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**UNITED STATES  
SECURITIES AND EXCHANGE COMMISSION**  
Washington, DC 20549

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**FORM 10-Q**

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(MARK ONE)

**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 0-23621

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**MKS INSTRUMENTS, INC.**

(Exact name of registrant as specified in its charter)

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Massachusetts  
(State or other jurisdiction of  
incorporation or organization)

2 Tech Drive, Suite 201, Andover, Massachusetts  
(Address of principal executive offices)

04-2277512  
(I.R.S. Employer  
Identification No.)

01810  
(Zip Code)

Registrant's telephone number, including area code (978) 645-5500

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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 every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit 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, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act:

Large accelerated filer	<input checked="" type="checkbox"/>	Accelerated filer	<input type="checkbox"/>
Non-accelerated filer	<input type="checkbox"/>	Smaller reporting company	<input type="checkbox"/>
		Emerging growth company	<input type="checkbox"/>

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

**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, no par value	MKSI	Nasdaq Global Select Market

As of May 1, 2019, the registrant had 54,357,260 shares of common stock outstanding.

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## PART I. FINANCIAL INFORMATION

## ITEM 1. FINANCIAL STATEMENTS.

MKS INSTRUMENTS, INC.  
CONDENSED CONSOLIDATED BALANCE SHEETS  
(in thousands, except share and per share data)  
(Unaudited)

	March 31, 2019	December 31, 2018
<b>ASSETS</b>		
Current assets:		
Cash and cash equivalents	\$ 418,016	\$ 644,345
Short-term investments	44,326	73,826
Trade accounts receivable, net of allowance for doubtful accounts of \$4,968 and \$5,243 at March 31, 2019 and December 31, 2018, respectively	335,990	295,454
Inventories	475,633	384,689
Other current assets	86,387	65,790
Total current assets	1,360,352	1,464,104
Property, plant and equipment, net	251,424	194,367
Right-of-use asset	65,628	—
Goodwill	1,057,331	586,996
Intangible assets, net	619,091	319,807
Long-term investments	10,350	10,290
Other assets	48,562	38,682
Total assets	<u>\$ 3,412,738</u>	<u>\$ 2,614,246</u>
<b>LIABILITIES AND STOCKHOLDERS' EQUITY</b>		
Current liabilities:		
Short-term debt	\$ 10,281	\$ 3,986
Accounts payable	95,317	83,825
Accrued compensation	61,523	82,350
Income taxes payable	14,355	16,358
Lease liability	19,459	—
Deferred revenue and customer advances	21,056	14,246
Other current liabilities	74,568	62,520
Total current liabilities	296,559	263,285
Long-term debt, net	976,823	343,842
Non-current deferred taxes	78,904	48,223
Non-current accrued compensation	60,337	55,598
Non-current lease liability	49,392	—
Other liabilities	29,862	30,111
Total liabilities	<u>1,491,877</u>	<u>741,059</u>
Commitments and contingencies (Note 19)		
Stockholders' equity:		
Preferred Stock, \$0.01 par value per share, 2,000,000 shares authorized; none issued and outstanding	—	—
Common Stock, no par value, 200,000,000 shares authorized; 54,231,772 and 54,039,554 shares issued and outstanding at March 31, 2019 and December 31, 2018, respectively	113	113
Additional paid-in capital	844,261	793,932
Retained earnings	1,086,409	1,084,797
Accumulated other comprehensive loss	(9,922)	(5,655)
Total stockholders' equity	<u>1,920,861</u>	<u>1,873,187</u>
Total liabilities and stockholders' equity	<u>\$ 3,412,738</u>	<u>\$ 2,614,246</u>

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

MKS INSTRUMENTS, INC.  
CONDENSED CONSOLIDATED STATEMENTS OF OPERATIONS  
AND COMPREHENSIVE INCOME  
(in thousands, except per share data)  
(Unaudited)

	Three Months Ended March 31,	
	2019	2018
Net revenues:		
Products	\$ 397,363	\$ 496,677
Services	66,198	57,598
Total net revenues	463,561	554,275
Cost of revenues:		
Cost of products	229,710	261,321
Cost of services	35,733	30,099
Total cost of revenues (exclusive of amortization shown separately below)	265,443	291,420
Gross profit	198,118	262,855
Research and development	38,933	34,857
Selling, general and administrative	82,455	82,949
Fees and expenses related to incremental term loan	5,847	—
Acquisition and integration costs	30,167	—
Restructuring	223	1,220
Customer contract obligation	1,700	—
Environmental costs	—	1,000
Amortization of intangible assets	15,727	11,190
Income from operations	23,066	131,639
Interest income	1,714	1,105
Interest expense	9,119	5,430
Other expense, net	325	572
Income before income taxes	15,336	126,742
Provision for income taxes	2,881	21,621
Net income	<u>\$ 12,455</u>	<u>\$ 105,121</u>
Other comprehensive income:		
Changes in value of financial instruments designated as cash flow hedges, net of tax expense (benefit)(1)	\$ 52	\$ 178
Foreign currency translation adjustments, net of tax of \$0	(4,268)	10,771
Unrecognized pension loss, net of tax benefit(2)	(1)	(85)
Unrealized loss on investments, net of tax benefit(3)	(50)	(59)
Total comprehensive income	<u>\$ 8,188</u>	<u>\$ 115,926</u>
Net income per share:		
Basic	<u>\$ 0.23</u>	<u>\$ 1.93</u>
Diluted	<u>\$ 0.23</u>	<u>\$ 1.90</u>
Weighted average common shares outstanding:		
Basic	<u>54,147</u>	<u>54,423</u>
Diluted	<u>54,848</u>	<u>55,286</u>

(1) Tax expense (benefit) was \$15 and (\$112) for the three months ended March 31, 2019 and 2018, respectively.

(2) Tax benefit was \$21 and \$36 for the three months ended March 31, 2019 and 2018, respectively.

(3) Tax benefit was \$16 and \$17 for the three months ended March 31, 2019 and 2018, respectively.

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

MKS INSTRUMENTS, INC.  
 CONDENSED CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY  
 (in thousands, except per share data)  
 (Unaudited)

	Common Stock		Additional Paid-In Capital	Retained Earnings	Accumulated Other Comprehensive Income/(Loss)	Total Stockholders' Equity
	Shares	Amount				
Balance at December 31, 2018	54,039,554	\$ 113	\$793,932	\$1,084,797	\$ (5,655)	\$1,873,187
Net issuance under stock-based plans	192,218		22,491			22,491
Stock-based compensation			27,838			27,838
Cash dividend (\$0.20 per common share)				(10,843)		(10,843)
Comprehensive income (net of tax):						
Net income				12,455		12,455
Other comprehensive loss					(4,267)	(4,267)
Balance at March 31, 2019	<u>54,231,772</u>	<u>\$ 113</u>	<u>\$844,261</u>	<u>\$1,086,409</u>	<u>\$ (9,922)</u>	<u>\$1,920,861</u>
	Common Stock		Additional Paid-In Capital	Retained Earnings	Accumulated Other Comprehensive Income/(Loss)	Total Stockholders' Equity
	Shares	Amount				
Balance at December 31, 2017	54,355,535	\$ 113	\$789,644	\$795,698	\$ 3,452	\$1,588,907
Net issuance under stock-based plans	136,568		(8,920)			(8,920)
Stock-based compensation			10,426			10,426
Cash dividend (\$0.18 per common share)				(9,808)		(9,808)
Accounting Standards Codification Topic 606 Adjustment				1,809		1,809
Comprehensive income (net of tax):						
Net income				105,121		105,121
Other comprehensive gain					10,805	10,805
Balance at March 31, 2018	<u>54,492,103</u>	<u>\$ 113</u>	<u>\$791,150</u>	<u>\$892,820</u>	<u>\$ 14,257</u>	<u>\$1,698,340</u>

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

MKS INSTRUMENTS, INC.  
CONDENSED CONSOLIDATED STATEMENTS OF CASH FLOWS  
(in thousands)  
(Unaudited)

	Three Months Ended March 31,	
	2019	2018
Cash flows provided by operating activities:		
Net income	\$ 12,455	\$ 105,121
Adjustments to reconcile net income to net cash provided by operating activities:		
Depreciation and amortization	25,211	20,492
Amortization of inventory step-up adjustment to fair value	5,140	—
Amortization of debt issuance costs, original issue discount, and soft call premium	1,202	2,019
Stock-based compensation	27,838	10,426
Provision for excess and obsolete inventory	5,063	5,333
(Recovery) provision for doubtful accounts	(440)	335
Deferred income taxes	(2,445)	(705)
Other	66	34
Changes in operating assets and liabilities, net of business acquired:		
Trade accounts receivable	4,028	(37,336)
Inventories	(10,327)	(28,177)
Income taxes	(3,653)	8,822
Other current and non-current assets	4,804	(942)
Accrued compensation	(22,957)	(32,531)
Other current and non-current liabilities	359	10,544
Accounts payable	(17,294)	9,321
Net cash provided by operating activities	<u>29,050</u>	<u>72,756</u>
Cash flows used in investing activities:		
Acquisition of business, net of cash acquired	(988,599)	—
Purchases of investments	(44,212)	(49,753)
Maturities of investments	18,684	49,596
Sales of investments	154,489	8,930
Proceeds from sale of assets	35	—
Purchases of property, plant and equipment	(14,529)	(9,390)
Net cash used in investing activities	<u>(874,132)</u>	<u>(617)</u>
Cash flows provided by (used in) financing activities:		
Net proceeds from short and long-term borrowings	638,638	11,907
Payments on short-term borrowings	(176)	(10,274)
Payments on long-term borrowings	—	(50,000)
Net payments related to employee stock awards	(8,987)	(8,921)
Dividend payments to common stockholders	(10,843)	(9,808)
Net cash provided by (used in) financing activities	<u>618,632</u>	<u>(67,096)</u>
Effect of exchange rate changes on cash and cash equivalents	121	1,958
(Decrease) Increase in cash and cash equivalents and restricted cash	<u>(226,329)</u>	<u>7,001</u>
Cash and cash equivalents at beginning of period	644,345	333,887
Cash and cash equivalents at end of period	<u>\$ 418,016</u>	<u>\$ 340,888</u>

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

MKS INSTRUMENTS, INC.  
NOTES TO UNAUDITED CONDENSED CONSOLIDATED FINANCIAL STATEMENTS  
(in thousands, except share and per share data)

1) Basis of Presentation

The terms “MKS” and the “Company” refer to MKS Instruments, Inc. and its subsidiaries. All intercompany accounts and transactions have been eliminated in consolidation. The interim financial data as of March 31, 2019, and for the three months ended March 31, 2019 are unaudited; however, in the opinion of MKS, the interim data includes all adjustments, consisting of normal recurring adjustments, necessary for a fair statement of the results for the interim periods. The condensed consolidated balance sheet presented as of December 31, 2018 has been derived from the consolidated audited financial statements as of that date. The unaudited condensed consolidated financial statements presented herein have been prepared in accordance with the instructions to Form 10-Q and do not include all of the information and note disclosures required by United States generally accepted accounting principles (“U.S. GAAP”). The unaudited condensed consolidated financial statements should be read in conjunction with the audited consolidated financial statements and notes thereto included in the MKS Annual Report on Form 10-K for the year ended December 31, 2018 filed with the Securities and Exchange Commission on February 26, 2019.

The preparation of these unaudited condensed consolidated financial statements requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and the disclosure of contingent liabilities at the date of the unaudited condensed consolidated financial statements and the reported amounts of revenues and expenses during the reporting period. On an on-going basis, management evaluates its estimates and judgments, including those related to revenue recognition, stock-based compensation, inventory, intangible assets, goodwill and other long-lived assets, warranty liabilities, pension liabilities, acquisition expenses, income taxes and investments. Management bases its estimates and judgments on historical experience and on various other factors that are believed to be reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions or conditions.

2) Recently Issued Accounting Pronouncements

In October 2018, the Financial Accounting Standards Board (“FASB”) issued Accounting Standards Update (“ASU”) 2018-16, “Derivatives and Hedging (Topic 815).” This standard permits the use of the Overnight Index Swap Rate (“OIS”) based on the Secured Overnight Financing Rate as a U.S. benchmark interest rate for hedge accounting purposes under Topic 815 in addition to the interest rates on direct treasury obligations of the U.S. government, the London Interbank Offered Rate (“LIBOR”) swap rate, the OIS rate based on the Federal Funds Effective Rate and the Securities Industry and Financial Markets Association Municipal Swap Rate. This standard is effective for annual periods beginning after December 15, 2018, including interim periods within those fiscal years. The Company adopted this ASU during the first quarter of 2019 and the adoption of this ASU did not have a material impact on the Company’s consolidated financial statements.

In August 2018, the FASB issued ASU 2018-15, “Intangibles-Goodwill and Other-Internal-Use Software (Subtopic 350-40): Customer’s Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement that is a Service Contract.” This standard aligns the requirements for capitalizing implementation costs incurred in a hosting arrangement that is a service contract with the requirements for capitalizing implementation costs incurred to develop or obtain internal-use software (and hosting arrangements that include an internal-use software license). The accounting for the service element of a hosting arrangement that is a service contract is not affected by the amendments to this update. This standard is effective for annual periods beginning after December 15, 2019, including interim periods within those fiscal years. The Company does not expect adoption of this ASU to have a material impact on the Company’s consolidated financial statements.

In August 2017, the FASB issued ASU 2017-12, “Derivatives and Hedging (Topic 815).” This standard better aligns an entity’s risk management activities and financial reporting for hedging relationships through changes to both the designation and measurement guidance for qualifying hedging relationships and the presentation of hedge results. The provisions of this ASU are effective for annual periods beginning after December 15, 2018, including interim periods within those fiscal years. The Company adopted this ASU during the first quarter of 2019 and the adoption of this ASU did not have a material impact on the Company’s consolidated financial statements.

In February 2016, the FASB issued ASU 2016-02, Leases. This standard requires the recognition of lease assets and liabilities for all leases, with certain exceptions, on the balance sheet. This ASU is effective for annual periods beginning after December 15, 2018, including interim periods within those fiscal years. The Company adopted ASU 2016-02 on January 1, 2019, and used the effective date as its date of initial application. As such, the Company did not adjust prior period amounts. The Company also elected to adopt the package of practical expedients upon transition, which permits companies to not reassess lease identification, classification, and initial direct costs under ASU 2016-02 for leases that commenced prior to the effective date. The Company implemented internal controls and a lease accounting information system to enable

MKS INSTRUMENTS, INC.  
NOTES TO UNAUDITED CONDENSED CONSOLIDATED FINANCIAL STATEMENTS  
(in thousands, except share and per share data)

preparation on adoption. Upon adoption, the Company recorded a cumulative effect of initially applying this new standard, resulting in the addition of \$71,042 of right-of-use assets and \$20,192 and \$54,147 of short-term and long-term lease liabilities, respectively. The right-of-use asset is net of the deferred rent liability, prepaid rent and a net favorable lease asset which were re-classified to the right-of-use asset upon adoption of the standard. For additional information on the required disclosures related to the impact of adopting this standard, see Note 3 to the Consolidated Condensed Financial Statements.

3) Leases

The Company has operating leases for real estate and non-real estate, which are comprised of automobiles, in North America, Europe, and Asia. The Company does not have any finance leases.

The Company has lease arrangements with lease and non-lease components, has elected to account for the lease and non-lease components as a single lease component, and has allocated all of the contract consideration to the lease component only. The Company has existing net leases in which the non-lease components (e.g. common area maintenance, maintenance, consumables, etc.) are paid separately from rent based on actual costs incurred. Therefore, non-lease components are not included in the right-of-use asset and lease liability and are reflected as expenses in the periods incurred.

The Company has existing leases that include variable lease and non-lease components that are not included in the right-of-use asset and lease liability, and are reflected as expenses in the periods incurred. Such payments primarily include common area maintenance charges and increases in rent payments that are driven by factors such as future changes in an index (e.g., the Consumer Price Index).

A right-of-use asset of \$65,628, short-term lease liability of \$19,459 and long-term lease liability of \$49,392 were reflected on the balance sheet as of March 31, 2019.

The elements of lease expense were as follows:

	<u>Three Months Ended March 31, 2019</u>
Lease Cost:	
Operating lease cost	\$ 5,377
Other Information:	
Operating cash flows used for operating leases	\$ 5,711
Weighted average discount rate	3.81%
Weighted average remaining lease term	4.9 years

Future lease payments under non-cancelable leases as of March 31, 2019 are detailed as follows:

2019 (remaining)	\$16,831
2020	18,608
2021	12,687
2022	7,518
2023	6,315
Thereafter	13,761
Total lease payments	75,720
Less: imputed interest	6,869
Total operating lease liabilities	<u>\$68,851</u>

MKS INSTRUMENTS, INC.  
NOTES TO UNAUDITED CONDENSED CONSOLIDATED FINANCIAL STATEMENTS  
(in thousands, except share and per share data)

Minimum lease payments under operating leases prior to adoption of ASU 2016-02 were as follows:

Year Ending December 31,	Operating Leases
2019	\$ 20,106
2020	17,142
2021	10,325
2022	5,573
2023	4,411
Thereafter	8,739
<b>Total minimum lease payments</b>	<b>\$ 66,296</b>

4) Revenue from Contracts with Customers

Contract assets as of March 31, 2019 and December 31, 2018 were \$3,624 and \$3,624, respectively, and included in other current assets.

A rollforward of the Company's deferred revenue and customer advances is as follows:

	Three Months Ended March 31, 2019
Beginning balance, January 1(1)	\$ 17,474
Deferred revenue and customer advances assumed in ESI Merger	3,314
Additions to deferred revenue and customer advances	17,219
Amount of deferred revenue and customer advances recognized in income	(13,933)
<b>Ending balance, March 31(2)</b>	<b>\$ 24,074</b>

(1) Beginning deferred revenue and customer advances as of January 1, 2019 included \$8,134 of current deferred revenue, \$3,228 of long-term deferred revenue and \$6,112 of current customer advances.

(2) Ending deferred revenue as of March 31, 2019 included \$13,322 of current deferred revenue, \$3,018 of long-term deferred revenue and \$7,734 of current customer advances.

*Disaggregation of Revenue*

The following table summarizes revenue from contracts with customers:

	Three Months Ended March 31, 2019			
	Vacuum & Analysis	Light & Motion	Equipment & Solutions	Total
<b>Net revenues:</b>				
Products	\$192,648	\$178,697	\$ 26,018	\$397,363
Services	41,707	15,291	9,200	66,198
<b>Total net revenues</b>	<b>\$234,355</b>	<b>\$193,988</b>	<b>\$ 35,218</b>	<b>\$463,561</b>

  

	Three Months Ended March 31, 2018			
	Vacuum & Analysis	Light & Motion	Equipment & Solutions	Total
<b>Net revenues:</b>				
Products	\$304,336	\$192,341	\$ —	\$496,677
Services	44,008	13,590	—	57,598
<b>Total net revenues</b>	<b>\$348,344</b>	<b>\$205,931</b>	<b>\$ —</b>	<b>\$554,275</b>

MKS INSTRUMENTS, INC.  
NOTES TO UNAUDITED CONDENSED CONSOLIDATED FINANCIAL STATEMENTS  
(in thousands, except share and per share data)

Product revenue, excluding revenue from certain custom products, is recorded at a point in time, while the majority of the service revenue and revenue from certain custom products is recorded over time.

Refer to Note 17 for revenue by reportable segment, geography and groupings of similar products.

5) **Investments**

The fair value of investments classified as short-term consists of the following:

	March 31, 2019	December 31, 2018
<b>Available-for-sale investments:</b>		
Time deposits and certificates of deposit	\$ 101	\$ 102
Bankers' acceptance drafts	1,722	989
Asset-backed securities	—	9,113
Commercial paper	33,509	19,359
Corporate obligations	8,994	9,352
U.S. treasury obligations	—	13,298
U.S. agency obligations	—	21,613
	<u>\$ 44,326</u>	<u>\$ 73,826</u>

Investments classified as long-term consist of the following:

	March 31, 2019	December 31, 2018
<b>Available-for-sale investments:</b>		
Group insurance contracts	\$ 5,950	\$ 5,890
<b>Cost method investments:</b>		
Minority interest in a private company	4,400	4,400
	<u>\$ 10,350</u>	<u>\$ 10,290</u>

The following tables show the gross unrealized gains and (losses) aggregated by investment category for available-for-sale investments:

As of March 31, 2019:	Cost	Gross Unrealized Gains	Gross Unrealized (Losses)	Estimated Fair Value
<b>Short-term investments:</b>				
<b>Available-for-sale investments:</b>				
Time deposits and certificates of deposit	\$ 99	\$ 2	\$ —	\$ 101
Bankers' acceptance drafts	1,722	—	—	1,722
Commercial paper	33,752	1	(244)	33,509
Corporate obligations	8,996	1	(3)	8,994
	<u>\$44,569</u>	<u>\$ 4</u>	<u>\$ (247)</u>	<u>\$44,326</u>

As of March 31, 2019:	Cost	Gross Unrealized Gains	Gross Unrealized (Losses)	Estimated Fair Value
<b>Long-term investments:</b>				
<b>Available-for-sale investments:</b>				
Group insurance contracts	\$ 5,582	\$ 368	\$ —	\$ 5,950

MKS INSTRUMENTS, INC.  
 NOTES TO UNAUDITED CONDENSED CONSOLIDATED FINANCIAL STATEMENTS  
 (in thousands, except share and per share data)

As of December 31, 2018:	Cost	Gross Unrealized Gains	Gross Unrealized (Losses)	Estimated Fair Value
<b>Short-term investments:</b>				
Available-for-sale investments:				
Time deposits and certificates of deposit	\$ 102	\$ —	\$ —	\$ 102
Bankers' acceptance drafts	989	—	—	989
Asset-backed securities	9,121	1	(9)	9,113
Commercial paper	19,504	—	(145)	19,359
Corporate obligations	9,367	—	(15)	9,352
U.S. treasury obligations	13,294	4	—	13,298
U.S. agency obligations	21,617	2	(6)	21,613
	<u>\$73,994</u>	<u>\$ 7</u>	<u>\$ (175)</u>	<u>\$73,826</u>

As of December 31, 2018:	Cost	Gross Unrealized Gains	Gross Unrealized (Losses)	Estimated Fair Value
<b>Long-term investments:</b>				
Available-for-sale investments:				
Group insurance contracts	<u>\$5,546</u>	<u>\$ 344</u>	<u>\$ —</u>	<u>\$ 5,890</u>

The tables above, which show the gross unrealized gains and (losses) aggregated by investment category for available-for-sale investments as of March 31, 2019 and December 31, 2018, reflect the inclusion within short-term investments of investments with contractual maturities greater than one year from the date of purchase. Management has the ability, if necessary, to liquidate any of its investments in order to meet the Company's liquidity needs in the next 12 months. Accordingly, those investments with contractual maturities greater than one year from the date of purchase are classified as short-term on the accompanying balance sheets.

The Company reviews and evaluates its investments for any indication of possible impairment. Based on this review, the Company has determined that the unrealized losses related to these investments at March 31, 2019 and December 31, 2018 were temporary.

Interest income is accrued as earned. Dividend income is recognized as income on the date the stock trades "ex-dividend." The cost of marketable securities sold is determined by the specific identification method. Realized gains or losses are reflected in income and were not material for the three months ended March 31, 2019 and 2018.

6) Fair Value Measurements

In accordance with the provisions of fair value accounting, a fair value measurement assumes that the transaction to sell an asset or transfer a liability occurs in the principal market for the asset or liability or, in the absence of a principal market, the most advantageous market for the asset or liability and defines fair value based upon an exit price model.

The fair value measurement guidance establishes a fair value hierarchy which requires an entity to maximize the use of observable inputs and minimize the use of unobservable inputs when measuring fair value. The guidance describes three levels of inputs that may be used to measure fair value:

- Level 1 Quoted prices in active markets for identical assets or liabilities assessed as of the reporting date. Active markets are those in which transactions for the asset or liability occur in sufficient frequency and volume to provide pricing information on an ongoing basis.
- Level 2 Observable inputs other than Level 1 prices, such as quoted prices for similar assets or liabilities; quoted prices in markets that are not active; or other inputs that are observable or can be corroborated by observable market data for substantially the full term of the assets or liabilities. Level 2 assets and liabilities include debt securities with quoted prices that are traded less frequently than exchange-traded instruments or securities or derivative contracts that are valued using a pricing model with inputs that are observable in the market or can be derived principally from or corroborated by observable market data.

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Level 3 Unobservable inputs that are supported by little or no market activity and that are significant to the fair value of the assets or liabilities. Level 3 assets and liabilities include financial instruments whose value is determined using pricing models, discounted cash flow methodologies, or similar techniques, as well as instruments for which the determination of fair value requires significant management judgment or estimation.

In certain cases, the inputs used to measure fair value may fall into different levels of the fair value hierarchy. In such cases, the Company categorizes such assets and liabilities based on the lowest level input that is significant to the fair value measurement in its entirety. The Company's assessment of the significance of a particular input to the fair value measurement in its entirety requires judgment and considers factors specific to the asset or liability.

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Assets and liabilities of the Company are measured at fair value on a recurring basis as of March 31, 2019 and are summarized as follows:

Description	March 31, 2019	Fair Value Measurements at Reporting Date Using		
		Quoted Prices in Active Markets for Identical Assets or Liabilities (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
<b>Assets:</b>				
Cash equivalents:				
Money market funds	\$ 294	\$ 294	\$ —	\$ —
Time deposits and certificates of deposit	3,852	—	3,852	—
Commercial paper	82,584	—	82,584	—
Corporate obligations	12,570	—	12,570	—
U.S. agency obligations	49,084	—	49,084	—
Restricted cash – money market funds	317	317	—	—
Available-for-sale investments:				
Time deposits and certificates of deposit	101	—	101	—
Bankers' acceptance drafts	1,722	—	1,722	—
Commercial paper	33,509	—	33,509	—
Corporate obligations	8,994	—	8,994	—
Group insurance contracts	5,950	—	5,950	—
Derivatives – currency forward contracts	3,492	—	3,492	—
Funds in investments and other assets:				
Israeli pension assets	14,481	—	14,481	—
Derivatives – interest rate hedge – non-current	4,459	—	4,459	—
Deferred compensation plan assets:				
Mutual funds and exchange traded funds	1,799	—	1,799	—
Money market securities	274	—	274	—
Total assets	<u>\$ 223,482</u>	<u>\$ 611</u>	<u>\$222,871</u>	<u>\$ —</u>
<b>Liabilities:</b>				
Derivatives – currency forward contracts	<u>\$ 322</u>	<u>\$ —</u>	<u>\$ 322</u>	<u>\$ —</u>
<b>Reported as follows:</b>				
<b>Assets:</b>				
Cash and cash equivalents, including restricted cash <sup>(1)</sup>	\$ 148,701	\$ 611	\$148,090	\$ —
Short-term investments	44,326	—	44,326	—
Other current assets	3,492	—	3,492	—
Total current assets	<u>\$ 196,519</u>	<u>\$ 611</u>	<u>\$195,908</u>	<u>\$ —</u>
Long-term investments <sup>(2)</sup>	\$ 5,950	\$ —	\$ 5,950	\$ —
Other assets	21,013	—	21,013	—
Total long-term assets	<u>\$ 26,963</u>	<u>\$ —</u>	<u>\$ 26,963</u>	<u>\$ —</u>
<b>Liabilities:</b>				
Other current liabilities	<u>\$ 322</u>	<u>\$ —</u>	<u>\$ 322</u>	<u>\$ —</u>

(1) The cash and cash equivalent amounts presented in the table above do not include cash of \$269,315 as of March 31, 2019.

(2) The long-term investments presented in the table above do not include the Company's minority interest investment in a private company, which is accounted for under the cost method.

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Assets and liabilities of the Company are measured at fair value on a recurring basis as of December 31, 2018 and are summarized as follows:

Description	December 31, 2018	Fair Value Measurements at Reporting Date Using		
		Quoted Prices in Active Markets for Identical Assets or Liabilities (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
<b>Assets:</b>				
Cash equivalents:				
Money market funds	\$ 180,340	\$ 180,340	\$ —	\$ —
Time deposits and certificates of deposit	850	—	850	—
Commercial paper	2,687	—	2,687	—
U.S. agency obligations	3,418	—	3,418	—
Restricted cash – money market funds	110	110	—	—
Available-for-sale investments:				
Time deposits and certificates of deposit	102	—	102	—
Bankers' acceptance drafts	989	—	989	—
Asset-backed securities	9,113	—	9,113	—
Commercial paper	19,359	—	19,359	—
Corporate obligations	9,352	—	9,352	—
U.S. treasury obligations	13,298	—	13,298	—
U.S. agency obligations	21,613	—	21,613	—
Group insurance contracts	5,890	—	5,890	—
Derivatives – currency forward contracts	2,485	—	2,485	—
Funds in investments and other assets:				
Israeli pension assets	14,408	—	14,408	—
Derivatives – interest rate hedge – non-current	6,083	—	6,083	—
Total assets	<u>\$ 290,097</u>	<u>\$ 180,450</u>	<u>\$ 109,647</u>	<u>\$ —</u>
<b>Liabilities:</b>				
Derivatives – currency forward contracts	<u>\$ 1,168</u>	<u>\$ —</u>	<u>\$ 1,168</u>	<u>\$ —</u>
Reported as follows:				
<b>Assets:</b>				
Cash and cash equivalents, including restricted cash <sup>(1)</sup>	\$ 187,405	\$ 180,450	\$ 6,955	\$ —
Short-term investments	73,826	—	73,826	—
Other current assets	2,485	—	2,485	—
Total current assets	<u>\$ 263,716</u>	<u>\$ 180,450</u>	<u>\$ 83,266</u>	<u>\$ —</u>
Long-term investments <sup>(2)</sup>	\$ 5,890	\$ —	\$ 5,890	\$ —
Other assets	20,491	—	20,491	—
Total long-term assets	<u>\$ 26,381</u>	<u>\$ —</u>	<u>\$ 26,381</u>	<u>\$ —</u>
<b>Liabilities:</b>				
Other current liabilities	<u>\$ 1,168</u>	<u>\$ —</u>	<u>\$ 1,168</u>	<u>\$ —</u>

(1) The cash and cash equivalent amounts presented in the table above do not include cash of \$456,940 as of December 31, 2018.

(2) The long-term investments presented in the table above do not include the Company's minority interest investment in a private company, which is accounted for under the cost method.

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Money Market Funds

Money market funds are cash and cash equivalents and are classified within Level 1 of the fair value hierarchy.

Available-For-Sale Investments

Available-for-sale investments consisted of time deposits, certificates of deposit, bankers' acceptance drafts, asset-backed securities (which include auto loans, credit card receivables and equipment trust receivables), commercial paper, corporate obligations, U.S. treasury obligations, U.S. agency obligations and group insurance contracts.

The Company measures its debt and equity investments at fair value. The Company's available-for-sale investments are classified within Level 2 of the fair value hierarchy.

Israeli Pension Assets

Israeli pension assets represent investments in mutual funds, government securities and other time deposits. These investments are set aside for the retirement benefit of the employees at the Company's Israeli subsidiaries. These funds are classified within Level 2 of the fair value hierarchy.

Derivatives

As a result of the Company's global operating activities, the Company is exposed to market risks from changes in foreign currency exchange rates and variable interest rates, which may adversely affect its operating results and financial position. When deemed appropriate, the Company minimizes its risks from foreign currency exchange rate and interest rate fluctuations through the use of derivative financial instruments. The principal market in which the Company executes its foreign currency contracts and interest rate swaps is the institutional market in an over-the-counter environment with a relatively high level of price transparency. The market participants usually are large commercial banks. The forward foreign currency exchange contracts and interest rate hedge are valued using broker quotations or market transactions and are classified within Level 2 of the fair value hierarchy.

7) Derivatives

The Company enters into derivative instruments for risk management purposes only, including derivatives designated as hedging instruments and those utilized as economic hedges. The Company operates internationally and, in the normal course of business, is exposed to fluctuations in interest rates and foreign exchange rates. These fluctuations can increase the costs of financing, investing and operating the business. The Company has used derivative instruments, such as forward foreign currency exchange contracts, to manage certain foreign currency exposure, and interest rate swaps to manage interest rate exposure.

By nature, all financial instruments involve market and credit risks. The Company enters into derivative instruments with major investment grade financial institutions, for which no collateral is required. The Company has policies to monitor the credit risk of these counterparties. While there can be no assurance, the Company does not anticipate any material non-performance by any of these counterparties.

Interest Rate Swap Agreement

On September 30, 2016, the Company entered into an interest rate swap agreement to fix the rate on approximately 50% of its then-outstanding balance under the Credit Agreement, as described further in Note 11. This hedge fixes the interest rate paid on the hedged debt at 1.198% per annum plus the applicable credit spread, which was 2.0% as of March 31, 2019, through September 30, 2020. The interest rate swap is recorded at fair value on the balance sheet and changes in the fair value are recognized in other comprehensive income (loss) ("OCI"). To the extent that this arrangement is no longer an effective hedge, any ineffectiveness measured in the hedging relationship is recorded currently in earnings in the period it occurs. At March 31, 2019, the notional amount of this transaction was \$290,000 and had a fair value of \$4,459. At December 31, 2018, the notional amount of this transaction was \$290,000 and had a fair value of \$6,083.

Foreign Exchange Contracts

The Company hedges a portion of its forecasted foreign currency-denominated intercompany sales of inventory, over a maximum period of eighteen months, using forward foreign exchange contracts accounted for as cash-flow hedges related to Japanese, South Korean, British, Euro

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and Taiwanese currencies. To the extent these derivatives are effective in off-setting the variability of the hedged cash flows, and otherwise meet the hedge accounting criteria, changes in the derivatives' fair value are not included in current earnings but are included in OCI in stockholders' equity. These changes in fair value will subsequently be reclassified into earnings, as applicable, when the forecasted transaction occurs. To the extent that a previously designated hedging transaction is no longer an effective hedge, any ineffectiveness measured in the hedging relationship is recorded currently in earnings in the period it occurs. The cash flows resulting from forward exchange contracts are classified in the consolidated statements of cash flows as part of cash flows from operating activities. The Company does not enter into derivative instruments for trading or speculative purposes.

As of March 31, 2019 and December 31, 2018, the Company had outstanding forward foreign exchange contracts with gross notional values of \$144,002 and \$159,394, respectively. The following tables provide a summary of the primary net hedging positions and corresponding fair values held as of March 31, 2019 and December 31, 2018:

Currency Hedged (Buy/Sell)	March 31, 2019	
	Gross Notional Value	Fair Value <sup>(1)</sup>
U.S. Dollar/Japanese Yen	\$ 39,022	\$ 302
U.S. Dollar/South Korean Won	54,077	1,424
U.S. Dollar/Euro	20,146	916
U.S. Dollar/U.K. Pound Sterling	10,921	125
U.S. Dollar/Taiwan Dollar	19,836	403
Total	<u>\$ 144,002</u>	<u>\$ 3,170</u>

  

Currency Hedged (Buy/Sell)	December 31, 2018	
	Gross Notional Value	Fair Value <sup>(1)</sup>
U.S. Dollar/Japanese Yen	\$ 43,770	\$ (478)
U.S. Dollar/South Korean Won	59,149	570
U.S. Dollar/Euro	23,515	688
U.S. Dollar/U.K. Pound Sterling	11,827	323
U.S. Dollar/Taiwan Dollar	21,133	214
Total	<u>\$ 159,394</u>	<u>\$ 1,317</u>

(1) Represents the receivable (payable) amount included in the consolidated balance sheet.

The following table provides a summary of the fair value amounts of the Company's derivative instruments:

Derivatives Designated as Hedging Instruments	March 31, 2019	December 31, 2018
<b>Derivative assets:</b>		
Foreign exchange contracts <sup>(1)</sup>	\$ 3,492	\$ 2,485
Foreign currency interest rate hedge <sup>(2)</sup>	4,459	6,083
<b>Derivative liabilities:</b>		
Foreign exchange contracts <sup>(1)</sup>	(322)	(1,168)
<b>Total net derivative asset designated as hedging instruments</b>	<u>\$ 7,629</u>	<u>\$ 7,400</u>

(1) The derivative assets of \$3,492 and \$2,485 as of March 31, 2019 and December 31, 2018, respectively, related to foreign exchange contracts and are classified in other current assets in the consolidated balance sheet. The derivative liabilities of \$322 and \$1,168 as of March 31, 2019 and December 31, 2018, respectively, are classified in other current liabilities in the consolidated balance sheet. These foreign exchange contracts are subject to a master netting agreement with one financial institution. However, the Company has elected to record these contracts on a gross basis in the balance sheet.

(2) The foreign currency interest rate hedge assets of \$4,459 and \$6,083 as of March 31, 2019 and December 31, 2018, respectively, are classified in other assets in the consolidated balance sheet.

The net amount of existing gains as of March 31, 2019 that the Company expects to reclassify from OCI into earnings within the next twelve months is immaterial.

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The following table provides a summary of the gains (losses) on derivatives designated as cash flow hedging instruments:

<u>Derivatives Designated as Cash Flow Hedging Instruments</u>	Three Months Ended March 31,	
	2019	2018
<b>Forward exchange contracts:</b>		
Net gain recognized in OCI(1)	\$ 67	\$ 66
Net gain (loss) reclassified from accumulated OCI into income(2)	\$ 949	\$ (2,539)

- (1) Net change in the fair value of the effective portion classified in OCI.  
 (2) Effective portion classified in cost of products for the three March 31, 2019 and 2018. The tax effect of the gains or losses reclassified from accumulated OCI into income is immaterial.

The following table provides a summary of the gain (loss) on derivatives not designated as hedging instruments:

<u>Derivatives Not Designated as Hedging Instruments</u>	Three Months Ended March 31,	
	2019	2018
<b>Forward exchange contracts:</b>		
Net gain (loss) recognized in income(1)	\$ 57	\$ (1,253)

- (1) The Company enters into foreign exchange contracts to hedge against changes in the balance sheet for certain subsidiaries to mitigate the risk associated with certain foreign currency transactions in the ordinary course of business. These derivatives are not designated as hedging instruments and gains or losses from these derivatives are recorded immediately in other (expense) income.

8) Inventories

Inventories consist of the following:

	March 31, 2019	December 31, 2018
Raw materials	\$ 303,588	\$ 235,593
Work-in-process	76,560	61,908
Finished goods	95,485	87,188
	<u>\$ 475,633</u>	<u>\$ 384,689</u>

9) Acquisitions

Electro Scientific Industries, Inc.

On February 1, 2019, the Company completed its acquisition of Electro Scientific Industries, Inc. (“ESI”) pursuant to an Agreement and Plan of Merger, dated as of October 29, 2018 (the “Merger Agreement”), by and among the Company, EAS Equipment, Inc., formerly a Delaware corporation and a wholly-owned subsidiary of the Company, and ESI (the “ESI Merger”). At the effective time of the ESI Merger and pursuant to the terms and conditions of the Merger Agreement, each share of ESI’s common stock that was issued and outstanding immediately prior to the effective time of the ESI Merger was converted into the right to receive \$30.00 in cash, without interest and subject to deduction of any required withholding tax.

The aggregate consideration of approximately \$1,032,671, excluding related transaction fees and expenses, and non-cash consideration related to the exchange of share-based awards of approximately \$30,630 for a total purchase consideration of approximately \$1,063,301. The Company funded the payment of the aggregate consideration with a combination of the Company’s available cash on hand and the proceeds from the Company’s senior secured term loan facility described in Note 11.

ESI provides laser-based manufacturing solutions for the micro-machining industry that enable customers to optimize production. It’s market is composed primarily of flexible and rigid PCB processing/fabrication, semiconductor wafer processing and passive component manufacturing and testing. ESI solutions incorporate specialized laser technology and proprietary control software to efficiently process the materials and components that are an integral part of electronic devices and systems.

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The purchase price of ESI consisted of the following:

Cash paid for outstanding shares(1)	\$ 1,032,671
Settlement of share-based compensation awards(2)	30,630
Total purchase price	1,063,301
Less: Cash and cash equivalents acquired	(44,072)
Total purchase price, net of cash and cash equivalents acquired	<u>\$ 1,019,229</u>

- (1) Represents cash paid of \$30.00 per share for approximately 34,422,361 shares of ESI common stock, without interest and subject to a deduction for any required withholding tax.
- (2) Represents the vested but not issued portion of ESI share-based compensation awards as of the acquisition date of February 1, 2019.

Under the acquisition method of accounting, the total estimated acquisition consideration is allocated to the acquired tangible and intangible assets and assumed liabilities of ESI based on their fair values as of the acquisition date. Any excess of the acquisition consideration over the fair value of assets acquired and liabilities assumed is allocated to goodwill. The Company expects that none of such goodwill and intangible assets will be deductible for tax purposes.

The following table summarizes the allocation of the preliminary purchase price to the fair values assigned to assets acquired and liabilities assumed at the date of the ESI Merger:

Current assets (excluding inventory)	\$ 209,194
Inventory	92,364
Intangible assets	318,600
Goodwill	471,403
Property, plant and equipment	52,891
Long-term assets	9,633
Total assets acquired	<u>1,154,085</u>
Current liabilities	51,479
Non-current deferred taxes	32,146
Other long-term liabilities	7,159
Total liabilities assumed	<u>90,784</u>
Fair value of assets acquired and liabilities assumed	1,063,301
Less: Cash and cash equivalents acquired	(44,072)
Total purchase price, net of cash and cash equivalents acquired	<u>\$ 1,019,229</u>

The fair value write-up of acquired finished goods inventory and demonstration inventory was \$8,383, the amount of which will be expensed over the period during which the acquired inventory is sold. Accordingly, for the three months ended March 31, 2019, the Company recorded a \$5,140 incremental cost of sales charge associated with the fair value write-up of inventory acquired in the ESI Merger.

The fair value write-up of acquired property, plant and equipment of \$26,667 will be amortized over the estimated useful life of the applicable assets. Property, plant and equipment is valued at its value-in-use, unless there was a known plan to dispose of the asset.

The acquired intangible assets are being amortized on a straight-line basis, which approximates the economic use of the asset.

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The following table reflects the allocation of the acquired intangible assets and related estimate of useful lives:

Completed technology - Laser	\$257,900	12 years
Completed technology - Non-Laser	18,500	10 years
Trademarks and trade names	14,400	7 years
Customer relationships	25,400	10 years
Backlog	2,400	1 year
	<u>\$318,600</u>	

The net fair value of the acquired intangibles was determined using the income approach. In performing these valuations, the key underlying probability-adjusted assumptions of the discounted cash flows were projected revenues, gross margin expectations and operating cost estimates. The valuations were based on the information that was available as of the acquisition date and the expectations and assumptions that have been deemed reasonable by the Company's management. There are inherent uncertainties and management judgment required in these determinations. This acquisition resulted in a purchase price that exceeded the estimated fair value of tangible and intangible assets, the excess amount of which was allocated to goodwill.

While the Company uses its best estimates and assumptions as part of the purchase price allocation process to value the assets acquired and liabilities assumed on the acquisition date, its estimates and assumptions are subject to refinement. Fair value estimates are based on a complex series of judgments about future events and uncertainties and rely heavily on estimates and assumptions. The judgments used to determine the estimated fair value assigned to each class of assets acquired and liabilities assumed, as well as asset lives, can materially impact the Company's results of operations. The finalization of the purchase accounting assessment will result in a change in the valuation of assets acquired and liabilities assumed and may have a material impact on the Company's results of operations and financial position. As a result, during the measurement period, which may be up to one year from the acquisition date, the Company records adjustments to the assets acquired and liabilities assumed with a corresponding offset to goodwill to reflect additional information received about facts and circumstances which existed at the date of acquisition. The Company records adjustments to the assets acquired and liabilities assumed subsequent to the purchase price allocation period in the Company's operating results in the period in which the adjustments are determined. The size and breadth of the ESI Merger will necessitate the use of this measurement period to adequately analyze and assess a number of the factors used in establishing the fair value of certain tangible and intangible assets acquired and liabilities assumed as of the acquisition date and the related tax impacts of any changes made. Any potential adjustments made could be material in relation to the preliminary values presented above.

The Company believes the amount of goodwill relative to identifiable intangible assets relates to several factors including: (1) broadening its position in key industrial end markets to complementary solutions; and (2) leveraging component and systems expertise to provide robust solutions to meet customer evolving technology needs.

The results of this acquisition were included in the Company's consolidated statement of operations beginning on February 1, 2019. ESI constitutes the Company's Equipment & Solutions reportable segment (see Note 17).

Certain executives from ESI had severance provisions in their respective ESI employment agreements. The agreements included terms that were accounted for as dual-trigger arrangements. Through the Company's acquisition accounting, the expense relating to these benefits was recognized in the combined entity's financial statements. The Company recorded costs of \$2,701 and \$14,023 in acquisition and integration costs as compensation expense and stock-based compensation expense, respectively, for the three months ended March 31, 2019 associated with these severance provisions. The restricted stock units and stock appreciation rights that were eligible for accelerated vesting if the executive exercised his or her rights but were not issued as of each reporting period-end, will be excluded from the computation of basic earnings per share and included in the computation of diluted earnings per share for such reporting period.

In addition, the Company recorded \$6,764 in acquisition and integration costs, which were primarily advisory services costs.

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The Company's consolidated net revenue and earnings for the three months ended March 31, 2019 include the following amounts of revenue and earnings of ESI since the acquisition date:

	Three Months Ended March 31, 2019
Total net revenues	\$ 35,218
Net loss	\$ (31,716)
Net loss per share:	
Basic	\$ (0.59)
Diluted	\$ (0.59)

### Pro Forma Results

The following unaudited pro forma financial information presents the combined results of operations of the Company as if the ESI Merger had occurred on January 1, 2018. The unaudited pro forma financial information is not necessarily indicative of what the Company's condensed consolidated results of operations actually would have been had the acquisition occurred at the beginning of each year. In addition, the unaudited pro forma financial information does not attempt to project the future results of operations of the combined Company.

	Three Months Ended March 31,	
	2019	2018
Total net revenues	\$478,069	\$660,513
Net income	\$ 49,135	\$101,633
Net income per share:		
Basic	\$ 0.91	\$ 1.87
Diluted	\$ 0.90	\$ 1.84

The unaudited pro forma financial information above gives effect primarily to the following:

- (1) Incremental amortization and depreciation expense related to the estimated fair value of identifiable intangible assets and property, plant and equipment, respectively from the purchase price allocation.
- (2) Revenue and cost of goods sold, adjustments as a result of the reduction in deferred revenue and the cost related to their estimated fair value.
- (3) Incremental interest expense related to the Company's Incremental Term Loan Facility, as discussed in Note 11.
- (4) The exclusion of acquisition costs and inventory and demonstration inventory step-up amortization from the three month periods ended March 31, 2019 and the addition of these items to the three month period ended March 31, 2018.
- (5) The exclusion of debt issuance costs due to the modification of the Incremental Term Loan Facility from the three month period ended March 31, 2019 and the addition of this item to the three month period ended March 31, 2018.
- (6) The estimated tax impact of the above adjustments.

## 10) Goodwill and Intangible Assets

### Goodwill

The Company's methodology for allocating the purchase price relating to purchase acquisitions is determined through established and generally accepted valuation techniques. Goodwill is measured as the excess of the cost of the acquisition over the sum of the amounts assigned to tangible and identifiable intangible assets acquired less liabilities assumed. The Company assigns assets acquired (including goodwill) and liabilities assumed to one or more reporting units as of the date of acquisition. Typically acquisitions relate to a single reporting unit and thus do not require the allocation of goodwill to multiple reporting units. If the products obtained in an acquisition are assigned to multiple reporting units, the goodwill is distributed to the respective reporting units as part of the purchase price allocation process.

Goodwill and purchased intangible assets with indefinite useful lives are not amortized, but are reviewed for impairment annually during the fourth quarter of each fiscal year and whenever events or changes in circumstances indicate that the carrying value of an asset may not be

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recoverable. The process of evaluating the potential impairment of goodwill and intangible assets requires significant judgment. The Company regularly monitors current business conditions and other factors including, but not limited to, adverse industry or economic trends, restructuring actions and lower projections of profitability that may impact future operating results.

Effective July 1, 2018, the Company reassigned goodwill to certain reporting units within the Light & Motion reportable segment resulting from a reorganization of the composition of goodwill reporting units. The goodwill was reassigned to the reporting units affected using the relative fair value approach. In conjunction with this goodwill reassignment, the Company performed an interim quantitative impairment test as of July 1, 2018 for all of its reporting units and concluded that the fair values of each reporting unit exceeded their respective carrying values.

Effective January 1, 2019, the Company reassigned goodwill to certain reporting units within the Light & Motion reportable segment resulting from a reorganization of the composition of goodwill reporting units. The goodwill was reassigned to the reporting units affected using the relative fair value approach. The Company also concluded that the fair value of each reporting unit exceeded its respective carrying value.

The changes in the carrying amount of goodwill and accumulated impairment loss during the three months ended March 31, 2019 and year ended December 31, 2018 were as follows:

	Three Months Ended March 31, 2019			Twelve Months Ended December 31, 2018		
	Gross Carrying Amount	Accumulated Impairment Loss	Net	Gross Carrying Amount	Accumulated Impairment Loss	Net
Beginning balance at January 1	\$ 731,272	\$ (144,276)	\$ 586,996	\$735,323	\$ (144,276)	\$591,047
Acquired goodwill <sup>(1)</sup>	471,403	—	471,403	—	—	—
Foreign currency translation	(1,068)	—	(1,068)	(4,051)	—	(4,051)
Ending balance at March 31, 2019 and December 31, 2018	<u>\$1,201,607</u>	<u>\$ (144,276)</u>	<u>\$1,057,331</u>	<u>\$731,272</u>	<u>\$ (144,276)</u>	<u>\$586,996</u>

(1) During the three months ended March 31, 2019, the Company recorded \$471,403 of goodwill related to the ESI Merger.

Intangible Assets

Components of the Company's intangible assets are comprised of the following:

As of March 31, 2019:	Gross	Accumulated Impairment Charges	Accumulated Amortization	Foreign Currency Translation	Net
Completed technology <sup>(1)</sup>	\$448,831	\$ (105)	\$ (146,614)	\$ (162)	\$301,950
Customer relationships <sup>(1)</sup>	308,144	(1,406)	(68,738)	(819)	237,181
Patents, trademarks, trade names and other <sup>(1)</sup>	120,895	—	(40,976)	41	79,960
	<u>\$877,870</u>	<u>\$ (1,511)</u>	<u>\$ (256,328)</u>	<u>\$ (940)</u>	<u>\$619,091</u>

(1) During the three months ended March 31, 2019, the Company recorded \$318,600 of separately identified intangible assets related to the ESI Merger, of which \$276,400 was completed technology, \$25,400 was customer relationships and \$16,800 was trademarks, trade names and backlog. Separately, on January 1, 2019, the Company reclassified \$6,428 of gross favorable lease assets and \$3,445 of related accumulated amortization from patents, trademarks, trade names and other to the right-of-use asset line in the balance sheet.

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As of December 31, 2018:	Gross	Impairment Charges	Accumulated Amortization	Foreign Currency Translation	Net
Completed technology	\$ 172,431	\$ (105)	\$ (137,283)	\$ (73)	\$ 34,970
Customer relationships	282,744	(1,406)	(63,788)	(269)	217,281
Patents, trademarks, trade names and other	110,523	—	(42,954)	(13)	67,556
	<u>\$ 565,698</u>	<u>\$ (1,511)</u>	<u>\$ (244,025)</u>	<u>\$ (355)</u>	<u>\$ 319,807</u>

Aggregate amortization expense related to acquired intangibles for the three months ended March 31, 2019 and 2018 was \$15,727 and \$11,190, respectively. The net amortization expense from favorable lease commitments for the three months ended March 31, 2019 and 2018 was net of \$0 and \$407, respectively. Aggregate net amortization expense related to acquired intangible assets for future years is as follows:

Year	Amount
2019 (remaining)	\$ 51,638
2020	55,751
2021	47,958
2022	45,480
2023	45,121
2024	44,204
Thereafter	273,039

11) Debt

Term Loan Credit Agreement

In connection with the completion of the acquisition of Newport Corporation in 2016 (the “Newport Merger”), the Company entered into a term loan credit agreement (the “Credit Agreement”) with Barclays Bank PLC, as administrative agent and collateral agent, and the lenders from time to time party thereto (the “Lenders”), that provided senior secured financing in the original principal amount of \$780,000 (the “2016 Term Loan Facility”), subject to increase at the Company’s option and subject to receipt of lender commitments in accordance with the Credit Agreement (the 2016 Term Loan Facility, together with the 2019 Incremental Term Loan Facility (as defined below), “Term Loan Facility”). The 2016 Term Loan Facility matures on April 29, 2023. Borrowings under the Term Loan Facility bear interest per annum at one of the following rates selected by the Company: (a) a base rate determined by reference to the highest of (1) the federal funds effective rate plus 0.50%, (2) the “prime rate” quoted in The Wall Street Journal, (3) a LIBOR rate determined by reference to the costs of funds for U.S. dollar deposits for an interest period of one month adjusted for certain additional costs, plus 1.00%, and (4) a floor of 1.75%, plus, in each case, an applicable margin; or (b) a LIBOR rate determined by reference to the costs of funds for U.S. dollar deposits for the interest period relevant to such borrowing adjusted for certain additional costs, subject to a LIBOR rate floor of 0.75%, plus an applicable margin. The Company has elected the interest rate as described in clause (b). The Credit Agreement provides that, unless an alternate rate of interest is agreed, all loans will be determined by reference to the Base Rate if the LIBOR rate cannot be ascertained, if regulators impose material restrictions on the authority of a lender to make LIBOR rate loans, or for other reasons. The 2016 Term Loan Facility was issued with original issue discount of 1.00% of the principal amount thereof.

The Company subsequently entered into four separate repricing amendments to the 2016 Term Loan Facility, which decreased the applicable margin for LIBOR borrowings from 4.0% to 1.75%, with a LIBOR rate floor of 0.75%. As a consequence of the pricing of the 2019 Incremental Term Loan Facility (defined below), the applicable margin for the 2016 Term Loan Facility was increased to 2.00% (from 1.75%) with respect to LIBOR borrowings and 1.00% (from 0.75%) with respect to base rate borrowings. The interest rate on the 2016 Term Loan Facility as of March 31, 2019 was 4.5%.

On September 30, 2016, the Company entered into an interest rate swap agreement, which has a maturity date of September 30, 2020, to fix the rate on \$335,000 of the then-outstanding balance of the 2016 Term Loan Facility. The rate is fixed at 1.198% per annum plus the applicable credit spread, which was 2.0% at March 31, 2019. At March 31, 2019, the notional amount of this transaction was \$290,000 and had a fair value of \$4,459.

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As of March 31, 2019, after total principal prepayments of \$425,000 and regularly scheduled principal payments of \$6,536, the total outstanding principal balance of the 2016 Term Loan Facility was \$348,464. As a result of making these prepayments, the Company is no longer required to make any regularly scheduled principal payments on the 2016 Term Loan Facility until the maturity date of the loan.

The Company incurred \$28,747 of deferred finance fees, original issue discount and repricing fees related to the term loans under the 2016 Term Loan Facility, which are included in long-term debt in the accompanying consolidated balance sheets and are being amortized to interest expense over the estimated life of the term loans using the effective interest method. A portion of these fees have been accelerated in connection with the various debt prepayments during 2016, 2017 and 2018. As of March 31, 2019, the remaining balance of the deferred finance fees, original issue discount and repricing fees related to the 2016 Term Loan Facility was \$3,980.

On February 1, 2019, in connection with the completion of the ESI Merger, the Company entered into an amendment (“Amendment No. 5”) to the Credit Agreement. Amendment No. 5 provided an additional tranche B-5 term loan commitment in the principal amount of \$650,000 (the “2019 Incremental Term Loan Facility”), all of which was drawn down in connection with the closing of the ESI Merger. Pursuant to Amendment No. 5, the Company also effectuated certain amendments to the Credit Agreement which make certain of the negative covenants and other provisions less restrictive. The 2019 Incremental Term Loan Facility matures on February 1, 2026 and bears interest at a rate per annum equal to, at the Company’s option, a base rate or LIBOR rate (as described above) plus, in each case, an applicable margin equal to 1.25% with respect to base rate borrowings and 2.25% with respect to LIBOR borrowings. The 2019 Incremental Term Loan Facility was issued with original issue discount of 1.00% of the principal amount thereof.

The Company incurred \$11,362 of deferred finance fees and original issue discount fees related to the term loans under the 2019 Incremental Term Loan Facility, which are included in long-term debt in the accompanying consolidated balance sheets and are being amortized to interest expense over the estimated life of the term loans using the effective interest method. As of March 31, 2019, the remaining balance of the deferred finance fees and original issue discount related to the 2019 Incremental Term Loan Facility was \$11,244.

The Company is required to make scheduled quarterly payments each equal to 0.25% of the original principal amount of the 2019 Incremental Term Loan Facility, with the balance due on February 1, 2026. If on or prior to the date that is six months after the closing date of Amendment No. 5, the Company prepays any loans under the 2019 Incremental Term Loan Facility in connection with a repricing transaction, the Company must pay a prepayment premium of 1.00% of the aggregate principal amount of the loans so prepaid. At March 31, 2019, the total balance outstanding of the 2019 Incremental Term Loan Facility was \$650,000 and the interest rate was 4.7%.

Under the Credit Agreement, the Company is required to prepay outstanding term loans under the 2016 Term Loan Facility and the 2019 Incremental Term Loan Facility, subject to certain exceptions, with portions of its annual excess cash flow as well as with the net cash proceeds of certain asset sales, certain casualty and condemnation events and the incurrence or issuance of certain debt. As a result the Company’s Total Leverage Ratio, it was not required to make a prepayment of excess cash flow for the fiscal year ended December 31, 2018.

All obligations under the Term Loan Facility are guaranteed by certain of the Company’s domestic subsidiaries, and are collateralized by substantially all of the Company’s assets and the assets of such subsidiaries, subject to certain exceptions and exclusions.

The Credit Agreement contains customary representations and warranties, affirmative and negative covenants and provisions relating to events of default. If an event of default occurs, the Lenders under the Term Loan Facility will be entitled to take various actions, including the acceleration of amounts due under the Term Loan Facility and all actions generally permitted to be taken by a secured creditor. At March 31, 2019, the Company was in compliance with all covenants under the Credit Agreement.

Senior Secured Asset-Based Revolving Credit Facility

In connection with the completion of the Newport Merger in April 2016, the Company entered into an asset-based credit agreement with Deutsche Bank AG New York Branch, as administrative agent and collateral agent, the other borrowers from time to time party thereto, and the lenders and letters of credit issuers from time to time party thereto, that provided senior secured financing of up to \$50,000, which the Company never borrowed against. On February 1, 2019, in connection with the completion of the ESI Merger, the Company terminated the \$50,000 asset-based credit agreement with Deutsche Bank AG New York Branch and entered into an asset-based credit agreement with Barclays Bank PLC, as administrative agent and collateral agent, the other borrowers from time to time party thereto, and the lenders and letters of credit issuers from

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time to time party thereto (the “ABL Credit Agreement”), that provides senior secured revolving credit financing of up to \$100,000, subject to a borrowing base limitation (the “ABL Facility”). The borrowing base for the ABL Facility at any time equals the sum of: (a) 85% of certain eligible accounts; plus (b) prior to certain notice and filed examination and appraisal requirements, the lesser of (i) 20% of net book value of eligible inventory in the United States and (ii) 30% of the borrowing base, and after the satisfaction of such requirements, the lesser of (i) the lesser of (A) 65% of the lower of cost or market value of certain eligible inventory and (B) 85% of the net orderly liquidation value of certain eligible inventory and (ii) 30% of the borrowing base; minus (c) reserves established by the administrative agent. The ABL Facility includes borrowing capacity in the form of letters of credit up to \$25,000.

Borrowings under the ABL Facility bear interest at a rate per annum equal to, at the Company’s option, any of the following, plus, in each case, an applicable margin: (a) a base rate determined by reference to the highest of (1) the federal funds effective rate plus 0.50%, (2) the “prime rate” quoted in The Wall Street Journal, (3) a LIBOR rate determined by reference to the costs of funds for U.S. dollar deposits for an interest period of one month adjusted for certain additional costs, plus 1.00% and (4) a floor of 0.00%; and (b) a LIBOR rate determined by reference to the costs of funds for U.S. dollar deposits for the interest period relevant to such borrowing adjusted for certain additional costs, with a floor of 0.00%. The initial applicable margin for borrowings under the ABL Facility is 0.50% with respect to base rate borrowings and 1.50% with respect to LIBOR borrowings. Commencing with the completion of the first fiscal quarter ending after the closing of the ABL Facility, the applicable margin for borrowings thereunder is subject to upward or downward adjustment each fiscal quarter, based on the average historical excess availability during the preceding quarter.

In addition to paying interest on any outstanding principal under the ABL Facility, the Company is required to pay a commitment fee in respect of the unutilized commitments thereunder equal to 0.25% per annum. The Company must also pay customary letter of credit fees and agency fees.

The Company incurred \$785 of costs in connection with the new ABL Facility, which were capitalized and included in other assets in the accompanying consolidated balance sheet and are being amortized to interest expense over the contractual term of five years of the ABL Facility. As a result of the prior asset-based facility being terminated, the Company wrote off \$216 of previously capitalized debt issuance costs.

The ABL Credit Agreement also contains customary representations and warranties, affirmative covenants and provisions relating to events of default. If an event of default occurs, the lenders under the ABL Facility will be entitled to take various actions, including the acceleration of amounts due under the ABL Facility and all actions permitted to be taken by a secured creditor.

Lines of Credit and Short-Term Borrowing Arrangements

One of the Company’s Japanese subsidiaries has lines of credit and short-term borrowing arrangements with two financial institutions, which arrangements generally expire and are renewed at three-month intervals. The lines of credit provided for aggregate borrowings as of March 31, 2019 of up to an equivalent of \$20,747. One of the borrowing arrangements has an interest rate based on the Tokyo Interbank Offer Rate at the time of borrowing and the other has an interest rate based on the Japanese Short-Term Prime Lending Rate. There were no borrowings outstanding under these arrangements at March 31, 2019 and December 31, 2018, respectively.

The Company has various revolving lines of credit and a financing facility. These revolving lines of credit and financing facility have no expiration date and as of March 31, 2019, provided for aggregate borrowings of up to an equivalent of \$11,275. These lines of credit have a base interest rate of 1.25% plus a Japanese Yen overnight LIBOR rate. Total borrowings outstanding under these arrangements were \$3,195 and \$3,389 at March 31, 2019 and December 31, 2018, respectively.

One of the Company’s Austrian subsidiaries has various outstanding loans from the Austrian government to fund research and development. These loans are unsecured and do not require principal repayment as long as certain conditions are met. Interest on these loans is payable semi-annually. The interest rates associated with these loans range from 0% to 0.75%.

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	March 31, 2019	December 31, 2018
<b>Short-term debt:</b>		
Japanese lines of credit	\$ 2,175	\$ 2,724
Japanese receivables financing facility	1,020	665
Austrian loans due through March 2020	586	597
Term Loan Facility	6,500	—
	<u>\$ 10,281</u>	<u>\$ 3,986</u>
<b>Long-term debt:</b>		
Austrian loans due through March 2020 and other debt	\$ 83	\$ 86
Term Loan Facility, net <sup>(1)</sup>	976,740	343,756
	<u>\$ 976,823</u>	<u>\$ 343,842</u>

- (1) Net of deferred financing fees, original issuance discount and repricing fee of \$15,224 and \$4,708 as of March 31, 2019 and December 31, 2018, respectively.

The Company recognized interest expense of \$9,119 and \$5,430 for the three months ended March 31, 2019 and 2018, respectively.

Contractual maturities of the Company's debt obligations as of March 31, 2019 are as follows:

Year	Amount
2019 (remaining)	\$ 8,656
2020	6,583
2021	6,500
2022	6,500
2023	354,964
2024	6,500
Thereafter	612,625

12) **Product Warranties**

The Company records the estimated costs to fulfill customer warranty obligations upon the recognition of the related revenue. While the Company engages in extensive product quality programs and processes, including actively monitoring and evaluating the quality of its component suppliers, the Company's warranty obligation is affected by shipment volume, product failure rates, utilization levels, material usage, and supplier warranties on parts delivered to the Company. Should actual product failure rates, utilization levels, material usage, or supplier warranties on parts differ from the Company's estimates, revisions to the estimated warranty liability would be required.

Product warranty activities were as follows:

	Three Months Ended March 31,	
	2019	2018
Beginning of period	\$ 10,399	\$ 10,104
Assumed product warranty liability from ESI Merger	7,177	—
Provision for product warranties	6,062	5,184
Direct and other charges to warranty liability	(6,705)	(4,073)
End of period <sup>(1)</sup>	<u>\$ 16,933</u>	<u>\$ 11,215</u>

- (1) As of March 31, 2019, short-term product warranty of \$13,843 and long-term product warranty of \$3,090 were included within other current liabilities and other liabilities, respectively, within the accompanying condensed consolidated balance sheet. As of March 31, 2018, short-term product warranty of \$10,856 and long-term product warranty of \$359 were included within other current liabilities and other liabilities, respectively, within the accompanying condensed consolidated balance sheet.

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13) Income Taxes

The Company's effective tax rates for the three months ended March 31, 2019 and 2018 were 18.8% and 17.1%, respectively. The effective tax rate for the three months ended March 31, 2019 and the related income tax expense were lower than the U.S. statutory tax rate due to the U.S. deduction for foreign derived intangible income, the federal tax credit for research activities and the geographic mix of income earned by the Company's international subsidiaries being taxed at rates lower than the U.S. statutory tax rate, offset by the global intangible low-taxed income inclusion, the limitation on the deduction of executive compensation and state income taxes.

The Company's effective tax rate for the three months ended March 31, 2018 and the related income tax expense were lower than the U.S. statutory tax rate mainly due to the geographic mix of income earned by the Company's international subsidiaries being taxed at rates lower than the U.S. statutory tax rate, windfall benefits of stock compensation and the deduction for foreign derived intangible income offset by the tax effects from global intangible low-taxed income and state income taxes.

As of March 31, 2019, the total amount of gross unrecognized tax benefits, which excludes interest and penalties, was approximately \$40,725. At December 31, 2018, the total amount of gross unrecognized tax benefits, which excludes interest and penalties, was approximately \$32,684. The net increase was primarily attributable to the addition of historical gross unrecognized tax benefits for ESI as a result of the ESI Merger during the quarter ended March 31, 2019. As of March 31, 2019, excluding interest and penalties, there were approximately \$33,085 of net unrecognized tax benefits that, if recognized, would impact the Company's effective tax rate.

The Company accrues interest expense, and if applicable, penalties, for any uncertain tax positions. Interest and penalties are classified as a component of income tax expense. As of March 31, 2019 and December 31, 2018, the Company had accrued interest on unrecognized tax benefits of approximately \$543 and \$568, respectively.

Over the next 12 months it is reasonably possible that the Company may recognize approximately \$1,452 of previously net unrecognized tax benefits, excluding interest and penalties, related to various U.S. federal, state and foreign tax positions primarily as a result of the expiration of certain statutes of limitations.

The Company and its subsidiaries are subject to examination by U.S. federal, state and foreign tax authorities. The U.S. Internal Revenue Service commenced an examination of the Company's U.S. federal income tax filings for tax years 2015 and 2016 during the quarter ended September 30, 2017. This audit was effectively settled during the quarter ended March 31, 2018, and the impact was not material. Also during the quarter ended March 31, 2018, the Company received notification from the U.S. Internal Revenue Service of their intent to audit its U.S. subsidiary, Newport Corporation, for tax year 2015. This audit commenced during the quarter ended June 30, 2018 and there have been no proposed adjustments through March 31, 2019. The U.S. statute of limitations remains open for tax years 2015 through present. The statute of limitations for the Company's tax filings in other jurisdictions varies between fiscal years 2013 through present. The Company also has certain federal credit carry-forwards and state tax loss and credit carry-forwards that are open to examination for tax years 2000 through the present.

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14) Net Income Per Share

The following table sets forth the computation of basic and diluted net income per share:

	Three Months Ended March 31,	
	2019	2018
<b>Numerator:</b>		
Net income	\$ 12,455	\$ 105,121
<b>Denominator:</b>		
Shares used in net income per common share – basic	54,147,000	54,423,000
<b>Effect of dilutive securities:</b>		
Restricted stock units, stock appreciation rights and shares issued under employee stock purchase plan	701,000	863,000
Shares used in net income per common share – diluted	54,848,000	55,286,000
<b>Net income per common share:</b>		
Basic	\$ 0.23	\$ 1.93
Diluted	\$ 0.23	\$ 1.90

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

For the three months ended March 31, 2019 and 2018 there were approximately 128,200 and 380 weighted-average restricted stock units, respectively, that would have had an anti-dilutive effect on EPS, and would thus need to be excluded from the computation of diluted weighted-average shares.

15) Stock-Based Compensation

The Company grants restricted stock units (“RSUs”) to employees and directors under the 2014 Stock Incentive Plan (the “2014 Plan”). The 2014 Plan is administered by the Compensation Committee of the Company’s Board of Directors. The 2014 Plan is intended to attract and retain employees and directors, and to provide an incentive for these individuals to assist the Company to achieve long-range performance goals and to enable these individuals to participate in the long-term growth of the Company.

In connection with the completion of the ESI Merger, the Company assumed:

- all RSUs that vest based solely on the satisfaction of service conditions, granted under any ESI equity plan, arrangement or agreement (“ESI Plan”) that were outstanding immediately prior to the effective time of the ESI Merger, and as to which shares of ESI common stock were not fully distributed in connection with the closing of the ESI Merger,
- all RSUs that were granted subject to vesting based on both the achievement of performance goals and the satisfaction of service conditions granted under any ESI Plan that were outstanding immediately prior to the effective time of the ESI Merger, and
- all stock appreciation rights (“SARs”) granted under any ESI Plan, whether vested or unvested, that were outstanding immediately prior to the effective time of the ESI Merger and held by an individual who was a service provider of ESI as of the date on which the effective time of the ESI Merger occurred.

As of the effective time of the ESI Merger, based on a formula in the Merger Agreement, (a) such RSUs were converted automatically into RSUs with respect to 736,133 shares of the Company’s common stock (the “Assumed RSUs”), and (b) all SARs were converted automatically into SARs with respect to 12,787 shares of the Company’s common stock (the “Assumed SARs”).

Included in the total number of assumed RSUs are 326,283 shares of the Company’s common stock for employees and outside directors that are part of the ESI Deferred Compensation plan. These shares will not become issued shares until their respective release dates.

The shares of the Company’s common stock that are subject to the Assumed SARs and the Assumed RSUs are issuable pursuant to the Company’s 2014 Plan.

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The 748,920 shares of the Company's common stock that are issuable pursuant to the Assumed RSUs and the Assumed SARs under the Company's 2014 Plan were registered under the Securities Act of 1933 on the Registration Statement on Form S-8. These shares are in addition to the 18,000,000 shares of the Company's common stock reserved for issuance under the Company's 2014 Plan and previously registered under the Securities Act of 1933 on the Registration Statement on Form S-8.

During the three months ended March 31, 2019, the Company granted 182,212 RSUs with a weighted average grant date fair value of \$82.58. During the three months ended March 31, 2018, the Company granted 122,831 RSUs with a weighted average grant date fair value of \$109.62. There were no SARs granted during the three months ended March 31, 2019 or 2018.

The total stock-based compensation expense included in the Company's consolidated statements of income and comprehensive income was as follows:

	Three Months Ended March 31,	
	2019	2018
Cost of revenues	\$ 422	\$ 1,005
Research and development expense	810	722
Selling, general and administrative expense	8,038	8,699
Acquisition and integration related expense	18,568	—
<b>Total pre-tax stock-based compensation expense</b>	<b>\$ 27,838</b>	<b>\$ 10,426</b>

At March 31, 2019, the total compensation expense related to unvested stock-based awards granted to employees and directors under the 2014 Plan that had not been recognized was \$31,356, net of estimated forfeitures. The future compensation expense for time-based awards is recognized on a straight-line basis and the future compensation expense for performance-based awards is recognized using the accelerated graded vesting method, both of which expense over the requisite service period, net of estimated forfeitures, except for retirement eligible employees, in which case the Company expenses the fair value of the grant in the period the grant is issued. The Company considers many factors when estimating expected forfeitures, including types of awards and historical experience. Actual results and future changes in estimates may differ substantially from the Company's current estimates.

The following table presents the activity for RSUs under the Plan:

	Three Months Ended March 31, 2019	
	Outstanding RSUs	Weighted Average Grant Date Fair Value
RSUs – beginning of period	647,394	\$ 74.04
Assumed shares from ESI Merger	736,133	\$ 84.10
Accrued dividend shares	1,558	\$ 78.45
Granted	182,212	\$ 82.58
Vested	(274,898)	\$ 67.57
Forfeited	(76,096)	\$ 91.14
<b>RSUs – end of period</b>	<b>1,216,303</b>	<b>\$ 81.81</b>

The following table presents the activity for SARs under the Plan:

	Three Months Ended March 31, 2019	
	Outstanding SARs	Weighted Average Grant Date Fair Value
SARs – beginning of period	177,538	\$ 28.52
Assumed SARs from ESI Merger	12,787	\$ 17.38
Exercised	(23,569)	\$ 27.34
Forfeited or expired	(184)	\$ 27.89
<b>SARs Outstanding – end of period</b>	<b>166,572</b>	<b>\$ 27.86</b>

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16) Stockholders' Equity

Share Repurchase Program

On July 25, 2011, the Company's Board of Directors approved a share repurchase program for the repurchase of up to an aggregate of \$200,000 of its outstanding common stock from time to time in open market purchases, privately negotiated transactions or through other appropriate means. The timing and quantity of any shares repurchased will depend upon a variety of factors, including business conditions, stock market conditions and business development activities, including, but not limited to, merger and acquisition opportunities. These repurchases may be commenced, suspended or discontinued at any time without prior notice. The Company has repurchased approximately 2,588,000 shares of common stock for approximately \$127,000 pursuant to the program since its adoption. During the three months ended March 31, 2019 and 2018, there were no repurchases of common stock.

Cash Dividends

Holders of the Company's common stock are entitled to receive dividends when they are declared by the Company's Board of Directors. In addition, the Company accrues dividend equivalents on the RSUs the Company assumed in the ESI Merger described in Note 15 above when dividends are declared by the Company's Board of Directors. During the three months ended March 31, 2019, the Company's Board of Directors declared a quarterly cash dividend of \$0.20 per share, which totaled \$10,843. During the three months ended March 31, 2018, the Company's Board of Directors declared a quarterly cash dividend of \$0.18 per share, which totaled \$9,808.

On May 8, 2019, the Company's Board of Directors declared a quarterly cash dividend of \$0.20 per share to be paid on June 7, 2019 to shareholders of record as of May 27, 2019. Future dividend declarations, if any, as well as the record and payment dates for such dividends, are subject to the final determination of the Company's Board of Directors. In addition, under the terms of the Term Loan Facility and its ABL Facility, the Company may be restricted from paying dividends under certain circumstances.

17) Business Segment, Geographic Area, Product and Significant Customer Information

The Company is a global provider of instruments, subsystems and process control solutions that measure, monitor, deliver, analyze, power and control critical parameters of advanced manufacturing processes to improve process performance and productivity for its customers. The Company's products are derived from its core competencies in pressure measurement and control, flow measurement and control, gas and vapor delivery, gas composition analysis, residual gas analysis, leak detection, control technology, ozone generation and delivery, power, reactive gas generation, vacuum technology, lasers, photonics, sub-micron positioning, vibration control, optics and laser-based manufacturing solutions. The Company also provides services relating to the maintenance and repair of its products, installation services and training. The Company's primary served markets include semiconductor, industrial technologies, life and health sciences, research and defense.

The Company's Chief Operating Decision Maker ("CODM") utilizes financial information to make decisions about allocating resources and assessing performance for the entire Company, which is used in the decision making process to assess performance. Effective February 1, 2019, in conjunction with its acquisition of ESI, the Company created a third reportable segment known as the Equipment & Solutions segment in addition to its existing two reportable segments: the Vacuum & Analysis segment and the Light & Motion segment.

The Vacuum & Analysis segment provides a broad range of instruments, components and subsystems which are derived from the Company's core competencies in pressure measurement and control, flow measurement and control, gas and vapor delivery, gas composition analysis, residual gas analysis, leak detection, control technology, ozone generation and delivery, RF & DC power, reactive gas generation and vacuum technology.

The Light & Motion segment provides a broad range of instruments, components and subsystems which are derived from the Company's core competencies in lasers, photonics, sub-micron positioning, vibration control, and optics.

The Equipment & Solutions segment provides laser-based manufacturing solutions for the micro-machining industry that enable customers to optimize production. The segment's market is composed primarily of flexible and rigid PCB processing/fabrication, semiconductor wafer processing and passive component manufacturing & test. Equipment & Solutions incorporate specialized laser technology and proprietary control software to efficiently process the materials and components that are an integral part of electronic devices and systems.

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The Company derives its segment results directly from the manner in which results are reported in its management reporting system. The accounting policies that the Company uses to derive reportable segment results are substantially the same as those used for external reporting purposes. The Company does not disclose external or intersegment revenues separately by reportable segment as this information is not presented to the CODM for decision making purposes.

The following table sets forth net revenues by reportable segment:

	Three Months Ended March 31,	
	2019	2018
Vacuum & Analysis	\$ 234,355	\$ 348,344
Light & Motion	193,988	205,931
Equipment & Solutions	35,218	—
	<u>\$ 463,561</u>	<u>\$ 554,275</u>

The following table sets forth a reconciliation of segment gross profit to consolidated net income:

	Three Months Ended March 31,	
	2019	2018
Gross profit by reportable segment:		
Vacuum & Analysis	\$ 98,139	\$ 158,500
Light & Motion	92,741	104,355
Equipment & Solutions	7,238	—
Total gross profit by reportable segment	198,118	262,855
Operating expenses:		
Research and development	38,933	34,857
Selling, general and administrative	82,455	82,949
Fees and expenses related to incremental term loan	5,847	—
Acquisition and integration costs	30,167	—
Restructuring	223	1,220
Customer contract obligation	1,700	—
Environmental costs	—	1,000
Amortization of intangible assets	15,727	11,190
Income from operations	23,066	131,639
Interest and other expense, net	7,730	4,897
Income before income taxes	15,336	126,742
Provision for income taxes	2,881	21,621
Net income	<u>\$ 12,455</u>	<u>\$ 105,121</u>

The following table sets forth capital expenditures by reportable segment for the three months ended March 31, 2019 and 2018:

	Vacuum & Analysis	Light & Motion	Equipment & Solutions	Total
Three Months Ended March 31, 2019:				
Capital expenditures	<u>\$ 7,488</u>	<u>\$ 5,154</u>	<u>\$ 1,887</u>	<u>\$ 14,529</u>
Three Months Ended March 31, 2018:				
Capital expenditures	<u>\$ 6,197</u>	<u>\$ 3,193</u>	<u>\$ —</u>	<u>\$ 9,390</u>

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The following table sets forth depreciation and amortization by reportable segment for the three months ended March 31, 2019 and 2018:

	Vacuum & Analysis	Light & Motion	Equipment & Solutions	Total
<b>Three Months Ended March 31, 2019:</b>				
Depreciation and amortization	\$ 4,045	\$ 14,140	\$ 7,026	\$ 25,211
<b>Three Months Ended March 31, 2018</b>				
Depreciation and amortization	\$ 5,129	\$ 15,363	\$ —	\$ 20,492

Total income tax expense is not presented by reportable segment because the necessary information is not available or used by the CODM.

The following table sets forth segment assets by reportable segment:

	Vacuum & Analysis	Light & Motion	Equipment & Solutions	Corporate, Eliminations & Other	Total
March 31, 2019:					
<b>Segment assets:</b>					
Accounts receivable	\$ 160,040	\$ 139,592	\$ 51,088	\$ (14,730)	\$ 335,990
Inventory, net	225,431	164,603	85,690	(91)	475,633
Total segment assets	\$ 385,471	\$ 304,195	\$ 136,778	\$ (14,821)	\$ 811,623
December 31, 2018:					
<b>Segment assets:</b>					
Accounts receivable	\$ 171,604	\$ 140,658	\$ —	\$ (16,808)	\$ 295,454
Inventory, net	222,965	161,658	—	66	384,689
Total segment assets	\$ 394,569	\$ 302,316	\$ —	\$ (16,742)	\$ 680,143

The following is a reconciliation of segment assets to consolidated total assets:

	March 31, 2019	December 31, 2018
Total segment assets	\$ 811,623	\$ 680,143
Cash and cash equivalents and investments	472,692	728,461
Other current assets	86,387	65,790
Property, plant and equipment, net	251,424	194,367
Right-of-use asset	65,628	—
Goodwill and intangible assets, net	1,676,422	906,803
Other assets	48,562	38,682
Consolidated total assets	\$ 3,412,738	\$ 2,614,246

**Geographic**

Information about the Company's operations in different geographic regions is presented in the tables below. Net revenues to unaffiliated customers are based on the location in which the sale originated. Transfers between geographic areas are at tax transfer prices and have been eliminated from consolidated net revenues.

	Three Months Ended March 31,	
	2019	2018
<b>Net revenues:</b>		
United States	\$ 224,347	\$ 276,720
Korea	35,802	54,011
Japan	42,102	58,274
Asia (excluding Korea and Japan)	101,327	101,384
Europe	59,983	63,886
	\$ 463,561	\$ 554,275

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	March 31, 2019	December 31, 2018
Long-lived assets:(1)		
United States	\$ 198,747	\$ 146,687
Europe	29,983	26,794
Asia	57,523	50,572
	<u>\$ 286,253</u>	<u>\$ 224,053</u>

- (1) Long-lived assets include property, plant and equipment, net and certain other long-term assets, excluding long-term tax related accounts. Goodwill associated with each of the Company's reportable segments is as follows:

Reportable segment:	March 31, 2019	December 31, 2018
Vacuum & Analysis	\$ 196,937	\$ 197,126
Light & Motion	388,896	389,870
Equipment & Solutions	471,498	—
Total goodwill	<u>\$ 1,057,331</u>	<u>\$ 586,996</u>

Worldwide Product Information

The Company groups its product offerings into three groups based upon the similarity of product function as follows:

	Three Months Ended March 31,	
	2019	2018
Advanced Manufacturing Components	\$ 371,345	\$ 496,677
Global Service	66,198	57,598
Advanced Manufacturing Systems	26,018	—
	<u>\$ 463,561</u>	<u>\$ 554,275</u>

Advanced manufacturing components are comprised of product revenues from the Company's Vacuum & Analysis and Light & Motion segments. Global service is comprised of total service revenues for all three of the Company's reportable segments. Advanced manufacturing systems is comprised of product revenues for the Company's Equipment & Solutions segment.

18) Restructuring

The Company recorded restructuring charges of \$223 during the three months ended March 31, 2019, primarily related to severance costs related to the consolidation of certain functions in Asia. The Company recorded restructuring charges of \$1,220 during the three months ended March 31, 2018 primarily related to severance costs related to streamlining and consolidating certain administrative functions.

Restructuring activities were as follows:

	Three Months Ended March 31,	
	2019	2018
Beginning of period	\$ 2,632	\$ 3,244
Charged to expense	223	1,220
Payments and adjustments	(252)	(1,806)
End of period	<u>\$ 2,603</u>	<u>\$ 2,658</u>

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19) Commitments and Contingencies

*Newport Litigation*

In March 2016, two putative class actions lawsuit captioned Dixon Chung v. Newport Corp., et al., Case No. A-16-733154-C, and Hubert C. Pincon v. Newport Corp., et al., Case No. A-16-734039-B, were filed in the District Court, Clark County, Nevada on behalf of a putative class of stockholders of Newport for claims related to the merger agreement (“Newport Merger Agreement”) between the Company, Newport, and a wholly-owned subsidiary of the Company (“Merger Sub”). The lawsuits named as defendants the Company, Newport, Merger Sub, and certain then current and former members of Newport’s board of directors. Both complaints alleged that Newport directors breached their fiduciary duties to Newport’s stockholders by agreeing to sell Newport through an inadequate and unfair process, which led to inadequate and unfair consideration, by agreeing to unfair deal protection devices and by omitting material information from the proxy statement. The complaints also alleged that the Company, Newport, and Merger Sub aided and abetted the directors’ alleged breaches of their fiduciary duties. The complaints sought injunctive relief, including to enjoin or rescind the Newport Merger Agreement, and an award of attorneys’ and other fees and costs, among other relief. On April 14, 2016, the Court consolidated the actions.

On October 19, 2016, plaintiffs in the consolidated action filed an amended complaint captioned In re Newport Corporation Shareholder Litigation, Case No. A-16-733154-B, in the District Court, Clark County, Nevada, on behalf of a putative class of Newport’s stockholders for claims related to the Newport Merger Agreement. The amended complaint contained substantially similar allegations related to Newport’s former board of directors’ alleged breaches of their fiduciary duties to Newport’s stockholders. The amended complaint sought monetary damages, including pre- and post-judgment interest. On June 22, 2017, the Court granted Defendants’ motion to dismiss and dismissed the amended complaint against all defendants but granted plaintiffs leave to amend.

On July 27, 2017, plaintiffs filed a second amended complaint containing substantially similar allegations but naming only Newport’s former directors as defendants. On August 8, 2017, the Court dismissed the Company and Newport from the action. The second amended complaint seeks monetary damages, including pre- and post-judgment interest. The Court granted a motion for class certification on September 27, 2018, appointing Mr. Pincon and Locals 302 and 612 of the International Union of Operating Engineers - Employers Construction Industry Retirement Trust as class representatives. On June 11, 2018, plaintiff Dixon Chung was voluntarily dismissed from the litigation. Discovery is ongoing in this action.

*ESI Litigation*

On November 29, 2018, a complaint captioned Brian Morris et. al. v. Electro Scientific Industries, Inc. et al. was filed in the U.S. District Court for the District of Oregon by alleged former stockholders of ESI in connection with the ESI Merger. The complaint named the Company’s subsidiary, ESI, and the former members of ESI’s board of directors as defendants. Five additional complaints were subsequently filed, two in the U.S. District Court for the District of Oregon and three in the Multnomah County Circuit Court in the State of Oregon. The cases filed in the U.S. District Court were dated December 6, 2018 and December 12, 2018 and captioned Melvyn Klein et. al. v. Electro Scientific Industries, Inc. et al. and Donald Mager et. al. v. Electro Scientific Industries, Inc. et al., respectively. The complaints filed in Multnomah County Circuit Court were dated December 5, 2018, December 5, 2018 and December 13, 2018 and captioned Michael Kent et. al v. Electro Scientific Industries, Inc. et al., Christopher Stanley et. al v. Electro Scientific Industries, Inc. et al. and Eduardo Colmenares et. al. v. Electro Scientific Industries, Inc., MKS Instruments, Inc., et al., respectively (collectively with Brian Morris et. al. v. Electro Scientific Industries, Inc. et al., the “Lawsuits”).

The Lawsuits are purported class actions brought on behalf of former ESI stockholders, asserting various claims against the former members of the ESI board of directors, ESI, the Company and the Company’s merger subsidiary, including breach of fiduciary duty and aiding and abetting the breach of fiduciary duty. The Lawsuits allege that the consideration paid to the ESI shareholders did not appropriately value ESI, and that merger related disclosures failed to disclose certain material information regarding the merger. The Lawsuits purported to seek unspecified damages.

On February 26, 2019, the parties entered into a settlement agreement, pursuant to which plaintiffs dismissed their individual claims with prejudice and class claims without prejudice in return for ESI’s previous supplemental merger related disclosures in connection with the transaction. ESI provided supplemental merger related disclosures to eliminate the burden and expense of litigation and to avoid any possible disruption to the merger that could result from further litigation.

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The Company is subject to various legal proceedings and claims, which have arisen in the ordinary course of business. In the opinion of management, the ultimate disposition of these matters will not have a material adverse effect on our results of operations, financial condition or cash flows.

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

This Quarterly Report on Form 10-Q contains "forward-looking statements" within the meaning of the Private Securities Litigation Reform Act of 1995, Section 27A of the Securities Act and Section 21E of the Securities Exchange Act of 1934, as amended (the "Exchange Act"). When used herein, the words "believes," "anticipates," "plans," "expects," "estimates," "would," "will," "intends" and similar expressions are intended to identify forward-looking statements. These forward-looking statements reflect management's current opinions and are subject to certain risks and uncertainties that could cause results to differ materially from those stated or implied. While we may elect to update forward looking statements in the future, we specifically disclaim any obligation to do so even if our estimates or expectations change. Risks and uncertainties include, but are not limited to those discussed in our Annual Report on Form 10-K for the year ended December 31, 2018 in the section entitled "Risk Factors" as referenced in Part II, Item 1A "Risk Factors" of this Quarterly Report on Form 10-Q.

### Overview

We are a global provider of instruments, subsystems and process control solutions that measure, monitor, deliver, analyze, power and control critical parameters of advanced manufacturing processes to improve process performance and productivity for our customers. Our products are derived from our core competencies in pressure measurement and control, flow measurement and control, gas and vapor delivery, gas composition analysis, residual gas analysis, leak detection, control technology, ozone generation and delivery, power, reactive gas generation, vacuum technology, lasers, photonics, sub-micron positioning, vibration control, optics and laser-based manufacturing solutions. We also provide services relating to the maintenance and repair of our products, installation services and training. Our primary served markets include semiconductor, industrial technologies, life and health sciences, research and defense.

### Acquisition of Electro Scientific Industries, Inc.

On February 1, 2019, we completed our acquisition of Electro Scientific Industries, Inc. ("ESI") pursuant to an Agreement and Plan of Merger, dated as of October 29, 2018 (the "ESI Merger"). At the effective time of the ESI Merger and pursuant to the terms and conditions of the merger agreement, each share of ESI's common stock that was issued and outstanding immediately prior to the effective time of the ESI Merger was converted into the right to receive \$30.00 in cash, without interest and subject to deduction of any required withholding tax. We paid the former ESI stockholders aggregate consideration of approximately \$1.033 billion, excluding related transaction fees and expenses, and non-cash consideration related to the exchange of share-based awards of approximately \$31 million for a total purchase consideration of approximately \$1.063 billion. We funded the payment of the aggregate consideration with a combination of our available cash on hand and the proceeds from our senior secured term loan facility as described below.

### Segments and Markets

Effective February 1, 2019, in conjunction with our acquisition of ESI, we created a third reportable segment known as the Equipment & Solutions segment in addition to our existing two reportable segments: the Vacuum & Analysis segment and the Light & Motion segment. ESI provides laser-based manufacturing solutions for the micro-machining industry that enable customers to optimize production. ESI's primary served markets include flexible and rigid PCB processing/fabrication, semiconductor wafer processing and passive component manufacturing and testing. ESI solutions incorporate specialized laser technology and proprietary control software to efficiently process the materials and components that are an integral part of electronic devices and systems.

The Vacuum & Analysis segment provides a broad range of instruments, components and subsystems which are derived from our core competencies in pressure measurement and control, flow measurement and control, gas and vapor delivery, gas composition analysis, residual gas analysis, leak detection, control technology, ozone generation and delivery, RF & DC power, reactive gas generation and vacuum technology.

The Light & Motion segment provides a broad range of instruments, components and subsystems which are derived from our core competencies in lasers, photonics, sub-micron positioning, vibration control, and optics.

We have a diverse base of customers. Approximately 52% and 43% of our net revenues for the three months ended March 31, 2019 and 2018, respectively, were from advanced manufacturing applications. These include, but are not limited to, industrial technologies, life and health sciences, and research and defense.

Approximately 48% and 57% of our net revenues for the three months ended March 31, 2019 and 2018, respectively, were from sales to semiconductor capital equipment manufacturers and semiconductor device manufacturers.

Net revenues from customers in our advanced markets, which exclude semiconductor capital equipment and semiconductor device product applications, increased by \$2.5 million, or 1%, for the three months ended March 31, 2019, compared to the same period in the prior year, primarily due to an increase of \$28.6 million from our Equipment & Solutions segment as a result of the ESI Merger, which included two months of revenue from customers in our advanced markets for the quarter. This increase was offset by a decrease of \$15.1 million and \$11.0 million in revenue from customers in our advanced markets in our Vacuum & Analysis and Light & Motion segments, respectively.

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Net revenues from semiconductor capital equipment manufacture and semiconductor device manufacture customers decreased by \$93.2 million, or 30%, for the three months ended March 31, 2019, compared to the same period in the prior year. This decrease was comprised of a decrease in net semiconductor revenues of \$98.8 million and \$1.0 million in the Vacuum & Analysis and Light & Motion segments, respectively, offset by an increase of \$6.6 million from our Equipment & Solutions segment as a result of the ESI Merger, which included two months of revenue from semiconductor customers for the quarter.

The semiconductor capital equipment industry has been experiencing a moderation in capital spending in the near term and we have seen a similar effect on our semiconductor revenue in the first quarter and expect that to continue into the second quarter. The semiconductor capital equipment industry is subject to rapid demand shifts, which are difficult to predict, and we cannot be certain as to the timing or extent of future demand or any future weakness in the semiconductor capital equipment industry.

A significant portion of our net revenues is from sales to customers in international markets. For the three months ended March 31, 2019 and 2018, international net revenues accounted for approximately 52% and 50% of our total net revenues. A significant portion of our international net revenues was from Japan, Germany, China, South Korea and Israel. We expect that international net revenues will continue to represent a significant percentage of our total net revenues. Long-lived assets located in the United States were \$198.7 million and \$146.7 million, as of March 31, 2019 and December 31, 2018, respectively, excluding goodwill and intangibles, and long-term tax-related accounts. Long-lived assets located outside of the United States were \$87.5 million and \$77.4 million, as of March 31, 2019 and December 31, 2018, respectively, excluding goodwill and intangibles, and long-term tax-related accounts.

### **Critical Accounting Policies and Estimates**

The preparation of our consolidated financial statements and related disclosures in conformity with accounting principles generally accepted in the United States requires management to make judgments, assumptions and estimates that affect the amounts reported. There have been no material changes in our critical accounting policies since December 31, 2018, other than the adoption of ASC 842 as outlined below.

#### Leases

In February 2016, the Financial Accounting Standards Board (“FASB”) issued Accounting Standards Update (“ASU”), Leases, (“ASU 2016-02”), to enhance the transparency and comparability of financial reporting related to leasing arrangements. We adopted ASU 2016-02 on January 1, 2019, or the effective date, and used the effective date as our date of initial application.

At the inception of an arrangement, we determine whether the arrangement is or contains a lease based on the facts and circumstances present. Most leases with a term greater than one year are recognized on the balance sheet as right-of-use assets, short-term lease liabilities and long-term lease liabilities. We have elected not to recognize on the balance sheet leases with terms of one year or less. Operating lease liabilities and their corresponding right-of-use assets are recorded based on the present value of lease payments over the expected remaining fixed lease term. Certain adjustments to the right-of-use asset may be required for items such as incentives received. In calculating the present value of future lease payments, we utilize our incremental borrowing rates, which are the rates incurred to borrow on a collateralized basis over a similar term an amount equal to the lease payments in a similar economic environment. We have elected to utilize a single blended interest rate based on currencies, geographies and lease terms that comprise the lease portfolio.

Although separation of lease and non-lease components is required, certain practical expedients are available. Entities may elect the practical expedient to not separate lease and non-lease components. We have elected to account for the lease and non-lease components of each of our operating leases as a single lease component and allocate all of the contract consideration to the lease component only. The lease component results in an operating right-of-use asset being recorded on the balance sheet and amortized on a straight-line basis as lease expense.

Many of our leases contain options to renew and extend lease terms, and options to terminate leases early. We do not recognize the right-of-use asset or lease liability for renewal or termination periods unless we are reasonably certain to exercise the option at lease inception.

For further information about our critical accounting policies, including our revenue recognition policy, please see the discussion of critical accounting policies in our Annual Report on Form 10-K for the year ended December 31, 2018 in the section captioned “Management’s Discussion and Analysis of Financial Condition and Results of Operations – Critical Accounting Policies and Estimates.”

## Results of Operations

The following table sets forth for the periods indicated the percentage of total net revenues of certain line items included in our consolidated statements of operations and comprehensive income data.

	Three Months Ended March 31,	
	2019	2018
Net revenues:		
Product	85.7%	89.6%
Services	14.3	10.4
Total net revenues	100.0	100.0
Cost of revenues:		
Cost of product revenues	49.6	47.2
Cost of service revenues	7.7	5.4
Total cost of revenues (exclusive of amortization shown separately below)	57.3	52.6
Gross profit	42.7	47.4
Research and development	8.4	6.3
Selling, general and administrative	17.8	15.0
Fees and expenses related to incremental term loan	1.2	—
Acquisition and integration costs	6.5	—
Restructuring	—	0.2
Customer contract obligation	0.4	—
Environmental costs	—	0.2
Amortization of intangible assets	3.4	2.0
Income from operations	5.0	23.7
Interest income	0.4	0.2
Interest expense	2.0	1.0
Other expense, net	0.1	—
Income from operations before income taxes	3.3	22.9
Provision for income taxes	0.6	3.9
Net income	2.7%	19.0%

### Net Revenues

	Three Months Ended March 31,	
	2019	2018
<i>(dollars in millions)</i>		
Product	\$397.4	\$ 496.7
Service	66.2	57.6
Total net revenues	<u>\$463.6</u>	<u>\$ 554.3</u>

Product revenues decreased \$99.3 million during the three months ended March 31, 2019, compared to the same period in the prior year, due to a decrease in net product revenues from our semiconductor customers of \$92.5 million and a decrease in net product revenues from customers in our advanced markets of \$6.8 million. The decrease in product revenues from semiconductor customers for the MKS business, excluding the impact of the ESI Merger (the “legacy MKS business”) was \$99.1 million, offset by an increase in product revenue from our semiconductor customers of \$6.6 million from the Equipment & Solutions segment as a result of the ESI Merger, which included two months of product revenue for the quarter. The decrease in product revenues from customers in advanced markets for the legacy MKS business was \$26.2 million, offset by an increase in product revenue from customers in advanced markets of \$19.4 million from the Equipment & Solutions segment as a result of the ESI Merger, which included two months of product revenue for the quarter.

Service revenues consisted mainly of fees for services related to the maintenance and repair of our products, sales of spare parts, and installation and training. Service revenues increased \$8.6 million during the three months ended March 31, 2019 compared to the same period in the prior year. This increase was primarily attributed to an increase in service revenues from customers in our advanced markets of \$9.2 million from the Equipment & Solutions segment as a result of the ESI Merger, which included two months of service revenue for the quarter.

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Total international net revenues, including product and service, were \$239.2 million and \$277.6 million for the three months ended March 31, 2019, compared to the same period in the prior year. This decrease of \$38.4 million for the three months ended March 31, 2019 was primarily due to decreases in net revenues in North America.

The following table sets forth our net revenues by reportable segment:

<i>(dollars in millions)</i>	Three Months Ended March 31,	
	2019	2018
Net revenues:		
Vacuum & Analysis	\$ 234.4	\$ 348.4
Light & Motion	194.0	205.9
Equipment & Solutions	35.2	—
Total net revenues	<u>\$ 463.6</u>	<u>\$ 554.3</u>

Net revenues from our Vacuum & Analysis segment decreased \$114.0 million for the three months ended March 31, 2019, compared to the same period in the prior year, due to decreases in net revenues from semiconductor customers of \$98.8 million and a decrease in net revenues from customers in our advanced markets of \$15.2 million, primarily from customers in our industrial technologies market.

Net revenues from our Light & Motion segment decreased \$11.9 million for the three months ended March 31, 2019, compared to the same period in the prior year. The decrease was primarily attributed to a decrease in net revenues from customers in our advanced markets of \$11.0 million, primarily from customers in our life and health sciences market. The remainder of the decrease was attributed to a decrease in net revenues from semiconductor customers of \$0.9 million.

## Gross Profit

	Three Months Ended March 31,		
	2019	2018	% Points Change
Gross profit as a percentage of net revenues:			
Product	42.2%	47.4%	(5.2)%
Service	46.0	47.7	(1.7)
Total gross profit	<u>42.7%</u>	<u>47.4%</u>	(4.7)%

Gross profit as a percentage of net product revenues decreased by 5.2 percentage points for the three months ended March 31, 2019, compared to the same period in the prior year, primarily due to lower revenue volumes and lower factory utilization.

Gross profit as a percentage of net service revenues decreased by 1.7 percentage points for the three months ended March 31, 2019, compared to the same period in the prior year, primarily due to unfavorable product mix partially offset by favorable absorption.

The following table sets forth gross profit as a percentage of net revenues by reportable segment:

	Three Months Ended March 31,		
	2019	2018	% Points Change
Gross profit as a percentage of net revenues:			
Vacuum & Analysis	41.7%	45.5%	(3.8)%
Light & Motion	47.8	50.7	(2.9)
Equipment & Solutions	20.6	—	100.0
Total gross profit	<u>42.7%</u>	<u>47.4%</u>	(4.7)%

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Gross profit for our Vacuum & Analysis segment decreased by 3.8 percentage points for the three months ended March 31, 2019, compared to the same period in the prior year, primarily due to lower revenue volumes.

Gross profit for our Light & Motion segment decreased by 2.9 percentage points for the three months ended March 31, 2019, compared to the same period in the prior year, primarily due to lower revenue volumes, unfavorable mix and lower factory utilization.

Gross profit for our Equipment & Solutions segment of 20.6% for the three months ended March 31, 2019, is lower than normal partly due to the amortization of the inventory step-up adjustment to fair value from purchase accounting of \$5.1 million. Excluding this adjustment, the gross margin would have been 35.1%.

### Research and Development

<i>(dollars in millions)</i>	Three Months Ended	
	March 31,	
	2019	2018
Research and development expenses	\$ 38.9	\$ 34.9

Research and development expenses increased \$4.0 million for the three months ended March 31, 2019, compared to the same period in the prior year, primarily due to the ESI Merger, which included \$2.4 million of compensation related expenses, \$0.7 million of project materials, \$0.5 million of depreciation expense and \$0.4 million of occupancy costs.

Our research and development efforts are primarily focused on developing and improving our instruments, components, subsystems and process control solutions to improve process performance and productivity.

We have thousands of products, and our research and development efforts primarily consist of a large number of projects related to these products, none of which is individually material to us. Current projects typically have durations of 3 to 30 months depending upon whether the product is an enhancement of existing technology or a new product. Our current initiatives include projects to enhance the performance characteristics of older products, to develop new products and to integrate various technologies into subsystems. These projects support in large part the transition in the semiconductor industry to smaller integrated circuit geometries and in the flat panel display and solar markets to larger substrate sizes, which require more advanced process control technology. Research and development expenses consist primarily of salaries and related expenses for personnel engaged in research and development, fees paid to consultants, material costs for prototypes and other expenses related to the design, development, testing and enhancement of our products.

We believe that the continued investment in research and development and ongoing development of new products are essential to the expansion of our markets. We expect to continue to make significant investment in research and development activities. We are subject to risks from products not being developed in a timely manner, as well as from rapidly changing customer requirements and competitive threats from other companies and technologies. Our success primarily depends on our products being designed into new generations of equipment for the semiconductor industry and advanced technology markets. We develop products that are technologically advanced so that they are positioned to be chosen for use in each successive generation of semiconductor capital equipment. If our products are not chosen to be designed into our customers' products, our net revenues may be reduced during the lifespan of those products.

### Selling, General and Administrative

<i>(dollars in millions)</i>	Three Months Ended	
	March 31,	
	2019	2018
Selling, general and administrative expenses	\$ 82.5	\$ 82.9

Selling, general and administrative expenses decreased by \$0.4 million for the three months ended March 31, 2019, compared to the same period in the prior year. This decrease was primarily attributed to a decrease of \$7.4 million related to the legacy MKS business, which included a decrease of \$5.9 million of compensation related expenses and \$1.6 million of commissions expense. This decrease was offset by an increase of \$7.0 million related to the ESI Merger, which included \$4.1 million in compensation related expenses, \$0.9 million of depreciation expense, \$0.5 million of consulting and professional fees and \$0.4 million of commissions expense.

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### Fees and Expenses Related to Incremental Term Loan Facility

<i>(dollars in millions)</i>	Three Months Ended March 31,	
	2019	2018
Fees and expenses related to incremental term loan	\$ 5.8	\$ —

We recorded fees and expenses related to Amendment No. 5 to our senior secured term loan facility, as described below, which related to the ESI Merger, during the three months ended March 31, 2019.

### Acquisition and Integration Costs

<i>(dollars in millions)</i>	Three Months Ended March 31,	
	2019	2018
Acquisition and integration costs	\$ 30.2	\$ —

We recorded acquisition and integration costs related to the ESI Merger, which closed on February 1, 2019, during the three months ended March 31, 2019. These costs consisted primarily of compensation costs for certain executives from ESI who had change in control provisions in their respective ESI employment agreements that were accounted for as dual-trigger arrangements and other stock vesting accelerations, as well as consulting and professional fees associated with the ESI Merger.

### Restructuring

<i>(dollars in millions)</i>	Three Months Ended March 31,	
	2019	2018
Restructuring	\$ 0.2	\$ 1.2

We recorded restructuring costs during the three months ended March 31, 2019, which were primarily comprised of severance costs related to the consolidation of certain functions in Asia. We recorded restructuring costs during the three months ended March 31, 2018, primarily comprised of severance costs related to streamlining and consolidating certain administrative functions.

### Customer Contract Obligation

<i>(dollars in millions)</i>	Three Months Ended March 31,	
	2019	2018
Customer contract obligation	\$ 1.7	\$ —

We recorded a charge during the three months ended March 31, 2019 related to a contractual obligation we acquired as part of our acquisition of Newport Corporation (the "Newport Merger").

### Environmental Costs

<i>(dollars in millions)</i>	Three Months Ended March 31,	
	2019	2018
Environmental costs	\$ —	\$ 1.0

We recorded \$1.0 million of environmental costs during the first quarter of 2018 related to a U.S. Environmental Protection Agency-designated Superfund site acquired as part of the Newport Merger.

### Amortization of Intangible Assets

<i>(dollars in millions)</i>	Three Months Ended March 31,	
	2019	2018
Amortization of intangible assets	\$ 15.7	\$ 11.2

Amortization of intangible assets increased by \$4.5 million during the three months ended March 31, 2019 primarily due to the amortization of intangible assets acquired as part of the ESI Merger.

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### Interest Expense, Net

<i>(dollars in millions)</i>	Three Months Ended March 31,	
	2019	2018
Interest expense, net	\$ 7.4	\$ 4.3

Interest expense, net, increased by \$3.1 million for the three months ended March 31, 2019, primarily due to two months of interest expense related to Amendment No. 5 to our senior secured term loan facility, as described below.

### Other Expense, Net

<i>(dollars in millions)</i>	Three Months Ended March 31,	
	2019	2018
Other expense, net	\$ 0.3	\$ 0.6

The changes in other expense, net, for the three months ended March 31, 2019, primarily related to changes in foreign exchange rates.

### Provision for Income Taxes

<i>(dollars in millions)</i>	Three Months Ended March 31,	
	2019	2018
Provision for income taxes	\$ 2.9	\$ 21.6

Our effective tax rates for the periods ended March 31, 2019 and 2018 were 18.8% and 17.1%, respectively. Our effective tax rate for the three months ended March 31, 2019 and the related income tax expense, was lower than the U.S. statutory tax rate due to the U.S. deduction for foreign derived intangible income, the U.S. credit for research activities and the geographic mix of income earned by the international subsidiaries being taxed at rates lower than the U.S. statutory tax rate, offset by the global intangible low-taxed income inclusion, the limitation on the deduction of executive compensation and state income taxes. The geographic mix of income is significantly impacted by acquisition and integration costs, and additional interest expense incurred in the U.S. jurisdiction as a result of the acquisition of ESI.

Our effective tax rate for the three months ended March 31, 2018 was lower than the U.S. statutory tax rate mainly due to foreign income being taxed at rates lower than the U.S. statutory tax rate, windfall benefits of stock compensation and the deduction for foreign derived intangible income offset by the tax effects from global intangible low-taxed income and state income taxes.

As of March 31, 2019, the total amount of gross unrecognized tax benefits, which excludes interest and penalties, was approximately \$40.7 million. At December 31, 2018, the total amount of gross unrecognized tax benefits, which excludes interest and penalties, was approximately \$32.7 million. The net increase is primarily attributable the addition of historical gross unrecognized tax benefits for ESI as a result of the ESI Merger during the quarter ended March 31, 2019. As of March 31, 2019, excluding interest and penalties, there were approximately \$33.1 million of net unrecognized tax benefits that, if recognized, would impact our annual effective tax rate. We accrue interest and, if applicable, penalties for any uncertain tax positions. Interest and penalties are classified as a component of income tax expense. As of March 31, 2019 and December 31, 2018, the Company had accrued interest on unrecognized tax benefits of approximately \$0.5 million and \$0.6 million, respectively.

Over the next 12 months it is reasonably possible that we may recognize approximately \$1.5 million of previously net unrecognized tax benefits, excluding interest and penalties, related to federal, state and foreign tax positions as a result of the expiration of statutes of limitation. The U.S. statute of limitations remains open for tax years 2015 through present. The statute of limitations for our tax filings in other jurisdictions varies between fiscal years 2013 through the present. We also have certain federal credit carry-forwards and state tax loss and credit carry-forwards that are open to examination for tax years 2000 through the present.

We are subject to examination by U.S. federal, state and foreign tax authorities. The U.S. Internal Revenue Service commenced an examination of the Company's U.S. federal income tax filings for tax years 2015 and 2016 during the quarter ended September 30, 2017. This audit was effectively settled during the quarter ended March 31, 2018, and the impact was not material. Also during the quarter ended March 31, 2018, we received notification from the U.S. Internal Revenue Service of their intent to audit our U.S. subsidiary, Newport Corporation, for tax year 2015. This audit commenced during the quarter ended June 30, 2018 and there have been no proposed adjustments through March 31, 2019.

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On a quarterly basis, we evaluate both positive and negative evidence that affects the realizability of net deferred tax assets and assess the need for a valuation allowance. The future benefit to be derived from our deferred tax assets is dependent upon our ability to generate sufficient future taxable income in each jurisdiction of the right type to realize the assets.

Our future effective tax rate depends on various factors, including further interpretations and guidance from U.S. federal and state governments on the impact of the enactment of the Tax Cuts and Jobs Act, the adoption of the proposed regulations issued by the U.S. Internal Revenue Service on the foreign derived intangible income and global intangible low-taxed income provisions, as well as the geographic composition of our pre-tax income, and changes in income tax reserves for unrecognized tax benefits. We monitor these factors and timely adjust our estimates of the effective tax rate accordingly. We expect that the geographic mix of pre-tax income will continue to have a favorable impact on our effective tax rate, however the geographic mix of pre-tax income can change based on multiple factors resulting in changes to the effective tax rate in future periods. While we believe we have adequately provided for all tax positions, amounts asserted by taxing authorities could materially differ from our accrued positions as a result of uncertain and complex application of tax law and regulations. Additionally, the recognition and measurement of certain tax benefits include estimates and judgment by management. Accordingly, we could record additional provisions or benefits for U.S. federal, state, and foreign tax matters in future periods as new information becomes available.

### **Liquidity and Capital Resources**

Cash and cash equivalents and short-term marketable investments totaled \$462.3 million at March 31, 2019, compared to \$718.2 million at December 31, 2018. This decrease primarily related to the \$406.0 million of cash used to fund the payment of a portion of the purchase price for ESI on February 1, 2019.

Net cash provided by operating activities was \$29.1 million for the three months ended March 31, 2019 and resulted from net income of \$12.5 million, which included non-cash charges of \$61.6 million, offset by a net increase in working capital of \$45.0 million. The net increase in working capital was primarily due to a decrease in accrued compensation of \$22.9 million, a decrease in accounts payable of \$17.3 million, an increase in inventories of \$10.3 million and a decrease in income taxes of \$3.7 million, partially offset by a decrease in other current and non-current assets of \$4.8 million and a decrease in accounts receivable of \$4.0 million.

Net cash provided by operating activities was \$72.7 million for the three months ended March 31, 2018 and resulted from net income of \$105.1 million, which included non-cash charges of \$37.9 million, offset by a net increase in working capital of \$70.3 million. The net increase in working capital was primarily due to an increase in accounts receivable of \$37.3 million and an increase in inventories of \$28.2 million, related to an increase in business activities and a decrease in accrued compensation of \$32.5 million, as year-end bonuses were paid. These increases in working capital were offset by an increase in other current and non-current liabilities of \$10.5 million, an increase in accounts payable of \$9.3 million and an increase in income taxes of \$8.8 million.

Net cash used in investing activities was \$874.1 million for the three months ended March 31, 2019 and was primarily due to the payment of a portion of the purchase price for the ESI Merger of \$988.6 million and purchases of production-related equipment of \$14.5 million, partially offset by net sales and maturities of short-term investments of \$129.0 million. Net cash used in investing activities was \$0.6 million for the three months ended March 31, 2018 due to purchases of production-related equipment of \$9.4 million, offset by net sales and maturities of short-term investments of \$8.8 million.

Net cash provided by financing activities was \$618.6 million for the three months ended March 31, 2019 and was primarily from net proceeds of \$638.6 million mainly from our 2019 Incremental Term Loan Facility, as described below, used to finance the ESI Merger, partially offset by net payments related to tax payments for employee stock awards of \$9.0 million and dividend payments of \$10.8 million. Net cash used in financing activities was \$67.1 million for the three months ended March 31, 2018 and resulted from partial repayment of the Term Loan Facility, as described below, of \$50.0 million, dividend payments made to common stockholders of \$9.8 million and net payments related to tax payments for employee stock awards of \$8.9 million, partially offset by a net increase in proceeds from short-term borrowings relating to our lines of credit of \$1.6 million.

On July 25, 2011, our Board of Directors approved a share repurchase program for the repurchase of up to an aggregate of \$200 million of our outstanding common stock from time to time in open market purchases, privately negotiated transactions or through other appropriate means. The timing and quantity of any shares repurchased depends upon a variety of factors, including business conditions, stock market conditions and business development activities, including but not limited to merger and acquisition opportunities. These repurchases may be commenced, suspended or discontinued at any time without prior notice. We have repurchased approximately 2,588,000 shares of common stock for approximately \$127 million pursuant to the program since its adoption. During the three months ended March 31, 2019 and 2018, there were no repurchases of common stock.

Holders of our common stock are entitled to receive dividends when and if they are declared by our Board of Directors. In addition, we accrue dividend equivalents on the RSUs we assumed in the ESI Merger when dividends are declared by the Company's Board of Directors. Our Board of Directors declared a cash dividend of \$0.20 per share during the first quarter of 2019, which totaled \$10.8 million. Our Board of Directors declared a cash dividend of \$0.18 per share during the first quarter of 2018, which totaled \$9.8 million.

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On May 8, 2019, our Board of Directors declared a quarterly cash dividend of \$0.20 per share to be paid on June 7, 2019 to shareholders of record as of May 27, 2019. Future dividend declarations, if any, as well as the record and payment dates for such dividends, are subject to the final determination of our Board of Directors. In addition, under the terms of our senior secured Term Loan Facility and our senior secured asset-based revolving credit facility, we may be restricted from paying dividends under certain circumstances.

### Term Loan Credit Agreement

In connection with the completion of the Newport Merger, we entered into a term loan credit agreement (the “Credit Agreement”) with Barclays Bank PLC, as administrative agent and collateral agent, and the lenders from time to time party thereto (the “Lenders”), that provided senior secured financing in the original principal amount of \$780.0 million (the “2016 Term Loan Facility”), subject to increase at our option and subject to the receipt of lender commitments in accordance with the Credit Agreement (the 2016 Term Loan Facility, together with the 2019 Incremental Term Loan Facility (as defined below), the “Term Loan Facility”). The 2016 Term Loan Facility matures on April 29, 2023. Borrowings under the Term Loan Facility bear interest per annum at one of the following rates selected by the Company: (a) a base rate determined by reference to the highest of (1) the federal funds effective rate plus 0.50%, (2) the “prime rate” quoted in *The Wall Street Journal*, (3) a LIBOR rate determined by reference to the costs of funds for U.S. dollar deposits for an interest period of one month adjusted for certain additional costs, plus 1.00%, and (4) a floor of 1.75%, plus, in each case, an applicable margin; or (b) a LIBOR rate determined by reference to the costs of funds for U.S. dollar deposits for the interest period relevant to such borrowing adjusted for certain additional costs, subject to a LIBOR rate floor of 0.75%, plus an applicable margin. We have elected the interest rate as described in clause (b). The Credit Agreement provides that, unless an alternate rate of interest is agreed, all loans will be determined by reference to the Base Rate if the LIBOR rate cannot be ascertained, if regulators impose material restrictions on the authority of a lender to make LIBOR rate loans, or for other reasons. The 2016 Term Loan Facility was issued with original issue discount of 1.00% of the principal amount thereof.

We subsequently entered into four separate repricing amendments to the 2016 Term Loan Facility, which decreased the applicable margin for LIBOR borrowings from 4.0% to 1.75%, with a LIBOR rate floor of 0.75%. As a consequence of the pricing of the 2019 Incremental Term Loan Facility (defined below), the applicable margin for the 2016 Term Loan Facility was increased to 2.00% (from 1.75%) with respect to LIBOR borrowings and 1.00% (from 0.75%) with respect to base rate borrowings. The interest rate on the 2016 Term Loan Facility as of March 31, 2019 was 4.5%.

In September 2016, we entered into an interest rate swap agreement, which has a maturity date of September 30, 2020, to fix the rate on \$335.0 million of the then-outstanding balance under the 2016 Term Loan Facility. The rate is fixed at 1.198% per annum plus the applicable credit spread, which was 2.0% at March 31, 2019. The notional amount of the interest rate swap agreement was \$290.0 million and had a fair value of \$4.5 million at March 31, 2019.

As of March 31, 2019, after total principal prepayments of \$425.0 million and regularly scheduled principal payments of \$6.5 million, the total outstanding principal balance of the 2016 Term Loan Facility was \$348.5 million. As a result of making these prepayments, we are no longer required to make any regularly scheduled principal payments on the 2016 Term Loan Facility until the maturity date of the loan.

We incurred \$28.7 million of deferred finance fees, original issue discount and repricing fees related to the term loans under the 2016 Term Loan Facility, which are included in long-term debt in the accompanying consolidated balance sheets and are being amortized to interest expense over the estimated life of the term loans using the effective interest method. A portion of these fees have been accelerated in connection with the various debt prepayments during 2016, 2017 and 2018. As of March 31, 2019, the remaining balance of the deferred finance fees, original issue discount and repricing fees related to the 2016 Term Loan Facility was \$4.0 million.

On February 1, 2019, in connection with the completion of the ESI Merger, we entered into an amendment (“Amendment No. 5”) to the Credit Agreement. Amendment No. 5 provided an additional tranche B-5 term loan commitment in the principal amount of \$650.0 million (the “2019 Incremental Term Loan Facility”), all of which was drawn down in connection with the closing of the ESI Merger. Pursuant to Amendment No. 5, we also effectuated certain amendments to the Credit Agreement which make certain of the negative covenants and other provisions less restrictive. The 2019 Incremental Term Loan Facility matures on February 1, 2026 and bears interest at a rate per annum equal to, at our option, a base rate or LIBOR rate (as described above) plus, in each case, an applicable margin equal to 1.25% with respect to base rate borrowings and 2.25% with respect to LIBOR borrowings. The 2019 Incremental Term Loan Facility was issued with original issue discount of 1.00% of the principal amount thereof.

On April 3, 2019, we entered into an interest rate swap agreement, which has a maturity date of March 31, 2023, to fix the rate on \$300.0 million of the outstanding balance of the 2019 Incremental Term Loan Facility. The rate is fixed at 2.309% per annum plus the applicable credit spread, which was 2.25% at March 31, 2019.

We incurred \$11.4 million of deferred finance fees and original issue discount fees related to the term loans under the 2019 Incremental Term Loan Facility, which are included in long-term debt in the accompanying consolidated balance sheets and are being amortized to interest expense over the estimated life of the term loans using the effective interest method. As of March 31, 2019, the remaining balance of the deferred finance fees and original issue discount related to the 2019 Incremental Term Loan Facility was \$11.2 million.

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We are required to make scheduled quarterly payments each equal to 0.25% of the original principal amount of the 2019 Incremental Term Loan Facility, with the balance due on February 1, 2026. If on or prior to the date that is six months after the closing date of Amendment No. 5, we prepay any loans under the 2019 Incremental Term Loan Facility in connection with a repricing transaction, we must pay a prepayment premium of 1.00% of the aggregate principal amount of the loans so prepaid. At March 31, 2019, the total balance outstanding of the 2019 Incremental Term Loan Facility was \$650.0 million, and the interest rate was 4.7%.

Under the Credit Agreement, we are required to prepay outstanding term loans under the 2016 Term Loan Facility and the 2019 Incremental Term Loan Facility, subject to certain exceptions, with portions of its annual excess cash flow as well as with the net cash proceeds of certain asset sales, certain casualty and condemnation events and the incurrence or issuance of certain debt. As a result of our Total Leverage Ratio, we were not required to make a prepayment of excess cash flow for the fiscal year ended December 31, 2018.

All obligations under the Term Loan Facility are guaranteed by certain of our domestic subsidiaries, and are collateralized by substantially all of our assets and the assets of such subsidiaries, subject to certain exceptions and exclusions.

The Credit Agreement contains customary representations and warranties, affirmative and negative covenants and provisions relating to events of default. If an event of default occurs, the Lenders under the Term Loan Facility will be entitled to take various actions, including the acceleration of amounts due under the Term Loan Facility and all actions generally permitted to be taken by a secured creditor. At March 31, 2019, we were in compliance with all covenants under the Credit Agreement.

### Senior Secured Asset-Based Revolving Credit Facility

In connection with the completion of the Newport Merger in April 2016, we entered into an asset-based credit agreement with Deutsche Bank AG New York Branch, as administrative agent and collateral agent, the other borrowers from time to time party thereto, and the lenders and letters of credit issuers from time to time party thereto, that provided senior secured financing of up to \$50.0 million, which we never borrowed against. On February 1, 2019, in connection with the completion of the ESI Merger, we terminated the \$50.0 million asset-based credit agreement with Deutsche Bank AG New York Branch and entered into an asset-based credit agreement with Barclays Bank PLC, as administrative agent and collateral agent, the other borrowers from time to time party thereto, and the lenders and letters of credit issuers from time to time party thereto (the "ABL Credit Agreement"), that provides senior secured revolving credit financing of up to \$100.0 million, subject to a borrowing base limitation (the "ABL Facility"). The borrowing base for the ABL Facility at any time equals the sum of: (a) 85% of certain eligible accounts; plus (b) prior to certain notice and filed examination and appraisal requirements, the lesser of (i) 20% of net book value of eligible inventory in the United States and (ii) 30% of the borrowing base, and after the satisfaction of such requirements, the lesser of (i) the lesser of (A) 65% of the lower of cost or market value of certain eligible inventory and (B) 85% of the net orderly liquidation value of certain eligible inventory and (ii) 30% of the borrowing base; minus (c) reserves established by the administrative agent. The ABL Facility includes borrowing capacity in the form of letters of credit up to \$25.0 million.

Borrowings under the ABL Facility bear interest at a rate per annum equal to, at our option, any of the following, plus, in each case, an applicable margin: (a) a base rate determined by reference to the highest of (1) the federal funds effective rate plus 0.50%, (2) the "prime rate" quoted in The Wall Street Journal, (3) a LIBOR rate determined by reference to the costs of funds for U.S. dollar deposits for an interest period of one month adjusted for certain additional costs, plus 1.00% and (4) a floor of 0.00%; and (b) a LIBOR rate determined by reference to the costs of funds for U.S. dollar deposits for the interest period relevant to such borrowing adjusted for certain additional costs, with a floor of 0.00%. The initial applicable margin for borrowings under the ABL Facility is 0.50% with respect to base rate borrowings and 1.50% with respect to LIBOR borrowings. Commencing with the completion of the first fiscal quarter ending after the closing of the ABL Facility, the applicable margin for borrowings thereunder is subject to upward or downward adjustment each fiscal quarter, based on the average historical excess availability during the preceding quarter.

In addition to paying interest on any outstanding principal under the ABL Facility, we are required to pay a commitment fee in respect of the unutilized commitments thereunder equal to 0.25% per annum. We must also pay customary letter of credit fees and agency fees.

We incurred \$0.8 million of costs in connection with the new ABL Facility, which were capitalized and included in other assets in the accompanying consolidated balance sheet and are being amortized to interest expense over the contractual term of five years of the ABL Facility. As a result of the prior asset-based facility being terminated, we wrote off \$0.2 million of previously capitalized debt issuance costs.

The ABL Credit Agreement also contains customary representations and warranties, affirmative covenants and provisions relating to events of default. If an event of default occurs, the lenders under the ABL Facility will be entitled to take various actions, including the acceleration of amounts due under the ABL Facility and all actions permitted to be taken by a secured creditor.

### **Off-Balance Sheet Arrangements**

We do not have any financial partnerships with unconsolidated entities, such as entities often referred to as structured finance, special purpose entities or variable interest entities, which are often established for the purpose of facilitating off-balance sheet arrangements or for other contractually narrow or limited purposes. Accordingly, we have no off-balance sheet arrangements that have or are reasonably expected to have a current or future effect on our financial condition, changes in financial condition, revenues or expenses, results of operations, liquidity, capital expenditures or capital resources that are material to investors.

### **Contractual Obligations**

Other than the 2019 Incremental Term Loan Facility for \$650.0 million and ABL Facility described above, there have been no other changes outside the ordinary course of business to our contractual obligations as disclosed in our Annual Report on Form 10-K for the year ended December 31, 2018.

### **Recently Issued Accounting Pronouncements**

In October 2018, the FASB issued ASU 2018-16, “Derivatives and Hedging (Topic 815).” This standard permits the use of the Overnight Index Swap Rate (“OIS”) based on the Secured Overnight Financing Rate as a U.S. benchmark interest rate for hedge accounting purposes under Topic 815 in addition to the interest rates on direct treasury obligations of the U.S. government, the LIBOR swap rate, the OIS rate based on the Federal Funds Effective Rate and the Securities Industry and Financial Markets Association Municipal Swap Rate. This standard is effective for annual periods beginning after December 15, 2018, including interim periods within those fiscal years. We adopted this ASU during the first quarter of 2019 and the adoption of this ASU did not have a material impact on our consolidated financial statements.

In August 2018, the FASB issued ASU 2018-15, “Intangibles-Goodwill and Other-Internal-Use Software (Subtopic 350-40): Customer’s Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement that is a Service Contract.” This standard aligns the requirements for capitalizing implementation costs incurred in a hosting arrangement that is a service contract with the requirements for capitalizing implementation costs incurred to develop or obtain internal-use software (and hosting arrangements that include an internal-use software license). The accounting for the service element of a hosting arrangement that is a service contract is not affected by the amendments to this update. This standard is effective for annual periods beginning after December 15, 2019, including interim periods within those fiscal years. We do not expect adoption of this ASU to have a material impact on our consolidated financial statements.

In August 2017, the FASB issued ASU 2017-12, “Derivatives and Hedging (Topic 815).” This standard better aligns an entity’s risk management activities and financial reporting for hedging relationships through changes to both the designation and measurement guidance for qualifying hedging relationships and the presentation of hedge results. The provisions of this ASU are effective for annual periods beginning after December 15, 2018, including interim periods within those fiscal years. We adopted this ASU during the first quarter of 2019 and the adoption of this ASU did not have a material impact on our consolidated financial statements.

In February 2016, the FASB issued ASU 2016-02, Leases. This standard requires the recognition of lease assets and liabilities for all leases, with certain exceptions, on the balance sheet. This ASU is effective for annual periods beginning after December 15, 2018, including interim periods within those fiscal years. We adopted ASU 2016-02 on January 1, 2019, and used the effective date as its date of initial application. As such, we did not adjust prior period amounts. We also elected to adopt the package of practical expedients upon transition, which permits companies to not reassess lease identification, classification, and initial direct costs under ASU 2016-02 for leases that commenced prior to the effective date. We implemented internal controls and a lease accounting information system to enable preparation on adoption. Upon adoption, we recorded a cumulative effect of initially applying this new standard, resulting in the addition of \$71.0 million of right-of-use assets and \$20.2 million and \$54.1 million of corresponding short-term and long-term lease liabilities, respectively. The right-of-use asset is net of the deferred rent liability, prepaid rent and net favorable lease asset which were re-classified to the right-of-use asset upon adoption of the standard. For additional information on the required disclosures related to the impact of adopting this standard, see Note 3 to the Consolidated Condensed Financial Statements.

### **ITEM 3. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK.**

Information concerning market risk is contained in the section entitled “Quantitative and Qualitative Disclosures About Market Risk” contained in our Annual Report on Form 10-K for the year ended December 31, 2018 filed with the Securities and Exchange Commission on February 26, 2019. As of March 31, 2019, there were no material changes in our exposure to market risk from December 31, 2018.

ITEM 4. CONTROLS AND PROCEDURES.

**Evaluation of Disclosure Controls and Procedures**

Our management, with the participation of our Chief Executive Officer and Chief Financial Officer, evaluated the effectiveness of our disclosure controls and procedures as of March 31, 2019. The term “disclosure controls and procedures,” as defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended (the “Exchange Act”), means controls and other procedures of an issuer that are designed to ensure that information required to be disclosed by the issuer in the reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the Securities and Exchange Commission’s rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by an issuer in the reports that it files or submits under the Exchange Act is accumulated and communicated to the issuer’s management, including its principal executive and principal financial officers, or persons performing similar functions as appropriate to allow timely decisions regarding required disclosure. Management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving their objectives and management necessarily applies its judgment in evaluating the cost-benefit relationship of possible controls and procedures. Based on the evaluation of our disclosure controls and procedures as of March 31, 2019, our Chief Executive Officer and Chief Financial Officer concluded that, as of such date, our disclosure controls and procedures were effective at the reasonable assurance level to ensure that information required to be disclosed by us in reports that we file or submit under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in Securities and Exchange Commission rules and forms and is accumulated and communicated to our management, including our Chief Executive Officer and Chief Financial Officer as appropriate to allow timely decisions regarding required disclosure.

**Changes in Internal Control over Financial Reporting**

There was no change in our internal control over financial reporting (as defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act) during the quarter ended March 31, 2019, 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.

*Newport Litigation*

In March 2016, two putative class actions lawsuit captioned Dixon Chung v. Newport Corp., et al., Case No. A-16-733154-C, and Hubert C. Pincon v. Newport Corp., et al., Case No. A-16-734039-B, were filed in the District Court, Clark County, Nevada on behalf of a putative class of stockholders of Newport Corporation (“Newport”) for claims related to the merger agreement (“Newport Merger Agreement”) between the Company, Newport, and a wholly-owned subsidiary of the Company (“Merger Sub”). The lawsuits named as defendants the Company, Newport, Merger Sub, and certain then current and former members of Newport’s board of directors. Both complaints alleged that Newport directors breached their fiduciary duties to Newport’s stockholders by agreeing to sell Newport through an inadequate and unfair process, which led to inadequate and unfair consideration, by agreeing to unfair deal protection devices and by omitting material information from the proxy statement. The complaints also alleged that the Company, Newport, and Merger Sub aided and abetted the directors’ alleged breaches of their fiduciary duties. The complaints sought injunctive relief, including to enjoin or rescind the Newport Merger Agreement, and an award of attorneys’ and other fees and costs, among other relief. On April 14, 2016, the Court consolidated the actions.

On October 19, 2016, plaintiffs in the consolidated action filed an amended complaint captioned In re Newport Corporation Shareholder Litigation, Case No. A-16-733154-B, in the District Court, Clark County, Nevada, on behalf of a putative class of Newport’s stockholders for claims related to the Newport Merger Agreement. The amended complaint contained substantially similar allegations related to Newport’s former board of directors’ alleged breaches of their fiduciary duties to Newport’s stockholders. The amended complaint sought monetary damages, including pre- and post-judgment interest. On June 22, 2017, the Court granted Defendants’ motion to dismiss and dismissed the amended complaint against all defendants but granted plaintiffs leave to amend.

On July 27, 2017, plaintiffs filed a second amended complaint containing substantially similar allegations but naming only Newport’s former directors as defendants. On August 8, 2017, the Court dismissed the Company and Newport from the action. The second amended complaint seeks monetary damages, including pre- and post-judgment interest. The Court granted a motion for class certification on September 27, 2018, appointing Mr. Pincon and Locals 302 and 612 of the International Union of Operating Engineers - Employers Construction Industry Retirement Trust as class representatives. On June 11, 2018, plaintiff Dixon Chung was voluntarily dismissed from the litigation. Discovery is ongoing in this action.

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### *ESI Litigation*

On November 29, 2018, a complaint captioned Brian Morris et. al. v. Electro Scientific Industries, Inc. et al. was filed in the U.S. District Court for the District of Oregon by alleged former stockholders of Electro Scientific Industries, Inc. (“ESI”) in connection with the acquisition of ESI by the Company. The complaint named the Company’s subsidiary, ESI, and the former members of ESI’s board of directors as defendants. Five additional complaints were subsequently filed, two in the U.S. District Court for the District of Oregon and three in the Multnomah County Circuit Court in the State of Oregon. The cases filed in the U.S. District Court were dated December 6, 2018 and December 12, 2018 and captioned Melvyn Klein et. al. v. Electro Scientific Industries, Inc. et al. and Donald Mager et. al. v. Electro Scientific Industries, Inc. et al., respectively. The complaints filed in Multnomah County Circuit Court were dated December 5, 2018, December 5, 2018 and December 13, 2018 and captioned Michael Kent et. al v. Electro Scientific Industries, Inc. et al., Christopher Stanley et. al v. Electro Scientific Industries, Inc. et al. and Eduardo Colmenares et. al. v. Electro Scientific Industries, Inc., MKS Instruments, Inc., et al., respectively (collectively with Brian Morris et. al. v. Electro Scientific Industries, Inc. et al., the “Lawsuits”).

The Lawsuits are purported class actions brought on behalf of former ESI stockholders, asserting various claims against the former members of the ESI board of directors, ESI, the Company and the Company’s merger subsidiary, including breach of fiduciary duty and aiding and abetting the breach of fiduciary duty. The Lawsuits allege that the consideration paid to the ESI shareholders did not appropriately value ESI, and that ESI’s merger related disclosures failed to disclose certain material information regarding the merger. The Lawsuits purport to seek unspecified damages.

On February 26, 2019, the parties entered into a settlement agreement, pursuant to which plaintiffs dismissed their individual claims with prejudice and class claims without prejudice in return for ESI’s previous supplemental merger related disclosures in connection with the transaction. ESI provided supplemental merger related disclosures to eliminate the burden and expense of litigation and to avoid any possible disruption to the merger that could result from further litigation.

The Company is subject to various legal proceedings and claims, which have arisen in the ordinary course of business. In the opinion of management, the ultimate disposition of these matters will not have a material adverse effect on our results of operations, financial condition or cash flows.

### ITEM 1A. RISK FACTORS.

Information regarding risk factors affecting the Company’s business are discussed in the Company’s Annual Report on Form 10-K for the year ended December 31, 2018 in the section entitled “Risk Factors.” There have been no material changes to the risk factors as described in Part I, Item 1A, “Risk Factors,” in our Annual Report on Form 10-K for the year ended December 31, 2018.

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### ITEM 6. EXHIBITS.

<u>Exhibit No.</u>	<u>Exhibit Description</u>
+3.1(1)	<a href="#"><u>Restated Articles of Organization of the Registrant</u></a>
+3.2(2)	<a href="#"><u>Articles of Amendment to Restated Articles of Organization of the Registrant, as filed with the Secretary of State of Massachusetts on May 18, 2001</u></a>
+3.3(3)	<a href="#"><u>Articles of Amendment to Restated Articles of Organization of the Registrant, as filed with the Secretary of State of Massachusetts on May 16, 2002</u></a>
+3.4(4)	<a href="#"><u>Amended and Restated By-Laws of the Registrant</u></a>
+10.1(5)	<a href="#"><u>Amendment No. 5 to Term Loan Credit Agreement and Amendment to Term Loan Guaranty and Term Loan Security Agreement, dated as of February 1, 2019, by and among the Registrant, the other loan parties party thereto, Barclays Bank PLC, as administrative agent and collateral agent and each participating lender party thereto</u></a>
+10.2(5)	<a href="#"><u>ABL Credit Agreement, dated as of February 1, 2019, by and among the Registrant, Barclays Bank PLC, as administrative agent and collateral agent, the other borrowers from time to time party thereto, and the lenders and letters of credit issuers from time to time party thereto</u></a>
+10.3(6)*	<a href="#"><u>Electro Scientific Industries, Inc.'s 2004 Stock Incentive Plan</u></a>
+10.4(6)*	<a href="#"><u>Form of Restricted Stock Units Award Agreement (with time-based vesting) used under Electro Scientific Industries, Inc.'s 2004 Stock Incentive Plan for 2016-2017</u></a>
+10.5(6)*	<a href="#"><u>Form of Restricted Stock Units Award Agreement (with time-based vesting) used under Electro Scientific Industries, Inc.'s 2004 Stock Incentive Plan for 2018</u></a>
+10.6(6)*	<a href="#"><u>Form of Restricted Stock Units Award Agreement (with performance-based vesting) used under Electro Scientific Industries, Inc.'s 2004 Stock Incentive Plan for 2016-2017</u></a>
+10.7(6)*	<a href="#"><u>Form of Restricted Stock Units Award Agreement (with performance-based vesting) used under Electro Scientific Industries, Inc.'s 2004 Stock Incentive Plan for 2018</u></a>
+10.8(6)*	<a href="#"><u>Form of the Registrant's RSU Assumption Agreement (with time-based vesting) for U.S. Employees Relating to Electro Scientific Industries, Inc.'s 2004 Stock Incentive Plan</u></a>
+10.9(6)*	<a href="#"><u>Form of the Registrant's RSU Assumption Agreement (with time-based vesting) for Employees Outside of the United States Relating to Electro Scientific Industries, Inc.'s 2004 Stock Incentive Plan</u></a>
+10.10(6)*	<a href="#"><u>Form of the Registrant's RSU Assumption Agreement (with performance-based vesting) for U.S. Employees Relating to Electro Scientific Industries, Inc.'s 2004 Stock Incentive Plan</u></a>
+10.11(6)*	<a href="#"><u>Form of the Registrant's RSU Assumption Agreement (with performance-based vesting) for Employees Outside of the United States Relating to Electro Scientific Industries, Inc.'s 2004 Stock Incentive Plan</u></a>
31.1	<a href="#"><u>Certification of Principal Executive Officer pursuant to Rule 13a-14(a)/Rule 15d-14(a) of the Securities Exchange Act of 1934, as amended</u></a>
31.2	<a href="#"><u>Certification of Principal Financial Officer pursuant to Rule 13a-14(a)/Rule 15d-14(a) of the Securities Exchange Act of 1934, as amended</u></a>
32.1	<a href="#"><u>Certification of Chief Executive Officer and Chief Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002</u></a>

+ Previously filed

\* Management contract or compensatory plan arrangement

- (1) Incorporated by reference to the Registration Statement on Form S-4 (File No. 333-49738), filed with the Securities and Exchange Commission on November 13, 2000.
- (2) Incorporated by reference to the Registrant's Quarterly Report on Form 10-Q for the quarter ended June 30, 2001 (File No. 000-23621), filed with the Securities and Exchange Commission on August 14, 2001.

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- (3) Incorporated by reference to the Registrant's Quarterly Report on Form 10-Q for the quarter ended June 30, 2002 (File No. 000-23621), filed with the Securities and Exchange Commission on August 13, 2002.
- (4) Incorporated by reference to the Registrant's Current Report on Form 8-K (File No. 000-23621), filed with the Securities and Exchange Commission on May 6, 2014.
- (5) Incorporated by reference to the Registrant's Current Report on Form 8-K (File No. 000-23621), filed with the Securities and Exchange Commission on February 1, 2019.
- (6) Incorporated by reference to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2018 (File No. 000-23621), filed with the Securities and Exchange Commission on February 26, 2019.

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.

MKS INSTRUMENTS, INC.

Date: May 8, 2019

By: /s/ Seth H. Bagshaw  
Seth H. Bagshaw  
Senior Vice President, Chief Financial Officer and Treasurer  
(Principal Financial Officer)

CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER  
PURSUANT TO RULE 13a-14(a)/RULE 15d-14(a) OF THE  
SECURITIES EXCHANGE ACT OF 1934, AS AMENDED

I, Gerald G. Colella, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of MKS Instruments, 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 8, 2019

/s/ Gerald G. Colella

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Gerald G. Colella  
Chief Executive Officer  
(Principal Executive Officer)

CERTIFICATION OF PRINCIPAL FINANCIAL OFFICER  
PURSUANT TO RULE 13a-14(a)/RULE 15d-14(a) OF THE  
SECURITIES EXCHANGE ACT OF 1934, AS AMENDED

I, Seth H. Bagshaw, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of MKS Instruments, 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 8, 2019

/s/ Seth H. Bagshaw

Seth H. Bagshaw

Senior Vice President, Chief Financial Officer and Treasurer  
(Principal Financial Officer)

## CERTIFICATION OF CHIEF EXECUTIVE OFFICER AND CHIEF FINANCIAL OFFICER

PURSUANT TO 18 U.S.C. SECTION 1350,

AS ADOPTED PURSUANT TO

SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Quarterly Report on Form 10-Q of MKS Instruments, Inc. (the "Company") for the period ended March 31, 2019, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), the undersigned, Gerald G. Colella, Chief Executive Officer of the Company, and Seth H. Bagshaw, Senior Vice President, Chief Financial Officer and Treasurer of the Company, each hereby certifies, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that, based on his knowledge:

- (1) the Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and
- (2) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Dated: May 8, 2019

/s/ Gerald G. ColellaGerald G. Colella  
Chief Executive Officer

Dated: May 8, 2019

/s/ Seth H. BagshawSeth H. Bagshaw  
Senior Vice President, Chief Financial Officer and Treasurer