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

FORM 10-Q

(MARK ONE)

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

For the quarterly period ended September 30, 2017

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

MKS INSTRUMENTS, INC.

(Exact name of registrant as specified in its charter)

Massachusetts
(State or other jurisdiction of
incorporation or organization)

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

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

01810
(Zip Code)

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

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

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes No

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, 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"/> (Do not check if a smaller reporting company)	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

As of October 27, 2017, the registrant had 54,294,566 shares of common stock outstanding.

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MKS INSTRUMENTS, INC.

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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)

	September 30, 2017	December 31, 2016
ASSETS		
Current assets:		
Cash and cash equivalents	\$ 305,977	\$ 228,623
Restricted cash	117	5,287
Short-term investments	228,631	189,463
Trade accounts receivable, net	280,302	248,757
Inventories, net	319,460	275,869
Other current assets	60,716	50,770
Total current assets	1,195,203	998,769
Property, plant and equipment, net	166,928	174,559
Goodwill	589,099	588,585
Intangible assets, net	376,334	408,004
Long-term investments	10,593	9,858
Other assets	32,188	32,467
Total assets	<u>\$ 2,370,345</u>	<u>\$ 2,212,242</u>
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Short-term borrowings and current portion of long-term debt	\$ 4,020	\$ 10,993
Accounts payable	77,842	69,337
Accrued compensation	75,725	67,728
Income taxes payable	38,609	22,794
Deferred revenue	17,812	14,463
Other current liabilities	68,604	51,985
Total current liabilities	282,612	237,300
Long-term debt	435,731	601,229
Non-current deferred taxes	71,110	66,446
Non-current accrued compensation	50,080	44,714
Other liabilities	23,107	20,761
Total liabilities	862,640	970,450
Commitments and contingencies (Note 18)		
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; 54,291,361 and 53,672,861 shares issued and outstanding at September 30, 2017 and December 31, 2016, respectively	113	113
Additional paid-in capital	782,597	777,482
Retained earnings	727,835	494,744
Accumulated other comprehensive loss	(2,840)	(30,547)
Total stockholders' equity	1,507,705	1,241,792
Total liabilities and stockholders' equity	<u>\$ 2,370,345</u>	<u>\$ 2,212,242</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 September 30,		Nine Months Ended September 30,	
	2017	2016	2017	2016
Net revenues:				
Products	\$434,710	\$335,156	\$1,259,582	\$774,248
Services	51,557	45,504	144,595	115,954
Total net revenues	<u>486,267</u>	<u>380,660</u>	<u>1,404,177</u>	<u>890,202</u>
Cost of revenues:				
Cost of products	225,174	183,789	659,538	433,134
Cost of services	33,098	28,486	91,514	74,857
Total cost of revenues (exclusive of amortization shown separately below)	<u>258,272</u>	<u>212,275</u>	<u>751,052</u>	<u>507,991</u>
Gross profit	227,995	168,385	653,125	382,211
Research and development	32,548	32,268	99,510	77,709
Selling, general and administrative	71,839	68,016	218,038	161,545
Acquisition and integration costs	2,466	2,641	4,698	25,190
Restructuring	10	—	2,596	24
Asset impairment	—	—	6,719	—
Amortization of intangible assets	10,977	12,452	34,946	22,990
Income from operations	110,155	53,008	286,618	94,753
Interest income	873	404	1,896	1,858
Interest expense	7,172	12,007	23,001	20,526
Gain on sale of business	—	—	74,856	—
Other (expense) income, net	(2,485)	843	(3,741)	2,336
Income before income taxes	101,371	42,248	336,628	78,421
Provision for income taxes	25,377	9,699	75,134	19,099
Net income	<u>\$ 75,994</u>	<u>\$ 32,549</u>	<u>\$ 261,494</u>	<u>\$ 59,322</u>
Other comprehensive income:				
Changes in value of financial instruments designated as cash flow hedges, net of tax benefit(1)	\$ (908)	\$ (229)	\$ (3,578)	\$ (2,104)
Foreign currency translation adjustments, net of tax of \$0	8,088	5,698	30,352	(536)
Unrecognized pension loss, net of tax expense(2)	(565)	—	(204)	—
Unrealized gain (loss) on investments, net of tax expense (benefit)(3)	1,301	(31)	1,137	424
Total comprehensive income	<u>\$ 83,910</u>	<u>\$ 37,987</u>	<u>\$ 289,201</u>	<u>\$ 57,106</u>
Net income per share:				
Basic	<u>\$ 1.40</u>	<u>\$ 0.61</u>	<u>\$ 4.84</u>	<u>\$ 1.11</u>
Diluted	<u>\$ 1.38</u>	<u>\$ 0.60</u>	<u>\$ 4.75</u>	<u>\$ 1.10</u>
Cash dividends per common share	<u>\$ 0.175</u>	<u>\$ 0.17</u>	<u>\$ 0.525</u>	<u>\$ 0.51</u>
Weighted average common shares outstanding:				
Basic	<u>54,282</u>	<u>53,574</u>	<u>54,076</u>	<u>53,423</u>
Diluted	<u>55,101</u>	<u>54,315</u>	<u>55,020</u>	<u>53,895</u>

(1) Tax expense (benefit) was \$688 and \$(117) for the three months ended September 30, 2017 and 2016, respectively. Tax benefit was \$884 and \$1,357 for the nine months ended September 30, 2017 and 2016, respectively.

(2) Tax benefit was \$312 and \$315 for the three and nine months ended September 30, 2017, respectively.

(3) Tax benefit was \$467 and \$15 for the three months ended September 30, 2017 and 2016, respectively. Tax (benefit) expense was \$(737) and \$274 for the nine months ended September 30, 2017 and 2016, respectively.

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

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

	Nine Months Ended September 30,	
	2017	2016
Cash flows provided by operating activities:		
Net income	\$ 261,494	\$ 59,322
Adjustments to reconcile net income to net cash provided by operating activities:		
Depreciation and amortization	62,550	43,757
Amortization of debt issuance costs, original issue discount and soft call premium	6,385	6,453
Amortization of inventory step-up adjustment to fair value	—	15,090
Asset impairment	6,719	—
Gain on sale of business	(74,856)	—
Stock-based compensation	19,834	19,826
Provision for excess and obsolete inventory	15,349	11,045
Provision for bad debt	650	167
Deferred income taxes	6,641	(9,567)
Excess tax benefits from stock-based compensation	—	(678)
Other	832	125
Changes in operating assets and liabilities:		
Trade accounts receivable	(26,489)	(44,508)
Inventories	(51,251)	(5,077)
Income taxes	15,646	20,418
Other current and non-current assets	(9,714)	(12,134)
Accrued compensation	11,058	4,460
Other current and non-current liabilities	22,517	4,568
Accounts payable	7,071	14,110
Net cash provided by operating activities	<u>274,436</u>	<u>127,377</u>
Cash flows provided by investing activities:		
Acquisition of businesses, net of cash acquired	—	(939,591)
Net proceeds from sale of business	72,509	—
Proceeds from sale of property, plant and equipment	—	40
Purchases of investments	(199,012)	(116,075)
Maturities of investments	116,779	148,606
Sales of investments	43,571	337,592
Purchases of property, plant and equipment	(17,857)	(11,959)
Net cash provided by (used in) investing activities	<u>15,990</u>	<u>(581,387)</u>
Cash flows used in financing activities:		
Restricted cash	5,012	(6,176)
Proceeds from short-term borrowings	12,968	15,434
Proceeds from long-term borrowings	190	743,746
Payments on short-term borrowings	(13,277)	(8,289)
Payments on long-term borrowings	(178,141)	(111,825)
Repurchase of common stock	—	(1,545)
Net payments related to employee stock awards	(14,719)	(3,108)
Dividend payments to common stockholders	(28,403)	(27,249)
Excess tax benefits from stock-based compensation	—	678
Net cash (used in) provided by financing activities	<u>(216,370)</u>	<u>601,666</u>
Effect of exchange rate changes on cash and cash equivalents	<u>3,298</u>	<u>(8,356)</u>
Increase in cash and cash equivalents	77,354	139,300
Cash and cash equivalents at beginning of period	228,623	227,574
Cash and cash equivalents at end of period	<u>\$ 305,977</u>	<u>\$ 366,874</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 September 30, 2017, and for the three and nine months ended September 30, 2017 and 2016 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, 2016 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, 2016 filed with the Securities and Exchange Commission on March 1, 2017.

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 August 2017, the Financial Accounting Standards Board (“FASB”) issued Accounting Standards Update (“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 does not expect adoption of this ASU to have a material impact on the Company’s consolidated financial statements.

In May 2017, the FASB issued ASU 2017-09, “Compensation-Stock Compensation (Topic 718)-Scope of Modification Accounting.” This standard provides guidance about which changes to the terms or conditions of a share-based payment award require an entity to apply modification accounting in Topic 718. The provisions of this ASU are effective for annual periods beginning after December 15, 2017, including interim periods within those fiscal years. Early adoption is permitted for any interim period for which financial statements have not yet been issued. The Company does not expect adoption of this ASU to have a material impact on the Company’s consolidated financial statements.

In March 2017, the FASB issued ASU 2017-07, “Compensation-Retirement Benefits (Topic 715)-Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost.” This standard requires that an employer disaggregate the service cost component from the other components of net benefit cost. This standard also provides explicit guidance on how to present the service cost component and the other components of the net benefit cost in the income statement and allows only the service cost component of net benefit cost to be eligible for capitalization. The provisions of this ASU are effective for annual periods beginning after December 31, 2017, including interim periods within those fiscal years. Early adoption is permitted as of the beginning of an annual period for which financial statements (interim or annual) have not been issued or made available for issuance. The Company does not expect adoption of this ASU to have a material impact on the Company’s consolidated financial statements.

In January 2017, the FASB issued ASU 2017-04, “Intangibles-Goodwill and Other (Topic 350).” This standard simplifies how an entity is required to test goodwill for impairment by eliminating Step 2 from the goodwill impairment test. Step 2 measures a goodwill impairment loss by comparing the implied fair value of a reporting unit’s goodwill with the carrying amount of goodwill. The provisions of this ASU are effective for annual or any interim goodwill impairment tests in fiscal years beginning after December 15, 2019. Early adoption is permitted for interim or annual goodwill impairment tests performed on testing dates after January 1, 2017. The Company expects to adopt this new standard in 2017 when it performs its annual goodwill impairment test in the fourth quarter. The Company does not expect adoption of this ASU to have a material impact on the Company’s consolidated financial statements.

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

In January 2017, the FASB issued ASU 2017-01, “Business Combinations (Topic 805)-Clarifying the Definition of a Business.” This standard clarifies the definition of a business with the objective of adding guidance to assist entities with evaluating whether transactions should be accounted for as acquisitions (or disposals) of assets or businesses. This standard also provides a more robust framework to use in determining when a set of assets and activities is a business. Because the current definition of a business is interpreted broadly and can be difficult to apply, stakeholders indicated that analyzing transactions is inefficient and costly and that the definition does not permit the use of reasonable judgment. The provisions of this ASU are effective for annual periods beginning after December 15, 2017, including interim periods within those fiscal years. Early adoption is applicable under certain circumstances. The Company does not expect adoption of this ASU to have a material impact on the Company’s consolidated financial statements.

In November 2016, the FASB issued ASU 2016-18, “Statement of Cash Flows (Topic 230)-Restricted Cash,” an amendment to ASU 2016-15. This standard requires that a statement of cash flows explain the change during the period in the total of cash, cash equivalents and amounts generally described as restricted cash and restricted cash equivalents. Therefore, amounts generally described as restricted cash and restricted cash equivalents should be included with cash and cash equivalents when reconciling the beginning-of-period and end-of-period total amounts shown on the statement of cash flows. Early adoption is permitted. The provisions of this ASU are effective for annual periods beginning after December 15, 2017, including interim periods within those fiscal years and should be applied at the time of adoption of ASU 2016-15. The Company does not expect adoption of this ASU to have a material impact on the Company’s consolidated financial statements.

In October 2016, the FASB issued ASU 2016-16, “Income Taxes (Topic 740)-Intra-Entity Transfer of Assets Other Than Inventory.” This standard requires that an entity recognize the income tax consequences of an intra-entity transfer of an asset other than inventory when the transfer occurs as opposed to when the assets have been sold to an outside party. The provisions of this ASU are effective for annual periods beginning after December 15, 2017, including interim periods within those fiscal years and early adoption is permitted. The Company does not expect adoption of this ASU to have a material impact on the Company’s consolidated financial statements.

In August 2016, the FASB issued ASU 2016-15, “Statement of Cash Flows (Topic 230)-Classification of Certain Cash Receipts and Cash Payments.” This standard addresses eight specific cash flow issues with the objective of addressing the diversity in practice in how certain cash receipts and cash payments are presented and classified in the statement of cash flows under Topic 230. The provisions of this ASU are effective for annual periods beginning after December 15, 2017, including interim periods within those fiscal years. The Company is currently evaluating the requirements of this ASU and has not yet determined its impact on the Company’s consolidated financial statements.

In February 2016, the FASB issued ASU 2016-02, “Leases (Topic 842).” This standard requires the recognition of lease assets and liabilities for all leases, with certain exceptions, on the balance sheet. In transition, lessees and lessors are required to recognize and measure leases at the beginning of the earliest period presented using a modified retrospective approach. This ASU is effective for annual periods beginning after December 15, 2018, including interim periods within those fiscal years. The Company is currently evaluating the requirements of this ASU and has not yet determined its impact on the Company’s consolidated financial statements.

In January 2016, the FASB issued ASU 2016-01, “Financial Instruments-Overall (Subtopic 825-10): Recognition and Measurement of Financial Assets and Financial Liabilities.” This ASU provides guidance for the recognition, measurement, presentation, and disclosure of financial instruments. The new pronouncement revises accounting related to equity investments and the presentation of certain fair value changes for financial assets and liabilities measured at fair value. Among other things, it amends the presentation and disclosure requirements of equity securities that do not result in consolidation and are not accounted for under the equity method. Changes in the fair value of these equity securities will be recognized directly in net income. This pronouncement is effective for annual periods beginning after December 15, 2017, 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 May 2014, the FASB issued ASU 2014-09, “Revenue from Contracts with Customers (Topic 606).” ASU 2014-09 provides for a single comprehensive model to use in accounting for revenue arising from contracts with customers and will replace most existing revenue recognition guidance in GAAP when it becomes effective. ASU 2014-09 is effective for fiscal years and interim periods within those years beginning after December 15, 2017. The two permitted transition methods under the new standard are the full retrospective method, in which case the standard would be applied to each prior reporting period presented, or the modified retrospective method, in which case the cumulative effect of applying the standard would be recognized at the date of initial application. The Company does not plan to early adopt the standard, but has concluded that it will use the modified retrospective method upon adoption in the first quarter of 2018.

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

In March, April, May and December 2016 and September 2017, the FASB issued additional updates to the new revenue standard relating to reporting revenue on a gross versus net basis, identifying performance obligations and licensing arrangements, narrow-scope improvements and practical expedients, and technical corrections and improvements, respectively. The Company has established a cross functional project steering committee and implementation team to identify potential differences that would result from applying the requirements of the new standard to the Company’s revenue contracts and related expense line items. The Company has reviewed its plan for the implementation and will continue to report the status against that plan to the Company’s Audit Committee. To date, the Company has made significant progress in evaluating the potential changes that the adoption of the new standard may have on its future financial reporting and disclosures. The Company has identified the various revenue streams, including product revenues, service revenues, installation and training, that could be impacted by Topic 606 and has reviewed individual customer contracts related to these revenue streams. The new revenue standard will primarily impact the Company’s recording of repair revenue and customized products, which will be recognized over time under Topic 606 as opposed to a point in time under the current standard. The Company is in the process of finalizing and documenting its assumptions used in quantifying the impact adoption of the new revenue standard will have on the Company, which could vary quarter to quarter. Based on the Company’s preliminary analysis, it does not expect the adoption of the new guidance to have a material impact on the timing or amount of its revenue recognition. In addition, the Company does not expect any major changes to be made to its existing accounting systems or internal controls. The Company will continue to assess the effect that the new revenue guidance will have on its consolidated financial statements, disclosures and related controls, and will disclose any material effects, if any, when known.

3) Investments

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

	September 30, 2017	December 31, 2016
Available-for-sale investments:		
Time deposits and certificates of deposit	\$ 21,503	\$ 23,818
Bankers’ acceptance drafts	3,452	1,439
Asset-backed securities	39,702	36,809
Commercial paper	21,215	24,381
Corporate obligations	80,099	46,707
Municipal bonds	45	591
Promissory note	1,075	675
U.S. treasury obligations	25,777	25,414
U.S. agency obligations	35,763	29,629
	<u>\$ 228,631</u>	<u>\$ 189,463</u>

Investments classified as long-term consists of the following:

	September 30, 2017	December 31, 2016
Available-for-sale investments:		
Group insurance contracts	\$ 6,193	\$ 5,558
Cost method investments:		
Minority interest in a private company ⁽¹⁾	4,400	4,300
	<u>\$ 10,593</u>	<u>\$ 9,858</u>

(1) In April 2016, the Company invested \$9,300 for a minority interest in a private company. For the year ended December 31, 2016, the Company recognized \$5,000 of impairment charges related to this cost method investment. In July 2017, the Company invested an additional \$100 in this private company.

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

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

	<u>Cost</u>	<u>Gross Unrealized Gains</u>	<u>Gross Unrealized (Losses)</u>	<u>Estimated Fair Value</u>
As of September 30, 2017:				
Short-term investments:				
Available-for-sale investments:				
Time deposits and certificates of deposit	\$ 21,501	\$ 2	\$ —	\$ 21,503
Bankers' acceptance drafts	3,452	—	—	3,452
Asset-backed securities	39,709	17	(24)	39,702
Commercial paper	21,278	—	(63)	21,215
Corporate obligations	80,020	87	(8)	80,099
Municipal bonds	45	—	—	45
Promissory note	1,075	—	—	1,075
U.S. treasury obligations	25,756	21	—	25,777
U.S. agency obligations	35,756	10	(3)	35,763
	<u>\$228,592</u>	<u>\$ 137</u>	<u>\$ (98)</u>	<u>\$228,631</u>

	<u>Cost</u>	<u>Gross Unrealized Gains</u>	<u>Gross Unrealized (Losses)</u>	<u>Estimated Fair Value</u>
As of September 30, 2017:				
Long-term investments:				
Available-for-sale investments:				
Group insurance contracts	<u>\$ 6,193</u>	<u>\$ —</u>	<u>\$ —</u>	<u>\$ 6,193</u>

	<u>Cost</u>	<u>Gross Unrealized Gains</u>	<u>Gross Unrealized (Losses)</u>	<u>Estimated Fair Value</u>
As of December 31, 2016:				
Short-term investments:				
Available-for-sale investments:				
Time deposits and certificates of deposit	\$ 23,818	\$ —	\$ —	\$ 23,818
Bankers acceptance drafts	1,439	—	—	1,439
Asset-backed securities	36,847	6	(44)	36,809
Commercial paper	24,423	—	(42)	24,381
Corporate obligations	46,700	21	(14)	46,707
Municipal bonds	591	—	—	591
Promissory note	675	—	—	675
U.S. treasury obligations	25,414	—	—	25,414
U.S. agency obligations	29,631	8	(10)	29,629
	<u>\$189,538</u>	<u>\$ 35</u>	<u>\$ (110)</u>	<u>\$189,463</u>

	<u>Cost</u>	<u>Gross Unrealized Gains</u>	<u>Gross Unrealized (Losses)</u>	<u>Estimated Fair Value</u>
As of December 31, 2016:				
Long-term investments:				
Available-for-sale investments:				
Group insurance contracts	<u>\$ 6,276</u>	<u>\$ —</u>	<u>\$ (718)</u>	<u>\$ 5,558</u>

The tables above, which show the gross unrealized gains and (losses) aggregated by investment category for available-for-sale investments as of September 30, 2017 and December 31, 2016, 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.

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

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 September 30, 2017 and December 31, 2017, 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 and nine months ended September 30, 2017 and 2016.

4) 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.
- 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.

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

Assets and liabilities of the Company are measured at fair value on a recurring basis as of September 30, 2017 and are summarized as follows:

Description	September 30, 2017	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)
Assets:				
Cash equivalents:				
Money market funds	\$ 3,872	\$ 3,872	\$ —	\$ —
Time deposits and certificates of deposit	—	—	—	—
Bankers' acceptance drafts	338	—	338	—
Commercial paper	21,792	—	21,792	—
Corporate obligations	2,269	—	2,269	—
U.S. agency obligations	6,595	—	6,595	—
Restricted cash – money market funds	117	117	—	—
Available-for-sale investments:				
Time deposits and certificates of deposit	21,503	—	21,503	—
Bankers' acceptance drafts	3,452	—	3,452	—
Asset-backed securities	39,702	—	39,702	—
Commercial paper	21,215	—	21,215	—
Corporate obligations	80,099	—	80,099	—
Municipal bonds	45	—	45	—
Promissory note	1,075	—	1,075	—
U.S. treasury obligations	25,777	—	25,777	—
U.S. agency obligations	35,763	—	35,763	—
Group insurance contracts	6,193	—	6,193	—
Derivatives – currency forward contracts	425	—	425	—
Funds in investments and other assets:				
Israeli pension assets	14,166	—	14,166	—
Derivatives – interest rate hedge – non-current	4,362	—	4,362	—
Restricted cash – non-current	820	820	—	—
Total assets	<u>\$ 289,580</u>	<u>\$ 4,809</u>	<u>\$ 284,771</u>	<u>\$ —</u>
Liabilities:				
Derivatives – currency forward contracts	<u>\$ 2,390</u>	<u>\$ —</u>	<u>\$ 2,390</u>	<u>\$ —</u>
Reported as follows:				
Assets:				
Cash and cash equivalents ⁽¹⁾	\$ 34,866	\$ 3,872	\$ 30,994	\$ —
Restricted cash	117	117	—	—
Short-term investments	228,631	—	228,631	—
Other current assets	425	—	425	—
Total current assets	<u>\$ 264,039</u>	<u>\$ 3,989</u>	<u>\$ 260,050</u>	<u>\$ —</u>
Long-term investments ⁽²⁾	\$ 6,193	\$ —	\$ 6,193	\$ —
Other long-term assets	18,528	—	18,528	—
Restricted cash – non-current	820	820	—	—
Total long-term assets	<u>\$ 25,541</u>	<u>\$ 820</u>	<u>\$ 24,721</u>	<u>\$ —</u>
Liabilities:				
Other current liabilities	<u>\$ 2,390</u>	<u>\$ —</u>	<u>\$ 2,390</u>	<u>\$ —</u>

(1) The cash and cash equivalent amounts presented in the table above do not include cash of \$266,899 and non-negotiable time deposits of \$4,212 as of September 30, 2017.

(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.

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

Assets and liabilities of the Company are measured at fair value on a recurring basis as of December 31, 2016 and are summarized as follows:

Description	December 31, 2016	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)
Assets:				
Cash equivalents:				
Money market funds	\$ 10,155	\$ 10,155	\$ —	\$ —
Time deposits and certificates of deposit	4,900	—	4,900	—
Bankers acceptance drafts	448	—	448	—
Commercial paper	11,828	—	11,828	—
Corporate obligations	2,025	—	2,025	—
U.S. agency obligations	3,899	—	3,899	—
Restricted cash – money market funds	5,287	5,287	—	—
Available-for-sale investments:				
Time deposits and certificates of deposit ***	23,818	—	23,818	—
Bankers acceptance drafts	1,439	—	1,439	—
Asset-backed securities	36,809	—	36,809	—
Commercial paper	24,381	—	24,381	—
Corporate obligations	46,707	—	46,707	—
Municipal bonds	591	—	591	—
Promissory note	675	—	675	—
U.S. treasury obligations	25,414	—	25,414	—
U.S. agency obligations	29,629	—	29,629	—
Group insurance contracts	5,558	—	5,558	—
Derivatives – currency forward contracts	2,985	—	2,985	—
Funds in investments and other assets:				
Israeli pension assets	13,910	—	13,910	—
Derivatives – interest rate hedge – non-current	4,900	—	4,900	—
Restricted cash – non-current	573	573	—	—
Total assets	<u>\$ 255,931</u>	<u>\$ 16,015</u>	<u>\$ 239,916</u>	<u>\$ —</u>
Liabilities:				
Derivatives – currency forward contracts	\$ 543	\$ —	\$ 543	\$ —
Total liabilities	<u>\$ 543</u>	<u>\$ —</u>	<u>\$ 543</u>	<u>\$ —</u>
Assets:				
Cash and cash equivalents(1)	\$ 33,255	\$ 10,155	\$ 23,100	\$ —
Restricted cash	5,287	5,287	—	—
Short-term investments	189,463	—	189,463	—
Other current assets	2,985	—	2,985	—
Total current assets	<u>\$ 230,990</u>	<u>\$ 15,442</u>	<u>\$ 215,548</u>	<u>\$ —</u>
Long-term investments(2)	\$ 5,558	\$ —	\$ 5,558	\$ —
Other long-term assets	18,810	—	18,810	—
Restricted cash – non-current	573	573	—	—
Total long-term assets	<u>\$ 24,941</u>	<u>\$ 573</u>	<u>\$ 24,368</u>	<u>\$ —</u>
Liabilities:				
Other current liabilities	\$ 543	\$ —	\$ 543	\$ —

(1) The cash and cash equivalent amounts presented in the table above do not include cash of \$192,432 and non-negotiable time deposits of \$2,936 as of December 31, 2016.

(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.

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

Money Market Funds

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

Restricted Cash

The Company has letters of credit, which require it to maintain specified cash deposit balances, consisting mainly of money market funds, as collateral. Such amounts have been classified as restricted cash and are classified as Level 1.

Available-For-Sale Investments

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

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 and 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 fluctuations through the use of derivative financial instruments. The principal market in which the Company executes its foreign currency contracts 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 are valued using broker quotations or market transactions and are classified within Level 2 of the fair value hierarchy.

5) 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 contracts, to manage certain foreign currency 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 9. This hedge fixes the interest rate paid on the hedged debt at 1.198% per annum plus the applicable credit spread, which was 2.25% as of September 30, 2017, 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. The notional amount of this transaction was \$305,000 and had a fair value of \$4,362 at September 30, 2017.

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

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 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 September 30, 2017 and December 31, 2016, the Company had outstanding forward foreign exchange contracts with gross notional values of \$86,217 and \$120,208, respectively. The following tables provide a summary of the primary net hedging positions and corresponding fair values held as of September 30, 2017 and December 31, 2016:

Currency Hedged (Buy/Sell)	September 30, 2017	
	Gross Notional Value	Fair Value(1) Asset/(Liability)
U.S. Dollar/Japanese Yen	\$ 29,929	\$ (1)
U.S. Dollar/South Korean Won	24,663	(324)
U.S. Dollar/Euro	14,979	(1,052)
U.S. Dollar/U.K. Pound Sterling	5,272	(315)
U.S. Dollar/Taiwan Dollar	11,374	(273)
Total	<u>\$ 86,217</u>	<u>\$ (1,965)</u>

Currency Hedged (Buy/Sell)	December 31, 2016	
	Gross Notional Value	Fair Value(1) Asset/(Liability)
U.S. Dollar/Japanese Yen	\$ 30,522	\$ 763
U.S. Dollar/South Korean Won	50,049	1,342
U.S. Dollar/Euro	18,040	156
U.S. Dollar/U.K. Pound Sterling	6,067	117
U.S. Dollar/Taiwan Dollar	15,530	64
Total	<u>\$ 120,208</u>	<u>\$ 2,442</u>

(1) Represents the fair value of the net (liability) asset 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	September 30, 2017	December 31, 2016
Derivative assets:		
Foreign exchange contracts(1)	\$ 425	\$ 2,985
Interest rate hedge(2)	4,362	4,900
Derivative liabilities:		
Foreign exchange contracts(1)	(2,390)	(543)
Total net derivative assets designated as hedging instruments	<u>\$ 2,397</u>	<u>\$ 7,342</u>

(1) The derivative asset of \$425 and \$2,985 as of September 30, 2017 and December 31, 2016, respectively, related to foreign exchange contracts are classified in other current assets in the consolidated balance sheet. The derivative liability of \$(2,390) and \$(543) as of September 30, 2017 and December 31, 2016 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 interest rate hedge assets of \$4,362 and \$4,900 as of September 30, 2017 and December 31, 2016, respectively, are classified in other assets in the consolidated balance sheet.

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The net amount of existing gains as of September 30, 2017 that the Company expects to reclassify from OCI into earnings within the next twelve months is immaterial.

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

<u>Derivatives Designated as Cash Flow Hedging Instruments</u>	<u>Three Months Ended</u> <u>September 30,</u>		<u>Nine Months Ended</u> <u>September 30,</u>	
	<u>2017</u>	<u>2016</u>	<u>2017</u>	<u>2016</u>
<u>Forward exchange contracts:</u>				
Net (loss) gain recognized in OCI(1)	\$ (220)	\$ 326	\$(4,462)	\$(3,107)
Net (loss) gain reclassified from accumulated OCI into income(2)	\$ (1,360)	\$ (764)	\$(1,842)	\$ 487

- (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 and nine months ended September 30, 2017 and 2016. The tax effect of the gains or losses reclassified from accumulated OCI into income is immaterial.

The following table provides a summary of the losses on derivatives not designated as hedging instruments:

<u>Derivatives Not Designated as Hedging Instruments</u>	<u>Three Months Ended</u> <u>September 30,</u>		<u>Nine Months Ended</u> <u>September 30,</u>	
	<u>2017</u>	<u>2016</u>	<u>2017</u>	<u>2016</u>
<u>Forward exchange contracts:</u>				
Net loss recognized in income(1)	\$ (877)	\$ (339)	\$(2,559)	\$(1,283)

- (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 selling, general and administrative expenses.

6) Inventories, net

Inventories consist of the following:

	<u>September 30,</u> <u>2017</u>	<u>December 31,</u> <u>2016</u>
Raw materials	\$ 177,677	\$ 150,150
Work-in-process	54,909	39,105
Finished goods	86,874	86,614
	<u>\$ 319,460</u>	<u>\$ 275,869</u>

7) Acquisitions and Dispositions

Newport Corporation

On April 29, 2016, the Company completed its acquisition of Newport Corporation (“Newport”) pursuant to an Agreement and Plan of Merger, dated as of February 22, 2016 (the “Merger Agreement”), by and among the Company, PSI Equipment, Inc., a wholly owned subsidiary of the Company (“Merger Sub”), and Newport (the “Newport Merger”). At the effective time of the Newport Merger and pursuant to the terms and conditions of the Merger Agreement, each share of Newport’s common stock that was issued and outstanding immediately prior to the effective time of the Newport Merger was converted into the right to receive \$23.00 in cash, without interest and subject to deduction for any required withholding tax.

Newport’s innovative solutions leverage its expertise in advanced technologies, including lasers, photonics and precision motion equipment, and optical components and sub-systems, to enhance the capabilities and productivity of its customers’ manufacturing, engineering and research applications. Newport is a global supplier of advanced-technology products and systems to customers in the scientific research and defense/security, microelectronics, life and health sciences and industrial manufacturing markets.

MKS INSTRUMENTS, INC.
NOTES TO UNAUDITED CONDENSED CONSOLIDATED FINANCIAL STATEMENTS – (continued)
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The purchase price of Newport consisted of the following:

Cash paid for outstanding shares(1)	\$ 905,254
Settlement of share-based compensation awards(2)	8,824
Cash paid for Newport debt(3)	93,200
Total purchase price	<u>1,007,278</u>
Less: Cash and cash equivalents acquired	<u>(61,463)</u>
Total purchase price, net of cash and cash equivalents acquired	<u>\$ 945,815</u>

- (1) Represents cash paid of \$23.00 per share for approximately 39,359,000 shares of Newport common stock, without interest and subject to a deduction for any required withholding tax.
- (2) Represents the vested but not issued portion of Newport share-based compensation awards as of the acquisition date of April 29, 2016.
- (3) Represents the cash paid for the outstanding balance of Newport's senior secured revolving credit agreement.

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, as described in Note 9.

Under the acquisition method of accounting, the total acquisition consideration is allocated to the acquired tangible and intangible assets and assumed liabilities of Newport 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 concluded that all such goodwill and intangible assets will not be deductible for tax purposes.

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

Current assets (including cash)	\$ 186,137
Inventory	142,714
Intangible assets	404,506
Goodwill	396,027
Property, plant and equipment	119,932
Long-term assets	<u>22,725</u>
Total assets acquired	1,272,041
Current liabilities	95,156
Intangible liability	4,302
Other long-term liabilities	<u>165,305</u>
Total liabilities assumed	264,763
Fair value of assets acquired and liabilities assumed	<u>1,007,278</u>
Less: Cash and cash equivalents acquired	<u>(61,463)</u>
Total purchase price, net of cash and cash equivalents acquired	<u>\$ 945,815</u>

The fair value write-up of acquired finished goods inventory was \$15,090, the amount of which will be amortized over the expected period during which the acquired inventory is sold. Accordingly, the Company recorded incremental costs of sales charges associated with the fair value write-up of inventory acquired in the merger with Newport of \$4,971 and \$15,090 for the three and nine months ended September 30, 2016, respectively.

The fair value write-up of acquired property, plant and equipment of \$36,242 will be amortized over the useful life of the 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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NOTES TO UNAUDITED CONDENSED CONSOLIDATED FINANCIAL STATEMENTS – (continued)
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The following table reflects the allocation of the acquired intangible assets and liabilities and related estimate of useful lives:

Order backlog	\$ 12,100	1 year
Customer relationships	247,793	6-18 years
Trademarks and trade names	55,900	Indefinite
Developed technology	75,386	4-8 years
In-process research and development	6,899	Undefined ⁽¹⁾
Leasehold interest (favorable)	6,428	4-5 years
Total intangible assets	\$404,506	
Leasehold interest (unfavorable)	<u>\$ 4,302</u>	

(1) The useful lives of in-process research and development will be defined in the future upon further evaluation of the status of these programs.

The 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.

The Company believes the amount of goodwill relative to identifiable intangible assets relates to several factors including: (1) potential buyer-specific synergies related to market opportunities for a combined product offering; and (2) potential to leverage the Company's sales force to attract new customers and revenue and cross sell to existing customers.

The results of this acquisition were included in the Company's consolidated operations beginning on April 29, 2016. Newport constitutes the Company's Light & Motion reportable segment (Note 16).

Certain executives from Newport had severance provisions in their respective Newport 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, however, the benefit itself will not be distributed until the final provision is met by each eligible executive. The Company recorded costs of \$6,631 and \$3,334 as compensation expense and stock-based compensation expense, respectively, for the three and nine months ended September 30, 2016, respectively, in connection with these severance provisions. The shares underlying the restricted stock units and stock appreciation rights that are eligible for accelerated vesting if the executive exercises his rights are not issued as of each reporting period-end and are excluded from the computation of basic earnings per share and included in the computation of diluted earnings per share for each reporting period.

Pro-Forma Results

The following unaudited pro-forma financial information presents the combined results of operations of the Company as if the acquisition of Newport had occurred on January 1, 2015. The unaudited pro-forma financial information is not necessarily indicative of what the Company's 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 September 30, 2016	Nine Months Ended September 30, 2016
Total net revenues	\$ 380,660	\$ 1,070,471
Net income	35,915	65,313
Net income per share:		
Basic	\$ 0.67	\$ 1.22
Diluted	\$ 0.66	\$ 1.21

MKS INSTRUMENTS, INC.
NOTES TO UNAUDITED CONDENSED CONSOLIDATED FINANCIAL STATEMENTS – (continued)
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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 from the purchase price allocation.
- (2) Revenue adjustments as a result of the reduction in deferred revenue related to its estimated fair value.
- (3) Incremental interest expense related to the Company's term loan credit agreement.
- (4) Excluding acquisition costs and inventory step-up amortization from the three and nine month periods ended September 30, 2016.
- (5) The tax impact of the above adjustments.

Cost Method Investment in a Private Company

In April 2016, the Company invested \$9,300 for a minority interest in a private company, which operates in the field of semiconductor process equipment instrumentation. The Company accounted for this investment using the cost method of accounting. During the fourth quarter of 2016, the Company recognized an impairment loss on this investment of \$5,000 based upon financial information of this private company. In July 2017, the Company invested an additional \$100 in this private company.

Sale of Data Analytics Solutions

In April 2017, the Company completed the sale of its Data Analytics Solutions business for total proceeds of \$72,509, net of cash sold and recorded a gain of \$74,856. This business, which had revenues in 2016 of \$12,700 and was included in the Vacuum & Analysis segment, was no longer a part of the Company's long-term strategic objectives.

The business did not qualify as a discontinued operation as this sale did not represent a strategic shift in the Company's business, nor did the sale have a major effect on the Company's operations. Therefore, the results of operations for all periods are included in the Company's income from operations. The assets and liabilities of this business have not been reclassified or segregated in the consolidated balance sheet or consolidated statements of cash flows as the amounts were immaterial.

8) 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 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.

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The changes in the carrying amount of goodwill and accumulated impairment (loss) during the nine months ended September 30, 2017 and year ended December 31, 2016 were as follows:

	Nine Months Ended September 30, 2017			Twelve Months Ended December 31, 2016		
	Gross Carrying Amount	Accumulated Impairment (Loss)	Net	Gross Carrying Amount	Accumulated Impairment (Loss)	Net
Beginning balance at January 1	\$ 727,999	\$ (139,414)	\$ 588,585	\$ 339,117	\$ (139,414)	\$ 199,703
Acquired goodwill ⁽¹⁾	—	—	—	396,027	—	396,027
Sale of business ⁽²⁾	(3,115)	—	(3,115)	—	—	—
Impairment loss ⁽³⁾	—	(4,862)	(4,862)	—	—	—
Foreign currency translation	8,491	—	8,491	(7,145)	—	(7,145)
Ending balance at September 30, 2017 and December 31, 2016	<u>\$ 733,375</u>	<u>\$ (144,276)</u>	<u>\$ 589,099</u>	<u>\$ 727,999</u>	<u>\$ (139,414)</u>	<u>\$ 588,585</u>

- (1) During 2016, the Company recorded \$396,027 of goodwill related to the Newport Merger.
 (2) In 2017, the Company sold its Data Analytics business and, as a result, charged the related goodwill of \$3,115 to the gain on sale of business.
 (3) In 2017, the Company recorded an impairment loss of \$4,862 related to the write-off of goodwill during the nine months ended September 30, 2017, related to the discontinuation of a product line and consolidation of two manufacturing plants.

Intangible Assets

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

As of September 30, 2017:	Gross	Impairment Charges ⁽¹⁾	Accumulated Amortization	Foreign Currency Translation	Net
Completed technology	\$ 176,586	\$ (105)	\$ (114,095)	\$ 49	\$ 62,435
Customer relationships	285,044	(1,406)	(43,397)	832	241,073
Patents, trademarks, trade names and other	111,723	—	(38,855)	(42)	72,826
	<u>\$ 573,353</u>	<u>\$ (1,511)</u>	<u>\$ (196,347)</u>	<u>\$ 839</u>	<u>\$ 376,334</u>

- (1) In 2017, the Company recorded impairment charges of \$1,511 related to the write-off of intangible assets during the nine months ended September 30, 2017, related to the discontinuation of a product line and consolidation of two manufacturing plants.

As of December 31, 2016:	Gross	Impairment Charges	Accumulated Amortization	Foreign Currency Translation	Net
Completed technology ⁽¹⁾	\$ 176,586	\$ —	\$ (97,707)	\$ (1,068)	\$ 77,811
Customer relationships ⁽¹⁾	285,044	—	(29,709)	(3,404)	251,931
Patents, trademarks, trade names and other ⁽¹⁾	111,723	—	(33,397)	(64)	78,262
	<u>\$ 573,353</u>	<u>\$ —</u>	<u>\$ (160,813)</u>	<u>\$ (4,536)</u>	<u>\$ 408,004</u>

- (1) During 2016, the Company recorded \$404,506 of separately identified intangible assets related to the Newport Merger, of which \$75,386 was completed technology, \$247,793 was customer relationships and \$81,327 was patents, trademarks, trade names, in-process research and development and other. During 2016, the Company also recorded \$4,302 of unfavorable lease commitments, which is recorded in other liabilities in the balance sheet.

MKS INSTRUMENTS, INC.
NOTES TO UNAUDITED CONDENSED CONSOLIDATED FINANCIAL STATEMENTS – (continued)
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Aggregate amortization expense related to acquired intangibles for the nine months ended September 30, 2017 and 2016 was \$34,946 and \$22,990, respectively. The amortization expense for the nine months ended September 30, 2017, was net of \$588 amortization income from unfavorable lease commitments. Aggregate net amortization expense related to acquired intangible assets and unfavorable lease commitments for future years is as follows:

Year	Amount
2017 (remaining)	\$ 10,767
2018	43,273
2019	40,160
2020	28,115
2021	20,302
2022	17,621
Thereafter	157,010

9) Debt

Term Loan Credit Agreement

In connection with the completion of 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 of \$780,000, subject to increase at the Company’s option in accordance with the Credit Agreement (the “Term Loan Facility”). 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 (that was initially 3.00% and was decreased as described below); 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 (that was initially 4.00% and was decreased as described below). The Company has elected the interest rate as described in clause (b). The Term Loan Facility was issued with original issue discount of 1.00% of the principal amount thereof.

On June 9, 2016, the Company entered into Amendment No. 1 (the “Re-pricing Amendment 1”) to the Credit Agreement by and among the Company, the Lenders and Barclays Bank PLC, as administrative agent and collateral agent for the Lenders. The Re-pricing Amendment 1 decreased the applicable margin for borrowings under the Company’s Term Loan Facility to 2.50% for base rate borrowings and 3.50% for LIBOR borrowings and extended the period during which a pre-payment premium may be required for a “Re-pricing Transaction” (as defined in the Credit Agreement) until six months after the effective date of the Re-pricing Amendment 1. In connection with the execution of the Re-pricing Amendment 1, the Company paid a pre-payment premium of 1.00%, or \$7,300, as well as certain fees and expenses of the administrative agent and the Lenders, in accordance with the terms of the Credit Agreement. Immediately prior to the effectiveness of the Re-pricing Amendment 1, the Company prepaid \$50,000 of principal under the Credit Agreement. In September 2016, the Company prepaid an additional \$60,000 under the Credit Agreement.

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 Credit Agreement. The rate is fixed at 1.198% per annum plus the applicable credit spread, which was 2.25% at September 30, 2017. At September 30, 2017, the notional amount of the interest rate swap agreement was \$305,000.

On December 14, 2016, the Company entered into Amendment No. 2 (the “Re-pricing Amendment 2”) to the Credit Agreement by and among the Company, the Lenders and Barclays Bank PLC, as administrative agent and collateral agent for the Lenders. The Re-pricing Amendment 2 decreased the applicable margin for the Company’s term loan under the Credit Agreement to 2.75% for LIBOR borrowings and 1.75% for base rate borrowings and reset the period during which a pre-payment premium may be required for a Re-pricing Transaction until six months after the effective date of the Re-pricing Amendment. In November 2016, prior to the effectiveness of the Re-pricing Amendment 2, the Company prepaid an additional \$40,000 of principal under the Credit Agreement. In March 2017, the Company prepaid \$50,000 of principal under the Credit Agreement.

On July 6, 2017, the Company entered into Amendment No. 3 (the “Re-pricing Amendment 3”) to the Credit Agreement by and among the Company, the Lenders and Barclays Bank PLC, as administrative agent and collateral agent for the Lenders. The Re-pricing Amendment 3 decreased the applicable margin for the Company’s term loan under the Credit Agreement to 2.25%

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when the Total Leverage Ratio (as defined in the Credit Agreement) is at or above 1.25:1 and to 2.00% when the Total Leverage Ratio is below 1.25:1, both with a LIBOR floor of 0.75%. The margin for base rate borrowings will decrease to 1.25% when the Total Leverage Ratio is at or above 1.25:1 and to 1.00% when the Total Leverage Ratio is below 1.25:1. The period during which a prepayment premium may be required for a Re-pricing Transaction was reset to six months after the effective date of the Re-pricing Amendment 3.

In July 2017 and August 2017, the Company prepaid \$50,000 and \$75,000, respectively, of principal under the Credit Agreement. As of September 30, 2017, after total pre-payments of \$325,000 and regularly scheduled principal payments of \$6,536, the total outstanding principal balance was \$448,464. As of September 30, 2017, the Total Leverage Ratio was below 1.25:1.

The Company incurred \$28,747 of deferred finance fees, original issue discount and a re-pricing fee related to the term loans under the Term Loan Facility, which is included in long-term debt in the accompanying consolidated balance sheets and will be 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 pre-payments during 2016 and 2017. As of September 30, 2017, the remaining balance of the deferred finance fees, original issue discount and re-pricing fee related to the Term Loan Facility was \$13,438.

Under the Credit Agreement, the Company is required to prepay outstanding term loans, 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. The Company is also required to make scheduled quarterly payments each equal to 0.25% of the principal amount of the term loans outstanding on December 14, 2016 (the date of the Re-pricing Amendment 2) less the amount of certain voluntary and mandatory repayments after such date, with the balance due on the seventh anniversary of the closing date. As a result of making total pre-payments of \$325,000, as of September 30, 2017 the Company is no longer required to make any scheduled principal payments until maturity date of the loan.

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 September 30, 2017, 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, the Company also 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 (the "ABL Facility"), that provides senior secured financing of up to \$50,000, subject to a borrowing base limitation. The borrowing base for the ABL Facility at any time equals the sum of: (a) 85% of certain eligible accounts; plus (b) subject to certain notice and field examination and appraisal 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; provided that until the administrative agent's receipt of a field examination of accounts receivable the borrowing base shall be equal to 70% of the book value of certain eligible accounts. The ABL Facility includes borrowing capacity in the form of letters of credit up to \$15,000. The Company has not drawn against the ABL Facility as of September 30, 2017.

Borrowings under the ABL 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, and (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%, plus, in each case, an initial applicable margin of 0.75%; 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, plus an initial applicable margin of 1.75%. 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.

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 NOTES TO UNAUDITED CONDENSED CONSOLIDATED FINANCIAL STATEMENTS – (continued)
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The Company incurred \$1,201 of costs in connection with the ABL Facility, which were capitalized and included in other assets in the accompanying consolidated balance sheets and will be amortized to interest expense using the straight-line method over the contractual term of five years of the ABL Facility.

In addition to paying interest on outstanding principal under the ABL Facility, the Company is required to pay a commitment fee in respect of the unutilized commitments thereunder. The initial commitment fee is 0.375% per annum. The total commitment fee recognized in interest expense for the nine months ended September 30, 2017, was \$242. Commencing with the completion of the first fiscal quarter ending after the closing of the ABL Facility, the commitment fee is subject to downward adjustment based on the amount of average unutilized commitments for the three month period immediately preceding such adjustment date. The Company must also pay customary letter of credit fees and agency fees.

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 September 30, 2017 of up to an equivalent of \$20,444 U.S. dollars. 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 September 30, 2017 and December 31, 2016.

The Company assumed various revolving lines of credit and a financing facility with the completion of the Newport Merger. These revolving lines of credit and financing facility have no expiration date and provided for aggregate borrowings as of September 30, 2017 of up to an equivalent of \$11,111 U.S. dollars. These lines of credit have a base interest rate of 1.25% plus a Japanese Yen overnight LIBOR rate.

One of the Company's Austrian subsidiaries has four 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 0.75% - 2.00%.

	September 30, 2017	December 31, 2016
Short-term debt:		
Japanese lines of credit	\$ 3,912	\$ 4,245
Japanese receivables financing facility	—	458
Other debt	108	8
Current portion of Term Loan Facility	—	6,282
	<u>\$ 4,020</u>	<u>\$ 10,993</u>
	September 30, 2017	December 31, 2016
Long-term debt:		
Austrian loans due through March 2020	\$ 705	\$ 548
Term Loan Facility, net ⁽¹⁾	435,026	600,681
	<u>\$ 435,731</u>	<u>\$ 601,229</u>

(1) Net of deferred financing fees, original issuance discount and re-pricing fee of \$13,438 and \$19,642 as of September 30, 2017 and December 31, 2016, respectively.

The Company recognized interest expense of \$23,001 and \$20,526 for the nine months ended September 30, 2017 and 2016, respectively. The increase for the nine months ended September 30, 2017, compared to 2016, was due to the fact that the nine month period ended September 30, 2016 only included five months of interest expense as a result of the Newport Merger.

MKS INSTRUMENTS, INC.
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Contractual maturities of the Company’s debt obligations as of September 30, 2017 are as follows:

Year	Amount
2017 (remaining)	\$ 4,020
2018	13
2019	617
2020	75
2021	—
2022	—
Thereafter	448,464

10) 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:

	Nine Months Ended September 30,	
	2017	2016
Beginning of period	\$ 8,261	\$ 5,205
Assumed product warranty liability from Newport Merger	—	3,040
Provision for product warranties	11,941	5,067
Direct and other charges to warranty liability	(10,080)	(5,170)
End of period ⁽¹⁾	<u>\$ 10,122</u>	<u>\$ 8,142</u>

(1) Short-term product warranty of \$9,725 and long-term product warranty of \$397 as of September 30, 2017, are included within other current liabilities and other liabilities, respectively, within the accompanying condensed consolidated balance sheet.

11) Income Taxes

The Company’s effective tax rate for the three and nine months ended September 30, 2017 was 25.0% and 22.3%, respectively. The effective tax rate for the three and nine months ended September 30, 2017 and related income tax expense, was 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, the tax benefit of windfall stock compensation deductions and the deduction for domestic production activities. These amounts were partially offset by taxes accrued, net of foreign tax credits, on actual and planned distributions from the Company’s international subsidiaries. The Company’s effective tax rate for the three and nine months ended September 30, 2016 was 23.0% and 24.4%, respectively. The effective tax rate for the three and nine months ended September 30, 2016 was lower than the U.S. statutory tax rate primarily due to the geographic mix of income and profits earned by the Company’s international subsidiaries being taxed at rates lower than the U.S. statutory tax rate, the federal research credit and the deduction for domestic production activities. These amounts were partially offset by taxes paid in connection with the Company’s reorganization of certain international subsidiaries and state income taxes.

As of September 30, 2017, the total amount of gross unrecognized tax benefits, which excludes interest and penalties, was approximately \$26,571. At December 31, 2016 the total amount of gross unrecognized tax benefits, which excludes interest and penalties, was approximately \$25,465. As of September 30, 2017, there were \$18,091 of net unrecognized tax benefits, excluding interest and penalties 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 September 30, 2017 and December 31, 2016, the Company had accrued interest on unrecognized tax benefits of approximately \$367 and \$491, respectively.

Over the next 12 months it is reasonably possible that the Company may recognize approximately \$1,733 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 Internal Revenue Service commenced an examination of the Company’s U.S. federal tax filing for the 2015 tax year during the quarter ended September 30, 2017. The U.S. statute of limitations remains open for tax years 2014 through present. The statute of limitations for the Company’s tax filings in other jurisdictions varies between fiscal years 2012 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.

MKS INSTRUMENTS, INC.
 NOTES TO UNAUDITED CONDENSED CONSOLIDATED FINANCIAL STATEMENTS – (continued)
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12) Pension Plans

As a result of the acquisition of Newport, the Company has assumed all assets and liabilities of Newport’s defined benefit pension plans, which cover substantially all of its full-time employees in France, Germany, Israel and Japan. In addition, there are certain pension liabilities relating to former employees in the United Kingdom. The German plan is unfunded, as permitted under the plan and applicable laws. The net periodic benefit costs were approximately \$254 and \$761, for the three and nine month periods ended September 30, 2017, respectively, and approximately \$673 and \$1,126 for the three and nine month periods ended September 30, 2016, respectively. The Company made contributions of approximately \$113 and \$453 to these plans, during the three and nine month periods ended September 30, 2017, respectively, as required by local pension accounting laws.

13) Net Income Per Share

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

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2017	2016	2017	2016
Numerator:				
Net income	\$ 75,994	\$ 32,549	\$ 261,494	\$ 59,322
Denominator:				
Shares used in net income per common share – basic	54,282,000	53,574,000	54,076,000	53,423,000
Effect of dilutive securities:				
Restricted stock units, stock appreciation rights and shares issued under employee stock purchase plan	819,000	741,000	944,000	472,000
Shares used in net income per common share – diluted	55,101,000	54,315,000	55,020,000	53,895,000
Net income per common share:				
Basic	\$ 1.40	\$ 0.61	\$ 4.84	\$ 1.11
Diluted	\$ 1.38	\$ 0.60	\$ 4.75	\$ 1.10

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 and nine months ended September 30, 2017, there were approximately 200 and 300 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. For the three and nine months ended September 30, 2016, there were 0 and approximately 500 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.

14) 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 1,770,000 shares of common stock for approximately \$52,000 pursuant to the program since its adoption.

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 NOTES TO UNAUDITED CONDENSED CONSOLIDATED FINANCIAL STATEMENTS – (continued)
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There were no shares repurchased during the nine months ended September 30, 2017. During the nine months ended September 30, 2016, the Company repurchased approximately 45,000 shares of its common stock for \$1,545, or an average price of \$34.50 per share.

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. The Company’s Board of Directors declared a cash dividend of \$0.175 per share in the first, second and third quarters of 2017, which totaled \$28,403. The Company’s Board of Directors declared a cash dividend of \$0.17 per share in the first, second and third quarters of 2016, which totaled \$27,249.

On October 30, 2017, the Company’s Board of Directors declared a quarterly cash dividend of \$0.18 per share to be paid on December 8, 2017 to shareholders of record as of November 27, 2017. 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 Company’s senior secured Term Loan Facility and its senior secured asset-based revolving credit facility, the Company may be restricted from paying dividends under certain circumstances.

15) Stock-Based Compensation

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

- all restricted stock units (“RSUs”) granted under any Newport equity plan that were outstanding immediately prior to the effective time of the Newport Merger, and as to which shares of Newport common stock were not fully distributed in connection with the closing of the Newport Merger, and
- all stock appreciation rights (“SARs”) granted under any Newport equity plan, whether vested or unvested, that were outstanding immediately prior to the effective time of the Newport Merger.

As of the effective time of the Newport Merger, based on a formula provided in the Merger Agreement, (a) the Newport RSUs were converted automatically into RSUs with respect to 360,674 shares of the Company’s common stock (the “Assumed RSUs”), and (b) the Newport stock appreciation rights were converted automatically into stock appreciation rights with respect to 899,851 shares of the Company’s common stock (the “Assumed SARs”).

Included in the total number of Assumed RSUs were 36,599 RSUs for outside directors that were part of the Newport Deferred Compensation Plan (the “DC Plan”), from which 19,137 underlying shares were released in May 2016, and 5,515 underlying shares were released in May 2017. Combined with an additional 286 shares that were added to the DC Plan due to reinvested dividends as of September 30, 2017, 12,233 RSUs remain outstanding under the DC Plan. These Assumed RSUs 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 Stock Incentive Plan (the “Plan”).

The 1,260,525 shares of the Company’s common stock that are issuable pursuant to the Assumed RSUs and the Assumed SARs under the Plan were registered under the Securities Act of 1933, as amended (the “Securities Act”), on a 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 Plan and previously registered under the Securities Act on a registration statement on Form S-8.

During the nine months ended September 30, 2017, the Company granted 388,137 RSUs with a weighted average grant date fair value of \$67.58. There were no SARs granted during the nine months ended September 30, 2017.

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

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2017	2016	2017	2016
Cost of revenues	\$ 1,016	\$ 666	\$ 3,133	\$ 1,996
Research and development expense	712	551	2,284	1,614
Selling, general and administrative expense	3,117	3,941	14,417	16,216
Total pre-tax stock-based compensation expense	<u>\$ 4,845</u>	<u>\$ 5,158</u>	<u>\$ 19,834</u>	<u>\$ 19,826</u>

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

At September 30, 2017, the total compensation expense related to unvested stock-based awards granted to employees, officers and directors under the Plan that had not been recognized was \$25,051, net of estimated forfeitures. The future compensation expense is recognized on a straight-line basis over the requisite service period, net of estimated forfeitures except for retirement eligible employees in which 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:

	Nine Months Ended September 30, 2017	
	Outstanding RSUs	Weighted Average Grant Date Fair Value
RSUs – beginning of period	1,325,516	\$ 34.38
Accrued dividend shares	99	74.58
Granted	388,137	67.58
Vested	(681,365)	34.53
Forfeited	(71,783)	37.45
RSUs – end of period	<u>960,604</u>	<u>\$ 47.46</u>

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

	Nine Months Ended September 30, 2017	
	Outstanding SARs	Weighted Average Grant Date Fair Value
SARs – beginning of period	599,334	\$ 28.10
Granted	—	—
Exercised	(258,854)	27.52
Forfeited or expired	(16,782)	27.88
SARs Outstanding – end of period	<u>323,698</u>	<u>\$ 28.58</u>

At September 30, 2017 the Company’s outstanding and exercisable SARs, the weighted-average base value, the weighted average remaining contractual life and the aggregate intrinsic value thereof, were as follows:

	Number of Shares	Weighted Average Base Value	Weighted Average Remaining Contractual Life (years)	Aggregate Intrinsic Value
SARs outstanding	323,698	\$ 28.58	3.4	\$ 21,323
SARs exercisable	260,049	\$ 27.95	3.1	\$ 17,292

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

The Company is a global provider of instruments, subsystems and process control solutions that measure, control, power, monitor and analyze critical parameters of advanced manufacturing processes to improve process performance and productivity. 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, RF & DC power, reactive gas generation, vacuum technology, lasers, photonics, sub-micron positioning, vibration isolation, and optics. The Company also provides services related to the maintenance and repair of its products, installation services and training.

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. Based upon the information provided to the CODM, the Company has determined it has two reportable segments.

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NOTES TO UNAUDITED CONDENSED CONSOLIDATED FINANCIAL STATEMENTS – (continued)
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Effective April 29, 2016, in conjunction with the Newport Merger, the Company changed its reportable segments based upon the organizational structure of the Company and how the CODM utilizes information provided to allocate resources and make decisions. The Company's two reportable segments are: Vacuum & Analysis and Light & Motion. The Vacuum & Analysis segment represents the legacy MKS business and the Light & Motion segment represents the legacy Newport business.

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 isolation, and optics.

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 September 30,		Nine Months Ended September 30,	
	2017	2016	2017	2016
Vacuum & Analysis	\$308,176	\$229,167	\$ 895,979	\$620,207
Light & Motion	178,091	151,493	508,198	269,995
	<u>\$486,267</u>	<u>\$380,660</u>	<u>\$1,404,177</u>	<u>\$890,202</u>

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

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2017	2016	2017	2016
Gross profit by reportable segment:				
Vacuum & Analysis	\$141,438	\$104,232	\$410,228	\$273,004
Light & Motion	86,557	64,153	242,897	109,207
Total gross profit by reportable segment	227,995	168,385	653,125	382,211
Operating expenses:				
Research and development	32,548	32,268	99,510	77,709
Selling, general and administrative	71,839	68,016	218,038	161,545
Acquisition and integration costs	2,466	2,641	4,698	25,190
Restructuring	10	—	2,596	24
Asset impairment	—	—	6,719	—
Amortization of intangible assets	10,977	12,452	34,946	22,990
Income from operations	110,155	53,008	286,618	94,753
Gain on sale of business	—	—	74,856	—
Interest and other (expense), net	(8,784)	(10,760)	(24,846)	(16,332)
Income before income taxes	101,371	42,248	336,628	78,421
Provision for income taxes	25,377	9,699	75,134	19,099
Net income	<u>\$ 75,994</u>	<u>\$ 32,549</u>	<u>\$261,494</u>	<u>\$ 59,322</u>

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

The following table sets forth capital expenditures by reportable segment for the three and nine months ended September 30, 2017 and 2016:

	Vacuum & Analysis	Light & Motion	Total
Three Months Ended September 30, 2017:			
Capital expenditures	\$ 4,212	\$3,906	\$ 8,118
Nine Months Ended September 30, 2017:			
Capital expenditures	\$ 10,114	\$7,743	\$17,857
Three Months Ended September 30, 2016:			
Capital expenditures	\$ 2,772	\$1,923	\$ 4,695
Nine Months Ended September 30, 2016:			
Capital expenditures	\$ 7,964	\$3,995	\$11,959

The following table sets forth depreciation and amortization by reportable segment for the three and nine months ended September 30, 2017 and 2016:

	Vacuum & Analysis	Light & Motion	Total
Three Months Ended September 30, 2017:			
Depreciation and amortization	\$ 5,058	\$15,071	\$20,129
Nine Months Ended September 30, 2017:			
Depreciation and amortization	\$ 15,277	\$47,273	\$62,550
Three Months Ended September 30, 2016:			
Depreciation and amortization	\$ 5,142	\$16,907	\$22,049
Nine Months Ended September 30, 2016:			
Depreciation and amortization	\$ 15,628	\$28,129	\$43,757

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	Corporate, Eliminations & Other	Total
September 30, 2017:				
Segment assets:				
Accounts receivable	\$ 196,149	\$ 108,223	\$ (24,070)	\$280,302
Inventory, net	190,252	129,208	—	319,460
Total segment assets	<u>\$386,401</u>	<u>\$237,431</u>	<u>\$ (24,070)</u>	<u>\$599,762</u>
December 31, 2016:				
Segment assets:				
Accounts receivable	\$ 148,516	\$ 121,516	\$ (21,275)	\$248,757
Inventory, net	165,040	110,829	—	275,869
Total segment assets	<u>\$313,556</u>	<u>\$232,345</u>	<u>\$ (21,275)</u>	<u>\$524,626</u>

The following table sets forth a reconciliation of segment assets to consolidated total assets:

	September 30, 2017	December 31, 2016
Total segment assets	\$ 599,762	\$ 524,626
Cash and cash equivalents, restricted cash and investments	545,318	433,231
Other current assets	60,716	50,770
Property, plant and equipment, net	166,928	174,559
Goodwill and intangible assets, net	965,433	996,589
Other assets	32,188	32,467
Consolidated total assets	<u>\$2,370,345</u>	<u>\$2,212,242</u>

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 negotiated transfer prices and have been eliminated from consolidated net revenues.

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

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2017	2016	2017	2016
Net revenues:				
United States	\$237,592	\$198,305	\$ 700,291	\$460,994
Korea	60,908	32,642	165,613	79,240
Japan	38,411	26,970	113,068	68,738
Asia (excluding Korea and Japan)	94,084	75,179	273,957	173,526
Europe	55,272	47,564	151,248	107,704
	<u>\$486,267</u>	<u>\$380,660</u>	<u>\$1,404,177</u>	<u>\$890,202</u>
		September 30,	December 31,	
		2017	2016	
Long-lived assets:(1)				
United States		\$ 116,607	\$ 122,547	
Europe		28,516	28,717	
Asia		48,091	49,406	
		<u>\$ 193,214</u>	<u>\$ 200,670</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 our reportable segments is as follows:

Reportable segment:	September 30,	December 31,
	2017	2016
Vacuum & Analysis	\$ 196,885	\$ 199,453
Light & Motion	392,214	389,132
Total goodwill	<u>\$ 589,099</u>	<u>\$ 588,585</u>

Worldwide Product Information

Because the reportable segment information above does not reflect worldwide sales of the Company's products, the Company groups its products into seven groups of similar products based upon the similarity of product function. The following table sets forth worldwide net revenue for each group of products:

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2017	2016	2017	2016
Analytical and Control Solutions Products	\$ 33,068	\$ 29,989	\$ 97,689	\$ 80,754
Materials Delivery Solutions Products	45,614	36,243	136,366	97,914
Power, Plasma and Reactive Gas Solutions Products	148,194	98,772	413,633	259,731
Pressure and Vacuum Measurement Products	81,300	64,163	248,291	181,808
Lasers Products	56,623	45,597	153,866	83,533
Optics Products	52,548	44,331	149,759	79,594
Photonics Products	68,920	61,565	204,573	106,868
	<u>\$486,267</u>	<u>\$380,660</u>	<u>\$1,404,177</u>	<u>\$890,202</u>

Sales of Analytical and Control Solutions Products, Materials Delivery Solutions Products, Power, Plasma and Reactive Gas Solutions Products, and Pressure and Vacuum Measurement Products are included in the Company's Vacuum & Analysis segment. Sales of Lasers Products, Optics Products, and Photonics Products are included in the Light & Motion segment.

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

Major Customers

The Company had two customers with net revenues greater than 10% of total net revenues in the periods shown below:

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2017	2016	2017	2016
Applied Materials, Inc.	12%	12%	13%	14%
LAM Research Corporation	11%	9%	12%	11%

17) Restructuring

During the nine months ended September 30, 2017 and 2016, the Company recorded restructuring charges of \$2,596 and \$0, respectively. The restructuring charges for the nine months ended September 30, 2017, primarily relate to: (i) the discontinuation of a product line resulting in the consolidation of two manufacturing plants related to our Light & Motion segment, which consolidation is expected to be completed by December 31, 2017, (ii) the restructuring of one of our international facilities and (iii) the consolidation of two sales offices.

The activity related to the Company's restructuring accrual is shown below:

	Nine Months Ended September 30, 2017
Balance at December 31, 2016	\$ 540
Charged to expense	2,596
Payments and adjustment	(608)
Balance at September 30, 2017	<u>\$ 2,528</u>

18) Commitments and Contingencies

On March 9, 2016, a putative class action lawsuit captioned *Dixon Chung v. Newport Corp., et al.*, Case No. A-16-733154-C, was 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 between the Company, Newport, and Merger Sub. The complaint, filed on March 9, 2016, named as defendants the Company, Newport and Merger Sub, and certain then-current and former members of Newport's former board of directors. The complaint alleges that the named 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, and by agreeing to unfair deal protection devices. The complaint also alleges that the Company, Newport, and Merger Sub aided and abetted the named directors' alleged breaches of their fiduciary duties. The complaint seeks injunctive relief, including to enjoin or rescind the Merger Agreement, monetary damages, and an award of attorneys' and other fees and costs, among other relief. On March 25, 2016, the plaintiff in the Chung action filed an amended complaint, which adds certain allegations, including that the preliminary proxy statement filed by Newport on March 15, 2016 (the "Proxy") omitted material information. The amended complaint also names as defendants the Company, Newport, Merger Sub, and then-current members of Newport's board of directors.

Also on March 25, 2016, a second putative class action complaint captioned *Hubert C. Pincon v. Newport Corp., et al.*, Case No. A-16-734039-B, was filed in the District Court, Clark County, Nevada, on behalf of a putative class of Newport's stockholders for claims related to the Merger Agreement. The complaint names as defendants the Company, Newport, and Merger Sub and the then-current members of Newport's former board of directors. It alleges that the named 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. The complaint also alleges that the Company, Newport, and Merger Sub aided and abetted the named directors' alleged breaches of their fiduciary duties. The complaint seeks injunctive relief, including to enjoin or rescind the Merger Agreement, and an award of attorneys' and other fees and costs, among other relief.

On April 14, 2016, the Court granted plaintiffs' motion to consolidate the Pincon and Chung actions and appointed counsel in the Pincon action as lead counsel. Also on April 14, 2016, the Court granted plaintiffs' motion for expedited discovery and scheduled a hearing on plaintiffs' anticipated motion for a preliminary injunction for April 25, 2016. On April 20, 2016, plaintiffs filed a motion to vacate the hearing on their anticipated motion for a preliminary injunction and notified the Court that they did not presently intend to file a motion for a preliminary injunction regarding the Merger Agreement. On April 22, 2016, the Court vacated the hearing on plaintiffs' anticipated motion for a preliminary injunction. In August 2016, plaintiffs completed the expedited discovery that the Court ordered.

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

On October 19, 2016, plaintiffs 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 class of Newport's stockholders for claims related to the Merger Agreement. The complaint named as defendants the Company, Newport, and the then-current members of Newport's former board of directors. It alleged that the named 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. The complaint also alleged that the Company and Newport aided and abetted the named directors' alleged breaches of their fiduciary duties. The complaint sought monetary damages, including pre- and post-judgment interest. On December 9, 2016, both the Company and the Newport defendants filed motions to dismiss. Plaintiffs filed an opposition to the motions to dismiss on January 13, 2017. On February 3, 2017, the Company and the Newport defendants filed their reply briefs in support of their motions to dismiss. A hearing on the motions to dismiss was held on February 15, 2017. On June 22, 2017, the court dismissed the amended complaint against all defendants but granted plaintiffs leave to amend. On July 27, 2017, plaintiffs filed an amended complaint asserting claims against the Newport directors. On July 28, 2017, the Company and Newport each entered into a stipulation and proposed order with plaintiffs whereby plaintiffs agreed not to assert any claims against the Company or Newport in an amended complaint and agreed to voluntarily dismiss the Company and Newport from the action. On August 7, 2017, plaintiffs filed a Second Amended Complaint, which names as defendants the individual directors of Newport Corporation. The Second Amended Complaint makes similar allegations against the directors as in the prior complaint, namely, that they 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, and by omitting material information from the Proxy. The Newport directors filed a motion to dismiss on September 1, 2017, plaintiffs filed an opposition to this motion to dismiss on October 6, 2017, and the Newport directors filed a reply brief in support of their motion to dismiss on October 27, 2017. The Newport directors intend to continue to defend vigorously against those claims. A hearing on the motion to dismiss is currently scheduled for December 7, 2017.

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 the Company's 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, 2016 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, control, power, monitor and analyze critical parameters of advanced manufacturing processes to improve process performance and productivity. 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, RF & DC power, reactive gas generation, vacuum technology, lasers, photonics, sub-micron positioning, vibration isolation, and optics. We also provide services related to the maintenance and repair of our products, installation services and training.

Our primary served markets include semiconductor capital equipment, general industrial, life sciences, and research.

Acquisition of Newport Corporation

On April 29, 2016, we completed our acquisition of Newport Corporation ("Newport") pursuant to an Agreement and Plan of Merger dated as of February 22, 2016 (the "Newport Merger"). At the effective time of the Newport Merger, each share of Newport's common stock issued and outstanding as of immediately prior to the effective time of the Newport Merger was converted into the right to receive \$23.00 in cash, without interest and subject to deduction for any required withholding tax. We paid to the former Newport stockholders aggregate consideration of \$905 million, excluding related transaction fees and expenses, and repaid \$93 million of Newport's U.S. indebtedness outstanding as of immediately prior to the effective time of the Newport Merger. We funded the payment of the aggregate consideration with a combination of our available cash on hand of \$240 million and the proceeds from the senior secured Term Loan Facility of \$780 million described below.

Newport is a global supplier of advanced-technology products and systems to customers in the scientific research and defense/security, microelectronics, life and health sciences and industrial manufacturing markets.

Effective April 29, 2016, in conjunction with our acquisition of Newport, we changed the structure of our reportable segments based upon our organizational structure and how our Chief Operating Decision Maker utilizes information provided to allocate resources and make decisions. Our two reportable segments are the Vacuum & Analysis segment and the Light & Motion segment. The Vacuum & Analysis segment represents the legacy MKS business and the Light & Motion segment represents the legacy Newport business.

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 isolation and optics.

Approximately 60% and 58% of our net revenues for the nine months ended September 30, 2017 and 2016, respectively, were from sales to semiconductor capital equipment manufacturers and semiconductor device manufacturers.

Approximately 40% and 42% of our net revenues for the nine months ended September 30, 2017 and 2016, respectively, were from other advanced manufacturing applications. These include, but are not limited to, electronic thin film, life and health sciences, process and industrial technologies and research and defense.

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Net revenues from semiconductor capital equipment manufacture and semiconductor device manufacture customers increased by \$80.4 million, or 38% for the three months ended September 30, 2017, compared to the same period in the prior year. This increase is comprised of an increase in net semiconductor revenues of \$73.8 million in the Vacuum & Analysis segment (the legacy MKS business) and \$6.6 million in the Light & Motion segment (the legacy Newport business). These increases are primarily due to volume increases from our semiconductor customers. Net revenues from semiconductor capital equipment manufacture and semiconductor device manufacture customers increased by \$326.5 million, or 63% for the nine months ended September 30, 2017, compared to the same period in the prior year. This increase is comprised of an increase in net semiconductor revenues from the Vacuum & Analysis segment of \$256.9 million and an increase from the Light & Motion segment \$69.6 million. These increases are primarily due to volume increases from our semiconductor customers. In addition, the increase in revenue in the Light & Motion segment is due to the fact that the nine month period ended September 30, 2016, only included five months of revenue as a result of the Newport Merger, compared to the respective period in 2017. The semiconductor capital equipment industry is subject to rapid demand shifts, which are difficult to predict, and we are uncertain as to the timing or extent of future demand or any future weakness in the semiconductor capital equipment industry.

Net revenues from customers in other advanced markets, which exclude semiconductor capital equipment and semiconductor device product applications, increased by \$25.2 million, or 15%, for the three months ended September 30, 2017, compared to the same period in the prior year. This increase was mainly due to an increase in revenues from customers in the process and industrial technologies market of \$14.9 million, electronic thin film market of \$5.7 million and life and health sciences market of \$5.0 million. Net revenues from customers in other advanced markets increased by \$187.5 million for the nine month period ended September 30, 2017, compared to the same period in the prior year. The increase was primarily driven by the Light & Motion segment, whose net revenues increased \$168.5 million, compared to the same period in the prior year, due to the fact that the nine month period ended September 30, 2016, only included five months of revenue as a result of the Newport Merger. In addition, revenues from customers in our Vacuum & Analysis segment increased, primarily in the process and industrial technologies market of \$9.2 million and electronic thin film market of \$8.8 million. Revenues from customers in other advanced markets are made up of many different markets, including electronic thin film, life and health sciences, process and industrial technologies and research and defense.

A significant portion of our net revenues is from sales to customers in international markets. For the nine months ended September 30, 2017 and 2016, international net revenues accounted for approximately 50% and 48% of our net revenues, respectively. A significant portion of our international net revenues were in Korea, Japan, Israel, China and Germany. We expect that international net revenues will continue to represent a significant percentage of our total net revenues.

Recent Events

Sale of Data Analytics Solutions business

In April 2017, we completed the sale of our Data Analytics Solutions business for total proceeds of \$72.5 million, net of cash sold and recorded a pre-tax gain of \$74.9 million. This business, which had net revenues in 2016 of \$12.7 million and was included in the Vacuum & Analysis segment, was no longer a part of our long-term strategic objectives.

The business did not qualify as a discontinued operation as this sale did not represent a strategic shift in our business, nor did the sale have a major effect on our operations, therefore, the results of operations for all periods are included in our income from operations. The assets and liabilities of this business have not been reclassified or segregated in the consolidated balance sheet or consolidated statements of cash flows as the amounts were immaterial.

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 of America 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, 2016. For further information, please see the discussion of critical accounting policies in our Annual Report on Form 10-K for the year ended December 31, 2016 in the section captioned "Management's Discussion and Analysis of Financial Condition and Results of Operations – Critical Accounting Policies and Estimates."

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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 September 30,		Nine Months Ended September 30,	
	2017	2016	2017	2016
Net revenues:				
Product	89.4%	88.0%	89.7%	87.0%
Services	10.6	12.0	10.3	13.0
Total net revenues	100.0	100.0	100.0	100.0
Cost of revenues:				
Cost of product revenues	46.3	48.3	47.0	48.7
Cost of service revenues	6.8	7.5	6.5	8.4
Total cost of revenues (exclusive of amortization shown separately below)	53.1	55.8	53.5	57.1
Gross profit	46.9	44.2	46.5	42.9
Research and development	6.7	8.5	7.1	8.7
Selling, general and administrative	14.8	18.4	15.5	19.8
Acquisition and integration costs	0.5	0.1	0.3	1.2
Restructuring	—	—	0.2	—
Asset impairment	—	—	0.5	—
Amortization of intangible assets	2.3	3.3	2.5	2.6
Income from operations	22.6	13.9	20.4	10.6
Gain on sale of business	—	—	5.3	—
Interest and other (expense), net	(1.8)	(2.8)	(1.7)	(1.8)
Income from operations before income taxes	20.8	11.1	24.0	8.8
Provision for income taxes	5.2	2.5	5.4	2.1
Net income	15.6%	8.6%	18.6%	6.7%

Net Revenues

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2017	2016	2017	2016
<i>(dollars in millions)</i>				
Product	\$ 434.7	\$ 335.2	\$1,259.6	\$774.3
Service	51.6	45.5	144.6	115.9
Total net revenues	\$ 486.3	\$ 380.7	\$1,404.2	\$890.2

Product revenues increased \$99.5 million and \$485.3 million during the three and nine months ended September 30, 2017, respectively, compared to the same periods in the prior year. Product revenues for the Vacuum & Analysis segment increased by \$73.4 million and \$265.7 million for the three and nine months ended September 30, 2017, respectively, compared to the same periods in the prior year. These increases in the Vacuum & Analysis segment were primarily due to volume increases in net revenues from semiconductor customers. Product revenues for the Light & Motion segment increased by \$26.1 million and \$219.6 million for the three and nine months ended, September 30, 2017, respectively, compared to the same periods in the prior year. The increase for the three months ended September 30, 2017, compared to the same period in the prior year, was primarily due to increases in net revenues from product revenues from customers in our other advanced markets. The increase for the nine months ended September 30, 2017, compared to the same period in the prior year, was primarily due to the fact that the nine month period ended September 30, 2016 only included five months of revenue as a result of the Newport Merger.

Service revenues consisted mainly of fees for services related to the maintenance and repair of our products, installation and training. Service revenues increased \$6.1 million and \$28.7 million during the three and nine months ended September 30, 2017, compared to the same periods in the prior year. The increase in service revenues for the three months ended September 30, 2017, compared to the same period in the prior year, was primarily due to an increase in service revenues from semiconductor customers. The increase in service revenues for the nine month period ended September 30, 2017, compared to the same period in the prior year, was primarily due to service revenues for the Light & Motion segment, which increased by \$18.4 million, primarily due to the fact that the nine month period ended September 30, 2016 only included five months of revenue as a result of the Newport Merger. The remaining increase of \$10.3 million was primarily due to an increase in service revenues from semiconductor customers from our Vacuum & Analysis segment.

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Total international net revenues, including product and service, were \$248.7 million and \$703.9 million for the three and nine months ended September 30, 2017, respectively, compared to \$182.4 million and \$429.2 million for the three and nine months ended September 30, 2016, respectively.

The increase of \$105.6 million and \$514.0 million in total net revenues for the three and nine months ended September 30, 2017, respectively, compared to the same periods in the prior year, was due to significant increases in net revenues in Korea, Japan, Israel, Singapore, and Germany. These increases consisted primarily of volume increases from customers in the semiconductor industry and the fact that revenues from our Light and Motion segment for the nine months ended September 30, 2016, only included five months of revenue as a result of the Newport Merger.

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

<i>(dollars in millions)</i>	Three Months Ended September 30,		Nine Months Ended September 30,	
	2017	2016	2017	2016
Net revenues:				
Vacuum & Analysis	\$308.2	\$229.2	\$896.0	\$620.2
Light & Motion	178.1	151.5	508.2	270.0
Total net revenues	<u>\$486.3</u>	<u>\$380.7</u>	<u>\$1,404.2</u>	<u>\$890.2</u>

Net revenues from our Vacuum & Analysis segment increased \$79.0 million and \$275.8 million for the three and nine months ended September 30, 2017, respectively, compared to the same periods in the prior year. These increases were primarily attributed to increases in net revenues from our semiconductor capital equipment and semiconductor device manufacturer customers of \$73.8 million and \$256.9 million for the three and nine month periods ended September 30, 2017, respectively. The remainder of the increases were attributed to net revenues from customers from our other advanced markets of \$5.2 million and \$18.9 million for the three and nine months ended September 30, 2017, respectively, primarily from our process and industrial technologies market and our electronic thin film market.

Net revenues from our Light & Motion segment increased \$26.6 million and \$238.2 million for the three and nine months ended September 30, 2017, respectively, compared to the same periods in the prior year. These increases included an increase in net revenues from our semiconductor capital equipment and semiconductor device manufacturer customers of \$6.6 million and \$69.6 million for the three and nine month periods ended September 30, 2017, respectively. The remainder of the increases were attributed to net revenues from customers from our other advanced markets of \$20.0 million and \$168.6 million for the three and nine months ended September 30, 2017, respectively, primarily from our process and industrial technologies market, our research and defense market and our life and health sciences market. The increase in net revenues for the nine month period ended September 30, 2017, was also due to the fact that the nine month period ended September 30, 2016 only included five months of revenue as a result of the Newport Merger.

Gross Profit

	Three Months Ended September 30,			Nine Months Ended September 30,		
	2017	2016	% Points Change	2017	2016	% Points Change
Gross profit as a percentage of net revenues:						
Product	48.2%	45.2%	3.0%	47.6%	44.1%	3.5%
Service	35.8%	37.4	(1.6)	36.7	35.4	1.3
Total gross profit	<u>46.9%</u>	<u>44.2%</u>	<u>2.7%</u>	<u>46.5%</u>	<u>42.9%</u>	<u>3.6%</u>

Gross profit as a percentage of net product revenues increased by 3.0 percentage points for the three months ended September 30, 2017, compared to the same period in the prior year. The increase was primarily attributed to 3.8 percentage points related to higher revenue volumes and 0.5 percentage points due to favorable material costs, as the three months ended September 30, 2016 included a charge of \$5.0 million for the inventory step-up adjustment to fair value related to the Newport Merger, partially offset by a decrease of 0.4 percentage points due to unfavorable changes in foreign exchange and 0.4 percentage points due to lower variable compensation costs.

Gross profit as a percentage of net product revenues increased by 3.5 percentage points for the nine months ended September 30, 2017, compared to the same period in the prior year. The increase was primarily attributed to 6.3 percentage points due to higher revenue volumes, primarily due to the Newport Merger, partially offset by a decrease of 1.5 percentage points due to higher overhead costs and 0.6 percentage points due to higher excess and obsolete inventory and warranty charges.

Gross profit as a percentage of net service revenues decreased by 1.6 percentage points for the three months ended September 30, 2017, compared to the same period in the prior year. This decrease was primarily attributed to 2.0 percentage points due to unfavorable mix.

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Gross profit as a percentage of net service revenues increased by 1.3 percentage points for the nine months ended September 30, 2017, compared to the same period in the prior year. The increase is primarily attributed to 2.0 percentage points related to lower labor and overhead costs. Cost of service revenues, including salaries and related expenses and other fixed costs, consisted primarily of services for repair and maintenance.

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

	Three Months Ended September 30,			Nine Months Ended September 30,		
	2017	2016	% Points Change	2017	2016	% Points Change
Gross profit as a percentage of net revenues:						
Vacuum & Analysis	45.9%	45.5%	0.4%	45.8%	44.0%	1.8%
Light & Motion	48.6	42.3	6.3	47.8	40.4	7.4
Total gross profit	<u>46.9%</u>	<u>44.2%</u>	<u>2.7%</u>	<u>46.5%</u>	<u>42.9%</u>	<u>3.6%</u>

Gross profit for our Vacuum & Analysis segment increased by 0.4 and 1.8 percentage points for the three and nine months ended September 30, 2017, respectively, compared to the same periods in the prior year. The increase for the three months ended September 30, 2017, was primarily due to higher revenue volumes and lower material costs, partially offset by unfavorable product mix. The increase for the nine months ended September 30, 2017, was primarily due to higher revenue volumes, partially offset by unfavorable product mix.

Gross profit for our Light & Motion segment increased by 6.3 and 7.4 percentage points for the three and nine months ended September 30, 2017, respectively, compared to the same periods in the prior year. The increase for the three months ended September 30, 2017, was primarily due to favorable product mix, lower material costs and higher revenue volumes. The increase for the nine months ended September 30, 2017, was primarily due to higher revenue volumes, lower material costs and favorable product mix, partially offset by higher overhead costs. The gross profit for the three and nine month periods ended September 30, 2016 included a charge of \$5.0 million and \$15.1 million, respectively, for the inventory step-up adjustment to fair value related to the Newport Merger, thus causing material costs to be lower for the three and nine month periods ended September 30, 2017, compared to the same periods in the prior year.

[Research and Development](#)

<i>(dollars in millions)</i>	Three Months Ended September 30,		Nine Months Ended September 30,	
	2017	2016	2017	2016
Research and development expenses	\$ 32.5	\$ 32.3	\$ 99.5	\$ 77.7

Research and development expenses remained relatively flat for the three months ended September 30, 2017, compared to the same period in the prior year.

Research and development expenses increased \$21.8 million for the nine months ended September 30, 2017, compared to the same period in the prior year. These increases were primarily due to the fact that the Light & Motion segment only included five months of expense during the nine months ended September 30, 2016 as a result of the Newport Merger. These increases included \$14.3 million of compensation costs and related benefits, \$4.6 million of project materials, \$1.1 million of occupancy costs and \$0.8 million of depreciation expense.

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 other 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.

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Selling, General and Administrative

<i>(dollars in millions)</i>	Three Months Ended September 30,		Nine Months Ended September 30,	
	2017	2016	2017	2016
Selling, general and administrative expenses	\$ 71.8	\$ 68.0	\$218.0	\$161.5

Selling, general and administrative expenses increased by \$3.8 million for the three months ended September 30, 2017, compared to the same period in the prior year, primarily due to increases of \$1.7 million in commission expense, \$1.3 million in information technology related expenses and \$0.8 million in variable compensation costs.

Selling, general and administrative expenses increased by \$56.5 million for the nine months ended September 30, 2017 compared to the same period in the prior year. These increases were primarily attributed to the Light & Motion segment due to the fact that the nine months ended September 30, 2016 only included five months of expense as a result of the Newport Merger, which occurred in April 2016. The increase included \$32.2 million of compensation costs, \$5.4 million of commission expense, \$3.5 million of consulting and professional fees, \$2.6 million of depreciation expense and \$2.5 million of information technology related expenses.

Acquisition and Integration Costs

<i>(dollars in millions)</i>	Three Months Ended September 30,		Nine Months Ended September 30,	
	2017	2016	2017	2016
Acquisition and integration costs	\$ 2.5	\$ 2.6	\$ 4.7	\$ 25.2

We incurred \$2.5 million and \$2.6 million of acquisition and integration costs for the three months ended September 30, 2017 and 2016, respectively, and \$4.7 million and \$25.2 million for the nine months ended September 30, 2017 and 2016, respectively. These costs related to the Newport Merger.

Restructuring

<i>(dollars in millions)</i>	Three Months Ended September 30,		Nine Months Ended September 30,	
	2017	2016	2017	2016
Restructuring	\$ —	\$ —	\$ 2.6	\$ —

Restructuring expense of \$2.6 million for the nine months ended September 30, 2017 related to the discontinuation of a product line resulting in the consolidation of two manufacturing plants, the restructuring of one of our international facilities and the consolidation of two sales offices.

Asset impairment

<i>(dollars in millions)</i>	Three Months Ended September 30,		Nine Months Ended September 30,	
	2017	2016	2017	2016
Asset impairment	\$ —	\$ —	\$ 6.7	\$ —

We recorded \$6.7 million of asset impairment charges for the nine months ended September 30, 2017 due to the consolidation of two manufacturing plants. These charges primarily related to the write-off of certain goodwill and intangible assets.

Amortization of Intangible Assets

<i>(dollars in millions)</i>	Three Months Ended September 30,		Nine Months Ended September 30,	
	2017	2016	2017	2016
Amortization of intangible assets	\$ 11.0	\$ 12.5	\$ 34.9	\$ 23.0

Amortization of intangible assets decreased by \$1.5 million during the three months ended September 30, 2017 compared to the same period in the prior year, due to certain intangible assets becoming fully amortized. Amortization of intangible assets increased \$11.9 million during the nine months ended September 30, 2017, compared to the same period in the prior year, due to the amortization of intangible assets acquired in the Newport Merger.

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Interest (Expense), Net

<i>(dollars in millions)</i>	Three Months Ended September 30,		Nine Months Ended September 30,	
	2017	2016	2017	2016
Interest expense, net	\$ 6.3	\$ 11.6	\$ 21.1	\$ 18.7

Interest expense, net decreased by \$5.3 million and increased by \$2.4 million for the three and nine months ended September 30, 2017, respectively, compared to the same periods in the prior year. The decrease for the three months ended September 30, 2017 was due primarily to principal pre-payments of \$325.0 million and three re-pricings of our Term Loan Facility (as defined below) through September 30, 2017. The increase for the nine months ended September 30, 2017 compared to the same period in the prior year, was due to the fact that the nine month period ended September 30, 2016 only included five months of interest expense as a result of the Newport Merger.

Gain on sale of business

<i>(dollars in millions)</i>	Three Months Ended September 30,		Nine Months Ended September 30,	
	2017	2016	2017	2016
Gain on sale of business	\$ —	\$ —	\$ 74.9	\$ —

We recorded a \$74.9 million gain for the nine months ended September 30, 2017 on the sale of our Data Analytics Solutions business during the second quarter of 2017.

Other (expense) income, net

<i>(dollars in millions)</i>	Three Months Ended September 30,		Nine Months Ended September 30,	
	2017	2016	2017	2016
Other (expense) income, net	\$ (2.5)	\$ 0.8	\$ (3.7)	\$ 2.3

The changes in other (expense) income, net for the three and nine months ended September 30, 2017 and 2016, respectively, primarily related to changes in foreign exchange rates. In addition, the three and nine month periods ended September 30, 2016 included \$1.3 million of net proceeds from an insurance policy.

Provision for Income Taxes

<i>(dollars in millions)</i>	Three Months Ended September 30,		Nine Months Ended September 30,	
	2017	2016	2017	2016
Provision for income taxes	\$ 25.4	\$ 9.7	\$ 75.1	\$ 19.1

Our effective tax rate for the three and nine months ended September 30, 2017 was 25.0% and 22.3%, respectively. The effective tax rate for the three and nine months ended September 30, 2017 was lower than the U.S. statutory tax rate mainly due to the geographic mix of income and profits earned by our international subsidiaries being taxed at rates lower than the U.S. statutory tax rate, the tax benefit of windfall stock compensation deductions and the deduction for domestic production activities. These amounts were partially offset by taxes accrued, net of foreign tax credits, on actual and planned distributions from our international subsidiaries. Our effective tax rate for the three and nine months ended September 30, 2016 was 23.0% and 24.4%, respectively. Our effective tax rate for the three and nine months ended September 30, 2016 was lower than the U.S. statutory tax rate due to the geographic mix of income and profits earned by our international subsidiaries being taxed at rates lower than the U.S. statutory tax rate, the federal research credit and the impact of the deduction for domestic production activities. These amounts were partially offset by taxes paid on our reorganization of certain international subsidiaries and state income taxes.

Our future effective tax rate depends on various factors, including the impact of tax legislation, the geographic composition of our pre-tax income, the results of tax audits, and changes in 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. We also expect that the impact of the windfall stock compensation tax benefit on the tax rate will vary significantly from quarter to quarter due to the timing of vesting and exercise of stock grants and the impact of changes in our stock price.

Our effective tax rate could be adversely affected by changes in the valuation of deferred tax assets and liabilities. In particular, the carrying value of deferred tax assets, which are predominantly in the United States, is dependent on our ability to generate sufficient future taxable income in the United States.

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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 taxes matters in future periods as new information becomes available.

Liquidity and Capital Resources

Cash and cash equivalents and short-term marketable investments totaled \$534.6 million at September 30, 2017, compared to \$418.1 million at December 31, 2016.

Net cash provided by operating activities was \$274.4 million for the nine months ended September 30, 2017 and resulted from net income of \$261.5 million, which included non-cash charges of \$44.1 million, offset by a net increase in working capital of \$31.2 million. The net increase in working capital was due to an increase in inventories of \$51.3 million and an increase in accounts receivable of \$26.5 million, related to an increase in business activities and an increase in other current and non-current assets of \$9.7 million. These increases in working capital were offset by an increase in other current and non-current liabilities of \$22.5 million, an increase in accrued income taxes of \$15.6 million, accrued compensation of \$11.1 million and accounts payable of \$7.1 million.

Net cash provided by operating activities was \$127.4 million for the nine months ended September 30, 2016 and resulted from net income of \$59.3 million, which included non-cash charges of \$86.2 million, offset by a net increase in working capital of \$18.1 million. The net increase in working capital was due to an increase in trade accounts receivable of \$44.5 million, as a result of increased revenue levels, an increase in other current assets of \$8.8 million, an increase in inventories of \$5.1 million and an increase in other non-current assets of \$3.3 million. These increases in working capital were offset by an increase in income taxes of \$20.4 million, an increase in accounts payable of \$14.1 million, an increase in other current and non-current liabilities of \$4.6 million and an increase in accrued compensation of \$4.5 million.

Net cash provided by investing activities was \$16.0 million for the nine months ended September 30, 2017 due to proceeds received from the sale of our Data Analytics Solutions business of \$72.5 million, offset by net sales and maturities of short-term investments of \$38.7 million and purchases of production-related equipment of \$17.8 million. Net cash used in investing activities was \$581.4 million for the nine months ended September 30, 2016 and resulted primarily from the Newport Merger for \$939.6 million and the purchase of production-related equipment of \$12.0 million, partially offset by the net sale and maturities of investments of \$370.1 million, which was used to partially finance the Newport Merger.

Net cash used in financing activities was \$216.4 million for the nine months ended September 30, 2017 and resulted primarily from partial repayment of the Term Loan Facility of \$178.1 million (\$175.0 million was pre-paid and \$3.1 million was a regularly scheduled payment of principal), dividend payments made to common stockholders of \$28.4 million and net payments related to tax payments for employee stock awards of \$14.7 million, partially offset by an increase in cash of \$5.0 million related to the release of a restriction on cash related to our letters of credit. Net cash provided by financing activities was \$601.7 million for the nine months ended September 30, 2016 and resulted primarily from net proceeds related to the Term Loan Facility used to finance the Newport Merger of \$639.1 million, partially offset by dividend payments made to common stockholders of \$27.2 million, restricted cash of \$6.2 million for collateral cash deposits relating to letters of credit and net payments related to tax payments made for employee stock awards of \$3.1 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.

During the nine months ended September 30, 2017 there were no repurchases of our common stock. During the nine months ended September 30, 2016 we repurchased approximately 45,000 shares of our common stock for \$1.5 million, or an average price of \$34.50 per share.

Our Board of Directors declared a cash dividend \$0.175 per share during the first, second and third quarters of 2017 that totaled \$28.4 million. Our Board of Directors declared a cash dividend of \$0.17 per share during the first, second and third quarters of 2016 that totaled \$27.2 million.

On October 30, 2017 the Company's Board of Directors declared a quarterly cash dividend of \$0.18 per share to be paid on December 8, 2017, to shareholders of record as of November 27, 2017. 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 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.

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Our total cash and cash equivalents and short-term marketable investments at September 30, 2017, consisted of \$207.7 million held in the United States and \$326.9 million held by our foreign subsidiaries, substantially all of which cash held by foreign subsidiaries would be subject to tax in the United States if returned to the United States. We believe our existing United States cash and short-term investment balances are adequate to meet domestic operating needs, including estimated working capital, planned capital expenditure requirements, payment of debt and any future cash dividends, if declared, during the next twelve months and the foreseeable future.

In April 2016, we invested \$9.3 million for a minority interest in a private company, which operates in the field of semiconductor process equipment instrumentation. We accounted for this investment using the cost method of accounting. During the fourth quarter of 2016, we recognized an impairment loss on this investment of \$5.0 million. In July 2017, we invested an additional \$0.1 million in this private company.

Sale of Data Analytics Solutions Business

In April 2017, we completed the sale of our Data Analytics Solutions business for total proceeds of \$72.5 million, net of cash sold and recorded a pre-tax gain of \$74.9 million. This business, which had net revenues in 2016 of \$12.7 million and was included in the Vacuum & Analysis segment, was no longer a part of our long-term strategic objectives.

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 of \$780.0 million, subject to increase at our option in accordance with the Credit Agreement (the "Term Loan Facility"). 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 (that was initially 3.00% and was decreased as described below); 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 (that was initially 4.00% and was decreased as described below). We have elected the interest rate as described in clause (b). The Term Loan Facility was issued with original issue discount of 1.00% of the principal amount thereof.

In June 2016, we entered into Amendment No. 1 (the "Re-pricing Amendment 1") to the Credit Agreement by and among the Company, the Lenders and Barclays Bank PLC, as administrative agent and collateral agent for the Lenders. The Re-pricing Amendment 1 decreased the applicable margin for borrowings under our Term Loan Facility to 2.50% for base rate borrowings and 3.50% for LIBOR borrowings and extended the period during which a pre-payment premium may be required for a "Re-pricing Transaction" (as defined in the Credit Agreement) until six months after the effective date of the Re-pricing Amendment 1. In connection with the execution of the Re-pricing Amendment 1, we paid a pre-payment premium of 1.00%, or \$7.3 million, as well as certain fees and expenses of the administrative agent and the Lenders, in accordance with the terms of the Credit Agreement. Immediately prior to the effectiveness of the Re-pricing Amendment 1, we prepaid \$50.0 million of principal under the Credit Agreement. In September 2016, we prepaid an additional \$60.0 million under the Credit Agreement.

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 Credit Agreement. The rate is fixed at 1.198% per annum plus the applicable credit spread, which was 2.25% at September 30, 2017. At September 30, 2017, the notional amount of the interest rate swap agreement was \$305.0 million.

In December 2016, we entered into Amendment No. 2 (the "Re-pricing Amendment 2") to the Credit Agreement by and among the Company, the Lenders and Barclays Bank PLC, as administrative agent and collateral agent for the Lenders. The Re-pricing Amendment 2 decreased the applicable margin for our term loan under the Credit Agreement to 2.75% for LIBOR borrowings and 1.75% for base rate borrowings and reset the period during which a pre-payment premium may be required for a Re-pricing Transaction until six months after the effective date of the Re-pricing Amendment. In November 2016, prior to the effectiveness of the Re-pricing Amendment 2, we prepaid an additional \$40.0 million of principal under the Credit Agreement. In March 2017, the Company prepaid \$50.0 million of principal under the Credit Agreement.

On July 6, 2017, we entered into Amendment No. 3 (the "Re-pricing Amendment 3") to our Credit Agreement by and among the Company, the Lenders and Barclays Bank PLC, as administrative agent and collateral agent for the Lenders. The Re-pricing Amendment 3 decreased the applicable margin for our term loan under the Credit Agreement to 2.25% when the Total Leverage Ratio (as defined in the Credit Agreement) is at or above 1.25:1 and to 2.00% when the Total Leverage Ratio is below 1.25:1, both with a LIBOR floor of 0.75%. The margin for base rate borrowings will decrease to 1.25% when the Total Leverage Ratio is at or above 1.25:1 and to 1.00% when the Total Leverage Ratio is below 1.25:1. The period in which a prepayment premium may be required for a Re-pricing Transaction was reset to six months after the effective date of the Re-pricing Amendment 3.

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In July 2017 and August 2017, we prepaid \$50.0 million and \$75.0 million, respectively, of principal under the Credit Agreement. As of September 30, 2017, after total pre-payments of \$325.0 million and regularly scheduled principal payments of \$6.5 million, the total outstanding principal balance was \$448.5 million. As of September 30, 2017, the Total Leverage Ratio was below 1.25:1.

We incurred \$28.7 million of deferred finance fees, original issue discount and a re-pricing fee related to the term loans under the Term Loan Facility, which are included in long-term debt in the accompanying consolidated balance sheets and will be 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 pre-payments during 2016 and 2017. As of September 30, 2017, the remaining balance of the deferred finance fees, original issue discount and re-pricing fee related to the Term Loan Facility was \$13.4 million.

Under the Credit Agreement, we are required to prepay outstanding term loans, subject to certain exceptions, with portions of our 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. We are also required to make scheduled quarterly payments each equal to 0.25% of the principal amount of the term loans outstanding on July 6, 2017 (the date of the Re-pricing Amendment 3), less the amount of certain voluntary and mandatory repayments after such date, with the balance due on the seventh anniversary of the closing date. As a result of making total pre-payments of \$325.0 million as of September 30, 2017, we are no longer required to make any scheduled principal payments until maturity of the loan.

All obligations under the Term Loan Facility are guaranteed by certain of our domestic subsidiaries, and are secured 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 September 30, 2017, 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, we also 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 (the "ABL Facility"), that provides senior secured financing of up to \$50.0 million, subject to a borrowing base limitation. The borrowing base for the ABL Facility at any time equals the sum of: (a) 85% of certain eligible accounts; plus (b) subject to certain notice and field examination and appraisal 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; provided that until the administrative agent's receipt of a field examination of accounts receivable the borrowing base shall be equal to 70% of the book value of certain eligible accounts. The ABL Facility includes borrowing capacity in the form of letters of credit up to \$15.0 million. We have not drawn against the ABL Facility.

Borrowings under the ABL Facility bear interest per annum at one of the following rates selected by us: (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, and (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%, plus, in each case, an initial applicable margin of 0.75%; 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, plus an initial applicable margin of 1.75%. 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.

We have incurred \$1.2 million of costs in connection with the ABL Facility, which were capitalized and included in other assets in the accompanying consolidated balance sheets and will be amortized to interest expense using the straight-line method over the contractual term of five years of the ABL Facility.

In addition to paying interest on outstanding principal under the ABL Facility, we are required to pay a commitment fee in respect of the unutilized commitments thereunder. The initial commitment fee is 0.375% per annum. The total commitment fee recognized in interest expense for the nine months ended September 30, 2017 was \$0.2 million. Commencing with the completion of the first fiscal quarter ending after the closing of the ABL Facility, the commitment fee is subject to downward adjustment based on the amount of average unutilized commitments for the three month period immediately preceding such adjustment date. We must also pay customary letter of credit fees and agency fees.

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Lines of Credit and Short-Term Borrowing Arrangements

One of our 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 provide for aggregate borrowings as of September 30, 2017, of up to an equivalent of \$20.4 million U.S. dollars. 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 September 30, 2017 and December 31, 2016.

We assumed various revolving lines of credit and a financing facility with the completion of the Newport Merger. These revolving lines of credit and financing facility have no expiration date and provide for aggregate borrowings as of September 30, 2017 of up to an equivalent of \$11.1 million U.S. dollars. These lines of credit have a base interest rate of 1.25% plus a Japanese Yen overnight LIBOR rate.

One of our Austrian subsidiaries has four 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 0.75% - 2.00%.

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

After total pre-payments of \$175.0 million and regularly scheduled principal payments of \$3.1 million during the nine months ended September 30, 2017, our total outstanding principal balance on our Credit Agreement was \$448.5 million. As a result of making total pre-payments since the inception of the Credit Agreement of \$325.0 million, the Company is no longer required to make any scheduled principal payments until the maturity date of the loan. 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, 2016.

Recently Issued Accounting Pronouncements

In August 2017, the Financial Accounting Standards Board (“FASB”) issued Accounting Standards Update (“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 do not expect adoption of this ASU to have a material impact on our consolidated financial statements.

In May 2017, the FASB issued ASU 2017-09, “Compensation-Stock Compensation (Topic 718)-Scope of Modification Accounting.” This standard provides guidance about which changes to the terms or conditions of a share-based payment award require an entity to apply modification accounting in Topic 718. The provisions of this ASU are effective for annual periods beginning after December 15, 2017, including interim periods within those fiscal years. Early adoption is permitted for any interim period for which financial statements have not yet been issued. We do not expect the adoption of this ASU to have a material impact on our consolidated financial statements.

In March 2017, the FASB issued ASU 2017-07, “Compensation-Retirement Benefits (Topic 715)-Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost.” This standard requires that an employer disaggregate the service cost component from the other components of net benefit cost. This standard also provides explicit guidance on how to present the service cost component and the other components of the net benefit cost in the income statement and allows only the service cost component of net benefit cost to be eligible for capitalization. The provisions of this ASU are effective for annual periods beginning after December 31, 2017, including interim periods within those fiscal years. Early adoption is permitted as of the beginning of an annual period for which financial statements (interim or annual) have not been issued or made available for issuance. We do not expect adoption of this ASU to have a material impact on our consolidated financial statements.

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In January 2017, the FASB issued ASU 2017-04, “Intangibles-Goodwill and Other (Topic 350).” This standard simplifies how an entity is required to test goodwill for impairment by eliminating Step 2 from the goodwill impairment test. Step 2 measures a goodwill impairment loss by comparing the implied fair value of a reporting unit’s goodwill with the carrying amount of goodwill. The provisions of this ASU are effective for annual or any interim goodwill impairment tests in fiscal years beginning after December 15, 2019. Early adoption is permitted for interim or annual goodwill impairment tests performed on testing dates after January 1, 2017. We expect to adopt this new standard in 2017 when we perform our annual goodwill impairment test in the fourth quarter. We do not expect the adoption of this ASU to have a material impact on our consolidated financial statements.

In January 2017, the FASB issued ASU 2017-01, “Business Combinations (Topic 805)-Clarifying the Definition of a Business.” This standard clarifies the definition of a business with the objective of adding guidance to assist entities with evaluating whether transactions should be accounted for as acquisitions (or disposals) of assets or businesses. This standard also provides a more robust framework to use in determining when a set of assets and activities is a business. Because the current definition of a business is interpreted broadly and can be difficult to apply, stakeholders indicated that analyzing transactions is inefficient and costly and that the definition does not permit the use of reasonable judgment. The provisions of this ASU are effective for annual periods beginning after December 15, 2017, including interim periods within those fiscal years. Early adoption is applicable under certain circumstances. We do not expect adoption of this ASU to have a material impact on our consolidated financial statements.

In November 2016, the FASB issued ASU 2016-18, “Statement of Cash Flows (Topic 230)-Restricted Cash,” an amendment to ASU 2016-15. This standard requires that a statement of cash flows explain the change during the period in the total of cash, cash equivalents and amounts generally described as restricted cash and restricted cash equivalents. Therefore, amounts generally described as restricted cash and restricted cash equivalents should be included with cash and cash equivalents when reconciling the beginning-of-period and end-of-period total amounts shown on the statement of cash flows. Early adoption is permitted. The provisions of this ASU are effective for annual periods beginning after December 15, 2017, including interim periods within those fiscal years and should be applied at the time of adoption of ASU 2016-15. We do not expect adoption of this ASU to have a material impact on our consolidated financial statements.

In October 2016, the FASB issued ASU 2016-16, “Income Taxes (Topic 740)-Intra-Entity Transfer of Assets Other Than Inventory.” This standard requires that an entity recognize the income tax consequences of an intra-entity transfer of an asset other than inventory when the transfer occurs as opposed to when the assets have been sold to an outside party. The provisions of this ASU are effective for annual periods beginning after December 15, 2017, including interim periods within those fiscal years and early adoption is permitted. We do not expect adoption of this ASU to have a material impact on our consolidated financial statements.

In August 2016, the FASB issued ASU 2016-15, “Statement of Cash Flows (Topic 230)-Classification of Certain Cash Receipts and Cash Payments.” This standard addresses eight specific cash flow issues with the objective of addressing the diversity in practice in how certain cash receipts and cash payments are presented and classified in the statement of cash flows under Topic 230. The provisions of this ASU are effective for annual periods beginning after December 15, 2017, including interim periods within those fiscal years. We are currently evaluating the requirements of this ASU and have not yet determined its impact on our consolidated financial statements.

In February 2016, the FASB issued ASU 2016-02, “Leases (Topic 842).” This standard requires the recognition of lease assets and liabilities for all leases, with certain exceptions, on the balance sheet. In transition, lessees and lessors are required to recognize and measure leases at the beginning of the earliest period presented using a modified retrospective approach. This ASU is effective for annual periods beginning after December 15, 2018, including interim periods within those fiscal years. We are currently evaluating the requirements of this ASU and have not yet determined its impact on our consolidated financial statements.

In January 2016, the FASB issued ASU 2016-01, “Financial Instruments-Overall (Subtopic 825-10): Recognition and Measurement of Financial Assets and Financial Liabilities.” This ASU provides guidance for the recognition, measurement, presentation, and disclosure of financial instruments. The new pronouncement revises accounting related to equity investments and the presentation of certain fair value changes for financial assets and liabilities measured at fair value. Among other things, it amends the presentation and disclosure requirements of equity securities that do not result in consolidation and are not accounted for under the equity method. Changes in the fair value of these equity securities will be recognized directly in net income. This pronouncement is effective for annual periods beginning after December 15, 2017, 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 May 2014, the FASB issued ASU 2014-09, “Revenue from Contracts with Customers (Topic 606).” ASU 2014-09 provides for a single comprehensive model to use in accounting for revenue arising from contracts with customers and will replace most existing revenue recognition guidance in Generally Accepted Accounting Principles when it becomes effective. ASU 2014-09 is effective for fiscal years and interim periods within those years beginning after December 15, 2017. The two permitted transition methods under the new standard are the full retrospective method, in which case the standard would be applied to each prior reporting period presented, or the modified retrospective method, in which case the cumulative effect of applying the standard would be recognized at the date of initial application. We do not plan to early adopt the standard, but have concluded that we will use the modified retrospective method upon adoption in the first quarter of 2018.

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In March, April, May and December 2016 and September 2017, the FASB issued additional updates to the new revenue standard relating to reporting revenue on a gross versus net basis, identifying performance obligations and licensing arrangements, narrow-scope improvements and practical expedients, and technical corrections and improvements, respectively. We have established a cross functional project steering committee and implementation team to identify potential differences that would result from applying the requirements of the new standard to our revenue contracts and related expense line items. We have reviewed our plan for the implementation and will continue to report the status against that plan to our Audit Committee. To date, we have made significant progress in evaluating the potential changes that the adoption of the new standard may have on our future financial reporting and disclosures. We have identified the various revenue streams, including product revenues, service revenues, installation and training, that could be impacted by Topic 606 and have reviewed individual customer contracts related to these revenue streams. The new revenue standard will primarily impact our recording of repair revenue and customized products, which will be recognized over time under Topic 606 as opposed to a point in time under the current standard. We are in the process of finalizing and documenting our assumptions used in quantifying the impact adoption of the new revenue standard will have on us, which could vary quarter to quarter. Based on our preliminary analysis, we do not expect the adoption of the new guidance to have a material impact on the timing or amount of our revenue recognition. In addition, we do not expect any major changes to be made to our existing accounting systems or internal controls. We will continue to assess the effect that the new revenue guidance will have on our consolidated financial statements, disclosures and related controls, and will disclose any material effects, if any, when known.

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, 2016 filed with the Securities and Exchange Commission on March 1, 2017. As of September 30, 2017, there were no material changes in our exposure to market risk from December 31, 2016.

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 September 30, 2017. 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 September 30, 2017, 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 September 30, 2017, 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.

On March 9, 2016, a putative class action lawsuit captioned *Dixon Chung v. Newport Corp., et al.*, Case No. A-16-733154-C, was filed in the District Court, Clark County, Nevada on behalf of a putative class of the Company’s stockholders for claims related to

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the February 22, 2016 Agreement and Plan of Merger (the “Merger Agreement”) between the Company, Newport Corporation (“Newport”), and PSI Equipment, Inc., a Nevada corporation and a wholly owned subsidiary of the Company, which was merged with Newport on April 29, 2016 and is the surviving corporation of such merger (“Merger Sub”). The complaint names as defendants the Company, Newport, Merger Sub, and certain then-current and former members of Newport’s former board of directors. The complaint alleges that the named 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, and by agreeing to unfair deal protection devices. The complaint also alleges that the Company, Newport, and Merger Sub aided and abetted the named directors’ alleged breaches of their fiduciary duties. The complaint seeks injunctive relief, including to enjoin or rescind the Merger Agreement, monetary damages, and an award of attorneys’ and other fees and costs, among other relief. On March 25, 2016, the plaintiff in the Chung action filed an amended complaint, which adds certain allegations, including that the definitive proxy statement filed by Newport on March 29, 2016 (“the Proxy”) omitted material information. The amended complaint also names as defendants the Company, Newport, Merger Sub, and then-current members of Newport’s board of directors.

Also on March 25, 2016, a second putative class action complaint captioned *Hubert C. Pincon v. Newport Corp., et al.*, Case No. A-16-734039-B, was filed in the District Court, Clark County, Nevada, on behalf of a putative class of the Company’s stockholders for claims related to the Merger Agreement. The complaint names as defendants the Company, Newport, and Merger Sub and the members of Newport’s former board of directors. It alleges that the named 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. The complaint also alleges that the Company, Newport, and Merger Sub aided and abetted the named directors’ alleged breaches of their fiduciary duties. The complaint seeks injunctive relief, including to enjoin or rescind the Merger Agreement, and an award of attorneys’ and other fees and costs, among other relief.

On April 14, 2016, the Court granted plaintiffs’ motion to consolidate the Pincon and Chung actions and appointed counsel in the Pincon action as lead counsel. Also on April 14, 2016, the Court granted plaintiffs’ motion for expedited discovery and scheduled a hearing on plaintiffs’ anticipated motion for a preliminary injunction for April 25, 2016. On April 20, 2016, plaintiffs filed a motion to vacate the hearing on their anticipated motion for a preliminary injunction and notified the Court that they did not presently intend to file a motion for a preliminary injunction regarding the Merger Agreement. On April 22, 2016, the Court vacated the hearing on plaintiffs’ anticipated motion for a preliminary injunction. In August 2016, plaintiffs completed the expedited discovery that the court ordered.

On October 19, 2016, plaintiffs 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 class of Newport’s stockholders for claims related to the Merger Agreement. The complaint named as defendants the Company, Newport, and the then-current members of Newport’s former board of directors. It alleged that the named 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. The complaint also alleged that the Company and Newport aided and abetted the named directors’ alleged breaches of their fiduciary duties. The complaint sought monetary damages, including pre- and post-judgment interest. On December 9, 2016, both the Company and the Newport defendants filed motions to dismiss. Plaintiffs filed an opposition to the motions to dismiss on January 13, 2017. On February 3, 2017, the Company and the Newport defendants filed their reply briefs in support of their motions to dismiss. A hearing on the motions to dismiss was held on February 15, 2017. On June 22, 2017, the court dismissed the amended complaint against all defendants but granted plaintiffs leave to amend. On July 27, 2017, plaintiffs filed an amended complaint asserting claims against the Newport directors. On July 28, 2017, the Company and Newport each entered into a stipulation and proposed order with plaintiffs whereby plaintiffs agreed not to assert any claims against the Company or Newport in an amended complaint and agreed to voluntarily dismiss the Company and Newport from the action. On August 7, 2017, plaintiffs filed a Second Amended Complaint, which names as defendants the individual directors of Newport Corporation. The Second Amended Complaint makes similar allegations against the directors as in the prior complaint, namely, that they 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, and by omitting material information from the Proxy. The Newport directors filed a motion to dismiss on September 1, 2017, plaintiffs filed an opposition to this motion to dismiss on October 6, 2017, and the Newport directors filed a reply brief in support of their motion to dismiss on October 27, 2017. The Newport directors intend to continue to defend vigorously against those claims. A hearing on the motion to dismiss is currently scheduled for December 7, 2017.

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 the Company’s 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, 2016 in the section entitled "Risk Factors." There have been no material changes from the risks disclosed therein.

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ITEM 6. EXHIBITS.

<u>Exhibit No.</u>	<u>Exhibit Description</u>
+3.1(1)	Restated Articles of Organization of the Registrant
+3.2(2)	Articles of Amendment to Restated Articles of Organization of the Registrant, as filed with the Secretary of State of Massachusetts on May 18, 2001
+3.3(3)	Articles of Amendment to Restated Articles of Organization of the Registrant, as filed with the Secretary of State of Massachusetts on May 16, 2002
+3.4(4)	Amended and Restated By-Laws of the Registrant
+10.1(5)	Amendment No. 3 to Term Loan Credit Agreement, dated as of July 6, 2017, among the Company, the other loan parties party thereto, Barclays Bank PLC, as administrative agent and collateral agent, and each participating lender party thereto
31.1	Certification of Principal Executive Officer pursuant to Rule 13a-14(a)/Rule 15d-14(a) of the Securities Exchange Act of 1934, as amended
31.2	Certification of Principal Financial Officer pursuant to Rule 13a-14(a)/Rule 15d-14(a) of the Securities Exchange Act of 1934, as amended
32.1	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
101.INS	XBRL Instance Document
101.SCH	XBRL Taxonomy Extension Schema Document
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document
101.LAB	XBRL Taxonomy Extension Label Linkbase Document
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document

+ Previously filed

- (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.
- (3) Incorporated by reference to the Registrant's Quarterly Report on Form 10-Q for the quarter ended June 30, 2002.
- (4) Incorporated by reference to the Registrant's Current Report on Form 8-K 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 filed with the Securities and Exchange Commission on July 6, 2017.

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.

November 3, 2017

MKS INSTRUMENTS, INC.

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: November 3, 2017

/s/ Gerald G. Colella

Gerald G. Colella
Chief Executive Officer and President
(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: November 3, 2017

/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 September 30, 2017, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), the undersigned, Gerald G. Colella, Chief Executive Officer and President 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: November 3, 2017

/s/ Gerald G. Colella

Gerald G. Colella
Chief Executive Officer and President

Dated: November 3, 2017

/s/ Seth H. Bagshaw

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