss	(5,477)	(3,449)
Retained earnings	528,153	512,783
Advanced Energy stockholders' equity	621,624	606,790
Noncontrolling interest	520	512
Total stockholders' equity	622,144	607,302

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

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

	Three Months Ended March 31,	
	2019	2018
Sales, net:		
Product	\$ 112,112	\$ 171,209
Services	28,631	24,408
Total sales, net	140,743	195,617
Cost of sales:		
Product	60,801	79,806
Services	14,202	12,166
Total cost of sales	75,003	91,972
Gross profit	65,740	103,645
Operating expenses:		
Research and development	21,289	17,637
Selling, general and administrative	29,014	28,648
Amortization of intangible assets	1,973	1,257
Restructuring expense	1,673	—
Total operating expenses	53,949	47,542
Operating income	11,791	56,103
Other income, net	743	26
Income from continuing operations, before income taxes	12,534	56,129
Provision (benefit) for income taxes	(2,853)	9,759
Income from continuing operations	15,387	46,370
Income (loss) from discontinued operations, net of income taxes	(9)	140
Net income	\$ 15,378	\$ 46,510
Income from continuing operations attributable to noncontrolling interest	8	31
Net income attributable to Advanced Energy Industries, Inc.	\$ 15,370	\$ 46,479
Basic weighted-average common shares outstanding		
	38,198	39,619
Diluted weighted-average common shares outstanding		
	38,426	39,995
Earnings per share:		
Continuing operations:		
Basic earnings per share	\$ 0.40	\$ 1.17
Diluted earnings per share	\$ 0.40	\$ 1.16
Discontinued operations:		
Basic earnings per share	\$ —	\$ —
Diluted earnings per share	\$ —	\$ —
Net income:		
Basic earnings per share	\$ 0.40	\$ 1.17
Diluted earnings per share	\$ 0.40	\$ 1.16

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

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

	Three Months Ended March 31,	
	2019	2018
Net income	\$ 15,378	\$ 46,510
Other comprehensive income:		
Foreign currency translation	(1,975)	2,472
Minimum benefit retirement liability	(53)	(168)
Comprehensive income	13,350	48,814
Comprehensive income attributable to noncontrolling interest	8	31
Comprehensive income attributable to Advanced Energy Industries, Inc.	\$ 13,342	\$ 48,783

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

ADVANCED ENERGY INDUSTRIES, INC.
Unaudited Condensed Consolidated Statements of Stockholders' Equity
(In thousands, except share amounts)

	Common Stock		Accumulated Other Comprehensive Income (Loss)			Retained Earnings	Non-controlling Interest	Total Stockholders' Equity
	Shares	Amount	Additional Paid-in Capital	Foreign Currency Translation	Minimum Benefit Retirement Liability			
Balances, December 31, 2017	39,604	\$ 40	\$ 184,843	\$ 4,695	\$ (2,162)	\$ 333,225	\$ —	\$ 520,641
Adoption of new accounting standards	—	—	—	—	—	19,706	—	19,706
Non-controlling interest from acquisition	—	—	—	—	—	—	431	431
Stock issued from equity plans	113	—	(4,127)	—	—	—	—	(4,127)
Stock-based compensation	—	—	4,494	—	—	—	—	4,494
Stock buyback	(181)	—	(12,750)	—	—	—	—	(12,750)
Comprehensive income (loss):								
Foreign currency translation	—	—	—	2,472	—	—	—	2,472
Minimum benefit retirement liability	—	—	—	—	(168)	—	—	(168)
Net income	—	—	—	—	—	46,479	31	46,510
Total comprehensive income (loss)	—	—	—	2,472	(168)	46,479	31	48,814
Balances, March 31, 2018	39,536	\$ 40	\$ 172,460	\$ 7,167	\$ (2,330)	\$ 399,410	\$ 462	\$ 577,209
Balances, December 31, 2018	38,164	\$ 38	\$ 97,418	\$ (590)	\$ (2,859)	\$ 512,783	\$ 512	\$ 607,302
Stock issued from equity plans	72	—	(1,707)	—	—	—	—	(1,707)
Stock-based compensation	—	—	3,199	—	—	—	—	3,199
Comprehensive income (loss):								
Foreign currency translation	—	—	—	(1,975)	—	—	—	(1,975)
Minimum benefit retirement liability	—	—	—	—	(53)	—	—	(53)
Net income	—	—	—	—	—	15,370	8	15,378
Total comprehensive income (loss)	—	—	—	(1,975)	(53)	15,370	8	13,350
Balances at March 31, 2019	38,236	\$ 38	\$ 98,910	\$ (2,565)	\$ (2,912)	\$ 528,153	\$ 520	\$ 622,144

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

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

	Three Months Ended March 31,	
	2019	2018
CASH FLOWS FROM OPERATING ACTIVITIES:		
Net income	\$ 15,378	\$ 46,510
Income (loss) from discontinued operations, net of income taxes	(9)	140
Income from continuing operations, net of income taxes	15,387	46,370
Adjustments to reconcile net income to net cash provided by operating activities:		
Depreciation and amortization	4,181	2,861
Stock-based compensation expense	3,199	4,494
Provision for deferred income taxes	(649)	—
Net loss on disposal of assets	6	138
Changes in operating assets and liabilities, net of assets acquired:		
Accounts and other receivable, net	(2,416)	(17,457)
Inventories	(1,243)	(17,113)
Other assets	(4,295)	364
Accounts payable	4,546	11,932
Other liabilities and accrued expenses	(7,165)	(2,346)
Income taxes	(4,696)	5,642
Net cash provided by operating activities from continuing operations	6,855	34,885
Net cash used in operating activities from discontinued operations	(1,409)	(1,784)
Net cash provided by operating activities	5,446	33,101
CASH FLOWS FROM INVESTING ACTIVITIES:		
Acquisitions, net of cash acquired	—	(6,072)
Purchases of property and equipment	(2,436)	(3,923)
Net cash used in investing activities from continuing operations	(2,436)	(9,995)
Net cash used in investing activities from discontinued operations	—	—
Net cash used in investing activities	(2,436)	(9,995)
CASH FLOWS FROM FINANCING ACTIVITIES:		
Purchase and retirement of common stock	—	(12,750)
Net payments related to stock-based award activities	(1,707)	(4,032)
Net cash used in financing activities from continuing operations	(1,707)	(16,782)
Net cash used in financing activities from discontinued operations	—	—
Net cash used in financing activities	(1,707)	(16,782)
EFFECT OF CURRENCY TRANSLATION ON CASH	(566)	167
INCREASE IN CASH AND CASH EQUIVALENTS	737	6,491
CASH AND CASH EQUIVALENTS, beginning of period	354,552	415,037
CASH AND CASH EQUIVALENTS, end of period	355,289	421,528
Less cash and cash equivalents from discontinued operations	4,140	7,654
CASH AND CASH EQUIVALENTS FROM CONTINUING OPERATIONS, end of period	\$ 351,149	\$ 413,874
SUPPLEMENTAL DISCLOSURE OF CASH FLOW INFORMATION:		
Cash paid for interest	\$ 56	\$ 56
Cash paid for income taxes	2,371	3,404
Cash received for refunds of income taxes	61	95
Cash held in banks outside the United States	174,980	320,753

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

ADVANCED ENERGY INDUSTRIES, INC.
NOTES TO UNAUDITED CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(In thousands, except per share data)

NOTE 1. BASIS OF PRESENTATION

Advanced Energy Industries, Inc., a Delaware corporation, and its wholly-owned subsidiaries ("we," "us," "our," "Advanced Energy," or the "Company") 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, analytical instrumentation and medical equipment, and in 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, and we currently report as a single unit. See *Note 4. Discontinued Operations* for more information.

In the opinion of management, the accompanying Unaudited Condensed Consolidated Financial Statements contain all adjustments, consisting of normal, recurring adjustments, necessary to present fairly the financial position of the Company as of March 31, 2019, and the results of our operations and cash flows for the three months ended March 31, 2019 and 2018.

The Unaudited Condensed Consolidated Financial Statements included herein have been prepared pursuant to the rules and regulations of the Securities and Exchange Commission ("SEC"). Certain information and footnote disclosures normally included in financial statements prepared in accordance with accounting principles generally accepted in the United States of America ("U.S. GAAP") have been condensed or omitted pursuant to such rules and regulations. These Unaudited Condensed Consolidated Financial Statements should be read in conjunction with the audited Consolidated Financial Statements and Notes thereto contained in our Annual Report on Form 10-K for the fiscal year ended December 31, 2018 and other financial information filed with the SEC.

Estimates and Assumptions

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, right-of-use assets and related liabilities, 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.

Critical Accounting Policies

Our accounting policies are described in our audited Consolidated Financial Statements and Notes contained in our Annual Report on Form 10-K for the year ended December 31, 2018. See *Note 16. Leases* for the updated policies related to the implementation of ASU 2016-02, "Leases (Topic 842)."

New Accounting Standards

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 the Consolidated Financial Statements upon adoption.

Recently issued accounting pronouncements 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

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

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 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.

Recently adopted accounting pronouncements

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 have an impact on 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 have an impact on our Consolidated Financial Statements.

In August 2017, the FASB issued ASU 2017-12, "Derivatives and Hedging (Topic 815)", Targeted Improvements to Accounting for Hedging Activities ("ASU 2017-12"). This ASU simplifies certain aspects of hedge accounting and results in a more accurate portrayal of the economics of an entity's risk management activities in its financial statements. ASU 2017-12 is effective for fiscal years beginning after December 15, 2018, and the interim periods within those fiscal years. We adopted ASU 2017-12 during the first quarter of fiscal year 2019 using the modified retrospective basis. The adoption of the provisions of ASU 2017-12 did not materially impact the company's Consolidated Balance Sheet or Statement of Operations.

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. 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 period ended March 31, 2019 .

NOTE 2. BUSINESS ACQUISITIONS

LumaSense Technologies Holdings, Inc.

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 net purchase price of \$84.7 million in cash.

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

	LumaSense
Cash paid for acquisition	\$ 94,946
Cash acquired	(10,262)
Total fair value of consideration transferred	<u>\$ 84,684</u>

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

The following table summarizes estimated fair values of the assets acquired and liabilities assumed from our acquisition:

	LumaSense
Accounts and other receivable, net	\$ 7,167
Inventories	9,372
Property and equipment	1,353
Goodwill	48,032
Intangible assets	26,000
Deferred income tax assets	8,116
Other assets	5,126
Total assets acquired	105,166
Accounts payable	5,734
Deferred income tax liabilities	7,984
Other liabilities	6,764
Total liabilities assumed	20,482
Total fair value of net assets acquired	\$ 84,684

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

	LumaSense	Amortization Method	Useful Life
Technology	\$ 20,000	Straight-line	10
Customer relationships	6,000	Straight-line	10
Total	\$ 26,000		

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. Advanced Energy is in the process of finalizing the assessment of fair value for the assets acquired and liabilities assumed related to the LumaSense acquisition.

Pro forma results for Advanced Energy Inc. giving effect to the LumaSense Technologies Holdings, Inc. Transaction

The following unaudited pro forma financial information presents the combined results of operations of Advanced Energy Inc. and LumaSense as if the acquisitions had been completed as of the beginning of the prior fiscal year, or January 1, 2018. 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 on January 1, 2018, nor are they indicative of future results.

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

The unaudited pro forma results for the three months ended March 31, 2019 and 2018 are as follows:

	March 31, 2019		March 31, 2018	
	As reported	Pro forma	As reported	Pro forma
Total sales	140,743	140,743	195,617	210,465
Net income attributable to Advanced Energy Industries, Inc.	15,370	15,491	46,479	46,310
Earnings per share:				
Basic earnings per share	\$ 0.40	\$ 0.41	\$ 1.17	\$ 1.17
Diluted earnings per share	\$ 0.40	\$ 0.40	\$ 1.16	\$ 1.16

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

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 as of January 1, 2018. These adjustments including amortization charges for acquired intangible assets, adjustments for acquisition transaction costs and amortization of purchased gross profit. These adjustments are net of any applicable tax impact and were included to arrive at the pro forma results above.

LumaSense'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 1, 2018. LumaSense contributed total sales of \$12.0 million and a net income of \$0.9 million for the three months ended March 31, 2019.

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.

Practical Expedients

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.

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.

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, and other industrial capital equipment markets. Our 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.

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. Any up-front fees received for extended warranties or maintenance plans are deferred. 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. We have deferred revenue related to our extended warranties and service contracts totaling \$32.5 million as of March 31, 2019 and \$33.4 million as of December 31, 2018. We are expected to recognize between \$0.1 million and \$3.5 million per year through 2034.

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

Disaggregation of Revenue

The following table presents our net sales by product line:

	Three Months Ended March 31,	
	2019	2018
Semiconductor capital market	\$ 67,514	\$ 136,010
Industrial technology capital market	44,598	35,199
Global support	28,631	24,408
Total	<u>\$ 140,743</u>	<u>\$ 195,617</u>

The following table presents our net sales by geographic region:

	Three Months Ended March 31,			
	2019		2018	
Sales to external customers:				
United States	\$ 57,875	41.1%	\$ 107,267	54.8%
Other North American countries	631	0.4	630	0.3
North America	<u>58,506</u>	<u>41.5</u>	<u>107,897</u>	<u>55.1</u>
Republic of Korea	13,800	9.8	24,893	12.7
People's Republic of China	15,474	11.0	11,870	6.1
Taiwan	11,621	8.3	7,540	3.9
Singapore	6,105	4.3	13,632	7.0
Other Asian countries	11,435	8.1	8,229	4.2
Asia	<u>58,435</u>	<u>41.5</u>	<u>66,164</u>	<u>33.9</u>
Germany	7,573	5.4	8,261	4.2
Other European countries	15,853	11.3	13,188	6.7
Europe	<u>23,426</u>	<u>16.7</u>	<u>21,449</u>	<u>10.9</u>
Other Countries	376	0.3	107	0.1
Total	<u>\$ 140,743</u>	<u>100.0%</u>	<u>\$ 195,617</u>	<u>100.0%</u>

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:

	Three Months Ended March 31,	
	2019	2018
Product and service revenue recognized at point in time	\$ 139,840	\$ 194,683
Extended warranty and service contracts recognized over time	903	934
Total	<u>\$ 140,743</u>	<u>\$ 195,617</u>

NOTE 4. 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 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.

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

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

	Three Months Ended March 31,	
	2019	2018
Sales	\$ —	\$ —
Cost of sales	—	112
Total operating expense (benefit)	—	(61)
Operating income (loss) from discontinued operations	—	(51)
Other income (expense)	(4)	124
Income (loss) from discontinued operations before income taxes	(4)	73
Provision (benefit) for income taxes	5	(67)
Income (loss) from discontinued operations, net of income taxes	\$ (9)	\$ 140

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

	March 31,	December 31,
	2019	2018
Cash and cash equivalents	\$ 4,140	\$ 5,251
Other current assets	430	406
Inventories	302	198
Current assets of discontinued operations	\$ 4,872	\$ 5,855
Other assets	\$ —	\$ 67
Deferred income tax assets	5,917	5,917
Non-current assets of discontinued operations	\$ 5,917	\$ 5,984
Accounts payable and other accrued expenses	\$ 349	\$ 350
Accrued warranty	3,905	4,936
Current liabilities of discontinued operations	\$ 4,254	\$ 5,286
Accrued warranty	\$ 10,344	\$ 10,429
Other liabilities	142	286
Non-current liabilities of discontinued operations	\$ 10,486	\$ 10,715

NOTE 5. INCOME TAXES

The following table sets out the tax expense and the effective tax rate for our income from continuing operations:

	Three Months Ended March 31,	
	2019	2018
Income from continuing operations, before income taxes	\$ 12,534	\$ 56,129
Provision (benefit) for income taxes	(2,853)	9,759
Effective tax rate	(22.8)%	17.4%

Our effective tax rates differ from the U.S. federal statutory rate of 21% for the three months ended March 31, 2019 and 2018, respectively, primarily due to the benefit of earnings in foreign jurisdictions which are subject to lower tax rates, partially offset by additional GILTI tax in the U.S. The effective tax rate for the first quarter of 2019 was lower than the same period in 2018 primarily due to the release of liabilities for uncertain tax positions in 2019 based on the completion of additional procedures during the quarter to support a change in facts with respect to a specific prior period position.

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 our diluted EPS is similar to the computation of our basic EPS except that the denominator is increased to include the number of additional common shares that would have

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

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 EPS for the three months ended March 31, 2019 and 2018 :

	Three Months Ended March 31,	
	2019	2018
Income from continuing operations	\$ 15,387	\$ 46,370
Income from continuing operations attributable to noncontrolling interest	8	31
Income from continuing operations attributable to Advanced Energy Industries, Inc.	<u>\$ 15,379</u>	<u>\$ 46,339</u>
Basic weighted-average common shares outstanding	38,198	39,619
Assumed exercise of dilutive stock options and restricted stock units	228	376
Diluted weighted-average common shares outstanding	<u>38,426</u>	<u>39,995</u>
Continuing operations:		
Basic earnings per share	\$ 0.40	\$ 1.17
Diluted earnings per share	\$ 0.40	\$ 1.16

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

	Three Months Ended March 31,	
	2019	2018
Restricted stock units	119	2

Stock Buyback

In September 2015, our Board of Directors authorized a program to repurchase up to \$150.0 million of our 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 Company common stock under this same program. As of March 31, 2019, we had \$24.9 million remaining for the future repurchase of shares of our common stock.

In order to execute the repurchase of shares of our common stock, the company periodically enters into stock repurchase agreements. During the three months ended March 31, 2019 and 2018, the company has repurchased the following shares of common stock:

	Three Months Ended March 31,	
	2019	2018
Amount paid to repurchase shares	\$ —	\$ 12,750
Number of shares repurchased	—	181
Average repurchase price per share	\$ —	\$ 70.47

There were no shares repurchased from related parties. All shares repurchased were recognized as a reduction to Additional paid-in capital. Repurchased shares were retired and assumed the status of authorized and unissued shares.

NOTE 7. MARKETABLE SECURITIES AND ASSETS MEASURED AT FAIR VALUE

Our investments with original maturities of more than three months at the time of purchase and that are intended to be held for no more than 12 months, are considered marketable securities available for sale.

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

Our marketable securities consist of certificates of deposit as follows:

	March 31, 2019		December 31, 2018	
	Cost	Fair Value	Cost	Fair Value
Total marketable securities	\$ 2,511	\$ 2,516	\$ 2,463	\$ 2,470

The maturities of our marketable securities available for sale as of March 31, 2019 are as follows:

	Earliest		Latest
Certificates of deposit	4/10/2019	to	10/17/2019

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 March 31, 2019, we do not believe any of the underlying issuers of our marketable securities are at risk of default.

The following tables present information about our marketable securities measured at fair value, on a recurring basis, as of March 31, 2019 and December 31, 2018. The tables indicate the fair value hierarchy of the valuation techniques utilized to determine fair value. We did not have any financial liabilities measured at fair value, on a recurring basis, as of March 31, 2019 and December 31, 2018.

March 31, 2019	Level 1	Level 2	Level 3	Total
Total marketable securities	\$ —	\$ 2,516	\$ —	\$ 2,516

December 31, 2018	Level 1	Level 2	Level 3	Total
Total marketable securities	\$ —	\$ 2,470	\$ —	\$ 2,470

There were no transfers in or out of Level 1, 2, or 3 fair value measurements during the three months ended March 31, 2019.

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 for one-month periods. These forward contracts manage the exchange rate risk associated with intercompany debt denominated in nonfunctional currencies. These derivative instruments are not designated as hedges; however, they do offset the fluctuations of our intercompany debt due to foreign exchange rate changes. We did not enter into any new foreign currency exchange forward contracts during the three months ended March 31, 2019 and 2018. We did not have any currency exchange rate contracts outstanding as of March 31, 2019 and 2018.

During the three months ended March 31, 2019 and 2018 the gains and losses recorded related to the foreign currency exchange contracts are as follows:

	Three Months Ended March 31,	
	2019	2018
Foreign currency loss from foreign currency exchange contracts	\$ —	\$ (750)

These gains and losses were offset by corresponding gains and losses on the revaluation of the underlying intercompany debt and both are included as a component of Other income, net, in our Unaudited Condensed Consolidated Statements of Operations.

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

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:

	March 31, 2019	December 31, 2018
Amounts billed, net	\$ 87,607	\$ 80,709
Unbilled receivables	14,798	19,733
Total receivables, net	<u>\$ 102,405</u>	<u>\$ 100,442</u>

Amounts billed, net consist of amounts that have been invoiced to our customers in accordance with our terms and conditions and are shown net of an allowance for doubtful accounts.

Unbilled receivables consist of amounts where we have satisfied our contractual obligations related to inventory stocking contracts with customers. Such amounts typically become billable 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.

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:

	March 31, 2019	December 31, 2018
Parts and raw materials	\$ 75,870	\$ 76,647
Work in process	9,286	6,644
Finished goods	13,914	14,696
Total	<u>\$ 99,070</u>	<u>\$ 97,987</u>

NOTE 11. PROPERTY AND EQUIPMENT

Property and equipment, net is comprised of the following:

	March 31, 2019	December 31, 2018
Buildings and land	\$ 1,719	\$ 1,737
Machinery and equipment	42,985	41,330
Computer and communication equipment	24,721	24,051
Furniture and fixtures	3,189	3,203
Vehicles	282	282
Leasehold improvements	20,487	20,593
Construction in process	1,113	867
	<u>94,496</u>	<u>92,063</u>
Less: Accumulated depreciation	(63,438)	(60,794)
Property and equipment, net	<u>\$ 31,058</u>	<u>\$ 31,269</u>

Depreciation expense recorded in continuing operations and included in selling, general and administrative expense is as follows:

	Three Months Ended March 31,	
	2019	2018
Depreciation expense	\$ 2,208	\$ 1,604

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

NOTE 12. GOODWILL

The following summarizes the changes in goodwill during the three months ended March 31, 2019 :

	Beginning Balance	Effect of Changes in Exchange Rates	Ending Balance
March 31, 2019	\$ 101,900	\$ (594)	\$ 101,306

NOTE 13. INTANGIBLE ASSETS

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

March 31, 2019	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount
Technology	\$ 39,730	\$ (8,967)	\$ 30,763
Customer relationships	35,416	(14,241)	21,175
Trademarks and other	2,518	(1,598)	920
Total	\$ 77,664	\$ (24,806)	\$ 52,858

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	\$ 77,889	\$ (22,979)	\$ 54,910

Amortization expense related to intangible assets is as follows:

	Three Months Ended March 31,	
	2019	2018
Amortization expense	\$ 1,973	\$ 1,257

Estimated amortization expense related to intangibles is as follows:

Year Ending December 31,	
2019 (remaining)	\$ 5,612
2020	6,842
2021	6,743
2022	6,486
2023	6,468
Thereafter	20,707
Total	\$ 52,858

NOTE 14. RESTRUCTURING COSTS

During 2018, we committed to a restructuring plan to optimize our manufacturing footprint and to improve our operating efficiencies and synergies related to our recent acquisitions. The table below summarizes the restructuring charges:

	Three Months Ended March 31, 2019	Cumulative Cost Through March 31, 2019
Severance and related charges	\$ 153	\$ 4,392
Facility relocation and closure charges	1,520	1,520
Total restructuring charges	\$ 1,673	\$ 5,912

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

The following table summarizes our restructuring liabilities at March 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 March 31, 2019
Total restructuring liabilities	\$ 3,806	\$ 1,673	\$ (2,360)	\$ (11)	\$ 3,108

As of December 31, 2018 and March 31, 2019 the accrued restructuring liabilities related primarily to severance and related charges.

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:

	Three Months Ended March 31,	
	2019	2018
Balances at beginning of period	\$ 2,084	\$ 2,312
Warranty liabilities acquired	—	92
Increases to accruals	519	178
Warranty expenditures	(345)	(506)
Effect of changes in exchange rates	6	8
Balances at end of period	\$ 2,264	\$ 2,084

NOTE 16. LEASES

We lease manufacturing and office space under non-cancelable operating leases. Some of these leases contain provisions for landlord funded leasehold improvements which are recorded as right of use assets with related liabilities. Additionally, several existing operating leases had deferred rent balances under ASC 840 which resulted in adjusted right of use asset balances recorded upon adoption of ASC 842. Most leases include one or more options to renew. We regularly evaluate the renewal options and when they are reasonably certain of exercise, we include the renewal period in our lease terms, along with the right-of-use assets ("ROU") and lease liabilities. In many cases, we have lease terms that are less than one year and therefore, we have elected the practical expedient to exclude these short-term leases from our ROU assets and lease liabilities.

Our leases do not provide an implicit rate. Accordingly, we use our incremental borrowing rate based on the information available at the lease commencement date in determining the present value of the lease payments. We have a centrally managed treasury function; therefore, based on the applicable lease terms and the current economic environment, we apply a portfolio approach for determining the incremental borrowing rate.

New leases are negotiated and executed to meet business objectives on an on-going basis. During the second fiscal quarter of 2019, we expect to record additional right of use assets and related liabilities for facilities in Metzingen, Germany and Denver, Colorado, USA. The lease in Metzingen commences on April 1, 2019 with a term of 3 years ; the right of use asset and liability recorded at commencement will be \$1.2 million . The lease in Denver, Colorado is expected to commence in June 2019 with a term of 10 years ; the right of use asset and liability recorded at commencement will be \$15.7 million .

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

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

Year Ending December 31,	
2019 (remaining)	\$ 6,003
2020	6,243
2021	5,937
2022	4,273
2023	2,974
Thereafter	17,928
Total lease payments	\$ 43,358
Less: Interest	(6,464)
Present value of lease liabilities	\$ 36,894

The weighted average remaining lease term and discount rate for all of our operating leases were as follows as of March 31, 2019 :

	Weighted Average Remaining Lease Term	Weighted Average Discount Rate
Operating Leases	8.35 years	3.75%

Supplemental cash flow information related to our operating leases was as follows for the period ended March 31, 2019 :

Cash paid for amounts included in the measurement of lease liabilities:

Operating cash outflow from operating leases	\$ 2,891
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NOTE 17. PENSION LIABILITY

In connection with the acquisition of HiTek Power Group and LumaSense, we acquired the HiTek Power Limited Pension Scheme (the "HiTek Plan") and the LumaSense Technologies GmbH pension obligation (the "LumaSense Plan"), respectively. These plans are both closed to new participants. 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. We are committed to make annual fixed payments of \$0.9 million into the HiTek Plan through April 30, 2024, and then \$1.8 million from May 1, 2024 through November 30, 2033. We are not currently committed to future payments to the LumaSense Plan.

The net pension liability is included in Other long-term liabilities in our balance sheet as follows:

	March 31, 2019	December 31, 2018
Pension liability	\$ 19,874	\$ 19,266

The following table sets forth the components of net periodic pension cost for the three months ended March 31, 2019 and 2018 :

	Three Months Ended March 31,	
	2019	2018
Interest cost	\$ 199	\$ 218
Expected return on plan assets	(170)	(161)
Amortization of actuarial gains and losses	118	136
Net periodic pension cost	\$ 147	\$ 193

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

NOTE 18. STOCK-BASED COMPENSATION

On May 4, 2017, the shareholders approved the Company's 2017 Omnibus Incentive Plan ("the 2017 Plan") and all shares that were then available for issuance under the 2008 Omnibus Incentive Plan are now available for issuance under the 2017 Plan. The 2017 Plan provides for the grant of stock options, stock appreciation rights, restricted stock, stock units (including deferred stock units), unrestricted stock, and dividend equivalent rights. Any of the awards issued under the 2017 Plan may be issued as performance-based awards to align compensation awards to the attainment of annual or long-term performance goals. As of March 31, 2019, there were 3.1 million shares reserved and 2.3 million shares available for grant under the 2017 Plan.

Restricted stock units ("RSU's") are generally granted with a grant date fair value equal to the market price of our stock at the date of grant and with generally a three or four-year vesting schedule or performance-based vesting as determined at the time of grant.

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.

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 months ended March 31, 2019 and 2018 was as follows:

	Three Months Ended March 31,	
	2019	2018
Stock-based compensation expense	\$ 3,199	\$ 4,494

Changes in the outstanding RSU awards during the three months ended March 31, 2019 were as follows:

	Three Months Ended March 31, 2019	
	Number of RSUs	Weighted-Average Grant Date Fair Value
RSUs outstanding at beginning of period	352	\$ 58.17
RSUs granted	331	\$ 51.94
RSUs vested	(96)	\$ 48.14
RSUs forfeited	(10)	\$ 32.19
RSUs outstanding at end of period	577	\$ 56.73

Changes in the outstanding stock option awards during the three months ended March 31, 2019 were as follows:

	Three Months Ended March 31, 2019	
	Number of Options	Weighted-Average Exercise Price per Share
Options outstanding at beginning of period	230	\$ 20.73
Options exercised	(9)	\$ 10.50
Options expired	(1)	\$ 7.69
Options outstanding at end of period	220	\$ 21.21

NOTE 19. COMMITMENTS AND CONTINGENCIES

We have firm purchase commitments and agreements with various suppliers to ensure the availability of components. The obligation as of March 31, 2019 is approximately \$99.4 million. Our policy with respect to all purchase commitments is to record losses, if any, when they are probable and reasonably estimable. We continuously monitor these commitments for exposure to potential losses and will record a provision for losses when it is deemed necessary.

We are involved in disputes and legal actions arising in the normal course of our business. There have been no material developments in legal proceedings in which we are involved during the three months ended March 31, 2019.

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

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 three months ended March 31, 2019, we engaged in the following transactions with companies related to members of our Board of Directors, as described below:

	Three Months Ended March 31,	
	2019	2018
Sales to related parties	\$ 352	\$ 73
Number of related party customers	1	1

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

	March 31,	December 31,
	2019	2018
Accounts receivable from related parties	\$ 154	\$ 109
Number of related party customers	1	1

NOTE 21. 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 three months ended March 31, 2019 and 2018:

	Three Months Ended March 31,			
	2019	% of Total Sales	2018	% of Total Sales
Applied Materials, Inc.	\$ 36,290	25.8%	\$ 69,872	35.7%
LAM Research	19,667	14.0%	39,726	20.3%

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 March 31, 2019 and December 31, 2018:

	March 31,	December 31,
	2019	2018
Applied Materials, Inc.	\$ 27,150	\$ 34,301
LAM Research	11,941	12,181

Our sales to Applied Materials, Inc. and LAM Research 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.

NOTE 22. CREDIT FACILITY

The Company is party to a Loan Agreement, as amended (the "Loan Agreement") with Bank of America N.A. ("BA") which provides a revolving line of credit of up to \$150.0 million subject to certain funding conditions. The Loan Agreement expires on July 28, 2022. Interest on amounts drawn shall be paid quarterly based upon the LIBOR Daily Floating Rate then in effect, plus between one and one-quarter (1.25%) and one and three-quarters (1.75%) percentage points depending on the Funded Debt to EBITDA ratio. As of March 31, 2019, the interest rate was 3.75%. The Loan Agreement also requires the Company to pay the lender on a quarterly basis an unused commitment fee based on credit availability. The obligations under the Loan Agreement are unsecured until the Funded Debt to EBITDA ratio exceeds 2.0 to 1.0, at which time the Company and certain affiliates' tangible and intangible personal property will be subject to a first priority, perfected lien and security interest in favor of BA pursuant to a Security Agreement. As of March 31, 2019, the Company is in compliance with all covenants required under the Loan Agreement. At March 31, 2019 our credit availability under the Loan Agreement was \$150.0 million.

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

Interest expense related to unused line of credit fees was as follows:

	Three Months Ended March 31,	
	2019	2018
Unused line of credit fees	\$ 56	\$ 56

ITEM 2. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

Special Note on Forward-Looking Statements

The following discussion contains, in addition to historical information, forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended. Statements in this report that are not historical information are forward-looking statements. For example, statements relating to our beliefs, expectations and plans are forward-looking statements, as are statements that certain actions, conditions or circumstances will continue. The inclusion of words such as "anticipate," "expect," "estimate," "can," "may," "might," "continue," "enables," "plan," "intend," "should," "could," "would," "likely," "potential," or "believe," as well as statements that events or circumstances "will" occur or continue, indicate forward-looking statements. Forward-looking statements involve risks and uncertainties, which are difficult to predict and many of which are beyond our control. Therefore, actual results could differ materially and adversely from those expressed in any forward-looking statements. Neither we nor any other person assumes responsibility for the accuracy and completeness of such forward-looking statements and readers are cautioned not to place undue reliance on forward-looking statements.

For additional information regarding factors that may affect our actual financial condition, results of operations and accuracy of our forward-looking statements, see the information under the caption "Risk Factors" in Part II, Item 1A of this Quarterly Report on Form 10-Q and, in our Annual Report on Form 10-K for the year ended December 31, 2018. We undertake no obligation to revise or update any forward-looking statements for any reason.

BUSINESS AND MARKET OVERVIEW

Semiconductor Market

The semiconductor market is being driven by the rapid adoption of solid-state drives (SSD) deploying the latest 3D-NAND memory devices and a ramp of advanced Logic devices at the 10nm technology node. The industry's transition to 3D memory devices and advanced Logic is generating increasing demand for RF power supplies, matches and accessories. The growing number of steps associated with the deposition and etch processes is driving an increase in the number of process chambers per fab and higher content of more advanced power solutions per chamber. As etching processes become more challenging due to increasing aspect ratios in advanced 3D devices, more advanced RF technology that includes pulsing and increased control and instrumentation is needed. We are capitalizing on these trends and providing a broader range of more complex combinations of RF power and frequencies and launching more capable matching networks to manage and control the delivered power. During the year, we acquired Trek and LumaSense, which increased our presence in the electrostatic chuck, electrostatic sensor, and temperature measurement applications for the semiconductor market.

Following record revenues in the first half of 2018, we began to see a pause in the semiconductor capital equipment market in the second half of 2018 that accelerated through the end of 2018. Investment in semiconductor capital equipment continued to weaken in the first quarter of 2019 as a result of slowing growth in end market demand for semiconductor devices, ongoing digestion of equipment capacity, and inventory reduction in both semiconductor devices and finished good inventory at our customers. It is difficult to determine when or if overall market investment in semiconductor capital equipment will return to 2017 levels.

Industrial Technology Markets

Customers in the industrial capital equipment market incorporate our industrial process power and applied power products into a wide variety of equipment used in applications such as thin films, advanced material fabrication, and analytical instrumentation.

In industrial technology applications, we remain focused on taking our products into new applications and world regions, increasing our penetration into Asia, Europe and North America. In 2018, we made gains across an array of industries. In the first quarter of 2018, we saw strength in solar driven a large shipment to a thin film solar customer and solid growth in

our medical and high voltage products. This was offset by weakness in industrial production and consumer related markets including flat panel display and hard coating applications. Our acquisition of LumaSense further expanded our presence in pyrometry and other temperature measurement applications and contributed to both sequential and year over year growth.

The analysis presented below is organized to provide the information we believe will be helpful for understanding our historical performance and relevant trends going forward. This discussion should be read in conjunction with our Unaudited Condensed Consolidated Financial Statements in Part I, Item 1 of this report, including the notes thereto. Also included in the following analysis are measures that are not in accordance with U.S. GAAP. A reconciliation of the non-GAAP measures to U.S. GAAP is provided below.

Results of Continuing Operations

The following tables set forth certain data, and the percentage of sales each item reflects, derived from our Unaudited Condensed Consolidated Statements of Operations for the periods indicated (in thousands):

	Three Months Ended March 31,			
	2019		2018	
Sales	\$ 140,743	100.0 %	\$ 195,617	100.0%
Gross profit	65,740	46.7	103,645	53.0
Operating expenses	53,949	38.3	47,542	24.3
Operating income from continuing operations	11,791	8.4	56,103	28.7
Other income (expense), net	743	0.5	26	—
Income from continuing operations before income taxes	12,534	8.9	56,129	28.7
Provision (benefit) for income taxes	(2,853)	(2.0)	9,759	5.0
Income from continuing operations, net of income taxes	\$ 15,387	10.9 %	\$ 46,370	23.7%

SALES

The following tables summarize net sales and percentages of net sales, by product line, for the three months ended March 31, 2019 and 2018 :

	Three Months Ended March 31,		Change 2019 v. 2018	
	2019	2018	Dollar	Percent
Semiconductor capital market	\$ 67,514	\$ 136,010	\$ (68,496)	(50.4)%
Industrial technology capital market	44,598	35,199	9,399	26.7 %
Global support	28,631	24,408	4,223	17.3 %
Total	\$ 140,743	\$ 195,617	\$ (54,874)	(28.1)%

	Three Months Ended March 31,	
	2019	2018
Semiconductor capital market	48.0%	69.5%
Industrial technology capital market	31.7	18.0
Global support	20.3	12.5
Total	100.0%	100.0%

Total Sales

Sales decreased \$54.9 million , or 28.1% , to \$140.7 million for the three months ended March 31, 2019 as compared to the same period in 2018 and decreased \$13.4 million , or 8.7% , as compared to the three months ended December 31, 2018 . The decrease in first quarter sales is principally associated with a decreased demand in the semiconductor capital equipment market. Sales for the three months ended March 31, 2019 includes \$12.0 million associated with our recently acquired LumaSense business.

Sales in the semiconductor market decreased \$68.5 million , or 50.4% , for the three months ended March 31, 2019 as compared to the same period in 2018 and decreased \$16.0 million , or 19.1% , as compared to the three months ended December 31,

2018 . The decrease in our semiconductor market sales is consistent with the overall market decline, as investment in new fabrication equipment has been delayed and original equipment manufacturers consume inventory.

Sales in the industrial technology markets increased \$9.4 million , or 26.7% , for the three months ended March 31, 2019 as compared to the same in period in 2018, predominately due to the addition of LumaSense. Sales increased \$3.0 million , or 7.3% , as compared to the three months ended December 31, 2018 . The thin film and specialty power industrial markets we serve include solar panel, flat panel display, architectural glass, consumer electronics, power control modules, data storage, high voltage and other industrial manufacturing markets. Our customers in these markets are primarily global and regional original equipment manufacturers.

Global service sales increased \$4.2 million , or 17.3% , for the three months ended March 31, 2019 as compared to the same period in 2018 and decreased \$0.5 million , or 1.7% , as compared to the three months ended December 31, 2018 . The increase in global service sales is due to continued share gains and growth in the installed base. Global service sales are also impacted by the timing and mix of projects during the periods.

Backlog

Our backlog was \$61.7 million at March 31, 2019 as compared to \$74.7 million at December 31, 2018 . Backlog declined primarily due to slowing demand in the semiconductor market.

GROSS PROFIT

For the three months ended March 31, 2019 , gross profit decreased \$37.9 million to \$65.7 million as compared to gross profit of \$103.6 million for the same period in 2018 principally due to the reduction in sales volume. Gross profit as a percent of sales decreased to 46.7% for the three months ended March 31, 2019 , from 53.0% for the same period in 2018. The change in gross profit as a percent of revenue is due to reduced operating leverage on lower volume, product mix and higher freight and customs costs. Gross profit for the three months ended March 31, 2019 includes \$7.5 million from our recently acquired LumaSense business.

OPERATING EXPENSE

Operating expenses increased \$6.4 million to \$ 53.9 million , or 38.3% of sales, for the three months ended March 31, 2019 from \$47.5 million , or 24.3% of sales, for the same period in 2018 .

The following tables summarize our operating expenses as a percentage of sales for the periods indicated:

	Three Months Ended March 31,			
	2019		2018	
Research and development	\$ 21,289	15.1%	\$ 17,637	9.0%
Selling, general, and administrative	29,014	20.6	28,648	14.7
Amortization of intangible assets	1,973	1.4	1,257	0.6
Restructuring charges	1,673	1.2	—	—
Total operating expenses	\$ 53,949	38.3%	\$ 47,542	24.3%

Research and Development

We perform research and development of products for new or emerging applications, technological changes 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 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 increased \$3.7 million to \$21.3 million , or 15.1% of sales, for the three months ended March 31, 2019 from \$17.6 million , or 9.0% of sales, for the same period in 2018 . The increase in research and development expense is 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. Research and development for the three months ended March 31, 2019 includes \$2.1 million from our recently acquired LumaSense business.

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 expenses increased \$0.4 million to \$29.0 million, or 20.6%, of sales for the three months ended March 31, 2019 from \$28.6 million, or 14.7% of sales, for the same period in 2018. Selling, general and administrative expenses for the three months ended March 31, 2019 includes \$3.6 million from our recently acquired LumaSense business. The resulting decrease in selling, general and administrative expense, after giving consideration to LumaSense 2019 expenses, was attributable to reductions in payroll related costs, travel and other outside services. We were able to implement cost containment while still preserving recent infrastructure investment in personnel and geographic footprint, as well as a favorable sales and use tax audit settlement.

Restructuring

In connection with the restructuring actions management previously put in place to optimize our manufacturing footprint to lower-cost regions, improvements in operating efficiencies and synergies related to our recent acquisitions, during the three months ended March 31, 2019, we recognized an additional \$1.5 million in restructuring charges related to excess leased space and inventory. Additionally, during this same time period, we paid approximately \$0.9 million in severance related costs.

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 \$0.7 million for the three months ended March 31, 2019, as compared to less than \$0.1 million for the same period in 2018. The increase in other income is primarily due to improved interest earnings as a result of improved investment management of excess cash.

Provision for Income Taxes

Our effective tax rates differ from the U.S. federal statutory rate of 21% for the three months ended March 31, 2019 and 2018, respectively, primarily due to the benefit of earnings in foreign jurisdictions which are subject to lower tax rates, partially offset by additional GILTI tax in the U.S. The effective tax rate for the first quarter of 2019 was lower than the same period in 2018 primarily due to the release of liabilities for uncertain tax positions in 2019 based on the completion of additional procedures during the quarter to support a change in facts with respect to a specific prior period position.

Our future effective income tax rate depends on various factors, such as changes in tax laws, regulations, accounting principles, or interpretations thereof and the geographic composition of our pre-tax income. We carefully monitor these factors and adjust our effective income tax rate accordingly.

Results of Discontinued Operations

We completed the wind down of our inverter engineering, manufacturing and sales product line in December 2015. Accordingly, the inverter product line is presented as a discontinued operation for all periods presented herein. Extended warranties previously sold for the inverter product line are reflected in deferred revenue from continuing operations on our Unaudited Condensed Consolidated Balance Sheets and will be reflected in continuing operations in future periods as the deferred revenue is earned and the associated services are rendered.

Income from discontinued operations, net of income taxes are as follows (in thousands):

	Three Months Ended March 31,	
	2019	2018
Sales	\$ —	\$ —
Cost of sales	—	112
Total operating expense (benefit)	—	(61)
Operating income (loss) from discontinued operations	—	(51)
Other income (expense)	(4)	124
Income (loss) from discontinued operations before income taxes	(4)	73
Provision (benefit) for income taxes	5	(67)
Income (loss) from discontinued operations, net of income taxes	\$ (9)	\$ 140

Operating income from discontinued operations for the three months ended March 31, 2019 and 2018 includes the impacts of changes in our estimated product warranty liability, the recovery of accounts receivable and foreign exchange gain or (losses).

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, as well as discontinued operations, and non-recurring items such as acquisition-related costs and restructuring expenses. 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.

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

	Three Months Ended March 31,	
	2019	2018
Gross profit from continuing operations, as reported	\$ 65,740	\$ 103,645
Adjustments to gross profit:		
Stock-based compensation	233	351
Facility expansion and relocation costs	170	—
Non-GAAP gross profit	66,143	103,996
Operating expenses from continuing operations, as reported	53,949	47,542
Adjustments:		
Amortization of intangible assets	(1,973)	(1,257)
Stock-based compensation	(2,966)	(4,143)
Acquisition-related costs	(1,511)	(350)
Facility expansion and relocation costs	(74)	(476)
Restructuring charges	(1,673)	—
Non-GAAP operating expenses	45,752	41,316
Non-GAAP operating income	\$ 20,391	\$ 62,680

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

	Three Months Ended March 31,	
	2019	2018
Gross profit from continuing operations, as reported	46.7 %	53.0 %
Adjustments to gross profit:		
Stock-based compensation	0.2	0.2
Facility expansion and relocation costs	0.1	—
Non-GAAP gross profit	47.0	53.2
Operating expenses from continuing operations, as reported	38.3	24.3
Adjustments:		
Amortization of intangible assets	(1.4)	(0.6)
Stock-based compensation	(2.0)	(2.1)
Acquisition-related costs	(1.1)	(0.2)
Facility expansion and relocation costs	(0.1)	(0.2)
Restructuring charges	(1.2)	—
Non-GAAP operating expenses	32.5	21.2
Non-GAAP operating income	14.5 %	32.0 %

Reconciliation of Non-GAAP measure - income from continuing operations, excluding certain items

	Three Months Ended March 31,	
	2019	2018
Income from continuing operations, less noncontrolling interest, net of income taxes	\$ 15,379	\$ 46,339
Adjustments:		
Amortization of intangible assets	1,973	1,257
Acquisition-related costs	1,511	350
Facility expansion and relocation costs	244	476
Restructuring charges	1,673	—
Tax Cuts and Jobs Act Impact	—	1,853
Tax effect of non-GAAP adjustments	(851)	(309)
Non-GAAP income, net of income taxes, excluding stock-based compensation	19,929	49,966
Stock-based compensation, net of taxes	2,463	3,460
Non-GAAP income, net of income taxes	\$ 22,392	\$ 53,426
Non-GAAP diluted earnings per share	\$0.58	\$1.34

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. From time to time, we may also reduce prices to customers to decrease sales prices due to reductions in the cost structure of our products from cost improvement initiatives and decreases in component part prices.

Liquidity and Capital Resources
LIQUIDITY

We believe that adequate liquidity and cash generation are 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, cash generated from current operations as well as our credit facility noted below.

At March 31, 2019, we had \$353.7 million in cash, cash equivalents, and marketable securities. We believe that our current and available cash levels, available credit facility, as well as our cash generated from future operations, will be adequate to meet

anticipated working capital requirements, capital expenditures, contractual obligations, share repurchase programs, and additional acquisitions during the next twelve months. We may, however, depending upon the number or size of additional acquisitions, seek additional financing from time to time.

In addition to available cash, cash equivalents, and marketable securities, we have an available revolving line of credit ("LOC") with a bank which provides up to \$150.0 million subject to certain funding conditions and expiring in July 2022. At March 31, 2019, we had \$150.0 million in available funding under the LOC. For more information on the LOC, see *Note 22. Credit Facility* in Part I, Item 1 "Unaudited Condensed Consolidated Financial Statements" contained herein.

In September 2015, our Board of Directors authorized a program to repurchase up to \$150.0 million of our stock over a thirty-month period. In November 2017, our Board of Directors approved an extension to the share repurchase program to December 2019 from its original maturity of March 2018 and in May 2018, approved a \$50 million increase in its authorization to repurchase shares of Company common stock under this same program. As of March 31, 2019, we had \$24.9 million remaining for the future repurchase of our stock.

In order to execute the repurchase of shares of common stock, the Company periodically enters into stock repurchase agreements. During the three months ended March 31, 2019 and 2018, the Company has repurchased the following shares of common stock (in thousands, except per share amounts):

	Three Months Ended March 31,	
	2019	2018
Amount paid to repurchase shares	\$ —	\$ 12,750
Number of shares repurchased	—	181
Average repurchase price per share	\$ —	\$ 70.47

CASH FLOWS

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

	Three Months Ended March 31,	
	2019	2018
Net cash provided by operating activities from continuing operations	\$ 6,855	\$ 34,885
Net cash used in operating activities from discontinued operations	(1,409)	(1,784)
Net cash provided by operating activities	5,446	33,101
Net cash used in investing activities from continuing operations	(2,436)	(9,995)
Net cash used in investing activities from discontinued operations	—	—
Net cash used in investing activities	(2,436)	(9,995)
Net cash used in financing activities from continuing operations	(1,707)	(16,782)
Net cash used in financing activities from discontinued operations	—	—
Net cash used in financing activities	(1,707)	(16,782)
EFFECT OF CURRENCY TRANSLATION ON CASH	(566)	167
INCREASE IN CASH AND CASH EQUIVALENTS	737	6,491
CASH AND CASH EQUIVALENTS, beginning of period	354,552	415,037
CASH AND CASH EQUIVALENTS, end of period	355,289	421,528
Less cash and cash equivalents from discontinued operations	4,140	7,654
CASH AND CASH EQUIVALENTS FROM CONTINUING OPERATIONS, end of period	\$ 351,149	\$ 413,874

2019 CASH FLOWS COMPARED TO 2018

Net cash provided by operating activities

Net cash provided by operating activities for the three months ended March 31, 2019 was \$5.4 million, as compared to \$33.1 million for the same period in 2018. The decrease of \$27.7 million in net cash flows from operating activities, as compared to the same period in 2018, is predominately due to decreased earnings from continuing operations.

Net cash used in investing activities

Net cash used in investing activities for the three months ended March 31, 2019 was \$2.4 million , as compared to \$10.0 million for the same period in 2018 which included \$6.1 million used in the acquisition of Trek.

Net cash used in financing activities

Net cash used in financing activities for the three months ended March 31, 2019 was \$1.7 million , as compared to \$16.8 million for the same period in 2018 which included \$12.8 million for the repurchase of company stock.

Effect of currency translation on cash

During the three months ended March 31, 2019 , currency translation had a \$0.6 million unfavorable impact as compared to a \$0.2 million favorable impact during the same period in 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"), 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 three months ended March 31, 2019 and 2018 are as follows:

	From	To	Three Months Ended March 31,	
			2019	2018
CAD	USD		2.1 %	(2.7)%
CHF	USD		(1.1)%	2.3 %
CNY	USD		2.5 %	3.6 %
DKK	USD		(2.0)%	N/A
EUR	USD		(2.0)%	2.9 %
GBP	USD		2.3 %	3.9 %
ILS	USD		3.3 %	N/A
INR	USD		0.1 %	(1.8)%
JPY	USD		(0.8)%	6.0 %
KRW	USD		(2.1)%	0.6 %
SGD	USD		0.6 %	1.9 %
TWD	USD		(0.9)%	2.2 %

Critical Accounting Policies and Estimates

The preparation of financial statements and related disclosures in conformity with U.S. GAAP requires us to make judgments, assumptions and estimates that affect the amounts reported in the Condensed Consolidated Financial Statements and accompanying notes. *Note 1. Operation and Summary of Significant Accounting Policies and Estimates* to the Consolidated Financial Statements in our Annual Report on Form 10-K for the year ended December 31, 2018 describes the significant accounting policies and methods used in the preparation of our Consolidated Financial Statements. Our critical accounting estimates, discussed in the Management's Discussion and Analysis of Financial Condition and Results of Operations in Part II, Item 7 of our Annual Report on Form 10-K for the year ended December 31, 2018 , include estimates for allowances for doubtful accounts, determining useful lives for depreciation and amortization, the valuation of assets and liabilities acquired in business combinations, assessing the need for impairment charges for identifiable intangible assets and goodwill, establishing warranty reserves, accounting for income taxes, and assessing excess and obsolete inventories. Such accounting policies and estimates require significant judgments and assumptions to be used in the preparation of the Condensed Consolidated Financial Statements and actual results could differ materially from the amounts reported based on variability in factors affecting these estimates.

ITEM 3. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Interest Rate Risk

Our market risk exposure relates to changes in interest rates in our investment portfolio. 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 March 31, 2019, our investments consisted of certificates of deposit, with maturities of less than 1 year and money market deposits (see *Note 7. Marketable Securities and Assets Measured at Fair Value* in Part 1, Item 1 "Unaudited Condensed Consolidated Financial Statements"). As a measurement of the sensitivity of our portfolio and assuming that our investment portfolio balances remain constant, a hypothetical decrease of one percentage point in interest rates would decrease annual pre-tax earnings by an immaterial amount.

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. Our purchasing and sales activities are primarily denominated in USD, CNY, EURO, and JPY. 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.

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 many 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.

From time to time, we enter into foreign currency exchange rate contracts with banks to hedge against changes in foreign currency exchange rates on assets and liabilities expected to be settled at a future date. 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 attempt to mitigate 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 into these contract instruments for risk management purposes only. We do not enter into or issue derivatives for trading or speculative purposes.

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.

See the "Risk Factors" set forth in Part I, Item 1A of our Annual Report on Form 10-K and Part II, Item 1A of this Form 10-Q for more information about the market risks to which we are exposed. There have been no material changes in our exposure to market risk from December 31, 2018.

ITEM 4. 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 ("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), 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 March 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.

Changes in Internal Control over Financial Reporting

There was no change in our internal control over financial reporting that occurred during the fiscal quarter covered by this Form 10-Q that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

PART II OTHER INFORMATION

ITEM 1. LEGAL PROCEEDINGS

We are involved in disputes and legal actions arising in the normal course of our business. There have been no material developments in legal proceedings in which we are involved during the three months ended March 31, 2019. For a description of previously reported legal proceedings refer to Part I, Item 3, "Legal Proceedings" of our Annual Report on Form 10-K for the year ended December 31, 2018.

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-Q and other reports we file with the Securities and Exchange Commission.

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

As a supplier to the global semiconductor, flat panel display, solar, industrial and related industries, we are subject to business cycles, the timing, length, and volatility of which can be difficult to predict. 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 sufficient 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.

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. 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. Any potential losses from such occurrences could significantly affect our relationship with customers, operations and results of operations for a prolonged period of time. As a result, we have begun investing in the evaluation of additional production options in Southeast Asia. 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.

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 relocate manufacturing or migrate manufacturing of specific products between facilities or to third party manufacturers. 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 evaluating establishing a second factory in southeast Asia 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.

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 operations;
- 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; and
- 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.

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 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 sufficient raw materials, parts, components, or subassemblies, on favorable terms or at all, to fulfill the excess demand

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, particularly imports. 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 also initiated the imposition of additional tariffs on certain foreign goods, including steel and aluminum, semiconductor manufacturing equipment and spare parts thereof.

Examples of recent actions are tariffs on steel and aluminum product imports announced by the U.S. Department of Commerce in March 2018 and a 25% tariff on certain products that originate in China announced by the United States Trade Representative ("USTR") in June 2018. The USTR also announced in June and July 2018 two additional supplemental lists of products that are subject to tariffs if the goods imported into the United States originate in China, which would increase the cost of imported products. These supplemental lists issued by the USTR issued an additional 25% and 10% duty, respectively, 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, the second list was made effective with a 25% tariff and in September the third list was made effective with a 10% tariff. 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.

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.

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.

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;
- 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.

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 PRC government actions, and unsettled political conditions including potential changes in U.S. policy regarding overseas manufacturing. 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.

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.

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 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 Organisation for Economic Co-operation 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, 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 thin film 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.

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, 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 5-10 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.

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. 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 53.2% and 69.6% of our sales for the three months ended March 31, 2019 and 2018, respectively. During the three months ended March 31, 2019, sales to Applied Materials, Inc. and Lam Research were \$36.3 million and \$19.7 million, respectively. During the three months ended March 31, 2018 sales to Applied Materials, Inc., and Lam Research were \$69.9 million and \$39.7 million, respectively. Applied Material, Inc. had a \$27.2 million and \$34.3 million accounts receivable balance as of March 31, 2019 and December 31, 2018, respectively. Lam Research had a \$11.9 million and \$12.2 million accounts receivable balance as of March 31, 2019 and December 31, 2018, respectively. A significant decline in sales from either or both 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.

We are subject to risks inherent in international operations.

Sales to our customers outside the United States were approximately 58.9% and 45.2% of our total sales for the three months ended March 31, 2019 and 2018, respectively. The acquisitions of the power controls modules and high and low voltage product lines 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 sufficient 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 \$23.6 million in accounts receivable from foreign customers as of March 31, 2019; and
- changes in tariffs, taxes, and foreign currency exchange rates.

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.

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. We believe some of our Asian competitors benefit from local governmental funding incentives and purchasing preferences from end-user customers in their 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 sufficient 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 claims from customers and suppliers and in some cases, 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. Discontinued Operations* in Part I, Item 1 "Unaudited Condensed Consolidated Financial Statements" contained herein.

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. Discontinued Operations* in Part I, Item 1 "Unaudited Condensed Consolidated Financial Statements" 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, our exposure to fluctuations in the value of the Euro 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 March 29, 2017, the UK's ambassador to the EU delivered a letter to the president of the European Council that gave formal notice under Article 50 of the Lisbon Treaty of UK's withdrawal from the EU, commonly referred to as "Brexit". As a result, negotiations have commenced to determine the terms of 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. 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 Shenzhen, 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 facility 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.

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. Any system, network or Internet failures, misuse by system users, 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, 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 user names, 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 of 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).

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.

Deterioration of demand for our inverter services could negatively impact our business.

Our business may be adversely affected by changes in national or global demand for our inverter service repair capabilities. Any such changes could adversely affect the carrying amount of our inverter service inventories, thereby negatively affecting our financial results from Continuing Operations.

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. 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 plan.

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 plan 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 I, Item 1 "Unaudited Condensed Consolidated Financial Statements" 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 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 March 31, 2019, we have \$101.3 million of goodwill and \$52.9 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 import, export 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. However, the implementation of these requirements could adversely affect the sourcing, availability and pricing of such minerals if they are found to be used in the manufacture of our 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 of 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 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.

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 governmental 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.

ITEM 6. EXHIBITS

The exhibits listed in the following Exhibit Index are filed as part of this Quarterly Report on Form 10-Q.

Exhibit Index to Form 10-Q for the Period Ended March 31, 2019

[3.1 Amended and Restated By-laws of Advanced Energy Industries, Inc.](#)

[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 Chief 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.SCH XBRL Taxonomy Extension Schema Document

101.CAL XBRL Taxonomy Extension Calculation Linkbase Document

101.DEF XBRL Taxonomy Extension Definition Linkbase Document

101.LAB XBRL Taxonomy Extension Label Linkbase Document

101.PRE XBRL Taxonomy Extension Presentation Linkbase Document

Attached as Exhibit 101 to this report are the following materials from Advanced Energy, Inc.'s Quarterly Report on Form 10-Q for the quarter ended March 31, 2019, formatted in XBRL (eXtensible Business Reporting Language): (i) the Condensed Consolidated Statements of Earnings, (ii) the Condensed Consolidated Statements of Comprehensive Earnings, (iii) the Condensed Consolidated Balance Sheets, (iv) the Condensed Consolidated Statements of Cash Flows, (v) the Condensed Consolidated Statements of Stockholders' Equity, and (vi) the Notes to the Condensed Consolidated Financial Statements.

SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned thereunto duly authorized.

ADVANCED ENERGY INDUSTRIES, INC.

Dated: May 6, 2019

/s/ Paul Oldham

Paul Oldham

Chief Financial Officer & Executive Vice President

AMENDED AND
RESTATED BY-LAWS OF
ADVANCED ENERGY INDUSTRIES, INC.
(A DELAWARE CORPORATION)
(UPDATED THROUGH THE FIFTH AMENDMENT)

By-Laws
OF
ADVANCED ENERGY INDUSTRIES, INC.
(A DELAWARE CORPORATION)

**ARTICLE I
OFFICES**

Section 1. Registered Office. The registered office of the corporation in the State of Delaware shall be in the City of Wilmington, County of New Castle.

Section 2. Other Offices. The corporation shall also have and maintain an office or principal place of business at such place as may be fixed by the Board of Directors, and may also have offices at such other places, both within and without the State of Delaware as the Board of Directors may from time to time determine or the business of the corporation may require.

**ARTICLE II
CORPORATE SEAL**

Section 3. Corporate Seal. The corporate seal shall consist of a die bearing the name of the corporation and the inscription, "Corporate Seal- Delaware." Said seal may be used by causing it or a facsimile thereof to be impressed or affixed or reproduced or otherwise.

**ARTICLE III
STOCKHOLDERS' MEETINGS**

Section 4. Place of Meetings. Meetings of the stockholders of the corporation shall be held at such place, either within or without the State of Delaware, as may be designated from time to time by the Board of Directors, or, if not so designated, then at the office of the corporation required to be maintained pursuant to Section 2 hereof.

Section 5. Annual Meeting.

(a) The annual meeting of the stockholders of the corporation, for the purpose of election of directors and for such other business as may lawfully come before it, shall be held on such date and at such time as may be designated from time to time by the Board of Directors.

(b) Special Meetings.

(i) Special meetings of the stockholders of the corporation may be called, for any purpose or purposes, by (i) the Chairman of the Board of Directors, (ii) the President, (iii) the Board of Directors pursuant to a resolution adopted by a majority of the total number of authorized directors (whether or not there exist any vacancies in previously authorized directorships at the time any such resolution is presented to the Board of Directors for adoption) or (iv) by the holders of shares entitled to cast not less than ten percent (10%) of the votes at the meeting, and shall be held at such place, on such date, and at such time as the Board of Directors, shall fix.

(ii) If a special meeting is called by any person or persons other than the Board of Directors, the request shall be in writing, specifying the general nature of the business proposed to be transacted, and shall be delivered personally or sent by registered mail or by telegraphic or other facsimile transmission to the Chairman of the Board of Directors, the President, or the Secretary of the corporation. No business may be transacted at such special meeting otherwise than specified in such notice. The Board of Directors shall determine the time and place of such special meeting, which shall be held not less than thirty-five (35) nor more than one hundred twenty (120) days after the date of the receipt of the request. Upon determination of the time and place of the meeting, the officer receiving the request shall cause notice to be given to the stockholders entitled to vote, in accordance with the provisions of Section 7 of these By-Laws. If the notice is not given within sixty (60) days after the receipt of the request, the person or persons requesting the meeting may set the time and place of the meeting and give the notice. Nothing contained in this paragraph (b) shall be construed as limiting, fixing, or affecting the time when a meeting of stockholders called by action of the Board of Directors may be held.

Section 6. Advance Notice of Stockholder Nominations and Other Business.

(a) Annual Meeting of Stockholders.

(i) Nominations of persons for election to the Board of Directors and the proposal of other business to be considered by the stockholders may be made at an annual meeting of stockholders (A) brought before the annual meeting by or at the direction of the Board of Directors, or (B) specified in the notice of meeting (or any supplement thereto) given by or at the direction of the Board of Directors (or any duly authorized committee thereof), or (C) by any stockholder of the corporation who (1) was a stockholder of record at the time of giving notice provided for in this Section 6, (2) at the time of the annual meeting is entitled to vote at the meeting, and (3) complies with the notice procedures set forth in this Section 6 as to such business or nomination; clause (C) shall be the exclusive means for a stockholder to make nominations or submit other business (other than matters properly brought under Rule 14a-8 under the Securities Exchange Act of 1934, as amended (the “*Exchange Act*”) and included in the corporation’s notice of meeting) before an annual meeting of stockholders.

(ii) Without qualification, for any nominations or any other business to be properly brought before an annual meeting by a stockholder pursuant to Section 6(a)(i)(C) of these By-Laws, the stockholder must have given timely notice thereof in writing to the Secretary and such other business must otherwise be a proper matter for stockholder action. To be timely, a stockholder’s notice shall be delivered to the Secretary at the principal executive offices of the corporation not earlier than the close of business on the 90th day and not later than the close of business on the 60th day prior to the first anniversary of the preceding year’s annual meeting; *provided, however*, that in the event that the date of the annual meeting is more than 30 days before or more than 30 days after such anniversary date, notice by the stockholder to be timely must be so delivered not earlier than the close of business on the 90th day prior to the date of such annual meeting and not later than the close of business on the later of the 60th day prior to the date of such annual meeting or, if the first public announcement of the date of such annual meeting is less than 70 days prior to the date of such annual meeting, the 10th day following the day on which public announcement of the date of such meeting is first made by the corporation. In no event shall any adjournment or postponement of an annual meeting or the announcement thereof commence a new time period for the giving of a stockholder’s notice as described above. To be in proper form, a stockholder’s notice (whether given pursuant to this Section 6(a)(ii) or Section 6(b)) to the Secretary must:

(A) set forth, as to the stockholder giving the notice and as to the Stockholder Associated Person (as defined herein), if any, on whose behalf the nomination or proposal is made (i) the name and address of such stockholder, as they appear on the corporation’s books and such Stockholder Associated Person, if any, (ii) (a) the class and number of shares of the corporation which are, directly or indirectly, owned beneficially and of record by such stockholder and Stockholder Associated Person, (b) any option, warrant, convertible security, stock appreciation right, or similar right with an exercise or conversion privilege or a settlement payment or mechanism at a price related to any class of shares of the corporation or with a value derived in whole or in part from the value of any class of shares of the corporation, whether or not such instrument or right shall be subject to settlement in the underlying class of stock of the corporation or otherwise (a “*Derivative Instrument*”) directly or indirectly owned beneficially by such stockholder or Stockholder Associated Person and any other direct or indirect opportunity to profit or share in any profit derived from any increase or decrease in the value of shares of the corporation, (c) any proxy, contract, arrangement, understanding, or relationship pursuant to which such stockholder or Stockholder Associated Person has a right to vote any shares of any security of the Company, (d) any short interest in any security of the Company (for purposes of this Section 6 a person shall be deemed to have a short interest in a security if such person directly or indirectly, through any contract, arrangement, understanding, relationship or otherwise, has the opportunity to profit or share in any profit derived from any decrease in the value of the subject security), (e) any rights to dividends on the shares of the corporation owned beneficially by such stockholder or Stockholder Associated Person that are separated or separable from the underlying shares of the corporation, (f) any proportionate interest in shares of the corporation or Derivative Instruments held, directly or indirectly, by a general or limited partnership in which such stockholder or Stockholder Associated Person is a general partner or, directly or indirectly, beneficially owns an interest in a general partner, (g) any performance- related fees (other than an asset-based fee) that such stockholder or Stockholder Associated Person is entitled to based on any increase or decrease in the value of shares of the corporation or Derivative Instruments, if any, as of the date of such notice, including without limitation any such interests held by members of such stockholder’s immediate family sharing the same household and (h) any prior campaigns against the corporation by the stockholder or the Stockholder Associated Person, (iii) a representation that such stockholder intends to appear in person or by proxy at the meeting to nominate the persons named in its notice and (iv) any other information relating to such stockholder or Stockholder Associated Person, if any, that would be required to be disclosed in a proxy statement or other filings required to be made in connection with solicitations of proxies for, as applicable, the proposal and/or for the election of directors in a contested election pursuant to Section 14 of the Exchange Act and the rules and regulations promulgated thereunder;

(B) if the notice relates to any business other than a nomination of a director or directors that the stockholder proposes to bring before the meeting, set forth a brief description of the business desired to be brought before the meeting, the reasons for conducting such business at the meeting and any material interest of such stockholder and Stockholder Associated Person, if any, on whose behalf the proposal is made, as well as (i) such other information concerning

such business and the stockholder proponent as would be required by the appropriate Rules and Regulations of the Securities and Exchange Commission to be included in a proxy statement soliciting proxies for the proposal and (ii) a description of all agreements, arrangements and understandings between such stockholder and Stockholder Associated Person, if any, and any other person or persons (including their names) in connection with the proposal of such business;

(C) set forth, (i) as to each person whom the stockholder proposes to nominate for election or reelection to the Board of Directors (each a “**Proposed Nominee**”) (a) the name, age, business address, and residence address of the Proposed Nominee, (b) the principal occupation or employment of the Proposed Nominee, (c) the class and number of shares of the corporation which are directly or indirectly owned beneficially and of record by the Proposed Nominee, (d) all information relating to the Proposed Nominee that would be required to be disclosed in a proxy statement or other filings required to be made in connection with solicitations of proxies for election of directors in a contested election pursuant to Section 14 of the Exchange Act and the rules and regulations promulgated thereunder (including the Proposed Nominee’s written consent to being named in the proxy statement as a nominee and to serving as a director if elected) and (ii) a description of all direct and indirect compensation and other material monetary agreements, arrangements and understandings during the past three years, and any other material relationships, between or among such stockholder and Stockholder Associated Person, if any, and their respective affiliates and associates, or others acting in concert therewith, on the one hand, and each Proposed Nominee, and his or her respective affiliates and associates, or others acting in concert therewith, on the other hand, including, without limitation all information that would be required to be disclosed pursuant to Rule 404 promulgated under Regulation S-K of the Securities and Exchange Commission if the stockholder making the nomination and any Stockholder Associated Person on whose behalf the nomination is made, if any, or any affiliate or associate thereof or person acting in concert therewith, were the “registrant” for purposes of such rule and the nominee were a director or executive officer of such registrant. The corporation may require any Proposed Nominee to furnish such other information as may reasonably be required by the corporation to determine the eligibility of such Proposed Nominee to serve as an independent director of the corporation or that could be material to a reasonable stockholder’s understanding of the independence, or lack thereof, of such nominee; and

(D) with respect to each Proposed Nominee for election or reelection to the Board of Directors, include a completed and signed questionnaire, representation and agreement as set forth in this Section 6(a)(ii)(D). To be eligible to be a nominee for election or reelection as a director of the corporation, a person must deliver (in accordance with the time periods prescribed for delivery of notice under Section 6(a)(ii) of these By-Laws) to the Secretary at the principal executive offices of the corporation a written questionnaire with respect to the background and qualification of such person and the background of any other person or entity on whose behalf the nomination is being made (which questionnaire shall be provided by the Secretary upon written request) and a written representation and agreement (in the form provided by the Secretary upon written request) that such person (1) is not and will not become a party to (a) any agreement, arrangement or understanding with, and has not given any commitment or assurance to, any person or entity as to how such person, if elected as a director of the corporation, will act or vote on any issue or question (a “Voting Commitment”) that has not been disclosed to the corporation or (b) any Voting Commitment that could limit or interfere with such person’s ability to comply, if elected as a director of the corporation, with such person’s fiduciary duties under applicable law, (2) is not and will not become a party to any agreement, arrangement or understanding with any person or entity other than the corporation with respect to any direct or indirect compensation, reimbursement or indemnification in connection with service or action as a director that has not been disclosed therein, and (3) in such person’s individual capacity and on behalf of any person or entity on whose behalf the nomination is being made, would be in compliance, if elected as a director of the corporation, and will comply with all applicable publicly disclosed corporate governance, conflict of interest, confidentiality and stock ownership and trading policies and guidelines of the corporation.

(E) A stockholder providing notice of with respect to Section 6(a)(ii) or Section 6(b) shall further update and supplement such notice, if necessary, so that the information provided or required to be provided in such notice pursuant to Section 6(a)(ii) or Section 6(b) shall be true and correct as of the record date for the meeting and as of the date of the meeting or any adjournment or postponement thereof, as the case may be, and such update and supplement shall be delivered to or mailed and received by the Secretary at the principal executive offices of the corporation not later than five (5) business days after the later of the record date for the meeting or the date notice of such record date is first publicly announced by the corporation (in the case of the update and supplement required to be made as of the record date), and as promptly as practicable after any change in the information required to be provided (in the case of any update or supplement required to be made after the record date).

As used herein, the term “Stockholder Associated Person” of any stockholder means (i) any person controlling or controlled by, directly or indirectly or acting in concert with, such stockholder, (ii) any beneficial owner of shares of stock of the corporation owned of record or beneficially by such stockholder (other than a stockholder that is a depository) and (iii) any person that directly, or indirectly through one or more intermediaries, controls, or is controlled by, or is under common control with such Stockholder Associated Person. A person shall be deemed to be “acting in concert” with another person if such person knowingly acts (whether or not pursuant to an express agreement) in concert with, or towards a common goal relating to the management, governance or control of the corporation in parallel with, such other person where (A) each person is conscious of the other person’s conduct or intent and this awareness is an element in their decision-making process and (B) at least one

additional factor suggests that such persons intend to act in concert or in parallel, which such additional factors may include, without limitation, exchanging information (whether publicly or privately), attending meetings, conducting discussions or making or soliciting invitations to act in concert or in parallel; *provided* that a person shall not be deemed to be acting in concert with any other person solely as a result of the solicitation of proxies after the filing of an effective Schedule 14A under Section 14(a) of the Exchange Act. A person acting in concert with another person shall be deemed to be acting in concert with any third party who is also acting in concert with such other person.

(iii) Notwithstanding anything in the second sentence of Section 6(a)(ii) of these By-Laws to the contrary, in the event that the number of directors to be elected to the Board of Directors is increased and there is no public announcement by the corporation naming all of the nominees for director or specifying the size of the increased Board of Directors at least 70 days prior to the first anniversary of the preceding year's annual meeting, a stockholder's notice pursuant to this Section 6 shall also be considered timely, but only with respect to nominees for any new positions created by such increase, if it shall be delivered to the Secretary at the principal executive offices of the corporation not later than the close of business on the 10th day following the day on which such public announcement is first made by the corporation.

(b) Special Meetings of Stockholders. Only such business shall be conducted at a special meeting of stockholders as shall have been brought before the meeting pursuant to the corporation's notice of meeting (or any supplement thereto). If the business stated in the corporation's notice of a special meeting of stockholders includes electing one or more directors to the Board of Directors, nominations of persons for election to the Board of Directors may be made (i) by or at the direction of the Board of Directors or (ii) provided that the Board of Directors has determined that directors shall be elected at such meeting, by any stockholder of the corporation who (A) is a stockholder of record at the time of giving of notice provided for in this Section 6 and at the time of the special meeting, (B) is entitled to vote at the meeting, and (C) complies with the notice procedures set forth in Section 6(a)(ii) as to such nomination. Clause (ii) of this sentence shall be the exclusive means for a stockholder to make nominations before a special meeting of shareholders. To be timely, the stockholder's notice required by Section 6(a)(ii) of these By-Laws with respect to any Proposed Nominee (including the completed and signed questionnaire, representation and agreement required by Section 6(a)(ii)(D) of these By-Laws) shall be delivered to the Secretary at the principal executive offices of the corporation not earlier than the close of business on the 90th day prior to the date of such special meeting and not later than the close of business on the later of (Y) the 60th day prior to the date of such special meeting or, (Z) if the first public announcement of the date of such special meeting is less than 70 days prior to the date of such special meeting, the 10th day following the day on which public announcement is first made of the date of the special meeting and of the nominees proposed by the Board of Directors to be elected at such meeting. In no event shall any adjournment or postponement of a special meeting or the announcement thereof commence a new time period for the giving of a stockholder's notice as described above. Such stockholder's notice shall set forth the information called for by Sections 6(a)(ii)(A), (C), (D) and (E).

(c) General.

(i) Only such persons who are nominated in accordance with the procedures set forth in this Section 6 shall be eligible to serve as directors and only such business shall be conducted at a meeting of stockholders as shall have been brought before the meeting in accordance with the procedures set forth in this Section 6. Except as otherwise provided by law, the Certificate of Incorporation or these By-Laws, the Chairman of the meeting shall have the power and duty to determine whether a nomination or any business proposed to be brought before the meeting was made or proposed, as the case may be, in accordance with the procedures set forth in this Section 6 and, if any proposed nomination or business is not in compliance with this Section 6, to declare that such defective proposal or nomination shall be disregarded.

(ii) For purposes of this Section 6, "public announcement" shall mean disclosure in a press release reported by a national news service or in any periodic or current report of the corporation filed with or furnished to the Securities and Exchange Commission.

(iii) Notwithstanding the foregoing provisions of this Section 6, a stockholder shall also comply with all applicable requirements of the Exchange Act and the rules and regulations thereunder with respect to the matters set forth in this Section 6; *provided, however*, that any references in these By-Laws to the Exchange Act or the rules promulgated thereunder are not intended to and shall not limit the requirements applicable to nominations or proposals as to any other business to be considered pursuant to Section 6. Nothing in this Section 6 shall be deemed to affect any rights (A) of stockholders to request inclusion of proposals in the corporation's proxy statement pursuant to Rule 14a-8 under the Exchange Act or (B) of the holders of any series of Preferred Stock if and to the extent provided for under law, the Certificate of Incorporation or these By-Laws.

(iv) All notices required to be given by a stockholder pursuant to this Section 6 must be in writing and delivered to the secretary of the corporation at the principal executive offices of the corporation in person or by first class United States mail postage prepaid or by reputable overnight delivery service within the time limits specified in this Section 6. Any other form of communication, including without limitation facsimile transmission and email, shall not satisfy the notice requirements of this Section 6 applicable to stockholders.

Section 7. Notice of Meetings; Waiver of Notice. Except as otherwise provided by law or the Certificate of Incorporation, written notice of each meeting of stockholders shall be given not less than ten (10) nor more than sixty (60) days before the date of the meeting to each stockholder entitled to vote at such meeting as of the record date for determining the stockholders entitled to notice of the meeting. The notice shall specify the place, date and hour of the meeting, the means of remote communication, if any, by which stockholders and proxy holders may be deemed to be present in person and vote at such meeting, the record date for determining the stockholders entitled to vote at the meeting, if such date is different from the record date for determining stockholders entitled to notice of the meeting, and in the case of a special meeting the purpose or purposes of the meeting. Notice of the time, place and purpose of any meeting of stockholders may be waived in writing, signed by the person entitled to notice thereof, either before or after such meeting, and will be waived by any stockholder by his attendance thereat in person or by proxy, except when the stockholder attends a meeting for the express purpose of objecting, at the beginning of the meeting, to the transaction of any business because the meeting is not lawfully called or convened. Any stockholder so waiving notice of such meeting shall be bound by the proceedings of any such meeting in all respects as if due notice thereof had been given.

Section 8. Quorum. At each meeting of stockholders, except where otherwise provided by law, the Certificate of Incorporation or these By-Laws, the presence, in person or by proxy duly authorized, of the holders of a majority of the outstanding shares of stock entitled to vote at the meeting shall constitute a quorum for the transaction of business. In the absence of a quorum, any meeting of stockholders may be adjourned, from time to time, either by the chairman of the meeting or by vote of the holders of a majority of the shares represented thereat, but no other business shall be transacted at such meeting. The stockholders present at a duly called or convened meeting, at which a quorum is present, may continue to transact business until adjournment, notwithstanding the withdrawal of enough stockholders to leave less than a quorum. Except as otherwise provided by law, the Certificate of Incorporation or these By-Laws, the affirmative vote of a majority of the shares present in person or represented by proxy at the meeting, excluding abstentions and broker non-votes, shall be necessary for the transaction of any business other than the election of directors; and directors shall be elected by a plurality of the votes of the shares present in person or represented by proxy at the meeting and entitled to vote on the election of directors. Where a separate vote by a class or classes or series is required, except where otherwise provided by law, the Certificate of Incorporation or these By-Laws, a majority of the outstanding shares of such class or classes or series, present in person or represented by proxy, shall constitute a quorum entitled to take action with respect to the vote on that matter and, except where otherwise provided by law, the Certificate of Incorporation or these By-Laws, the affirmative vote of the majority (plurality, in the case of the election of directors) of the votes cast by the holders of shares of such class or classes or series shall be the act of such class or classes or series.

Section 9. Adjournment and Notice of Adjourned Meetings. Any meeting of stockholders, whether annual or special, may be adjourned from time to time either by the chairman of the meeting or by the vote of a majority of the shares casting votes, excluding abstentions. When a meeting is adjourned to another time or place, notice need not be given of the adjourned meeting if the time and place thereof are announced at the meeting at which the adjournment is taken. At the adjourned meeting the corporation may transact any business which might have been transacted at the original meeting. If the adjournment is for more than 30 days a notice of the adjourned meeting shall be given to each stockholder of record entitled to vote at the meeting. If, after the adjournment, a new record date for stockholders entitled to vote is fixed for the adjourned meeting, the Board of Directors shall fix a new record date for notice of such adjourned meeting in accordance with Section 213(a) of the General Corporation Law of Delaware, and shall give notice of the adjourned meeting to each stockholder of record entitled to vote at such adjourned meeting as of the record date fixed for notice of such adjourned meeting.

Section 10. Voting Rights. For the purpose of determining those stockholders entitled to vote at any meeting of the stockholders, except as otherwise provided by law, only persons in whose names shares stand on the stock records of the corporation on the record date, as provided in Section 12 of these By-Laws, shall be entitled to vote at any meeting of stockholders. Every person entitled to vote or execute consents shall have the right to do so either in person or by an agent or agents authorized by a proxy granted in accordance with Delaware Law. An agent so appointed need not be a stockholder. No proxy shall be voted after three (3) years from its date of creation unless the proxy provides for a longer period.

Section 11. Joint Owners of Stock. If shares or other securities having voting power stand of record in the names of two (2) or more persons, whether fiduciaries, members of a partnership, joint tenants, tenants in common, tenants by the entirety, or otherwise, or if two (2) or more persons have the same fiduciary relationship respecting the same shares, unless the Secretary is given written notice to the contrary and is furnished with a copy of the instrument or order appointing them or creating the relationship wherein it is so provided, their acts with respect to voting shall have the following effect: (a) if only one (1) votes, his act binds all; (B) if more than one (1) votes, the act of the majority so voting binds all; (c) if more than one votes, but the vote is evenly split on any particular matter, each faction may vote the securities in question proportionally, or may apply to the Delaware Court of Chancery for relief as provided in the General Corporation Law of Delaware, Section 217(b). If the instrument filed with the Secretary shows that any such tenancy is held in unequal interests, a majority or even-split for the purpose of subsection (c) shall be a majority or even-split in interest.

Section 12. List of Stockholders. The Secretary shall prepare and make, at least ten (10) days before every meeting of stockholders, a complete list of the stockholders entitled to vote at the meeting; provided, however, if the record date for determining the

stockholders entitled to vote is less than 10 days before the meeting date, the list shall reflect the stockholders entitled to vote as of the tenth day before the meeting date, arranged in alphabetical order, and showing the address of each stockholder and the number of shares registered in the name of each stockholder. Nothing contained in this Section 12 shall require the corporation to include electronic mail addresses or other electronic contact information on such list. Such list shall be open to the examination of any stockholder for any purpose germane to the meeting for a period of at least 10 days prior to the meeting: (i) on a reasonably accessible electronic network, provided that the information required to gain access to such list is provided with the notice of the meeting, or (ii) during ordinary business hours, at the principal place of business of the corporation. In the event that the corporation determines to make the list available on an electronic network, the corporation may take reasonable steps to ensure that such information is available only to stockholders of the corporation. If the meeting is to be held at a place, then a list of stockholders entitled to vote at the meeting shall be produced and kept at the time and place of the meeting during the whole time thereof and may be examined by any stockholder who is present. If the meeting is to be held solely by means of remote communication, then such list shall also be open to the examination of any stockholder during the whole time of the meeting on a reasonably accessible electronic network, and the information required to access such list shall be provided with the notice of the meeting.

Section 13. Action Without Meeting.

(a) Unless otherwise provided in the Certificate of Incorporation, any action required by statute to be taken at any annual or special meeting of the stockholders, or any action which may be taken at any annual or special meeting of the stockholders, may be taken without a meeting, without prior notice and without a vote, if a consent in writing, setting forth the action so taken, shall be signed by the holders of outstanding stock having not less than the minimum number of votes that would be necessary to authorize or take such action at a meeting at which all shares entitled to vote thereon were present and voted.

(b) Every written consent shall bear the date of signature of each stockholder who signs the consent, and no written consent shall be effective to take the corporate action referred to therein unless, within sixty (60) days of the earliest dated consent delivered to the corporation in the manner herein required, written consents signed by a sufficient number of stockholders to take action are delivered to the corporation by delivery to its registered office in the State of Delaware, its principal place of business or an officer or agent of the corporation having custody of the book in which proceedings of meetings of stockholders are recorded. Delivery made to a corporation's registered office shall be by hand or by certified or registered mail, return receipt requested.

(c) Prompt notice of the taking of the corporate action without a meeting by less than unanimous written consent shall be given to those stockholders who have not consented in writing and who, if the action had been taken at a meeting, would have been entitled to notice of the meeting if the record date for notice of such meeting had been the date that written consents signed by a sufficient number of holders to take the action were delivered to the corporation as provided in Section 228(c) of the General Corporation Law of Delaware. If the action which is consented to is such as would have required the filing of a certificate under any section of the General Corporation Law of the State of Delaware if such action had been voted on by stockholders at a meeting thereof, then the certificate filed under such section shall state, in lieu of any statement required by such section concerning any vote of stockholders, that written consent has been given as provided in Section 228 of the General Corporation Law of Delaware.

Section 14. Organization.

(a) At every meeting of stockholders, the Chairman of the Board of Directors, or, if a Chairman has not been appointed or is absent, the President, or, if the President is absent, a chairman of the meeting chosen by a majority in interest of the stockholders entitled to vote, present in person or by proxy, shall act as chairman. The Secretary, or, in his absence, an Assistant Secretary directed to do so by the President, shall act as secretary of the meeting.

(b) The Board of Directors of the corporation shall be entitled to make such rules or regulations for the conduct of meetings of stockholder as it shall deem necessary, appropriate or convenient. Subject to such rules and regulations of the Board of Directors, if any, the chairman of the meeting shall have the right and authority to prescribe such rules, regulations and procedures and to do all such acts as, in the judgment of such chairman, are necessary, appropriate or convenient for the proper conduct of the meeting, including, without limitation, establishing an agenda or order of business for the meeting, rules and procedures for maintaining order at the meeting and the safety of those present, limitations on participation in such meeting to stockholder of record of the corporation and their duly authorized and constituted proxies and such other persons as the chairman shall permit, restrictions on entry to the meeting after the time fixed for the commencement thereof, limitations on the time allotted to questions or comments by participants and regulation of the opening and closing of the polls for balloting on matters which are to be voted on by ballot. Unless and to the extent determined by the Board of Directors or the chairman of the meeting, meetings of stockholder shall not be required to be held in accordance with rules of parliamentary procedure.

ARTICLE IV

DIRECTORS

Section 15. Number. The authorized number of directors of the corporation shall be fixed by resolution duly adopted by the Board of Directors. Directors need not be stockholder unless so required by the Certificate of Incorporation. If for any cause, the directors

shall not have been elected at an annual meeting, they may be elected as soon thereafter as convenient at a special meeting of the stockholders called for that purpose in the manner provided in these By Laws.

Section 16. Powers. The powers of the corporation shall be exercised, its business conducted and its property controlled by the Board of Directors, except as may be otherwise provided by statute or by the Certificate of Incorporation.

Section 17. Term of Office. Directors shall be elected at each annual meeting of stockholder for a term of one year. Each director shall serve until his successor is duly elected and qualified or until his death, resignation or removal. No decrease in the number of directors constituting the Board of Directors shall shorten the term of any incumbent director.

Section 18. Vacancies. Unless otherwise provided in the Certificate of Incorporation, any vacancies on the Board of Directors resulting from death, resignation, disqualification, removal or other causes and any newly created directorships resulting from any increase in the number of directors, shall unless the Board of Directors determines by resolution that any such vacancies or newly created directorships shall be filled by stockholders, be filled only by the affirmative vote of a majority of the directors then in office, even though less than a quorum of the Board of Directors. Any director elected in accordance with the preceding sentence shall hold office for the remainder of the full term of the director for which the vacancy was created or occurred and until such director's successor shall have been elected and qualified. A vacancy in the Board of Directors shall be deemed to exist under this Bylaw in the case of the death, removal or resignation of any director.

Section 19. Resignation. Any director may resign at any time by delivering his written resignation to the Chairman of the Board or President, such resignation to specify whether it will be effective at a particular time, upon receipt by the Chairman of the Board or President or at the pleasure of the Board of Directors. If no such specification is made, it shall be deemed effective at the pleasure of the Board of Directors. When one or more directors shall resign from the Board of Directors, effective at a future date, a majority of the directors then in office, including those who have so resigned, shall have power to fill such vacancy or vacancies, the vote thereon to take effect when such resignation or resignations shall become effective, and each Director so chosen shall hold office for the unexpired portion of the term of the Director whose place shall be vacated and until his successor shall have been duly elected and qualified.

Section 20. Removal. Subject to the rights of the holders of any class or series of stock and any limitations imposed by law, the Board of Directors or any individual director may be removed from office at any time with or without cause by the affirmative vote of the holders of a majority of the voting power of all the then-outstanding shares of voting stock of the corporation, entitled to vote at an election of directors (the "Voting Stock").

Section 21. Meetings.

(a) **Annual Meetings.** The annual meeting of the Board of Directors shall be held immediately before or after the annual meeting of stockholders and at the place where such meeting is held. No notice of an annual meeting of the Board of Directors shall be necessary and such meeting shall be held for the purpose of electing officers and transacting such other business as may lawfully come before it.

(b) **Regular Meetings.** Except as hereinafter otherwise provided, regular meetings of the Board of Directors shall be held in the office of the corporation required to be maintained pursuant to Section 2 hereof. Unless otherwise restricted by the Certificate of Incorporation, regular meetings of the Board of Directors may also be held at any place within or without the State of Delaware which has been designated by resolution of the Board of Directors or the written consent of all directors.

(c) **Special Meetings.** Unless otherwise restricted by the Certificate of Incorporation, special meetings of the Board of Directors may be held at any time and place within or without the State of Delaware whenever called by the Chairman of the Board, the President or any two of the directors.

(d) **Telephone Meetings.** Any member of the Board of Directors, or of any committee thereof, may participate in a meeting by means of conference telephone or similar communications equipment by means of which all persons participating in the meeting can hear each other, and participation in a meeting by such means shall constitute presence in person at such meeting.

(e) **Notice of Meetings.** Notice of the time and place of all special meetings of the Board of Directors shall be orally or in writing, by telephone, facsimile, telegraph or telex, during normal business hours, at least twenty-four (24) hours before the date and time of the meeting, or sent in writing to each director by first class mail, charges prepaid, at least three (3) days before the date of the meeting. Notice of any meeting may be waived in writing at any time before or after the meeting and will be waived by any director by attendance thereat, except when the director attends the meeting for the express purpose of objecting, at the beginning of the meeting, to the transaction of any business because the meeting is not lawfully called or convened.

(f) **Waiver of Notice.** The transaction of all business at any meeting of the Board of Directors, or any committee thereof, however called or noticed, or wherever held, shall be as valid as though had at a meeting duly held after regular call and notice, if a quorum be present and if, either before or after the meeting, each of the directors not present shall sign a written waiver of notice. All such waivers shall be filed with the corporate records or made a part of the minutes of the meeting.

Section 22. Quorum and Voting.

(a) Unless the Certificate of Incorporation requires a greater number and except with respect to indemnification questions arising under Section 43 hereof, for which a quorum shall be one-third of the exact number of directors fixed from time to time in accordance with the Certificate of Incorporation, a quorum of the Board of Directors shall consist of a majority of the exact number of directors fixed from time to time by the Board of Directors in accordance with the Certificate of Incorporation; *provided, however*, at any meeting whether a quorum be present or otherwise, a majority of the directors present may adjourn from time to time until the time fixed for the next regular meeting of the Board of Directors, without notice other than by announcement at the meeting.

(b) At each meeting of the Board of Directors at which a quorum is present, all questions and business shall be determined by the affirmative vote of a majority of the directors present, unless a different vote be required by law, the Certificate of Incorporation or these By-Laws.

Section 23. Action Without Meeting. Unless otherwise restricted by the Certificate of Incorporation or these By-Laws, any action required or permitted to be taken at any meeting of the Board of Directors or of any committee thereof may be taken without a meeting, if all members of the Board of Directors or committee, as the case may be, consent thereto in writing, and such writing or writings are filed with the minutes of proceedings of the Board of Directors or committee.

Section 24. Fees and Compensation. Directors shall be entitled to such compensation for their services as may be approved by the Board of Directors, including, if so approved, by resolution of the Board of Directors, a fixed sum and expenses of attendance, if any, for attendance at each regular or special meeting of the Board of Directors and at any meeting of a committee of the Board of Directors. Nothing herein contained shall be construed to preclude any director from serving the corporation in any other capacity as an officer, agent, employee, or otherwise and receiving compensation therefor.

Section 25. Committees.

(a) **Executive Committee.** The Board of Directors may by resolution passed by a majority of the whole Board of Directors appoint an Executive Committee to consist of one (1) or more members of the Board of Directors. The Executive Committee, to the extent permitted by law and provided in the resolution of the Board of Directors shall have and may exercise all the powers and authority of the Board of Directors in the management of the business and affairs of the corporation, including without limitation the power or authority to issue stock options, and may authorize the seal of the corporation to be affixed to all papers which may require it; but no such committee shall have power or authority to the extent limited by Section 141(c)(2) of the General Corporation Law of Delaware.

(b) **Other Committees.** The Board of Directors may, by resolution passed by a majority of the whole Board of Directors, from time to time appoint such other committees as may be permitted by law. Such other committees appointed by the Board of Directors shall consist of one (1) or more members of the Board of Directors and shall have such powers and perform such duties as may be prescribed by the resolution or resolutions creating such committees, but in no event shall such committee have the powers denied to the Executive Committee in these By-Laws.

(c) **Term.** Each member of a committee of the Board of Directors shall serve a term on the committee coexistent with such member's term on the Board of Directors. The Board of Directors, subject to the provisions of subsections (a) or (b) of this Bylaw may at any time increase or decrease the number of members of a committee or terminate the existence of a committee. The membership of a committee member shall terminate on the date of his death or voluntary resignation from the committee or from the Board of Directors. The Board of Directors may at any time for any reason remove any individual committee member and the Board of Directors may fill any committee vacancy created by death, resignation, removal or increase in the number of members of the committee. The Board of Directors may designate one or more directors as alternate members of any committee, who may replace any absent or disqualified member at any meeting of the committee, and, in addition, in the absence or disqualification of any member of a committee, the member or members thereof present at any meeting and not disqualified from voting, whether or not he or they constitute a quorum, may unanimously appoint another member of the Board of Directors to act at the meeting in the place of any such absent or disqualified member.

(d) **Meetings.** Unless the Board of Directors shall otherwise provide, regular meetings of the Executive Committee or any other committee appointed pursuant to this Section 25 shall be held at such times and places as are determined by the Board of Directors, or by any such committee, and when notice thereof has been given to each member of such committee, no further notice of such regular meetings need be given thereafter. Special meetings of any such committee may be held at any place which has been determined from time to time by such committee, and may be called by any director who is a member of such committee, upon written notice to the members of such committee of the time and place of such special meeting given in the manner provided for the giving of written notice to members of the Board of Directors of the time and place of special meetings of the Board of Directors. Notice of any special meeting of any committee may be waived in writing at any time before or after the meeting and will be waived by any director by attendance thereat, except when the director attends such special meeting for the express purpose of objecting, at the beginning of the meeting, to the transaction of any business because the meeting is not lawfully called or convened. A majority of the authorized number of members of any such committee shall constitute a quorum

for the transaction of business, and the act of a majority of those present at any meeting at which a quorum is present shall be the act of such committee.

Section 26. Organization. At every meeting of the directors, the Chairman of the Board of Directors, or, if a Chairman has not been appointed or is absent, the President, or if the President is absent, the most senior Vice President, or, in the absence of any such officer, a chairman of the meeting chosen by a majority of the directors present, shall preside over the meeting. The Secretary, or in his absence, an Assistant Secretary directed to do so by the President, shall act as secretary of the meeting.

ARTICLE V

OFFICERS

Section 27. Officers Designated. The officers of the corporation shall be a Chairman of the Board, a Chief Executive Officer, a Chief Financial Officer, a Secretary, and such other officers as the Board of Directors may appoint, including a President, a Chief Operating Officer, one or more Vice Presidents, a Treasurer, one or more Assistant Secretaries and Assistant Treasurers. Each officer shall have the powers and duties set forth in these By-Laws and as the Board of Directors from time to time shall specify. The Board of Directors may assign such additional titles to one or more of the officers as it shall deem appropriate. Any one person may hold any number of offices of the corporation at any one time unless specifically prohibited therefrom by law. The salaries and other compensation of the officers of the corporation shall be fixed by or in the manner designated by the Board of Directors.

Section 28. Duties.

(a) General. All officers shall hold office at the pleasure of the Board of Directors and until their successors shall have been duly elected and qualified, unless sooner removed. Any officer elected or appointed by the Board of Directors may be removed in accordance with Section 31 of these By-Laws. If the office of any officer becomes vacant for any reason, the vacancy may be filled (i) by the Board of Directors, in the case of the Chief Executive Officer and (ii) by the Chief Executive Officer, in the case of all other officers.

(b) Duties of Chairman of the Board of Directors. The Chairman of the Board of Directors, when present, shall preside at all meetings of the stockholders and the Board of Directors. The Chairman of the Board of Directors shall perform other duties commonly incident to his office and shall also perform such other duties and have such other powers as the Board of Directors shall designate from time to time.

(c) Duties of Chief Executive Officer. The Chief Executive Officer shall preside at all meetings of the stockholders and at all meetings of the Board of Directors, unless the Chairman of the Board of Directors has been appointed and is present. The Chief Executive Officer, or if there shall at any time be no Chief Executive Officer then the President, shall be the chief executive officer of the corporation and shall, subject to the control of the Board of Directors, have general supervision, direction and control of the business and officers of the corporation. The Chief Executive Officer, or if there shall at any time be no Chief Executive Officer then the President, shall perform other duties commonly incident to his office and shall also perform such other duties and have such other powers as the Board of Directors shall designate from time to time.

(d) Duties of Chief Financial Officer. The Chief Financial Officer shall keep or cause to be kept the books of account of the corporation in a thorough and proper manner and shall render statements of the financial affairs of the corporation in such form and as often as required by the Board of Directors or the President. The Chief Financial Officer, subject to the order of the Board of Directors, shall have the custody of all funds and securities of the corporation. The Chief Financial Officer shall perform other duties commonly incident to his office and shall also perform such other duties and have such other powers as the Board of Directors or the President shall designate from time to time. The President may direct the Treasurer or any Assistant Treasurer, or the Controller or any Assistant Controller to assume and perform the duties of the Chief Financial Officer in the absence or disability of the Chief Financial Officer, and each Treasurer and Assistant Treasurer and each Controller and Assistant Controller shall perform other duties commonly incident to his office and shall also perform such other duties and have such other powers as the Board of Directors or the President shall designate from time to time.

(e) Duties of Vice Presidents. The Vice Presidents, if any are appointed, may assume and perform the duties of the Chief Executive Officer or President in the absence or disability of the Chief Executive Officer or President, as applicable. The Vice Presidents shall perform other duties commonly incident to their office and shall also perform such other duties and have such other powers as the Board of Directors, Chief Executive Officer or President shall designate from time to time.

(f) Duties of Secretary. The Secretary shall attend all meetings of the stockholders and of the Board of Directors and shall record all acts and proceedings thereof in the minute book of the corporation. The Secretary shall give notice in conformity with these By-Laws of all meetings of the stockholders and of all meetings of the Board of Directors and any committee thereof requiring notice. The Secretary shall perform all other duties given him in these By-Laws and other duties commonly incident to his office and shall also perform such other duties and have such other powers as the Board of Directors shall designate from time to time. The President may direct any Assistant Secretary to assume and perform the duties of the Secretary in the absence or

disability of the Secretary, and each Assistant Secretary shall perform other duties commonly incident to his office and shall also perform such other duties and have such other powers as the Board of Directors, Chief Executive Officer or President shall designate from time to time.

Section 29. Delegation of Authority. The Board of Directors may from time to time delegate the powers or duties of any officer to any other officer or agent, notwithstanding any provision hereof.

Section 30. Resignations. Any officer may resign at any time by giving written notice to the Board of Directors or to the President or to the Secretary. Any such resignation shall be effective when received by the person or persons to whom such notice is given, unless a later time is specified therein, in which event the resignation shall become effective at such later time. Unless otherwise specified in such notice, the acceptance of any such resignation shall not be necessary to make it effective. Any resignation shall be without prejudice to the rights, if any, of the corporation under any contract with the resigning officer.

Section 31. Removal. Any officer may be removed from office at any time, either with or without cause, by the President or by the affirmative vote of a majority of the directors in office at the time, or by the unanimous written consent of the directors in office at the time, or by any committee or superior officers upon whom such power of removal may have been conferred by the Board of Directors.

ARTICLE VI

EXECUTION OF CORPORATE INSTRUMENTS AND VOTING OF SECURITIES OWNED BY THE CORPORATION

Section 32. Execution of Corporate Instruments. The Board of Directors may, in its discretion, determine the method and designate the signatory officer or officers, or other person or persons, to execute on behalf of the corporation any corporate instrument or document, or to sign on behalf of the corporation the corporate name without limitation, or to enter into contracts on behalf of the corporation, except where otherwise provided by law or these By-Laws, and such execution or signature shall be binding upon the corporation.

Unless otherwise specifically determined by the Board of Directors or otherwise required by law, promissory notes, deeds of trust, mortgages and other evidences of indebtedness of the corporation, and other corporate instruments or documents requiring the corporate seal, and certificates of shares of stock owned by the corporation, shall be executed, signed or endorsed by the Chairman of the Board of Directors, or the President, or by both the Secretary or Treasurer and the President. All other instruments and documents requiring the corporate signature, but not requiring the corporate seal, may be executed as aforesaid or in such other manner as may be directed by the Board of Directors.

All checks and drafts drawn on banks or other depositories on funds to the credit of the corporation or in special accounts of the corporation shall be signed by such person or persons as the Board of Directors shall authorize so to do.

Unless authorized or ratified by the Board of Directors or within the agency power of an officer, no officer, agent or employee shall have any power or authority to bind the corporation by any contract or engagement or to pledge its credit or to render it liable for any purpose or for any amount.

Section 33. Voting of Securities Owned by the Corporation. All stock and other securities of other corporations owned or held by the corporation for itself, or for other parties in any capacity, shall be voted, and all proxies with respect thereto shall be executed, by the person authorized so to do by resolution of the Board of Directors, or, in the absence of such authorization, by the Chairman of the Board of Directors, or the President.

ARTICLE VII

SHARES of STOCK

Section 34. Form and Execution of Certificates; Uncertificated Shares. Certificates for the shares of stock of the corporation shall be in such form as is consistent with the Certificate of Incorporation and applicable law; provided that the Board of Directors may provide by resolution or resolutions that some or all of any or all classes or series of its stock shall be uncertificated shares. Any such resolution shall not apply to shares represented by a certificate until such certificate is surrendered to the corporation. Every holder of stock in the corporation represented by certificates shall be entitled to have a certificate signed by or in the name of the corporation by the Chairman of the Board of Directors, or the President or any Vice President and by the Treasurer or Assistant Treasurer or the Secretary or Assistant Secretary, certifying the number of shares owned by him in the corporation. Any or all of the signatures on the certificate may be facsimiles. In the case any officer, transfer agent, or registrar who has signed or whose facsimile signature has been placed upon a certificate shall have ceased to be such officer, transfer agent, or registrar before such certificate is issued, it may be issued with the same effect as if he were

such officer, transfer agent, or registrar at the date of issue. Each certificate shall state upon the face or back thereof, in full or in summary, all of the powers, designations, preferences, and rights and the limitations or restrictions of the shares authorized to be issued or shall, except as otherwise required by law, set forth on the face or back a statement that the corporation will furnish without charge to each stockholder who so requests the powers, designations, preferences and relative, participating, optional, or other special rights of each class of stock or series thereof and the qualifications, limitations or restrictions of such preferences and/or rights. Within a reasonable time after the issuance or transfer of uncertificated stock, the corporation shall send to the registered owner thereof a written notice containing the information required to be set forth or stated on certificates pursuant to this section or otherwise required by law or with respect to this section a statement that the corporation will furnish without charge to each stockholder who so requests the powers, designations, preferences and relative participating, optional or other special rights of each class of stock or series thereof and the qualifications, limitations or restrictions of such preferences and/or rights. Except as otherwise expressly provided by law, the rights and obligations of the holders of certificates representing stock, or uncertificated shares, of the same class and series shall be identical.

Section 35. Lost Certificates. The corporation may issue a new certificate of stock or uncertificated shares in place of any certificate theretofore issued by the corporation alleged to have been lost, stolen, or destroyed, upon the making of an affidavit of that fact by the person claiming the certificate of stock to be lost, stolen, or destroyed. The corporation may require, as a condition precedent to the issuance of a new certificate or certificates or uncertificated shares, the owner of such lost, stolen, or destroyed certificate or certificates, or his legal representative, to advertise the same in such manner as it shall require or to give the corporation a surety bond in such form and amount as it may direct as indemnity against any claim that may be made against the corporation with respect to the certificate alleged to have been lost, stolen, or destroyed.

Section 36. Transfers.

(a) Transfers of record of shares of stock of the corporation shall be made only upon its books by the holders thereof, in person or by attorney duly authorized, and upon the surrender of a properly endorsed certificate or certificates for a like number of shares (or, with respect to uncertificated shares, by delivery of duly executed instructions or in any other manner permitted by applicable law).

(b) The corporation shall have power to enter into and perform any agreement with any number of stockholders of any one or more classes of stock of the corporation to restrict the transfer of shares of stock of the corporation of any one or more classes owned by such stockholders in any manner not prohibited by the General Corporation Law of Delaware.

Section 37. Fixing Record Dates.

(a) In order that the corporation may determine the stockholders entitled to notice of or to vote at any meeting of stockholders or any adjournment thereof, the Board of Directors may fix, in advance, a record date, which record date shall not precede the date upon which the resolution fixing the record date is adopted by the Board of Directors, and which record date shall not be more than sixty (60) nor less than ten (10) days before the date of such meeting. If no record date is fixed by the Board of Directors, the record date for determining stockholders entitled to notice of or to vote at a meeting of stockholders shall be at the close of business on the day next preceding the day on which notice is given, or if notice is waived, at the close of business on the day next preceding the day on which the meeting is held. A determination of stockholders of record entitled to notice of or to vote at a meeting of stockholders shall apply to any adjournment of the meeting; *provided, however*, that the Board of Directors may fix a new record date for the adjourned meeting.

(b) Prior to the Initial Public Offering, in order that the corporation may determine the stockholders entitled to consent to corporate action in writing without a meeting, the Board of Directors may fix a record date, which record date shall not precede the date upon which the resolution fixing the record date is adopted by the Board of Directors, and which date shall not be more than 10 days after the date upon which the resolution fixing the record date is adopted by the Board of Directors. Any stockholder of record seeking to have the stockholders authorize or take corporate action by written consent shall, by written notice to the Secretary, request the Board of Directors to fix a record date. The Board of Directors shall promptly, but in all events within 10 days after the date on which such a request is received, adopt a resolution fixing the record date. If no record date has been fixed by the Board of Directors within 10 days of the date on which such a request is received, the record date for determining stockholders entitled to consent to corporate action in writing without a meeting, when no prior action by the Board of Directors is required by applicable law, shall be the first date on which a signed written consent setting forth the action taken or proposed to be taken is delivered to the corporation by delivery to its registered office in the State of Delaware, its principal place of business or an officer or agent of the corporation having custody of the book in which proceedings of meetings of stockholders are recorded. Delivery made to the corporation's registered office shall be by hand or by certified or registered mail, return receipt requested. If no record date has been fixed by the Board of Directors and prior action by the Board of Directors is required by law, the record date for determining stockholders entitled to consent to corporate action in writing without a meeting shall be at the close of business on the day on which the Board of Directors adopts the resolution taking such prior action.

(c) In order that the corporation may determine the stockholders entitled to receive payment of any dividend or other distribution or allotment of any rights or the stockholders entitled to exercise any rights in respect of any change, conversion or exchange of stock, or for the purpose of any other lawful action, the Board of Directors may fix, in advance, a record date, which record date shall not precede the date upon which the resolution fixing the record date is adopted, and which record date shall be not more than sixty (60) days prior to such action. If no record date is fixed, the record date for determining stockholders for any such purpose shall be at the close of business on the day on which the Board of Directors adopts the resolution relating thereto.

Section 38. Registered Stockholders. The corporation shall be entitled to recognize the exclusive right of a person registered on its books as the owner of shares to receive dividends, and to vote as such owner, and shall not be bound to recognize any equitable or other claim to or interest in such share or shares on the part of any other person whether or not it shall have express or other notice thereof, except as otherwise provided by the laws of Delaware.

ARTICLE VIII

OTHER SECURITIES OF THE CORPORATION

Section 39. Execution of Other Securities. All bonds, debentures and other corporate securities of the corporation, other than stock certificates (covered in Section 34), may be signed by the Chairman of the Board of Directors, the President, or such other person as may be authorized by the Board of Directors, and the corporate seal impressed thereon or a facsimile of such seal imprinted thereon and attested by the signature of the Secretary or an Assistant Secretary, or the Chief Financial Officer or Treasurer or an Assistant Treasurer; *provided*, however, that where any such bond, debenture or other corporate security shall be authenticated by the manual signature, or where permissible facsimile signature, of a trustee under an indenture pursuant to which such bond, debenture or other corporate security shall be issued, the signatures of the persons signing and attesting the corporate seal on such bond, debenture or other corporate security may be the imprinted facsimile of the signatures of such persons. Interest coupons appertaining to any such bond, debenture or other corporate security, authenticated by a trustee as aforesaid, shall be signed by the Treasurer or an Assistant Treasurer of the corporation or such other person as may be authorized by the Board of Directors, or bear imprinted thereon the facsimile signature of such person. In case any officer who shall have signed or attested any bond, debenture or other corporate security, or whose facsimile signature shall appear thereon or on any such interest coupon, shall have ceased to be such officer before the bond, debenture or other corporate security so signed or attested shall have been delivered, such bond, debenture or other corporate security nevertheless may be adopted by the corporation and issued and delivered as though the person who signed the same or whose facsimile signature shall have been used thereon had not ceased to be such officer of the corporation.

ARTICLE IX

DIVIDENDS

Section 40. Declaration of Dividends. Dividends upon the capital stock of the corporation, subject to the provisions of the Certificate of Incorporation, if any, may be declared by the Board of Directors pursuant to law at any regular or special meeting. Dividends may be paid in cash, in property, or in shares of the capital stock, subject to the provisions of the Certificate of Incorporation.

Section 41. Dividend Reserve. Before payment of any dividend, there may be set aside out of any funds of the corporation available for dividends such sum or sums as the Board of Directors from time to time, in their absolute discretion, think proper as a reserve or reserves to meet contingencies, or for equalizing dividends, or for repairing or maintaining any property of the corporation, or for such other purpose as the Board of Directors shall think conducive to the interests of the corporation, and the Board of Directors may modify or abolish any such reserve in the manner in which it was created.

ARTICLE X

FISCAL YEAR

Section 42. Fiscal Year. The fiscal year of the corporation shall be fixed by resolution of the Board of Directors.

ARTICLE XI
INDEMNIFICATION

Section 43. Indemnification of Directors, Executive Officers, Other Officers, Employees and Other Agents.

(a) Directors and Executive Officers. The corporation shall indemnify its directors and executive officers (for the purposes of this Article XI, "executive officers" shall have the meaning defined in Rule 3b-7 promulgated under the 1934 Act) to the fullest extent not prohibited by the Delaware General Corporation Law; *provided, however,* that the corporation may modify the extent of such indemnification by individual contracts with its directors and executive officers; and, *provided, further,* that the corporation shall not be required to indemnify any director or executive officer in connection with any proceeding (or part thereof) initiated by such person unless (i) such indemnification is expressly required to be made by law, (ii) the proceeding was authorized by the Board of Directors of the corporation, (iii) such Indemnification is provided by the corporation, in its sole discretion, pursuant to the powers vested in the corporation under the Delaware General Corporation Law or (iv) such indemnification is required to be made under subsection (d).

(b) Other Officers, Employees and Other Agents. The corporation shall have power to indemnify its other officers, employees and other agents as set forth in the Delaware General Corporation Law.

(c) Expenses. The corporation shall advance to any person who was or is a party or is threatened to be made a party to any threatened, pending or completed action, suit or proceeding, whether civil, criminal, administrative or investigative, by reason of the fact that he is or was a director or executive officer, of the corporation, or is or was serving at the request of the corporation as a director or executive officer of another corporation, partnership, joint venture, trust or other enterprise, prior to the final disposition of the proceeding, promptly following request therefor, all expenses incurred by any director or executive officer in connection with such proceeding upon receipt of an undertaking by or on behalf of such person to repay said amounts if it should be determined ultimately that such person is not entitled to be indemnified under this Bylaw or otherwise.

Notwithstanding the foregoing, unless otherwise determined pursuant to paragraph (e) of this Bylaw, no advance shall be made by the corporation to an executive officer of the corporation (except by reason of the fact that such executive officer is or was a director of the corporation in which event this paragraph shall not apply) in any action, suit or proceeding, whether civil, criminal, administrative or investigative, if a determination is reasonably and promptly made by the Board of Directors by a majority vote of a quorum consisting of directors who were not parties to the proceeding, or (ii) if such quorum is not obtainable, or, even if obtainable, a quorum of disinterested directors so directs, by independent legal counsel in a written opinion, that the facts known to the decision-making party at the time such determination is made demonstrate clearly and convincingly that such person acted in bad faith or in a manner that such person did not believe to be in or not opposed to the best interests of the corporation.

(d) Enforcement. Without the necessity of entering into an express contract, all rights to indemnification and advances to directors and executive officers under this Bylaw shall be deemed to be contractual rights and be effective to the same extent and as if provided for in a contract between the corporation and the director or executive officer. Any right to indemnification or advances granted by this Bylaw to a director or executive officer shall be enforceable by or on behalf of the person holding such right in any court of competent jurisdiction if (i) the claim for indemnification or advances is denied, in whole or in part, or no disposition of such claim is made within ninety (90) days of request therefor. The claimant in such enforcement action, if successful in whole or in part, shall be entitled to be paid also the expense of prosecuting his claim. In connection with any claim for indemnification, the corporation shall be entitled to raise as a defense to any such action that the claimant has not met the standards of conduct that make it permissible under the Delaware General Corporation Law for the corporation to indemnify the claimant for the amount claimed. In connection with any claim by an executive officer of the corporation (except in any action, suit or proceeding, whether civil, criminal, administrative or investigative, by reason of the fact that such executive officer is or was a director of the corporation) for advances, the corporation shall be entitled to raise a defense as to any such action clear and convincing evidence that such person acted in bad faith or in a manner that such person did not believe to be in or not opposed to the best interests of the corporation, or with respect to any criminal action or proceeding that such person acted without reasonable cause to believe that his conduct was lawful. Neither the failure of the corporation (including its Board of Directors, independent legal counsel or its stockholders) to have made a determination prior to the commencement of such action that indemnification of the claimant is proper in the circumstances because he has met the applicable standard of conduct set forth in the Delaware General Corporation Law, nor an actual determination by the corporation (including its Board of Directors, independent legal counsel or its stockholders) that the claimant has not met such applicable standard of conduct, shall be a defense to the action or create a presumption that claimant has not met the applicable standard of conduct. In any suit brought by a director or executive officer to enforce a right to indemnification or to an advancement of expenses hereunder, the burden of proving that the director or executive officer is not entitled to be indemnified, or to such advancement of expenses, under this Article XI or otherwise shall be on the corporation.

(e) Non-Exclusivity of Rights. The rights conferred on any person by this By-Law shall not be exclusive of any other right which such person may have or hereafter acquire under any statute, provision of the Certificate of Incorporation, By-Laws,

agreement, vote of stockholders or disinterested directors or otherwise, both as to action in his official capacity and as to action in another capacity while holding office. A right to indemnification or to advancement of expenses arising under a provision of the certificate of incorporation or a by-law shall not be eliminated or impaired by an amendment to such provision after the occurrence of the act or omission that is the subject of the civil, criminal, administrative or investigative action, suit or proceeding for which indemnification or advancement of expenses is sought, unless the provision in effect at the time of such act or omission explicitly authorizes such elimination or impairment after such action or omission has occurred. The corporation is specifically authorized to enter into individual contracts with any or all of its directors, officers, employees or agents respecting indemnification and advances, to the fullest extent not prohibited by the Delaware General Corporation Law.

(f) **Survival of Rights.** The rights conferred on any person by this Bylaw shall continue as to a person who has ceased to be a director, officer, employee or other agent and shall inure to the benefit of the heirs, executors and administrators of such a person.

(g) **Insurance.** To the fullest extent permitted by the Delaware General Corporation Law, the corporation, upon approval by the Board of Directors, may purchase insurance on behalf of any person required or permitted to be indemnified pursuant to this Bylaw.

(h) **Amendments.** Any repeal or modification of this Bylaw shall only be prospective and shall not affect the rights under this Bylaw in effect at the time of the alleged occurrence of any action or omission to act that is the cause of any proceeding against any agent of the corporation.

(i) **Saving Clause.** If this Bylaw or any portion hereof shall be invalidated on any ground by any court of competent jurisdiction, then the corporation shall nevertheless indemnify each director and executive officer to the full extent not prohibited by any applicable portion of this Bylaw that shall not have been invalidated, or by any other applicable law.

(j) **Certain Definitions.** For the purposes of this Bylaw, the following definitions shall apply:

(i) The term "proceeding" shall be broadly construed and shall include, without limitation, the investigation, preparation, prosecution, defense, settlement, arbitration and appeal of, and the giving of testimony in, any threatened, pending or completed action, suit or proceeding, whether civil, criminal, administrative or investigative.

(ii) The term "expenses" shall be broadly construed and shall include, without limitation, court costs, attorneys' fees, witness fees, fines, amounts paid in settlement or judgment and any other costs and expenses of any nature or kind incurred in connection with any proceeding.

(iii) The term the "corporation" shall include, in addition to the resulting corporation, any constituent corporation (including any constituent of a constituent) absorbed in a consolidation or merger which, if its separate existence had continued, would have had power and authority to indemnify its directors, officers, and employees or agents, so that any person who is or was a director, officer, employee or agent of such constituent corporation, or is or was serving at the request of such constituent corporation as a director, officer, employee or agent of another corporation, partnership, joint venture, trust or other enterprise, shall stand in the same position under the provisions of this Bylaw with respect to the resulting or surviving corporation as he would have with respect to such constituent corporation if its separate existence had continued.

(iv) References to a "director," "executive officer," "officer," "employee," or "agent" of the corporation shall include, without limitation, situations where such person is serving at the request of the corporation as, respectively, a director, executive officer, officer, employee, trustee or agent of another corporation, partnership, joint venture, trust or other enterprise.

(v) References to "other enterprises" shall include employee benefit plans; references to "fines" shall include any excise taxes assessed on a person with respect to an employee benefit plan; and references to "serving at the request of the corporation" shall include any service as a director, officer, employee or agent of the corporation which imposes duties on, or involves services by, such director, officer, employee, or agent with respect to an employee benefit plan, its participants, or beneficiaries; and a person who acted in good faith and in a manner he reasonably believed to be in the interest of the participants and beneficiaries of an employee benefit plan shall be deemed to have acted in a manner "not opposed to the best interests of the corporation" as referred to in this Bylaw.

ARTICLE XII

NOTICES

Section 44. Notices.

(a) Notice to Stockholders. Whenever, under any provisions of these By-Laws, notice is required to be given to any stockholder, it shall be given in writing, timely and duly deposited in the United States mail, postage prepaid, and addressed to his last known post office address as shown by the stock record of the corporation or its transfer agent.

(b) Notice to Directors. Any notice required to be given to any director may be given by the method stated in subsection (a), or by facsimile, telex or telegram, except that such notice other than one which is delivered personally shall be sent to such address as such director shall have filed in writing with the Secretary, or, in the absence of such filing, to the last known post office address of such director.

(c) Affidavit of Mailing. An affidavit of mailing, executed by a duly authorized and competent employee of the corporation or its transfer agent appointed with respect to the class of stock affected, specifying the name and address or the names and addresses of the stockholder or stockholders, or director or directors, to whom any such notice or notices was or were given, and the time and method of giving the same, shall in the absence of fraud, be prima facie evidence of the facts therein contained.

(d) Time Notices Deemed Given. All notices given by mail, as above provided, shall be deemed to have been given as at the time of mailing, and all notices given by facsimile, telex or telegram shall be deemed to have been given as of the sending time recorded at time of transmission.

(e) Methods of Notice. It shall not be necessary that the same method of giving notice be employed in respect of all directors, but one permissible method may be employed in respect of any one or more, and any other permissible method or methods may be employed in respect of any other or others.

(f) Failure to Receive Notice. The period or limitation of time within which any stockholder may exercise any option or right, or enjoy any privilege or benefit, or be required to act, or within which any director may exercise any power or right, or enjoy any privilege, pursuant to any notice sent him in the manner above provided, shall not be affected or extended in any manner by the failure of such stockholder or such director to receive such notice.

(g) Notice to Person with Whom Communication Is Unlawful. Whenever notice is required to be given, under any provision of law or of the Certificate of Incorporation or By-Laws of the corporation, to any person with whom communication is unlawful, the giving of such notice to such person shall not be required and there shall be no duty to apply to any governmental authority or agency for a license or permit to give such notice to such person. Any action or meeting which shall be taken or held without notice to any such person with whom communication is unlawful shall have the same force and effect as if such notice had been duly given. In the event that the action taken by the corporation is such as to require the filing of a certificate under any provision of the Delaware General Corporation Law, the certificate shall state, if such is the fact and if notice is required, that notice was given to all persons entitled to receive notice except such persons with whom communication is unlawful.

(h) Notice to Person with Undeliverable Address. Whenever notice is required to be given, under any provision of law or the Certificate of Incorporation or By-Laws of the corporation, to any stockholder to whom (i) notice of two consecutive annual meetings, and all notices of meetings or of the taking of action by written consent without a meeting to such person during the period between such two consecutive annual meetings, or (ii) all, and at least two, payments (if sent by first class mail) of dividends or interest on securities during a twelve-month period, have been mailed addressed to such person at his address as shown on the records of the corporation and have been returned undeliverable, the giving of such notice to such person shall not be required. Any action or meeting which shall be taken or held without notice to such person shall have the same force and effect as if such notice had been duly given. If any such person shall deliver to the corporation a written notice setting forth his then current address, the requirement that notice be given to such person shall be reinstated. In the event that the action taken by the corporation is such as to require the filing of a certificate under any provision of the Delaware General Corporation Law, the certificate need not state that notice was not given to persons to whom notice was not required to be given pursuant to this paragraph.

ARTICLE XIII

AMENDMENTS

Section 45. Amendments. Subject to paragraph (h) of Section 43 of the By-Laws, the By-Laws may be altered or amended or new By-Laws adopted by the affirmative vote of at least sixty-six and two-thirds percent (66-2/3 %) of the voting power of all of the then-outstanding shares of the Voting Stock. The Board of Directors shall also have the power to adopt, amend, or repeal By-Laws.

Section 46. Forum. Unless the Company consents in writing to the selection of an alternative forum, the sole and exclusive forum for (i) any derivative action or proceeding brought on behalf of the Company, (ii) any action asserting a claim of breach of a fiduciary duty owed by any director, officer or other employee of the Company to the Company or the Company's stockholders, (iii) any action asserting a claim arising pursuant to any provision of the Delaware General Company Law, or the Certificate of Incorporation or these By-Laws (as either may be amended from time to time) or (iv) any action asserting a claim governed by the internal affairs doctrine shall be the Court of Chancery in the State of Delaware (or, if the Court of Chancery does not have jurisdiction, the federal district court for the state of Delaware), in all cases subject to the court having personal jurisdiction over the indispensable parties named as defendants. Any person or entity purchasing or otherwise acquiring any interest in shares of capital stock of the Company shall be deemed to have notice of and consented to the provisions of this Bylaw.

I, Yuval Wasserman, certify that:

1. I have reviewed this quarterly report on Form 10-Q for the period ended March 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: May 6, 2019

/s/ Yuval Wasserman

Yuval Wasserman

Chief Executive Officer

I, Paul Oldham, certify that:

1. I have reviewed this quarterly report on Form 10-Q for the period ended March 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: May 6, 2019

/s/ Paul Oldham

Paul Oldham

Chief Financial Officer & Executive Vice President

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

I hereby certify, pursuant to 18 U.S.C. Section 1350, that the accompanying Quarterly Report on Form 10-Q for the period ended March 31, 2019, of Advanced Energy Industries, Inc., fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934 and that information contained in the Quarterly Report on Form 10-Q fairly presents, in all material respects, the financial condition and results of operations of Advanced Energy Industries, Inc.

Date: May 6, 2019

/s/ Yuval Wasserman

Yuval Wasserman

Chief Executive Officer

A signed original 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

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

I hereby certify, pursuant to 18 U.S.C. Section 1350, that the accompanying Quarterly Report on Form 10-Q for the period ended March 31, 2019, of Advanced Energy Industries, Inc., fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934 and that information contained in the Quarterly Report on Form 10-Q fairly presents, in all material respects, the financial condition and results of operations of Advanced Energy Industries, Inc.

Date: May 6, 2019

/s/ Paul Oldham

Paul Oldham

Chief Financial Officer & Executive Vice President

A signed original 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.