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, 2020

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	**04-2277512**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**
2 Tech Drive, Suite 201, Andover, Massachusetts	**01810**
(Address of principal executive offices)	**(Zip Code)**

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

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

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Stock, no par value	MKSI	Nasdaq Global Select Market

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

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes ☒ No ☐

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

Large accelerated filer	☒	Accelerated filer	☐
Non-accelerated filer	☐	Smaller reporting company	☐
		Emerging growth company	☐

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

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

As of October 27, 2020, the registrant had 55,137,088 shares of common stock outstanding.

MKS INSTRUMENTS, INC.
FORM 10-Q
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PART I. FINANCIAL INFORMATION

ITEM 1. FINANCIAL STATEMENTS.

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

ASSETS	September 30, 2020	December 31, 2019
Current assets:		
Cash and cash equivalents	$ 493.3	$ 414.6
Short-term investments	222.4	109.4
Trade accounts receivable, net of allowance for doubtful accounts of $2.0 and $1.8 at September 30, 2020 and December 31, 2019, respectively	363.9	341.1
Inventories	494.2	462.1
Other current assets	95.9	106.3
Total current assets	1,669.7	1,433.5
Property, plant and equipment, net	267.9	241.9
Right-of-use asset	180.1	64.5
Goodwill	1,062.1	1,058.5
Intangible assets, net	523.3	564.6
Long-term investments	6.3	5.8
Other assets	41.5	47.5
Total assets	$ 3,750.9	$ 3,416.3
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Short-term debt	$ 12.0	$ 12.1
Accounts payable	113.4	88.4
Accrued compensation	95.4	100.9
Income taxes payable	18.8	15.4
Lease liability	16.8	20.6
Deferred revenue and customer advances	30.4	21.5
Other current liabilities	77.5	58.8
Total current liabilities	364.3	317.7
Long-term debt, net	816.8	871.7
Non-current deferred taxes	67.2	72.4
Non-current accrued compensation	44.9	43.9
Non-current lease liability	172.2	44.8
Other liabilities	58.7	42.5
Total liabilities	1,524.1	1,393.0
Commitments and contingencies (Note 19)		
Stockholders' equity:		
Preferred Stock, $0.01 par value per share, 2,000,000 shares authorized; none issued and outstanding	—	—
Common Stock, no par value, 200,000,000 shares authorized; 55,135,910 and 54,596,183 shares issued and outstanding at September 30, 2020 and December 31, 2019, respectively	0.1	0.1
Additional paid-in capital	861.6	864.3
Retained earnings	1,382.7	1,181.2
Accumulated other comprehensive loss	(17.6)	(22.3)
Total stockholders' equity	2,226.8	2,023.3
Total liabilities and stockholders' equity	$ 3,750.9	$ 3,416.3

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 millions, except per share data)
(Unaudited)

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2020	2019	2020	2019
Net revenues:				
Products	$ 506.8	$ 386.2	$ 1,441.0	$ 1,184.9
Services	83.0	76.3	228.8	215.2
Total net revenues	589.8	462.5	1,669.8	1,400.1
Cost of revenues:				
Cost of products	280.7	216.3	794.8	672.2
Cost of services	47.1	41.2	127.1	113.8
Total cost of revenues (exclusive of amortization shown separately below)	327.8	257.5	921.9	786.0
Gross profit	262.0	205.0	747.9	614.1
Research and development	42.5	41.7	127.7	122.3
Selling, general and administrative	87.0	82.1	260.3	247.8
Acquisition and integration costs	0.5	2.1	3.4	35.5
Restructuring and other	3.1	1.5	6.8	4.7
Amortization of intangible assets	12.5	17.0	42.6	50.3
Asset impairment	—	—	1.2	—
COVID-19 related net credits	—	—	(1.2)	—
Fees and expenses related to repricing of Term Loan	—	0.6	—	6.5
Gain on sale of long-lived assets	—	(6.8)	—	(6.8)
Income from operations	116.4	66.8	307.1	153.8
Interest income	0.1	1.2	1.1	4.3
Interest expense	6.6	13.5	22.7	35.3
Other expense (income), net	1.1	(0.9)	3.0	0.2
Income before income taxes	108.8	55.4	282.5	122.6
Provision for income taxes	17.1	8.0	48.0	25.0
Net income	$ 91.7	$ 47.4	$ 234.5	$ 97.6
Other comprehensive income, net of tax:				
Changes in value of financial instruments designated as cash flow hedges	$ (0.6)	$ (0.8)	$ (7.7)	$ (8.6)
Foreign currency translation adjustments	17.1	(14.5)	12.1	(18.2)
Net actuarial gain on pension and post-retirement benefits	0.1	0.1	0.1	0.1
Unrealized gain (loss) on investments	—	—	0.2	(0.1)
Total comprehensive income	$ 108.3	$ 32.2	$ 239.2	$ 70.8
Net income per share:				
Basic	$ 1.66	$ 0.86	$ 4.26	$ 1.79
Diluted	$ 1.66	$ 0.86	$ 4.24	$ 1.77
Weighted average common shares outstanding:				
Basic	55.2	54.9	55.1	54.6
Diluted	55.4	55.2	55.3	55.0

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

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

	Common Stock		Additional Paid-In Capital	Retained Earnings	Accumulated Other Comprehensive Income/(Loss)	Total Stockholders' Equity
	Shares	Amount				
Balance at December 31, 2019	54,596,183	$ 0.1	$ 864.3	$ 1,181.2	$ (22.3)	$ 2,023.3
Net issuance under stock-based plans	276,800		(20.4)			(20.4)
Stock-based compensation			8.5			8.5
Cash dividend ($0.20 per common share)				(11.0)		(11.0)
Comprehensive income (net of tax):						
Net income				69.1		69.1
Other comprehensive loss					(17.0)	(17.0)
Balance at March 31, 2020	54,872,983	0.1	852.4	1,239.3	(39.3)	2,052.5
Net issuance under stock-based plans	205,850		(0.5)			(0.5)
Stock-based compensation			6.8			6.8
Cash dividend ($0.20 per common share)				(11.0)		(11.0)
Comprehensive income (net of tax):						
Net income				73.7		73.7
Other comprehensive income					5.1	5.1
Balance at June 30, 2020	55,078,833	0.1	858.7	1,302.0	(34.2)	2,126.6
Net issuance under stock-based plans	57,077		(4.5)			(4.5)
Stock-based compensation			7.4			7.4
Cash dividend ($0.20 per common share)				(11.0)		(11.0)
Comprehensive income (net of tax):						
Net income				91.7		91.7
Other comprehensive income					16.6	16.6
Balance at September 30, 2020	55,135,910	$ 0.1	$ 861.6	$ 1,382.7	$ (17.6)	$ 2,226.8

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

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

	Common Stock		Additional Paid-In Capital	Retained Earnings	Accumulated Other Comprehensive Income/(Loss)	Total Stockholders' Equity
	Shares	Amount				
Balance at December 31, 2018	54,039,554	$ 0.1	$ 793.9	$ 1,084.8	$ (5.6)	$ 1,873.2
Net issuance under stock-based plans	192,218		22.5			22.5
Stock-based compensation			27.8			27.8
Cash dividend ($0.20 per common share)				(10.8)		(10.8)
Comprehensive income (net of tax):						
Net income				12.5		12.5
Other comprehensive loss					(4.3)	(4.3)
Balance at March 31, 2019	54,231,772	0.1	844.2	1,086.5	(9.9)	1,920.9
Net issuance under stock-based plans	247,920		(2.1)			(2.1)
Stock-based compensation			7.2			7.2
Cash dividend ($0.20 per common share)				(10.9)		(10.9)
Stock dividends accrued			0.2	(0.2)		—
Comprehensive income (net of tax):						
Net income				37.7		37.7
Other comprehensive loss					(7.3)	(7.3)
Balance at June 30, 2019	54,479,692	0.1	849.5	1,113.1	(17.2)	1,945.5
Net issuance under stock-based plans	16,972		(0.6)			(0.6)
Stock-based compensation			7.4			7.4
Cash dividend ($0.20 per common share)				(10.9)		(10.9)
Stock dividends accrued			0.1	(0.1)		—
Comprehensive income (net of tax):						
Net income				47.4		47.4
Other comprehensive loss					(15.3)	(15.3)
Balance at September 30, 2019	54,496,664	0.1	$ 856.4	$ 1,149.5	$ (32.5)	$ 1,973.5

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

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

	Nine Months Ended September 30,	
	2020	2019
Cash flows provided by operating activities:		
Net income	$ 234.5	$ 97.6
Adjustments to reconcile net income to net cash provided by operating activities:		
Depreciation and amortization	75.8	79.9
Amortization of inventory step-up adjustment to fair value	—	7.6
Amortization of debt issuance costs, original issue discount and soft call premium	2.1	6.5
Stock-based compensation	22.7	42.1
Provision for excess and obsolete inventory	19.8	18.6
Provision for doubtful accounts	0.2	0.2
Deferred income taxes	(0.7)	(9.1)
Gain on sale of long-lived asset	—	(6.8)
Asset impairment	1.2	—
Other	1.6	0.4
Changes in operating assets and liabilities, net of business acquired:		
Trade accounts receivable	(20.9)	9.3
Inventories	(47.1)	(25.8)
Income taxes	21.4	(0.7)
Other current and non-current assets	10.9	(18.2)
Accrued compensation	(5.8)	(13.4)
Other current and non-current liabilities	25.8	3.0
Accounts payable	24.5	(23.9)
Net cash provided by operating activities	366.0	167.3
Cash flows used in investing activities:		
Acquisition of business, net of cash acquired	—	(988.6)
Purchases of investments	(358.2)	(171.3)
Maturities of investments	181.5	93.3
Sales of investments	64.3	162.4
Proceeds from sale of assets	—	41.2
Purchases of property, plant and equipment	(59.9)	(44.7)
Net cash used in investing activities	(172.3)	(907.7)
Cash flows (used in) provided by financing activities:		
Net proceeds from short and long-term borrowings	20.1	642.2
Payments on short and long-term borrowings	(77.0)	(107.8)
Net payments related to employee stock awards	(25.4)	(11.8)
Dividend payments	(33.0)	(32.6)
Net cash (used in) provided by financing activities	(115.3)	490.0
Effect of exchange rate changes on cash and cash equivalents	0.3	(7.6)
Increase (decrease) in cash and cash equivalents	78.7	(258.0)
Cash and cash equivalents at beginning of period	414.6	644.3
Cash and cash equivalents at end of period	$ 493.3	$ 386.3

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

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, 2020, and for the three and nine months ended September 30, 2020 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, 2019 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, 2019 filed with the Securities and Exchange Commission on February 28, 2020.

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, lease liabilities and income taxes. 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.

While the Company’s operations and financial performance in certain areas of its business have been negatively impacted by the coronavirus (“COVID-19”) pandemic, the impact to the Company’s financial results for the three and nine months ended September 30, 2020 was minimal due to the strong demand for its products from its semiconductor customers. The extent to which the COVID-19 pandemic impacts the Company’s financial results and operations for the remainder of 2020 and beyond will depend on future developments that are highly uncertain and cannot be predicted at this time. The Company is not aware of any specific event or circumstance that would require an update to its estimates or judgments or a revision of the carrying value of its assets or liabilities as of the date of issuance of this Quarterly Report on Form 10-Q. These estimates may change, as new events occur and additional information is obtained. Actual results could differ materially from these estimates under different assumptions or conditions.

2) Recently Issued or Adopted Accounting Pronouncements

In March 2020, the Financial Accounting Standards Board (“FASB”) issued Accounting Standards Update (“ASU”) No. 2020-04, “Reference Rate Reform (Topic 848): Facilitation of the Effects of Reference Rate Reform on Financial Reporting.” This standard provides temporary optional expedients and exceptions to accounting guidance on contract modifications and hedge accounting to ease entities’ financial reporting burdens as the market transitions from the London Interbank Offered Rate (“LIBOR”) and other interbank offered rates to alternative reference rates. The standard was effective upon issuance and generally can be applied through December 31, 2022. The Company is in the process of evaluating the requirements of this standard and has not yet determined the impact of adoption on its consolidated financial statements.

In December 2019, the FASB issued ASU 2019-12, “Income Taxes (Topic 740).” This standard simplifies the accounting for income taxes by removing certain exceptions to the general principles in Topic 740. The amendments also improve consistent application and simplify U.S. GAAP for other areas of Topic 740 by clarifying and amending existing guidance. This standard is effective for annual periods beginning after December 15, 2021, including interim periods within those fiscal years beginning after December 15, 2022. The Company evaluated the requirements of this ASU and the impact of pending adoption on the Company’s consolidated financial statements. The Company does not expect that the impact of this ASU will be material to its financial position, results of operations and cash flows.

In August 2018, the FASB issued ASU 2018-15, “Intangibles-Goodwill and Other-Internal-Use Software (Subtopic 350-40): Customer’s Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement that is a Service Contract.” This standard aligns the requirements for capitalizing implementation costs incurred in a hosting arrangement that is a service contract with the requirements for capitalizing implementation costs incurred to develop or obtain internal-use software (and hosting arrangements that include an internal-use software license). The accounting for the service element of a hosting arrangement that is a service contract is not affected by the amendments to this update. This standard is effective for annual periods beginning after December 15, 2019, including interim periods within those fiscal years. The Company adopted this ASU during the first quarter of 2020 and the adoption of this ASU did not have a material impact on its financial position, results of operations and cash flows.

In June 2016, the FASB issued ASU 2016-13, "Financial Instruments-Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments." This standard introduced the expected credit losses methodology for the measurement of credit losses on financial assets that are not measured at fair value through net income and replaces today's "incurred loss" model with an "expected credit loss" model that requires consideration of a broader range of information to estimate expected credit losses over the lifetime of the asset. There have been several consequential subsequent amendments to this standard. This standard is effective for annual periods beginning after December 15, 2019, including interim periods within those fiscal years. The Company adopted this ASU during the first quarter of 2020 and the adoption of this ASU did not have a material impact on its financial position, results of operations and cash flows.

3) Leases

The Company has various operating leases for real estate and non-real estate items. The non-real estate leases are mainly comprised of automobiles but also include office equipment and other lower-valued items. The Company does not have any finance leases.

Some of the Company's real estate lease agreements include Company options to either extend and/or terminate the lease. The cost of these options is included in our operating lease liabilities to the extent that such options are reasonably certain of being exercised. Leases with renewal options allow the Company to extend the lease term typically between 1 to 10 years. When determining the lease term, renewal options reasonably certain of being exercised are included in the lease term. When determining if a renewal option is reasonably certain of being exercised, the Company considers several economic factors, including but not limited to, the significance of leasehold improvements made to the property, whether the physical space is difficult to replace, underlying contractual obligations, and specific characteristics unique to that particular lease that would make it reasonably certain that the Company would exercise such an option.

During the nine months ended September 30, 2020, the Company recorded $127.2 of additional right-of-use assets and lease liabilities related to three new leases that commenced and two existing leases that were extended during the period.

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

The elements of lease expense were as follows:

	Three Months Ended September 30,	
	2020	2019
Lease cost:		
Operating lease cost(1)	$ 7.2	$ 5.9
Short-term lease	1.4	1.1
Total lease cost	$ 8.6	$ 7.0

	Nine Months Ended September 30,	
	2020	2019
Lease cost:		
Operating lease cost(1)	$ 22.1	$ 16.6
Short-term lease	3.7	3.4
Total lease cost	$ 25.8	$ 20.0

(1) Operating lease cost includes an immaterial amount of variable expenses and sublease rental income.

The weighted average discount rate and the weighted average remaining lease term were 3.0% and 15 years, respectively, as of September 30, 2020. The weighted average discount rate and weighted average remaining lease term were 3.8% and 5.0 years, respectively, as of September 30, 2019. Operating cash flows used for operating leases for the nine months ended September 30, 2020 and September 30, 2019 were $15.4 and $17.4, respectively.

Future lease payments under non-cancelable leases as of September 30, 2020 are detailed as follows:

2020 (remaining)	$ 0.3
2021	12.1
2022	18.1
2023	16.9
2024	16.3
Thereafter	179.3
Total lease payments	243.0
Less: imputed interest	54.0
Total operating lease liabilities	$ 189.0

The remaining 2020 lease payment amount of $0.3 and the 2021 lease payment amount of $12.1 are net of tenant improvement allowances of $5.2 and $10.0, respectively. Amounts presented above do not include payments relating to immaterial leases excluded from the balance sheet as part of transition elections adopted upon implementation of ASU 2016-02,“Leases”, on January 1, 2019, as well as operating leases with terms of less than twelve months.

4) Revenue from Contracts with Customers

Contract assets as of September 30, 2020 and December 31, 2019 were $3.7 and $3.5, respectively, and are included in other current assets.

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

	Nine Months Ended September 30, 2020	Nine Months Ended September 30, 2019
Beginning balance, January 1[1]	$ 24.8	$ 17.5
Deferred revenue and customer advances assumed in ESI Merger	—	4.6
Additions to deferred revenue and customer advances	76.3	41.9
Amount of deferred revenue and customer advances recognized in income	(65.6)	(38.8)
Ending balance, September 30[2]	$ 35.5	$ 25.2

(1) Beginning deferred revenue and customer advances as of January 1, 2020 included $12.4 of current deferred revenue, $3.3 of long-term deferred revenue and $9.1 of current customer advances.

(2) Ending deferred revenue and customer advances as of September 30, 2020 included $19.7 of current deferred revenue, $5.1 of long-term deferred revenue and $10.7 of current customer advances.

Disaggregation of Revenue

The following table summarizes revenue from contracts with customers:

	Three Months Ended September 30, 2020			
	Vacuum & Analysis	Light & Motion	Equipment & Solutions	Total
Net revenues:				
Products	$ 313.9	$ 156.9	$ 36.0	$ 506.8
Services	47.4	19.0	16.6	83.0
Total net revenues	$ 361.3	$ 175.9	$ 52.6	$ 589.8

	Three Months Ended September 30, 2019			
	Vacuum & Analysis	Light & Motion	Equipment & Solutions	Total
Net revenues:				
Products	$ 197.2	$ 156.4	$ 32.6	$ 386.2
Services	43.5	16.0	16.8	76.3
Total net revenues	$ 240.7	$ 172.4	$ 49.4	$ 462.5

	Nine Months Ended September 30, 2020			
	Vacuum & Analysis	Light & Motion	Equipment & Solutions	Total
Net revenues:				
Products	$ 863.5	$ 457.3	$ 120.2	$ 1,441.0
Services	131.6	50.0	47.2	228.8
Total net revenues	$ 995.1	$ 507.3	$ 167.4	$ 1,669.8

	Nine Months Ended September 30, 2019			
	Vacuum & Analysis	Light & Motion	Equipment & Solutions	Total
Net revenues:				
Products	$ 581.6	$ 502.5	$ 100.8	$ 1,184.9
Services	129.1	46.5	39.6	215.2
Total net revenues	$ 710.7	$ 549.0	$ 140.4	$ 1,400.1

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

Refer to Note 17 for revenue by reportable segment and geography.

5) Investments

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

As of September 30, 2020:	Cost	Gross Unrealized Gains	Gross Unrealized (Losses)	Estimated Fair Value
Short-term investments:				
Available-for-sale investments:				
Time deposits and certificates of deposit	$ 0.3	$ —	$ —	$ 0.3
Bankers' acceptance drafts	3.1	—	—	3.1
U.S. treasury obligations	219.0	—	—	219.0
	$ 222.4	$ —	$ —	$ 222.4

As of September 30, 2020:	Cost	Gross Unrealized Gains	Gross Unrealized (Losses)	Estimated Fair Value
Long-term investments:				
Available-for-sale investments:				
Group insurance contracts	$ 5.5	$ 0.8	$ —	$ 6.3

As of December 31, 2019:	Cost	Gross Unrealized Gains	Gross Unrealized (Losses)	Estimated Fair Value
Short-term investments:				
Available-for-sale investments:				
Time deposits and certificates of deposit	$ 13.1	$ —	$ —	$ 13.1
Bankers' acceptance drafts	4.0	—	—	4.0
Commercial paper	61.5	—	(0.3)	61.2
U.S. treasury obligations	5.0	—	—	5.0
U.S. agency obligations	26.1	—	—	26.1
	$ 109.7	$ —	$ (0.3)	$ 109.4

As of December 31, 2019:	Cost	Gross Unrealized Gains	Gross Unrealized (Losses)	Estimated Fair Value
Long-term investments:				
Available-for-sale investments:				
Group insurance contracts	$ 5.2	$ 0.6	$ —	$ 5.8

The tables above, which show the gross unrealized gains and (losses) aggregated by investment category for available-for-sale investments as of September 30, 2020 and December 31, 2019, reflect the inclusion within short-term investments of investments with contractual maturities greater than one year from the date of purchase. Management has the ability, if necessary, to liquidate any of its investments in order to meet the Company’s liquidity needs in the next 12 months. Accordingly, those investments with contractual maturities greater than one year from the date of purchase are classified as short-term on the accompanying balance sheets.

The Company reviews and evaluates its investments for any indication of possible impairment. Based on this review, the Company has determined that the unrealized losses related to these investments at September 30, 2020 were temporary.

Interest income is accrued as earned. Dividend income is recognized as income on the date the security 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, 2020 and September 30, 2019.

6) Fair Value Measurements

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

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

Level 1 Quoted prices in active markets for identical assets or liabilities 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.

Assets and liabilities of the Company are measured at fair value on a recurring basis as of September 30, 2020 and are summarized as follows:

		Fair Value Measurements at Reporting Date Using		
Description	September 30, 2020	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	$ 0.4	$ 0.4	$ —	$ —
U.S. treasury obligations	69.4	—	69.4	—
Available-for-sale investments:				
Time deposits and certificates of deposit	0.3	—	0.3	—
Bankers' acceptance drafts	3.1	—	3.1	—
U.S. treasury obligations	219.0	—	219.0	—
Group insurance contracts	6.3	—	6.3	—
Derivatives – currency forward contracts	0.1	—	0.1	—
Funds in investments and other assets:				
Israeli pension assets	17.3	—	17.3	—
Deferred compensation plan assets:				
Mutual funds and exchange traded funds	1.5	—	1.5	—
Money market securities	0.1	—	0.1	—
Total assets	$ 317.5	$ 0.4	$ 317.1	$ —
Liabilities:				
Derivatives – currency forward contracts	$ 2.2	$ —	$ 2.2	$ —
Derivatives – interest rate hedge – non-current	14.0	—	14.0	—
Total liabilities	$ 16.2	$ —	$ 16.2	$ —
Reported as follows:				
Assets:				
Cash and cash equivalents[(1)]	$ 69.8	$ 0.4	$ 69.4	$ —
Short-term investments	222.4	—	222.4	—
Other current assets	0.1	—	0.1	—
Total current assets	$ 292.3	$ 0.4	$ 291.9	$ —
Long-term investments	$ 6.3	$ —	$ 6.3	$ —
Other assets	18.9	—	18.9	—
Total long-term assets	$ 25.2	$ —	$ 25.2	$ —
Liabilities:				
Other current liabilities	$ 2.2	$ —	$ 2.2	$ —
Other liabilities	$ 14.0	$ —	$ 14.0	$ —

(1) The cash and cash equivalent amounts presented in the table above do not include cash of $423.5 as of September 30, 2020.

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

		Fair Value Measurements at Reporting Date Using		
Description	December 31, 2019	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	$ 0.6	$ 0.6	$ —	$ —
Time deposits and certificates of deposit	2.2	—	2.2	—
Commercial paper	42.6	—	42.6	—
U.S. treasury obligations	2.7	—	2.7	—
U.S. agency obligations	17.1	—	17.1	—
Available-for-sale securities:				
Time deposits and certificates of deposit	13.1	—	13.1	—
Bankers' acceptance drafts	4.0	—	4.0	—
Commercial paper	61.2	—	61.2	—
U.S. treasury obligations	5.0	—	5.0	—
U.S. agency obligations	26.1	—	26.1	—
Group insurance contracts	5.8	—	5.8	—
Derivatives – currency forward contracts	1.1	—	1.1	—
Derivatives –interest rate hedge - current	0.8	—	0.8	—
Funds in investments and other assets:				
Israeli pension assets	16.7	—	16.7	—
Deferred compensation plan assets:				
Mutual funds and exchange traded funds	2.0	—	2.0	—
Money market funds	0.5	—	0.5	—
Total assets	$ 201.5	$ 0.6	$ 200.9	$ —
Liabilities:				
Derivatives – currency forward contracts	$ 0.3	$ —	$ 0.3	$ —
Derivatives – interest rate hedge - non-current	6.5	—	6.5	—
Total liabilities	$ 6.8	$ —	$ 6.8	$ —
Reported as follows:				
Assets:				
Cash and cash equivalents(1)	$ 65.2	$ 0.6	$ 64.6	$ —
Short-term investments	109.4	—	109.4	—
Other current assets	1.9	—	1.9	—
Total current assets	$ 176.5	$ 0.6	$ 175.9	$ —
Long-term investments	$ 5.8	$ —	$ 5.8	$ —
Other assets	19.2	—	19.2	—
Total long-term assets	$ 25.0	$ —	$ 25.0	$ —
Liabilities:				
Other current liabilities	$ 0.3	$ —	$ 0.3	$ —
Other liabilities	$ 6.5	$ —	$ 6.5	$ —

(1) The cash and cash equivalent amounts presented in the table above do not include cash of $349.4 as of December 31, 2019.

Money Market Funds

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

Available-For-Sale Investments

As of September 30, 2020 and December 31, 2019, available-for-sale investments consisted of time deposits and drafts denominated in the Euro currency, certificates of deposit, bankers' acceptance drafts, commercial paper, U.S. treasury obligations, U.S. agency obligations and group insurance contracts.

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

Israeli Pension Assets

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

7) Derivatives

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

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

Interest Rate Swap Agreements

On September 30, 2016, the Company entered into an interest rate swap agreement, which had a maturity date of September 30, 2020, to fix the rate on approximately 50% of its then-outstanding balance under the 2016 Term Loan Facility, as described further in Note 11. This hedge fixed the interest rate paid on the hedged debt at 1.198% per annum plus the applicable credit spread, which was 1.75% as of September 30, 2020. This interest rate swap matured on September 30, 2020. At December 31, 2019, the notional amount of this transaction was $250.0 and it had a fair value asset of $0.8.

On April 3, 2019, the Company entered into an interest rate swap agreement, which has a maturity date of March 31, 2023, to fix the rate on $300.0 of the then-outstanding balance of the 2019 Incremental Term Loan Facility, as described further in Note 11. The rate was fixed at 2.309% per annum plus the applicable credit spread, which was 1.75% at September 30, 2020. At September 30, 2020, the notional amount of this transaction was $300.0 and had a fair value liability of $14.0. At December 31, 2019, the notional amount of this transaction was $300.0 and had a fair value liability of $6.5.

The interest rate swaps are recorded at fair value on the balance sheet and changes in the fair value are recognized in other comprehensive income ("OCI"). To the extent that these arrangements are no longer an effective hedge, any ineffectiveness measured in the hedging relationships is recorded in earnings in the period it occurs.

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. 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 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, 2020 and December 31, 2019, the Company had outstanding forward foreign exchange contracts with gross notional values of $158.9 and $154.7, respectively. The following tables provide a summary of the primary net hedging positions and corresponding fair values held as of September 30, 2020 and December 31, 2019:

	September 30, 2020	
Currency Hedged (Buy/Sell)	Gross Notional Value	Fair Value(1)
U.S. Dollar/Japanese Yen	$ 55.2	$ (0.4)
U.S. Dollar/South Korean Won	40.9	(0.4)
U.S. Dollar/Euro	13.6	(0.3)
U.S. Dollar/U.K. Pound Sterling	6.2	(0.1)
U.S. Dollar/Taiwan Dollar	43.0	(0.9)
Total	$ 158.9	$ (2.1)

	December 31, 2019	
Currency Hedged (Buy/Sell)	Gross Notional Value	Fair Value(1)
U.S. Dollar/Japanese Yen	$ 45.9	$ —
U.S. Dollar/South Korean Won	51.7	0.2
U.S. Dollar/Euro	15.7	0.2
U.S. Dollar/U.K. Pound Sterling	8.3	(0.2)
U.S. Dollar/Taiwan Dollar	33.1	(0.4)
Total	$ 154.7	$ (0.2)

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

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

	September 30, 2020	December 31, 2019
Derivative assets:		
Foreign exchange contracts(1)	$ 0.1	$ 1.1
Interest rate hedge(2)	—	0.8
Derivative liabilities:		
Foreign exchange contracts(1)	(2.2)	(1.3)
Interest rate hedge(2)	(14.0)	(6.5)
Total net derivative liability designated as hedging instruments	$ (16.1)	$ (5.9)

(1) The derivative asset of $0.1 and derivative liability of $2.2 related to the forward foreign exchange contracts are classified in other current assets and other current liabilities in the condensed consolidated balance sheet as of September 30, 2020. The derivative asset of $1.1 and derivative liability of $1.3 related to the forward foreign exchange contracts are classified in other current assets and other current liabilities in the condensed consolidated balance sheet as of December 31, 2019. These forward 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 asset of $0.8 is classified in other current assets in the condensed consolidated balance sheet as of December 31, 2019. The interest rate hedge liabilities of $14.0 and $6.5 are classified in other non-current liabilities as of September 30, 2020 and December 31, 2019, respectively.

The net amount of existing gains as of September 30, 2020 that is expected to be reclassified from OCI into earnings within the next 12 months is immaterial.

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

Derivatives Designated as Cash Flow Hedging Instruments	Three Months Ended September 30, 2020	Three Months Ended September 30, 2019	Nine Months Ended September 30, 2020	Nine Months Ended September 30, 2019
Forward exchange contracts:				
Net loss recognized in accumulated OCI[1]	$ (0.6)	$ (1.0)	$ (7.7)	$ (11.2)
Net gain reclassified from accumulated OCI into income[2]	$ 0.4	$ 2.0	$ 2.2	$ 4.1

(1) Net change in the fair value of the effective portion classified in accumulated OCI.

(2) Effective portion classified in cost of products for the three and nine months ended September 30, 2020 and 2019. The tax effect of the gains or losses reclassified from accumulated OCI into income is immaterial.

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

Derivatives Not Designated as Hedging Instruments	Three Months Ended September 30, 2020	Three Months Ended September 30, 2019	Nine Months Ended September 30, 2020	Nine Months Ended September 30, 2019
Forward exchange contracts:				
Net (loss) gain recognized in income[1]	$ (0.6)	$ 0.1	$ (0.6)	$ (0.2)

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

8) Inventories

Inventories consist of the following:

	September 30, 2020	December 31, 2019
Raw materials	$ 316.6	$ 288.8
Work-in-process	76.5	79.3
Finished goods	101.1	94.0
	$ 494.2	$ 462.1

9) Acquisitions

Electro Scientific Industries, Inc.

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

The Company funded the payment for ESI’s outstanding shares with a combination of the Company’s available cash on hand and the proceeds from the Company’s 2019 Incremental Term Loan Facility, as defined and as described further in Note 11.

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

The purchase price of ESI consisted of the following:

Cash paid for outstanding shares(1)	$	1,032.7
Settlement of share-based compensation awards(2)		30.6
Total purchase price		1,063.3
Less: Cash and cash equivalents acquired		(44.1)
Total purchase price, net of cash and cash equivalents acquired	$	1,019.2

(1) Represents cash paid of $30.00 per share for approximately 34,422,361 shares of ESI common stock, without interest and subject to a deduction for any required withholding tax.

(2) Represents the vested but not issued portion of ESI share-based compensation awards as of the acquisition date of February 1, 2019.

Under the acquisition method of accounting, the total estimated acquisition consideration is allocated to the acquired tangible and intangible assets and assumed liabilities of ESI based on their fair values as of the acquisition date. Any excess of the acquisition consideration over the fair value of assets acquired and liabilities assumed is allocated to goodwill. None of the goodwill and intangible assets are deductible for tax purposes.

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

Current assets (excluding inventory)	$	208.0
Inventory		81.7
Intangible assets		316.2
Goodwill		474.0
Property, plant and equipment		65.5
Long-term assets		9.6
Total assets acquired		1,155.0
Current liabilities		51.5
Non-current deferred taxes		33.0
Other long-term liabilities		7.2
Total liabilities assumed		91.7
Fair value of assets acquired and liabilities assumed		1,063.3
Less: Cash and cash equivalents acquired		(44.1)
Total purchase price, net of cash and cash equivalents acquired	$	1,019.2

The fair value write-up of acquired finished goods inventory was $7.6, the amount of which was expensed over the period during which the acquired inventory was sold. For the nine months ended September 30, 2019, the Company recorded $7.6 of incremental cost of sales charge associated with the fair value write-up of inventory acquired in the ESI Merger.

The fair value write-up of acquired property, plant and equipment of $39.3 will be amortized over the estimated useful life of the applicable assets, excluding the fair value write-up in the value of land. 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.

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

Completed technology - Laser	$	255.7	12 years
Completed technology - Non-Laser		18.3	10 years
Trademarks and trade names		14.4	7 years
Customer relationships		25.4	10 years
Backlog		2.4	1 year
	$	316.2	

The fair value of the acquired intangibles was determined using the income approach. In performing these valuations, the key underlying 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 broadening its position in key industrial markets to complementary solutions, and leveraging component and systems expertise to provide robust solutions to meet customer evolving technology needs.

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

Certain executives from ESI had severance provisions in their respective ESI employment agreements. The agreements included terms that were accounted for as dual-trigger arrangements. Through the Company's acquisition accounting, the expense relating to these benefits was recognized in the combined entity's financial statements. The Company recorded costs of $2.7 and $14.0 in acquisition and integration costs as compensation expense and stock-based compensation expense, respectively, for the nine months ended September 30, 2019 associated with these severance provisions. The restricted stock units and stock appreciation rights that were eligible for accelerated vesting if the executive exercised his or her rights but were not issued as of each reporting period-end, were excluded from the computation of basic earnings per share and included in the computation of diluted earnings per share for such reporting period.

Pro Forma Results

The following unaudited pro forma financial information presents the combined results of operations of the Company as if the ESI Merger had occurred on January 1, 2018. The unaudited pro forma financial information is not necessarily indicative of what the Company's condensed consolidated results of operations actually would have been had the acquisition occurred at the beginning of the 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, 2019	Nine Months Ended September 30, 2019
Total net revenues	$ 462.5	$ 1,414.7
Net income	$ 47.7	$ 127.7
Net income per share:		
Basic	$ 0.87	$ 2.34
Diluted	$ 0.86	$ 2.32

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

(1) Incremental amortization and depreciation expense related to the estimated fair value of identifiable intangible assets and property, plant and equipment, respectively, from the purchase price allocation.

(2) Revenue and cost of goods sold adjustments as a result of the reduction in deferred revenue and the cost related to their estimated fair value.

(3) Incremental interest expense related to the Company's 2019 Incremental Term Loan Facility.

(4) The exclusion of acquisition costs and inventory and demonstration inventory step-up amortization from the three and nine months ended September 30, 2019.

(5) The exclusion of debt issuance costs due to the modification of the Term Loan Facility from the three and nine months ended September 30, 2019.

(6) The estimated tax impact of the above adjustments.

10) Goodwill and Intangible Assets

Goodwill

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

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

The changes in the carrying amount of goodwill and accumulated impairment loss during the nine months ended September 30, 2020 and year ended December 31, 2019 were as follows:

	Nine Months Ended September 30, 2020			Twelve Months Ended December 31, 2019		
	Gross Carrying Amount	Accumulated Impairment Loss	Net	Gross Carrying Amount	Accumulated Impairment Loss	Net
Beginning balance at January 1	$ 1,202.8	$ (144.3)	$ 1,058.5	$ 731.3	$ (144.3)	$ 587.0
Acquired goodwill	—	—	—	474.0	—	474.0
Foreign currency translation	3.6	—	3.6	(2.5)	—	(2.5)
Ending balance at September 30, 2020 and December 31, 2019	$ 1,206.4	$ (144.3)	$ 1,062.1	$ 1,202.8	$ (144.3)	$ 1,058.5

Intangible Assets

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

As of September 30, 2020:	Gross	Accumulated Impairment Charges	Accumulated Amortization	Foreign Currency Translation	Net
Completed technology	$ 446.4	$ (0.1)	$ (203.2)	$ (0.1)	$ 243.0
Customer relationships	308.2	(1.4)	(99.6)	0.2	207.4
Patents, trademarks, trade names and other	120.9	—	(47.8)	(0.2)	72.9
	$ 875.5	$ (1.5)	$ (350.6)	$ (0.1)	$ 523.3

As of December 31, 2019:	Gross	Accumulated Impairment Charges	Accumulated Amortization	Foreign Currency Translation	Net
Completed technology(1)	$ 446.4	$ (0.1)	$ (178.3)	$ (0.2)	$ 267.8
Customer relationships(1)	308.2	(1.4)	(84.2)	(1.4)	221.2
Patents, trademarks, trade names and other(2)	120.9	—	(45.5)	0.2	75.6
	$ 875.5	$ (1.5)	$ (308.0)	$ (1.4)	$ 564.6

(1) During 2019, the Company recorded $316.2 of separately identified intangible assets related to the ESI Merger, of which $274.0 was completed technology, $25.4 was customer relationships and $16.8 was trademarks, trade names and backlog.

(2) During 2019, the Company reclassified $6.4 of gross favorable lease assets and $3.4 of related accumulated amortization from patents, trademarks, trade names and other to the right-of-use asset line in the balance sheet.

Aggregate amortization expense related to acquired intangibles for the nine months ended September 30, 2020 and September 30, 2019 were $42.6 and $50.3, respectively. Aggregate net amortization expense related to acquired intangible assets for future years is as follows:

Year		Amount
2020 (remaining)	$	13.2
2021		47.9
2022		45.4
2023		45.0
2024		44.1
2025		43.2
Thereafter		228.6

The Company excluded $55.9 of indefinite-lived trademarks and trade names that were not subject to amortization from the table above.

11) Debt

Senior Secured Term Loan Credit Facility

In connection with the completion of the acquisition of Newport Corporation ("Newport") in 2016 (the "Newport Merger"), the Company entered into a term loan credit agreement (the "Term Loan 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 a senior secured term loan credit facility in the original principal amount of $780.0 (the "2016 Term Loan Facility"), subject to increase at the Company's option and subject to receipt of lender commitments in accordance with the Term Loan Credit Agreement (the 2016 Term Loan Facility, together with the 2019 Incremental Term Loan Facility and 2019 Term Loan Refinancing Facility (each as defined below), the "Term Loan Facility"). Prior to the effectiveness of Amendment No. 6 (as defined below), the 2016 Term Loan Facility had a maturity date of April 29, 2023. As of September 30, 2020, 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 London Interbank Offer Rate ("LIBOR") rate determined by reference to the costs of funds for U.S. dollar deposits for an interest period of one month adjusted for certain additional costs, plus 1.00%, and (4) a floor of 1.75%, plus, in each case, an applicable margin; or (b) a LIBOR rate determined by reference to the costs of funds for U.S. dollar deposits for the interest period relevant to such borrowing adjusted for certain additional costs, subject to a LIBOR rate floor of 0.0%, plus an applicable margin. The Company has elected the interest rate as described in clause (b) of the foregoing sentence. The Term Loan Credit Agreement provides that, unless an alternate rate of interest is agreed, all loans will be determined by reference to the base rate if the LIBOR rate cannot be ascertained, if regulators impose material restrictions on the authority of a lender to make LIBOR rate loans, or for other reasons. The 2016 Term Loan Facility was issued with original issue discount of 1.00% of the principal amount thereof.

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

On September 30, 2016, the Company entered into an interest rate swap agreement, which had a maturity date of September 30, 2020, to fix the rate on $335.0 of the then-outstanding balance of the 2016 Term Loan Facility. The rate was fixed at 1.198% per annum plus the applicable credit spread, which was 1.75% at September 30, 2020. This interest rate swap matured on September 30, 2020.

The Company incurred $28.7 of deferred finance fees, original issue discount and repricing fees related to the term loans under the 2016 Term Loan Facility, which are included in long-term debt in the accompanying consolidated balance sheets and are being amortized to interest expense over the estimated life of the term loans using the effective interest method.

On February 1, 2019, in connection with the completion of the ESI Merger, the Company entered into an amendment (“Amendment No. 5”) to the Term Loan Credit Agreement. Amendment No. 5 provided an additional tranche B-5 term loan commitment in the original principal amount of $650.0 (the “2019 Incremental Term Loan Facility”), all of which was drawn down in connection with the closing of the ESI Merger. Pursuant to Amendment No. 5, the Company also effectuated certain amendments to the Term Loan Credit Agreement which make certain of the negative covenants and other provisions less restrictive. Prior to the effectiveness of Amendment No. 6 (as defined below), the 2019 Incremental Term Loan Facility had a maturity date of February 1, 2026 and bore interest at a rate per annum equal to, at the Company’s option, a base rate or LIBOR rate (as described above) plus, in each case, an applicable margin equal to 1.25% with respect to base rate borrowings and 2.25% with respect to LIBOR borrowings. The 2019 Incremental Term Loan Facility was issued with original issue discount of 1.00% of the principal amount thereof.

On April 3, 2019, the Company entered into an interest rate swap agreement, which has a maturity date of March 31, 2023, to fix the rate on $300.0 of the then-outstanding balance of the 2019 Incremental Term Loan Facility. The rate was fixed at 2.309% per annum plus the applicable credit spread, which was 1.75% at September 30, 2020. At September 30, 2020, the notional amount of this transaction was $300.0 and it had a fair value liability of $14.0.

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

On September 27, 2019, the Company entered into an amendment (“Amendment No. 6”) to the Term Loan Credit Agreement. Amendment No. 6 refinanced all existing loans outstanding under the 2016 Term Loan Facility and 2019 Incremental Term Loan Facility (“Existing Term Loans”) for a tranche B-6 term loan commitment in the original principal amount of $896.8 (“2019 Term Loan Refinancing Facility”). Each lender of the Existing Term Loans that elected to participate in the 2019 Term Loan Refinancing Facility was deemed to have exchanged the aggregate outstanding principal amount of its Existing Term Loans for an equal aggregate principal amount of tranche B-6 term loans under the 2019 Term Loan Refinancing Facility. On the effective date of Amendment No. 6 and immediately prior to the exchanges described above, the Company made a voluntary prepayment of $50.0, which was applied to the Existing Term Loans on a pro rata basis.

The Company incurred $2.2 of original issue discount fees related to the term loans under the 2019 Term Loan Refinancing Facility, which are included in long-term debt in the accompanying consolidated balance sheets and are being amortized to interest expense over the estimated life of the term loans using the effective interest method.

As of September 30, 2020, the remaining balance of deferred finance fees and original issue discount of the Term Loan Facility was $9.8. A portion of the deferred finance fees and original issue discount have been accelerated in connection with the various debt prepayments and extinguishments between 2016 and 2020.

The 2019 Term Loan Refinancing Facility matures on February 2, 2026, and bears interest at a rate per annum equal to, at the Company’s option, a base rate or LIBOR rate (as described above) plus, in each case, an applicable margin equal to 0.75% with respect to base rate borrowings and 1.75% with respect to LIBOR borrowings. The 2019 Term Loan Refinancing Facility was issued with original issue discount of 0.25% of the principal amount thereof.

The Company is required to make scheduled quarterly payments each equal to 0.25% of the original principal amount of the 2019 Term Loan Refinancing Facility with the balance due on February 2, 2026.

As of September 30, 2020, after total principal prepayments of $575.0 (which includes a $50.0 prepayment made during the nine months ended September 30, 2020) and regularly scheduled principal payments of $19.4, the total outstanding principal balance of the Term Loan Facility was $835.6 and the interest rate was 1.9%.

Under the Term Loan 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 of its asset sales, certain casualty and condemnation events and the incurrence or issuance of certain debt.

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 Term Loan 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, 2020, the Company was in compliance with all covenants under the Term Loan Credit Agreement.

Senior Secured Asset-Based Revolving Credit Facility

On February 1, 2019, in connection with the completion of the ESI Merger, the Company entered into an asset-based revolving credit agreement with Barclays Bank PLC, as administrative agent and collateral agent, the other borrowers from time to time party thereto, and the lenders and letters of credit issuers from time to time party thereto (the "ABL Credit Agreement"), that provides a senior secured asset-based revolving credit facility of up to $100.0, subject to a borrowing base limitation (the "ABL Facility"). On April 26, 2019, the Company entered into a First Amendment to the ABL Credit Agreement which amended the borrowing base calculation for eligible inventory prior to an initial field examination and appraisal requirements. The borrowing base for the ABL Facility at any time equals the sum of: (a) 85% of certain eligible accounts; plus (b) prior to certain notice and field examination and appraisal requirements, the lesser of (i) 20% of net book value of eligible inventory in the United States and (ii) 30% of the borrowing base, and after the satisfaction of such requirements, the lesser of (i) the lesser of (A) 65% of the lower of cost or market value of certain eligible inventory and (B) 85% of the net orderly liquidation value of certain eligible inventory and (ii) 30% of the borrowing base; minus (c) reserves established by the administrative agent, in each case, subject to additional limitations and examination requirements for eligible accounts and eligible inventory acquired in an acquisition after February 1, 2019. The ABL Facility includes borrowing capacity in the form of letters of credit up to $25.0.

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

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

If at any time the aggregate amount of outstanding loans, protective advances, unreimbursed letter of credit drawings and undrawn letters of credit under the ABL Facility exceeds the lesser of (a) the commitment amount and (b) the borrowing base, the Company is required to repay outstanding loans and/or cash collateralize letters of credit, with no reduction of the commitment amount. During any period that the amount available under the ABL Facility is less than the greater of (i) $8.5 and (ii) 10.0% of the lesser of (1) the commitment amount and (2) the borrowing base for three consecutive business days, until the time when excess availability has been at least the greater of (i) $8.5 and (ii) 10.0% of the lesser of (1) the commitment amount and (2) the borrowing base, in each case, for 30 consecutive calendar days (a "Cash Dominion Period"), or during the continuance of an event of default, the Company is required to repay outstanding loans and/or cash collateralize letters of credit with the cash that it is required to deposit daily in a collection account maintained with the administrative agent under the ABL Facility. During a Cash Dominion Period, the Company may make borrowings under the ABL Facility subject to the satisfaction of customary funding conditions.

There is no scheduled amortization under the ABL Facility. The principal amount outstanding under the ABL Facility is due and payable in full on the fifth anniversary of the closing date.

All obligations under the ABL 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.

From the time when the Company has excess availability less than the greater of (a) 10.0% of the lesser of (1) the commitment amount and (2) the borrowing base and (b) $8.5 until the time when the Company has excess availability equal to or greater than the greater of (a) 10.0% of the lesser of (1) the commitment amount and (2) the borrowing base and (b) $8.5 for 30 consecutive days, or during the continuance of an event of default, the ABL Credit Agreement requires the Company to maintain a Fixed Charge Coverage Ratio (as defined in the ABL Credit Agreement) tested on the last day of each fiscal quarter of at least 1.0 to 1.0.

The ABL Credit Agreement also contains customary representations and warranties, affirmative covenants and provisions relating to events of default. If an event of default occurs, the lenders under the ABL Facility will be entitled to take various actions, including the acceleration of amounts due under the ABL Facility and all actions permitted to be taken by a secured creditor. The Company has not borrowed against the ABL Facility to date.

Lines of Credit and Short-Term Borrowing Arrangements

The Company's Japanese subsidiaries have lines of credit and a financing facility with various financial institutions, many of which generally expire and are renewed at three-month intervals with the remaining having no expiration date. The lines of credit and financing facility provided for aggregate borrowings as of September 30, 2020 of up to an equivalent of $31.7 U.S. dollars. Total borrowings outstanding under these arrangements were $3.0 and $3.1 at September 30, 2020 and December 31, 2019, respectively.

	September 30, 2020	December 31, 2019
Short-term debt:		
Japanese lines of credit	$ 3.0	$ 2.5
Japanese receivables financing facility	—	0.6
Term Loan Facility	9.0	9.0
	$ 12.0	$ 12.1

	September 30, 2020	December 31, 2019
Long-term debt:		
Term Loan Facility, net(1)	$ 816.8	$ 871.6
Other debt	—	0.1
	$ 816.8	$ 871.7

(1) Net of deferred financing fees, original issue discount and repricing fees of $9.8 and $11.8 as of September 30, 2020 and December 31, 2019, respectively.

Contractual maturities of the Company's debt obligations as of September 30, 2020 are as follows:

Year	Amount
2020 (remaining)	$ 5.3
2021	9.0
2022	9.0
2023	9.0
2024	9.0
2025	9.0
Thereafter	788.3

12) Product Warranties

The Company provides for 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, 2020	Nine Months Ended September 30, 2019
Beginning of period	$ 14.9	$ 10.4
Assumed product warranty liability from ESI Merger	—	7.2
Provision for product warranties	20.2	18.7
Charges to warranty liability	(19.0)	(21.2)
End of period[1]	$ 16.1	$ 15.1

(1) As of September 30, 2020, short-term product warranty of $13.0 and long-term product warranty of $3.1 were included within other current liabilities and other non-current liabilities, respectively, within the accompanying condensed consolidated balance sheet. As of September 30, 2019, short-term product warranty of $12.0 and long-term product warranty of $3.1 were included within other current liabilities and other non-current liabilities, respectively, within the accompanying condensed consolidated balance sheet.

13) Income Taxes

The Company's effective tax rates for the three and nine months ended September 30, 2020 were 15.7 % and 17.0%, respectively. The effective tax rates for the three and nine months ended September 30, 2020, and related income tax expense, were lower than the U.S. statutory tax rate mainly due to the geographic mix of income earned by the Company's international subsidiaries being taxed at rates lower than the U.S. statutory tax rate, windfall benefits of stock compensation, and the deduction for foreign derived intangible income offset by the tax effects of the global intangible low taxed income inclusion and the write-off of deferred tax assets related to certain foreign net operating losses.

The Company's effective tax rates for the three and nine months ended September 30, 2019 were 14.4% and 20.4%, respectively. The effective tax rates for the three and nine months ended September 30, 2019, and related income tax expense, were lower than the U.S. statutory tax rate due to the deduction for foreign derived intangible income, the geographic mix of income earned by the Company's international subsidiaries being taxed at rates lower than the U.S. statutory tax rate and the impact of various tax credits, offset by the tax effects of the global intangible low-taxed income inclusion along with the correction of an out-of-period error with respect to deferred tax assets related to limitations on the deduction of executive compensation in the amount of $5.0. This correction, which was recorded during the three months ended June 30, 2019, but should have been recorded during the three months ended September 30, 2018, increased the Company's effective tax rate for the three and six months ended June 30, 2019 and the nine months ended September 30, 2019 by 9.8%, 7.5% and 3.8%, respectively. The error and subsequent adjustment were not material to prior or current interim and annual financial statements.

On March 27, 2020, the United States enacted the Coronavirus Aid, Relief, and Economic Security (CARES) Act which contains numerous income tax provisions among other tax and non-tax provisions. Some of these income tax provisions have retroactive effect on years before the date of enactment. The Company has evaluated the CARES Act legislation in relation to income taxes and does not expect the CARES Act income tax provisions to have a material impact on its financial statements.

The total amount of gross unrecognized tax benefits, which excludes interest and penalties, was $47.5 and $43.5 as of September 30, 2020 and December 31, 2019, respectively. As of September 30, 2020 if these benefits were recognized in a future period, the timing of which is not estimable, the net unrecognized tax benefit of $39.2, excluding interest and penalties, 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, 2020 and December 31, 2019, the Company had accrued interest on unrecognized tax benefits of $0.6 and $0.5, respectively.

Over the next 12 months, it is reasonably possible that the Company may recognize $0.9 of previously net unrecognized tax benefits, excluding interest and penalties, related to various U.S. state and foreign tax positions primarily as a result of the expiration of certain statutes of limitations.

The Company and its subsidiaries are subject to examination by U.S. federal, state and foreign tax authorities. The U.S. federal statute of limitations remains open for tax years 2016 through the present. The statute of limitations for the Company's tax filings in other jurisdictions varies between fiscal years 2014 through present. The Company has certain foreign, federal and state tax loss and credit carry-forwards that are open to examination for tax years 2000 through the present.

14) 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,	
	2020	2019	2020	2019
Numerator:				
Net income	$ 91.7	$ 47.4	$ 234.5	$ 97.6
Denominator:				
Shares used in net income per common share – basic	55,173,000	54,945,000	55,060,000	54,636,000
Effect of dilutive securities:				
Restricted stock units and stock appreciation rights	226,000	259,000	241,000	409,000
Shares used in net income per common share – diluted	55,399,000	55,204,000	55,301,000	55,045,000
Net income per common share:				
Basic	$ 1.66	$ 0.86	$ 4.26	$ 1.79
Diluted	$ 1.66	$ 0.86	$ 4.24	$ 1.77

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 ("RSUs") and stock appreciation rights ("SARs")) had been converted to such common shares, and if such assumed conversion is dilutive.

For the three and nine months ended September 30, 2020 there were approximately 2,600 and 900 weighted-average restricted stock units, respectively, that would have had an anti-dilutive effect on EPS, and were excluded from the computation of diluted weighted-average shares.

For the three and nine months ended September 30, 2019, there were approximately 204,000 and 165,000 weighted-average restricted stock units, respectively, that would have had an anti-dilutive effect on EPS, and were excluded from the computation of diluted weighted-average shares.

15) Stock-Based Compensation

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

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

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

As of the effective time of the ESI Merger, based on a formula in the ESI Merger Agreement, (a) such RSUs were converted automatically into RSUs with respect to 736,000 shares of the Company's common stock (the "Assumed RSUs"), and (b)

such SARs were converted automatically into SARs with respect to 13,000 shares of the Company's common stock (the "Assumed SARs").

Included in the total number of Assumed RSUs are 326,000 shares of the Company's common stock for employees and outside directors that are part of the ESI Deferred Compensation plan (the "ESI DC Plan"). These shares will not become issued shares until their respective release dates.

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

The 749,000 shares of the Company's common stock that are issuable pursuant to the Assumed RSUs and the Assumed SARs under the Company's 2014 Plan were registered under the Securities Act of 1933 on the Registration Statement on Form S-8. These shares are in addition to the 18,000,000 shares of the Company's common stock reserved for issuance under the 2014 Plan and previously registered under the Securities Act of 1933 on the Registration Statement on Form S-8.

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,	
	2020	2019	2020	2019
Cost of revenues	$ 1.2	$ 0.8	$ 3.1	$ 1.9
Research and development expense	1.0	1.0	3.0	2.8
Selling, general and administrative expense	5.1	4.0	15.9	16.2
Acquisition and integration related expense	0.1	1.2	0.7	20.8
Restructuring related expense	—	0.4	—	0.4
Total pre-tax stock-based compensation expense	$ 7.4	$ 7.4	$ 22.7	$ 42.1

At September 30, 2020, the total compensation expense related to unvested stock-based awards granted to employees and directors under the 2014 Plan that had not been recognized was $37.7. The future compensation expense for time-based awards is recognized on a straight-line basis and the future compensation expense for performance-based awards is recognized using the accelerated graded vesting method, both of which expense over the requisite service period, except for retirement eligible employees, in which case the Company expenses the fair value of the grant in the period the grant is issued.

The following table presents the activity for RSUs under the 2014 Plan:

	Nine Months Ended September 30, 2020	
	Outstanding RSUs	Weighted Average Grant Date Fair Value
RSUs – beginning of period	1,102,534	$ 85.93
Accrued dividend shares	535	$ 107.82
Granted	305,610	$ 98.25
Vested	(732,416)	$ 85.32
Forfeited	(63,094)	$ 85.40
RSUs – end of period	613,169	$ 92.87

The following table presents the activity for SARs under the 2014 Plan:

	Nine Months Ended September 30, 2020	
	Outstanding SARs	Weighted Average Grant Date Fair Value
SARs – beginning of period	108,854	$ 29.05
Exercised	(49,492)	$ 27.42
Forfeited or expired	(1,400)	$ 22.39
SARs – end of period	57,962	$ 30.61

16) Stockholders' Equity

Share Repurchase Program

On July 25, 2011, the Company's Board of Directors approved a share repurchase program for the repurchase of up to an aggregate of $200 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 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. The Company has repurchased approximately 2,588,000 shares of common stock for approximately $127 pursuant to the program since its adoption. During the three and nine months ended September 30, 2020 and 2019, there were no repurchases of common stock.

Cash Dividends

Holders of the Company's common stock are entitled to receive dividends when they are declared by the Company's Board of Directors. In addition, the Company accrues dividend equivalents on the RSUs the Company assumed in the ESI Merger described in Note 15 above when dividends are declared by the Company's Board of Directors. The Company's Board of Directors declared a cash dividend of $0.20 per share during each of the first, second and third quarters of 2020, which totaled $33.0, or $0.60 per share. The Company's Board of Directors declared a cash dividend of $0.20 per share during each of the first, second and third quarters of 2019, which totaled $32.6, or $0.60 per share.

On October 26, 2020, the Company's Board of Directors declared a quarterly cash dividend of $0.20 per share to be paid on December 4, 2020 to stockholders of record as of November 23, 2020.

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 Term Loan Facility and ABL Facility, the Company may be restricted from paying dividends under certain circumstances.

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

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

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

The Vacuum & Analysis segment provides a broad range of instruments, components and subsystems which are derived from the Company's core competencies in pressure measurement and control, flow measurement and control, gas and vapor delivery, gas composition analysis, electronic control technology, reactive gas generation and delivery, power generation and delivery 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, optics, precision motion control and vibration control.

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

The 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,	
	2020	2019	2020	2019
Vacuum & Analysis	$ 361.3	$ 240.7	$ 995.1	$ 710.7
Light & Motion	175.9	172.4	507.3	549.0
Equipment & Solutions	52.6	49.4	167.4	140.4
	$ 589.8	$ 462.5	$ 1,669.8	$ 1,400.1

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,	
	2020	2019	2020	2019
Gross profit by reportable segment:				
Vacuum & Analysis	$ 163.5	$ 102.8	$ 444.1	$ 303.0
Light & Motion	76.0	79.9	227.8	257.6
Equipment & Solutions	22.5	22.3	76.0	53.5
Total gross profit by reportable segment	262.0	205.0	747.9	614.1
Operating expenses:				
Research and development	42.5	41.7	127.7	122.3
Selling, general and administrative	87.0	82.1	260.3	247.8
Acquisition and integration costs	0.5	2.1	3.4	35.5
Restructuring and other	3.1	1.5	6.8	4.7
Amortization of intangible assets	12.5	17.0	42.6	50.3
Asset impairment	—	—	1.2	—
COVID-19 related net credits	—	—	(1.2)	—
Fees and expenses related to repricing of Term Loan Facility	—	0.6	—	6.5
Gain on sale of long-lived assets	—	(6.8)	—	(6.8)
Income from operations	116.4	66.8	307.1	153.8
Interest and other expense, net	7.6	11.4	24.6	31.2
Income before income taxes	108.8	55.4	282.5	122.6
Provision for income taxes	17.1	8.0	48.0	25.0
Net income	$ 91.7	$ 47.4	$ 234.5	$ 97.6

The following table sets forth capital expenditures by reportable segment for the three and nine months ended September 30, 2020 and 2019:

	Vacuum & Analysis	Light & Motion	Equipment & Solutions	Total
Three Months Ended September 30, 2020:				
Capital expenditures	$ 9.7	$ 12.9	$ 6.4	$ 29.0
Nine Months Ended September 30, 2020:				
Capital expenditures	$ 28.8	$ 21.4	$ 9.7	$ 59.9
Three Months Ended September 30, 2019:				
Capital expenditures	$ 7.4	$ 6.8	$ 2.3	$ 16.5
Nine Months Ended September 30, 2019:				
Capital expenditures	$ 21.6	$ 16.9	$ 6.2	$ 44.7

The following table sets forth depreciation and amortization by reportable segment for the three and nine months ended September 30, 2020 and 2019:

	Vacuum & Analysis	Light & Motion	Equipment & Solutions	Total
Three Months Ended September 30, 2020:				
Depreciation and amortization	$ 5.1	$ 9.6	$ 8.6	$ 23.3
Nine Months Ended September 30, 2020:				
Depreciation and amortization	$ 15.1	$ 33.5	$ 27.2	$ 75.8
Three Months Ended September 30, 2019:				
Depreciation and amortization	$ 4.2	$ 13.0	$ 10.0	$ 27.2
Nine Months Ended September 30, 2019:				
Depreciation and amortization	$ 12.2	$ 40.4	$ 27.3	$ 79.9

Total income tax expense is not presented by reportable segment because the necessary information is not available nor used by the CODM.

The following table sets forth segment assets by reportable segment:

September 30, 2020	Vacuum & Analysis	Light & Motion	Equipment & Solutions	Corporate, Eliminations & Other	Total
Segment assets:					
Trade accounts receivable, net	$ 202.9	$ 143.7	$ 42.5	$ (25.2)	$ 363.9
Inventory, net	261.0	169.9	64.6	(1.3)	494.2
Total segment assets	$ 463.9	$ 313.6	$ 107.1	$ (26.5)	$ 858.1

December 31, 2019	Vacuum & Analysis	Light & Motion	Equipment & Solutions	Corporate, Eliminations & Other	Total
Segment assets:					
Trade accounts receivable, net	$ 185.9	$ 147.2	$ 40.1	$ (32.1)	$ 341.1
Inventory, net	224.8	163.7	73.5	0.1	462.1
Total segment assets	$ 410.7	$ 310.9	$ 113.6	$ (32.0)	$ 803.2

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

	September 30, 2020	December 31, 2019
Total segment assets	$ 858.1	$ 803.2
Cash and cash equivalents	493.3	414.6
Short-term investments	222.4	109.4
Other current assets	95.9	106.3
Property, plant and equipment, net	267.9	241.9
Right-of-use asset	180.1	64.5
Goodwill and intangible assets, net	1,585.4	1,623.1
Other assets and long-term investments	47.8	53.3
Consolidated total assets	$ 3,750.9	$ 3,416.3

Geographic

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

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2020	2019	2020	2019
Net revenues:				
United States	$ 281.2	$ 211.1	$ 757.7	$ 653.0
South Korea	65.8	41.3	206.8	116.0
China	67.6	46.7	192.5	140.5
Japan	39.9	32.4	117.1	105.5
Israel	34.3	26.4	98.3	76.6
Germany	29.4	36.4	94.3	111.9
Other	71.6	68.2	203.1	196.6
	$ 589.8	$ 462.5	$ 1,669.8	$ 1,400.1

Long-lived assets:(1)	September 30, 2020	December 31, 2019
United States	$ 353.1	$ 208.3
Europe	37.3	41.4
Asia	88.7	89.6
	$ 479.1	$ 339.3

(1) Long-lived assets include property, plant and equipment, net, right-of-use assets, and certain other assets, and exclude goodwill, intangible assets and long-term tax-related accounts.

Goodwill associated with each of the Company's reportable segments is as follows:

	September 30, 2020	December 31, 2019
Reportable segment:		
Vacuum & Analysis	$ 196.5	$ 196.7
Light & Motion	391.7	388.5
Equipment & Solutions	473.9	473.3
Total goodwill	$ 1,062.1	$ 1,058.5

Major Customers

For the three and nine months ended September 30, 2020, the Company had two customers that each accounted for 10% or more of the Company's total net revenues. Net revenues from LAM Research Corporation constituted 14.1% and 12.3%, of the Company's total net revenues for the three and nine month periods ended September 30, 2020, respectively, and net revenues from Applied Materials, Inc. constituted 11.0% and 10.8% of the Company's total net revenues for the same periods. For the three and nine months ended September 30, 2019, no single customer accounted for 10% or more of the Company's total net revenues.

18) Restructuring and Other

Restructuring

The Company recorded restructuring charges of $0.8 and $1.4 during the three and nine months ended September 30, 2020, related to the pending closure of a facility in Europe and costs related to the exit of certain product groups.

The Company recorded restructuring charges of $1.5 and $3.0 during the three and nine months ended September 30, 2019, primarily related to severance costs as a result of an organization-wide reduction in workforce, the consolidation of service functions in Asia and the movement of certain products to low cost regions.

Restructuring activities were as follows:

	Nine Months Ended September 30,	
	2020	2019
Beginning of period restructuring accrual	$ 3.7	$ 2.6
Charged to expense	1.4	3.0
Payments and adjustments	(3.8)	(3.1)
End of period restructuring accrual	$ 1.3	$ 2.5

Other

The Company recorded charges of $2.3 and $5.9 during the three and nine months ended September 30, 2020, respectively, related to duplicate facility costs.

The Company received an insurance reimbursement of $0.5 during the nine months ended September 30, 2020 for costs recorded on a legal settlement from a contractual obligation assumed as part of the acquisition of Newport. The Company recorded a charge of $1.7 during the nine months ended September 30, 2019 related to this legal settlement.

19) Commitments and Contingencies

In 2016, two putative class actions lawsuit captioned Dixon Chung v. Newport Corp., et al., Case No. A-16-733154-C, and Hubert C. Pincon v. Newport Corp., et al., Case No. A-16-734039-B, were filed in the District Court, Clark County, Nevada on behalf of a putative class of stockholders of Newport for claims related to the merger agreement ("Newport Merger Agreement") between the Company, Newport, and a wholly-owned subsidiary of the Company ("Merger Sub"). The lawsuits named as defendants the Company, Newport, Merger Sub, and certain then current and former members of Newport's board of directors. Both complaints alleged that Newport directors breached their fiduciary duties to Newport's stockholders by agreeing to sell Newport through an inadequate and unfair process, which led to inadequate and unfair consideration, by agreeing to unfair deal protection devices and by omitting material information from the proxy statement. The complaints also alleged that the Company, Newport and Merger Sub aided and abetted the directors' alleged breaches of their fiduciary duties. The Court consolidated the actions, and plaintiffs later filed an amended complaint captioned In re Newport Corporation Shareholder Litigation, Case No. A-16-733154-B, in the District Court, Clark County, Nevada, on behalf of a putative class of Newport's stockholders for claims related to the Newport Merger Agreement. The amended complaint alleged Newport's former board of directors breached their fiduciary duties to Newport's stockholders and that the Company, Newport and Merger Sub had aided and abetted these breaches and sought monetary damages, including pre- and post-judgment interest. In June 2017, the Court granted defendants' motion to dismiss and dismissed the amended complaint against all defendants but granted plaintiffs leave to amend.

On July 27, 2017, plaintiffs filed a second amended complaint containing substantially similar allegations but naming only Newport's former directors as defendants. On August 8, 2017, the Court dismissed the Company and Newport from the action. The second amended complaint seeks monetary damages, including pre- and post-judgment interest. The Court granted a motion for class certification on September 27, 2018, appointing Mr. Pincon and Locals 302 and 612 of the International Union of Operating Engineers - Employers Construction Industry Retirement Trust as class representatives. On June 11, 2018, plaintiff Dixon Chung was voluntarily dismissed from the litigation. On August 9, 2019, plaintiffs filed a motion for leave to file a third amended complaint, which was denied on October 10, 2019. On August 23, 2019, defendants filed a motion for summary judgment. On January 23, 2020, the court entered its findings of fact, conclusions of law, and order granting defendants' motion for summary judgment. On February 18, 2020, plaintiffs filed a notice of appeal from the court's order granting defendants' motion for summary judgment, as well as from the court's prior orders granting defendants' motion for a bench trial and denying plaintiffs' motion for leave to file an amended complaint. On March 20, 2020, plaintiffs filed a motion to retax and settle costs, and defendants filed a motion for costs, interest, and attorneys' fees. On August 4, 2020, the court issued a bench ruling granting in part and denying in part defendants' motion for costs, interest, and attorneys' fees, and granting in part and denying in part plaintiffs' motion to retax and settle costs.

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

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

This Quarterly Report on Form 10-Q contains "forward-looking statements" within the meaning of the Private Securities Litigation Reform Act of 1995, Section 27A of the Securities Act of 1933 and Section 21E of the Securities Exchange Act of 1934 regarding the future financial performance, business prospects and growth of MKS. These statements are only predictions based on current assumptions and expectations. Any statements that are not statements of historical fact (including statements containing the words "will," "projects," "intends," "believes," "plans," "anticipates," "expects," "estimates," "forecasts," "continues" and similar expressions) should be considered to be forward-looking statements. Actual events or results may differ materially from those in the forward-looking statements set forth herein. Among the important factors that could cause actual events to differ materially from those in the forward-looking statements are the conditions affecting the markets in which MKS operates, including the fluctuations in capital spending in the semiconductor industry and other advanced manufacturing markets, fluctuations in sales to our major customers, the impact of the COVID-19 pandemic on the global economy and financial markets, including any restrictions on MKS' operations and the operations of MKS' customers and suppliers resulting from public health requirements and government mandates, the terms of our Term Loan Facility, competition from larger or more established companies in MKS' markets, MKS' ability to successfully grow its business and particularly that of ESI's business, the challenges, risks and costs involved with integrating the operations of the companies we have acquired, potential fluctuations in quarterly results, dependence on new product development, rapid technological and market change, acquisition strategy, manufacturing and sourcing risks, volatility of stock price, international operations, financial risk management, and the other factors described in MKS' most recent Annual Report on Form 10-K for the year ended December 31, 2019 and any subsequent Quarterly Reports on Form 10-Q, as filed with the U.S. Securities and Exchange Commission (the "SEC"). MKS is under no obligation to, and expressly disclaims any obligation to, update or alter these forward-looking statements, whether as a result of new information, future events or otherwise after the date of this presentation.

The Management's Discussion and Analysis of Financial Condition and Results of Operations, or MD&A, describes principal factors affecting the results of our operations, financial condition and liquidity, as well as our critical accounting policies and estimates that require significant judgment and thus have the most significant potential impact on our Consolidated Financial Statements. This section provides an analysis of our financial results for the three and nine months ended September 30, 2020 compared to the three and nine months ended September 30, 2019.

Overview

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

Recent Events

Impact of COVID-19

The World Health Organization formally declared the outbreak of COVID-19 a pandemic in March 2020. This pandemic has impacted the global economy and we have devoted considerable resources to address the impact to our employees and manufacturing capacity, as well as how to manage government mandates reacting to the pandemic, supply chain disruptions, and changing demand from our customers for our products and services.

In January 2020, we created a global COVID-19 task force which oversees our corporate activities in response to the pandemic. Our response has focused on:

Health and Safety of our Workforce

- Expediting social distancing and facility sanitation measures
- Establishing work-from-home policy and return to work policies
- Implementing and applying key safety precautions

Continuity of Operations

- Securing critical components amidst disruptions to supply chain
- Addressing rapid changes in workforce availability to ensure timely response to customer needs
- Harnessing our global services footprint to respond to the repair and maintenance needs of our customers

While our operations and financial performance in certain areas of our business have been negatively impacted by the COVID-19 pandemic, the impact to our financial results for the three and nine months ended September 30, 2020 has been minimal due to strong demand for our products from our semiconductor customers. However, the situation remains dynamic and there remains significant uncertainty as to the length and severity of the pandemic, the actions that may be taken by government authorities, the impact to the business of our customers and suppliers, the long-term economic implications and other factors identified in Part II, Item IA "Risk Factors" in our Quarterly Report on Form 10-Q for the three months ended March 31, 2020, which was filed with the SEC on May 6, 2020. We believe the longer the COVID-19 pandemic continues, the more material the adverse impact could be on our business, financial condition and operating results. We will continue to evaluate the nature and extent of the impact to our business, financial condition and operating results.

Segments and Markets

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, electronic control technology, reactive gas generation and delivery, power generation and delivery, 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, optics, precision motion control and vibration control.

The Equipment & Solutions segment was created in conjunction with the completion of our acquisition of Electro Scientific Industries, Inc. on February 1, 2019 (the "ESI Merger"). The Equipment & Solutions segment provides laser-based manufacturing systems solutions for the micro-machining industry that enable customers to optimize production. The primary served markets for the Equipment & Solutions segment include flexible and rigid printed circuit board ("PCB") processing/fabrication, semiconductor wafer processing and passive component manufacturing and testing. The Equipment & Solutions segment's systems incorporate specialized laser technology and proprietary control software to efficiently process the materials and components that are an integral part of electronic devices and systems.

We have a diverse base of customers. Approximately 60% and 52% of our net revenues, for the nine months ended September 30, 2020 and 2019, respectively, were from sales to semiconductor capital equipment manufacturers and semiconductor device manufacturers.

Approximately 40% and 48% of our net revenues, for the nine months ended September 30, 2020 and 2019, respectively, were from sales to customers in our advanced markets. These include, but are not limited to, industrial technologies, life and health sciences, and research and defense.

Net revenues from semiconductor capital equipment manufacture and semiconductor device manufacture customers increased by $136.1 million, or 61%, for the three months ended September 30, 2020, compared to the same period in the prior year, primarily due to an increase of $125.1 million from our Vacuum & Analysis segment. Net revenues from semiconductor capital equipment manufacture and semiconductor device manufacture customers increased by $335.9 million, or 51%, for the nine months ended September 30, 2020, compared to the same period in the prior year, primarily due to an increase of $305.9 million from our Vacuum & Analysis segment. These increases were primarily driven by broad-based demand across foundry, logic and memory manufacturing activities. The semiconductor capital equipment industry is subject to rapid demand shifts, which are difficult to predict, and we cannot be certain as to the timing or extent of future demand or any future weakness in the semiconductor capital equipment industry.

Net revenues from customers in our advanced markets decreased by $8.7 million, or 4%, for the three months ended September 30, 2020, compared to the same period in the prior year, primarily due to a decrease of $6.2 million from our Light & Motion segment. Net revenues from customers in our advanced markets decreased by $66.1 million, or 9%, for the nine months ended September 30, 2020, compared to the same period in the prior year, primarily due to a decrease of $62.8 million from our Light & Motion segment. Our advanced markets experienced an overall decline for the nine months ended September 30, 2020 driven by a general slowdown in our industrial markets as well as in our research market which was negatively impacted by university and research lab closures resulting from the COVID-19 pandemic.

A significant portion of our net revenues is from sales to customers in international markets. For the nine months ended September 30, 2020 and 2019, international net revenues accounted for approximately 55% and 53%, respectively, of our total net revenues. A significant portion of our international net revenues was from South Korea, China, Japan, Israel and Germany. We expect international net revenues will continue to represent a significant percentage of our total net revenues. Long-lived assets located in the

United States were $353.1 million and $208.3 million, as of September 30, 2020 and December 31, 2019, respectively, excluding goodwill, intangible assets, and long-term tax-related accounts. The increase in long-lived assets in the United States, comparing September 30, 2020 to December 31, 2019, was primarily related to an increase in the right-of-use asset for new facility leases. Long-lived assets located outside of the United States were $126.0 million and $131.0 million, as of September 30, 2020 and December 31, 2019, respectively, excluding goodwill, intangible assets, and long-term tax-related accounts.

Critical Accounting Policies and Estimates

The preparation of our consolidated financial statements and related disclosures in conformity with accounting principles generally accepted in the United States requires management to make judgments, assumptions and estimates that affect the amounts reported. There have been no material changes in our critical accounting policies since December 31, 2019.

While we do not believe that the impact on the business to date of the COVID-19 pandemic has triggered the need to perform an impairment test on goodwill, we will continue to assess the impact of the pandemic on our business.

For further information about our critical accounting policies, please see the discussion of critical accounting policies in our Annual Report on Form 10-K for the year ended December 31, 2019 in the section captioned “Management’s Discussion and Analysis of Financial Condition and Results of Operations – Critical Accounting Policies and Estimates.”

Results of Operations

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

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2020	2019	2020	2019
Net revenues:				
Product	85.9%	83.5%	86.3%	84.6%
Services	14.1	16.5	13.7	15.4
Total net revenues	100.0	100.0	100.0	100.0
Cost of revenues:				
Cost of product revenues	47.6	46.8	47.6	48.0
Cost of service revenues	8.0	8.9	7.6	8.1
Total cost of revenues (exclusive of amortization shown separately below)	55.6	55.7	55.2	56.1
Gross profit	44.4	44.3	44.8	43.9
Research and development	7.2	9.0	7.7	8.8
Selling, general and administrative	14.7	17.8	15.6	17.7
Acquisition and integration costs	0.1	0.5	0.2	2.5
Restructuring and other	0.5	0.3	0.4	0.3
Amortization of intangible assets	2.1	3.7	2.5	3.6
Asset impairment	—	—	0.1	—
COVID-19 related net credits	—	—	(0.1)	—
Fees and expenses related to repricing of Term Loan	—	0.1	—	0.5
Gain on sale of long-lived assets	—	(1.5)	—	(0.5)
Income from operations	19.8	14.4	18.4	11.0
Interest income	—	0.3	0.1	0.3
Interest expense	1.1	2.9	1.4	2.5
Other expense (income), net	0.2	(0.2)	0.2	—
Income before income taxes	18.5	12.0	16.9	8.8
Provision for income taxes	2.9	1.7	2.9	1.8
Net income	15.6%	10.3%	14.0%	7.0%

Net Revenues

(dollars in millions)	Three Months Ended September 30, 2020	Three Months Ended September 30, 2019	Nine Months Ended September 30, 2020	Nine Months Ended September 30, 2019
Product	$ 506.8	$ 386.2	$ 1,441.0	$ 1,184.9
Service	83.0	76.3	228.8	215.2
Total net revenues	$ 589.8	$ 462.5	$ 1,669.8	$ 1,400.1

Product revenues increased $120.6 million and $256.1 million during the three and nine months ended September 30, 2020, respectively, compared to the same periods in the prior year. These increases were primarily attributed to increases in net product revenues from our semiconductor customers, primarily due to higher volume, of $128.5 million and $326.5 million, for these same periods, respectively, partially offset by a decrease in net product revenues from customers in our advanced markets of $7.9 million and $70.4 million, for these same periods, respectively.

Service revenues consisted mainly of fees for services related to the maintenance and repair of our products, sales of spare parts, and installation and training. Service revenues increased $6.7 million and $13.5 million during the three and nine months ended September 30, 2020, compared to the same periods in the prior year. The increase in service revenues for the three months ended September 30, 2020 was primarily attributed to an increase in service revenues from customers in our semiconductor market in our Vacuum & Analysis and Light & Motion segments. The increase in service revenues for the nine months ended September 30, 2020, was primarily attributed to an increase in service revenues from customers in our advanced markets in our Equipment & Solutions segment and from customers in our semiconductor market in our Vacuum & Analysis segment.

Total international net revenues, including product and service, were $308.6 million and $912.1 million for the three and nine months ended September 30, 2020, respectively, compared to $251.3 million and $747.1 million for the three and nine months ended September 30, 2019, respectively. These increases were primarily attributed to increases in net revenues in South Korea and China.

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

(dollars in millions)	Three Months Ended September 30, 2020	Three Months Ended September 30, 2019	Nine Months Ended September 30, 2020	Nine Months Ended September 30, 2019
Net revenues:				
Vacuum & Analysis	$ 361.3	$ 240.7	$ 995.1	$ 710.7
Light & Motion	175.9	172.5	507.3	549.0
Equipment & Solutions	52.6	49.3	167.4	140.4
Total net revenues	$ 589.8	$ 462.5	$ 1,669.8	$ 1,400.1

Net revenues from our Vacuum & Analysis segment increased $120.6 million and $284.4 million for the three and nine months ended September 30, 2020, respectively, compared to the same periods in the prior year, due to volume increases in net revenues from semiconductor customers of $125.1 million and $305.9 million for the three and nine months ended September 30, 2020, respectively, offset by decreases in net revenues from customers in our advanced markets of $4.5 million and $21.5 million for the same periods, respectively, primarily from customers in our industrial technologies market.

Net revenues from our Light & Motion segment increased $3.4 million and decreased $41.7 million for the three and nine months ended September 30, 2020, respectively, compared to the same periods in the prior year. The decrease for the nine months ended September 30, 2020 was attributed to a decrease in revenues from customers in our advanced markets of $62.8 million, primarily from customers in our industrial technologies and research and defense markets, offset by an increase of $21.1 million in net revenues from semiconductor customers.

Net revenues from our Equipment & Solutions segment increased $3.3 million and $27.0 million for the three and nine months ended September 30, 2020, compared to the same periods in the prior year, due to increases in net revenues from customers in our advanced markets of $1.9 million and $18.1 million, respectively, and increases in net revenues from semiconductor customers of $1.4 million and $8.9 million, respectively.

Gross Margin

	Three Months Ended September 30,			Nine Months Ended September 30,		
	2020	2019	% Points Change	2020	2019	% Points Change
Gross margin as a percentage of net revenues:						
Product	44.6%	44.0%	0.6%	44.9%	43.3%	1.6%
Service	43.2	46.0	(2.8)	44.4	47.1	(2.7)
Total gross margin	44.4%	44.3%	0.1%	44.8%	43.9%	0.9%

Gross margin as a percentage of net product revenues increased by 0.6 and 1.6 percentage points for the three and nine months ended September 30, 2020, respectively, compared to the same periods in the prior year, primarily due to higher revenue volumes and favorable absorption, partially offset by unfavorable product mix and higher logistics costs.

Gross margin as a percentage of net service revenues decreased by 2.8 and 2.7 percentage points for the three and nine months ended September 30, 2020, respectively, compared to the same periods in the prior year, primarily due to unfavorable absorption partially offset by favorable mix of products serviced.

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

	Three Months Ended September 30,			Nine Months Ended September 30,		
	2020	2019	% Points Change	2020	2019	% Points Change
Gross margin as a percentage of net revenues:						
Vacuum & Analysis	45.3%	42.7%	2.6%	44.6%	42.6%	2.0%
Light & Motion	42.8	46.0	(3.2)	44.7	46.5	(1.8)
Equipment & Solutions	43.0	44.5	(1.5)	45.4	38.5	6.9
Total gross margin	44.4%	44.3%	0.1%	44.8%	43.9%	0.9%

Gross margin for our Vacuum & Analysis segment increased by 2.6 and 2.0 percentage points for the three and nine months ended September 30, 2020, respectively, compared to the same periods in the prior year, primarily due to higher revenue volumes.

Gross margin for our Light & Motion segment decreased by 3.2 percentage points for the three months ended September 30, 2020, compared to the same period in the prior year, primarily due to unfavorable product mix and higher excess and obsolete inventory charges. Gross margin decreased by 1.8 percentage points for the nine months ended September 30, 2020 compared to the same period in the prior year primarily due to lower revenue volumes, unfavorable product mix and higher excess and obsolete inventory charges.

Gross margin for our Equipment & Solutions segment decreased by 1.5 percentage points for the three months ended September 30, 2020, compared to the same period in the prior year, mainly due to unfavorable product mix. Gross margin increased by 6.9 percentage points for the nine months ended September 30, 2020, compared to the same period in the prior year, mainly as a result of an inventory step-up adjustment to fair value from purchase accounting of $7.6 million for the nine months ended September 30, 2019. Excluding this adjustment, gross margin for our Equipment & Solutions segment for the nine months ended September 30, 2019 would have been 43.6%.

Research and Development

	Three Months Ended September 30,		Nine Months Ended September 30,	
(dollars in millions)	2020	2019	2020	2019
Research and development expenses	$ 42.5	$ 41.6	$ 127.7	$ 122.4

Research and development expenses increased $0.9 million for the three months ended September 30, 2020, compared to the same period in the prior year. The increase was primarily related to an increase of $3.0 million in compensation-related costs, partially offset by a decrease of $2.2 million in project materials. Research and development expenses increased $5.3 million for the nine months ended September 30, 2020, compared to the same period in the prior year. The increase was primarily related to an increase of $6.8 million in compensation-related costs, mainly related to variable compensation, $1.1 million in professional fees, $1.1 million in software maintenance, partially offset by a decrease of $3.3 million in project materials and $1.0 million in travel costs.

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

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

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

Selling, General and Administrative

	Three Months Ended September 30,		Nine Months Ended September 30,	
(dollars in millions)	2020	2019	2020	2019
Selling, general and administrative expenses	$ 87.0	$ 82.1	$ 260.3	$ 247.8

Selling, general and administrative expenses increased $4.9 million for the three months ended September 30, 2020, compared to the same period in the prior year. The increase was primarily related to an increase of $6.8 million in compensation-related costs and $1.0 million in information technology costs, partially offset by a decrease of $2.2 million in travel costs, mainly as a result of the COVID-19 pandemic, and a decrease of $1.0 million in bad debt expense.

Selling, general and administrative expenses increased $12.5 million for the nine months ended September 30, 2020, compared to the same period in the prior year. The increase was primarily related to an increase of $14.1 million in compensation-related costs, $3.3 million in information technology costs and $0.8 million in commissions expense, partially offset by a $6.3 million decrease in travel costs, mainly as a result of the COVID-19 pandemic.

Acquisition and Integration Costs

	Three Months Ended September 30,		Nine Months Ended September 30,	
(dollars in millions)	2020	2019	2020	2019
Acquisition and integration costs	$ 0.5	$ 2.1	$ 3.4	$ 35.5

We recorded acquisition and integration costs related to the ESI Merger, which closed on February 1, 2019, during the three and nine months ended September 30, 2020 and 2019. The costs for the three and nine months ended September 30, 2020 consisted of cash bonus and stock-based compensation for certain ESI executives assisting in the integration process. The costs for the three and nine months ended September 30, 2019 consisted primarily of compensation costs for certain executives from ESI who had change in control provisions in their respective ESI employment agreements that were accounted for as dual-trigger arrangements and other stock vesting accelerations, as well as consulting and professional fees associated with the ESI Merger.

Restructuring and Other

	Three Months Ended September 30,		Nine Months Ended September 30,	
(dollars in millions)	2020	2019	2020	2019
Restructuring and other	$ 3.1	$ 1.5	$ 6.8	$ 4.7

Restructuring and other related costs during the three and nine months ended September 30, 2020 primarily related to duplicate facility costs attributed to entering into new facility leases, costs related to the exit of certain product groups and costs related to the pending closure of a facility in Europe. Such costs for the nine months ended September 30, 2020 were offset by an insurance reimbursement related to a legal settlement.

Restructuring and other related costs during the three and nine months ended September 30, 2019 consisted primarily of severance costs related to an organization-wide reduction in workforce, the consolidation of service functions in Asia and the movement of certain products to low cost regions. During the nine months ended September 30, 2019, we also recorded a charge from a contractual obligation we assumed as part of the Newport Merger.

Amortization of Intangible Assets

	Three Months Ended September 30,		Nine Months Ended September 30,	
(dollars in millions)	2020	2019	2020	2019
Amortization of intangible assets	$ 12.5	$ 17.0	$ 42.6	$ 50.3

Amortization of intangible assets decreased by $4.5 million and $7.7 million during the three and nine months ended September 30, 2020, respectively, compared to the same periods in the prior year, primarily due to certain intangible assets in our Light & Motion segment that were fully amortized.

Asset Impairment

	Three Months Ended September 30,		Nine Months Ended September 30,	
(dollars in millions)	2020	2019	2020	2019
Asset impairment	$ —	$ —	$ 1.2	$ —

We recorded an asset impairment charge during the nine months ended September 30, 2020, as a result of the write-down of long-lived assets related to the pending closure of a facility in Europe.

COVID-19 Related Net Credits

	Three Months Ended September 30,		Nine Months Ended September 30,	
(dollars in millions)	2020	2019	2020	2019
COVID-19 related net credits	$ —	$ —	$ (1.2)	$ —

We recorded costs and credits related to the COVID-19 pandemic during the nine months ended September 30, 2020. The credits related to U.S. and foreign payroll-tax related credits for maintaining our workforce during the pandemic, offset by costs, which included shift premiums and bonuses.

Fees and Expenses Related to Repricing of Term Loan Facility

	Three Months Ended September 30,		Nine Months Ended September 30,	
(dollars in millions)	2020	2019	2020	2019
Fees and expenses related to repricing of Term Loan Facility	$ —	$ 0.6	$ —	$ 6.5

We recorded fees and expenses related to Amendment No. 5 and Amendment No. 6 to our Term Loan Credit Agreement, as defined and as described further below, which provided for the 2019 Incremental Term Loan Facility, as defined and as described further below, and which related to the ESI Merger, during the three and nine months ended September 30, 2019.

Gain on Sale of Long-Lived Assets

	Three Months Ended September 30,		Nine Months Ended September 30,	
(dollars in millions)	2020	2019	2020	2019
Gain on sale of long-lived assets	$ —	$ (6.8)	$ —	$ (6.8)

We recorded a net gain on the sale of two of our buildings in Boulder, Colorado and three of our buildings in Portland, Oregon during the three and nine months ended September 30, 2019.

Interest Expense, Net

	Three Months Ended September 30,		Nine Months Ended September 30,	
(dollars in millions)	2020	2019	2020	2019
Interest expense, net	$ 6.5	$ 12.3	$ 21.6	$ 31.0

Interest expense, net, decreased by $5.8 million and $9.4 million for the three and nine months ended September 30, 2020, respectively, compared to the same periods in the prior year, primarily due to lower interest expense as a result of lower interest rates and lower average debt balances as a result of various debt prepayments made in 2019 and the nine months ended September 30, 2020.

Other Expense (Income), Net

	Three Months Ended September 30,		Nine Months Ended September 30,	
(dollars in millions)	2020	2019	2020	2019
Other expense (income), net	$ 1.1	$ (0.9)	$ 3.0	$ 0.2

The changes in other expense (income), net, for the three and nine months ended September 30, 2020 and 2019, respectively, primarily related to changes in foreign exchange rates.

Provision for Income Taxes

	Three Months Ended September 30,		Nine Months Ended September 30,	
(dollars in millions)	2020	2019	2020	2019
Provision for income taxes	$ 17.1	$ 8.0	$ 48.0	$ 25.0

Our effective tax rates for the three and nine months ended September 30, 2020 were 15.7% and 17.0%, respectively. Our effective tax rates for the three and nine months ended September 30, 2020 and related income tax expense, were lower than the U.S. statutory tax rate mainly due to the geographic mix of income earned by the international subsidiaries being taxed at rates lower than the U.S. statutory tax rate, windfall benefits of stock compensation, and the deduction for foreign derived intangible income offset by the tax effects of the global intangible low taxed income inclusion and the write-off of deferred tax assets related to certain foreign net operating losses.

As of September 30, 2020 and December 31, 2019, the total amount of gross unrecognized tax benefits, which excludes interest and penalties, was approximately $47.5 million and $43.5 million, respectively. As of September 30, 2020, if these benefits were recognized in a future period, the timing of which is not estimable, the net unrecognized tax benefit of $39.2 million, excluding interest and penalties, would impact our effective tax rate.

Over the next 12 months it is reasonably possible that we may recognize approximately $0.9 million of previously net unrecognized tax benefits, excluding interest and penalties, related to federal, state and foreign tax positions as a result of the expiration of statutes of limitation. The U.S. federal statute of limitations remains open for tax years 2016 through present. The statute of limitations for our tax filings in other jurisdictions varies between fiscal years 2014 through the present. We also have certain foreign, federal and state tax loss and credit carry-forwards that are open to examination for tax years 2000 through the present.

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

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

During the three months ended September 30, 2020, the U.S. Treasury Department and the U.S. Internal Revenue Service issued proposed and final regulations regarding various tax provisions of the Tax Cuts and Jobs Act of 2017 that could impact our provision for income taxes. We do not expect the impact of any changes to have a material impact on our results of operations, financial condition or cash flows.

Liquidity and Capital Resources

Cash and cash equivalents and short-term marketable investments totaled $715.7 million at September 30, 2020, compared to $524.0 million at December 31, 2019. The primary driver in our current and anticipated future cash flows is and will continue to be cash generated from operations, consisting primarily of our net income, excluding non-cash charges and changes in operating assets and liabilities. In periods when our sales are growing, higher sales to customers will result in increased trade receivables, and inventories will generally increase as we build products for future sales. This may result in lower cash generated from operations. Conversely, in periods when our sales are declining, our trade accounts receivable and inventory balances will generally decrease, resulting in increased cash from operations.

Net cash provided by operating activities was $366.0 million for the nine months ended September 30, 2020 and resulted from net income of $234.5 million, which included non-cash charges of $122.7 million, and a net decrease in working capital of $8.8 million. The net decrease in working capital was primarily due to an increase in other current and non-current liabilities of $25.8, an increase in accounts payable of $24.5 million an increase in income taxes of $21.4 and a decrease in other current and non-current assets of $10.9, offset by an increase in inventories of $47.1 million, an increase in trade accounts receivable of $20.9 million and a decrease in accrued compensation of $5.8 million. The increases in accounts receivable, inventory and accounts payable are all the result of increased business levels during the nine months ended September 30, 2020.

Net cash used in investing activities was $172.3 million for the nine months ended September 30, 2020 and was primarily due to net purchases of short-term investments of $112.4 million and the purchases of production-related equipment of $59.9 million.

Net cash used in financing activities was $115.3 million for the nine months ended September 30, 2020 and was primarily due to net payments on short and long-term borrowings of $77.0 million, dividend payments of $33.0 million and net payments related to tax payments on the vesting of employee stock awards of $25.4 million. These uses were partially offset by net proceeds from short-term borrowings of $20.1 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. We have repurchased approximately 2.6 million shares of common stock for approximately $127 million pursuant to the program since its adoption. During the nine months ended September 30, 2020 and 2019, there were no repurchases of common stock.

Holders of our common stock are entitled to receive dividends when and if they are declared by our Board of Directors. In addition, we accrue dividend equivalents on the restricted stock units we assumed in the ESI Merger when dividends are declared by the Company's Board of Directors. Our Board of Directors declared a cash dividend of $0.20 per share during each of the first, second and third quarters of 2020, which totaled $33.0 million, or $0.60 per share. Our Board of Directors declared a cash dividend of $0.20 per share during each of the first, second and third quarters of 2019, which totaled $32.6 million, or $0.60 per share.

On October 26, 2020, our Board of Directors declared a quarterly cash dividend of $0.20 per share to be paid on December 4, 2020 to stockholders of record as of November 23, 2020.

Future dividend declarations, if any, as well as the record and payment dates for such dividends, are subject to the final determination of our Board of Directors. In addition, under the terms of our Term Loan Facility and ABL Facility, we may be restricted from paying dividends under certain circumstances.

Senior Secured Term Loan Credit Facility

In connection with the completion of the acquisition of Newport Corporation (“Newport”) in April 2016 (the “Newport Merger”), we entered into a term loan credit agreement (the “Term Loan 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 a senior secured term loan credit facility in the original principal amount of $780.0 million (the “2016 Term Loan Facility”), subject to increase at our option and subject to receipt of lender commitments in accordance with the Term Loan Credit Agreement (the 2016 Term Loan Facility, together with the 2019 Incremental Term Loan Facility and 2019 Term Loan Refinancing Facility (each as defined below), the “Term Loan Facility”). Prior to the effectiveness of Amendment No. 6 (as defined below), the 2016 Term Loan Facility had a maturity date of April 29, 2023. As of September 30, 2020, borrowings under the Term Loan 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*, (3) a London Interbank Offer Rate (“LIBOR”) rate determined by reference to the costs of funds for U.S. dollar deposits for an interest period of one month adjusted for certain additional costs, plus 1.00%, and (4) a floor of 1.75%, plus, in each case, an applicable margin; or (b) a LIBOR rate determined by reference to the costs of funds for U.S. dollar deposits for the interest period relevant to such borrowing adjusted for certain additional costs, subject to a LIBOR rate floor of 0.0%, plus an applicable margin. We have elected the interest rate as described in clause (b) of the foregoing sentence. The Term Loan Credit Agreement provides that, unless an alternate rate of interest is agreed, all loans will be determined by reference to the base rate if the LIBOR rate cannot be ascertained, if regulators impose material restrictions on the authority of a lender to make LIBOR rate loans, or for other reasons. The 2016 Term Loan Facility was issued with original issue discount of 1.00% of the principal amount thereof.

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

On September 30, 2016, we entered into an interest rate swap agreement, which had a maturity date of September 30, 2020, to fix the rate on $335.0 million of the then-outstanding balance of the 2016 Term Loan Facility. The rate was fixed at 1.198% per annum plus the applicable credit spread, which was 1.75% at September 30, 2020. This interest rate swap matured on September 30, 2020.

We incurred $28.7 million of deferred finance fees, original issue discount and repricing fees related to the term loans under the 2016 Term Loan Facility, which are included in long-term debt in the accompanying consolidated balance sheets and are being amortized to interest expense over the estimated life of the term loans using the effective interest method.

On February 1, 2019, in connection with the completion of the ESI Merger, we entered into an amendment (“Amendment No. 5”) to the Term Loan Credit Agreement. Amendment No. 5 provided an additional tranche B-5 term loan commitment in the original principal amount of $650.0 million (the “2019 Incremental Term Loan Facility”), all of which was drawn down in connection with the closing of the ESI Merger. Pursuant to Amendment No. 5, we also effectuated certain amendments to the Term Loan Credit Agreement which make certain of the negative covenants and other provisions less restrictive. Prior to the effectiveness of Amendment No. 6 (as defined below), the 2019 Incremental Term Loan Facility had a maturity date of February 1, 2026 and bore interest at a rate per annum equal to, at our option, a base rate or LIBOR rate (as described above) plus, in each case, an applicable margin equal to 1.25% with respect to base rate borrowings and 2.25% with respect to LIBOR borrowings. The 2019 Incremental Term Loan Facility was issued with original issue discount of 1.00% of the principal amount thereof.

On April 3, 2019, we entered into an interest rate swap agreement, which has a maturity date of March 31, 2023, to fix the rate on $300.0 million of the then-outstanding balance of the 2019 Incremental Term Loan Facility. The rate was fixed at 2.309% per annum plus the applicable credit spread, which was 1.75% at September 30, 2020. At September 30, 2020, the notional amount of this transaction was $300.0 million and it had a fair value liability of $14.0 million.

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

On September 27, 2019, we entered into an amendment (“Amendment No. 6”) to the Term Loan Credit Agreement. Amendment No. 6 refinanced all existing loans outstanding under the 2016 Term Loan Facility and 2019 Incremental Term Loan Facility (“Existing Term Loans”) for a tranche B-6 term loan commitment in the original principal amount of $896.8 million (“2019 Term Loan Refinancing Facility”). Each lender of the Existing Term Loans that elected to participate in the 2019 Term Loan Refinancing Facility was deemed to have exchanged the aggregate outstanding principal amount of its Existing Term Loans for an equal aggregate principal amount of tranche B-6 term loans under the 2019 Term Loan Refinancing Facility. On the effective date of Amendment No. 6 and immediately prior to the exchanges described above, we made a voluntary prepayment of $50.0 million, which was applied to the Existing Term Loans on a pro rata basis.

We incurred $2.2 million of original issue discount fees related to the term loans under the 2019 Term Loan Refinancing Facility, which are included in long-term debt in the accompanying consolidated balance sheets and are being amortized to interest expense over the estimated life of the term loans using the effective interest method.

As of September 30, 2020, the remaining balance of deferred finance fees and original issue discount of the Term Loan Facility was $9.8 million. A portion of the deferred finance fees and original issue discount have been accelerated in connection with the various debt prepayments and extinguishments between 2016 and 2020.

The 2019 Term Loan Refinancing Facility matures on February 2, 2026, and bears interest at a rate per annum equal to, at our option, a base rate or LIBOR rate (as described above) plus, in each case, an applicable margin equal to 0.75% with respect to base rate borrowings and 1.75% with respect to LIBOR borrowings. The 2019 Term Loan Refinancing Facility was issued with original issue discount of 0.25% of the principal amount thereof.

We are required to make scheduled quarterly payments each equal to 0.25% of the original principal amount of the 2019 Term Loan Refinancing Facility with the balance due on February 2, 2026.

As of September 30, 2020, after total principal prepayments of $575.0 million (which includes a $50.0 million prepayment made during the nine months ended September 30, 2020) and regularly scheduled principal payments of $19.4 million, the total outstanding principal balance of the Term Loan Facility was $835.6 million and the interest rate was 1.9%.

Under the Term Loan 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 of our asset sales, certain casualty and condemnation events and the incurrence or issuance of certain debt.

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

The Term Loan 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, 2020, we were in compliance with all covenants under the Term Loan Credit Agreement.

Senior Secured Asset-Based Revolving Credit Facility

On February 1, 2019, in connection with the completion of the ESI Merger, we entered into an asset-based revolving credit agreement with Barclays Bank PLC, as administrative agent and collateral agent, the other borrowers from time to time party thereto, and the lenders and letters of credit issuers from time to time party thereto (the “ABL Credit Agreement”), that provides a senior secured asset-based revolving credit facility of up to $100.0 million, subject to a borrowing base limitation (the “ABL Facility”). On April 26, 2019, we entered into a First Amendment to the ABL Credit Agreement which amended the borrowing base calculation for eligible inventory prior to an initial field examination and appraisal requirements. The borrowing base for the ABL Facility at any time equals the sum of: (a) 85% of certain eligible accounts; plus (b) prior to certain notice and field examination and appraisal requirements, the lesser of (i) 20% of net book value of eligible inventory in the United States and (ii) 30% of the borrowing base, and after the satisfaction of such requirements, the lesser of (i) the lesser of (A) 65% of the lower of cost or market value of certain eligible inventory and (B) 85% of the net orderly liquidation value of certain eligible inventory and (ii) 30% of the borrowing base; minus (c) reserves established by the administrative agent, in each case, subject to additional limitations and examination requirements for eligible accounts and eligible inventory acquired in an acquisition after February 1, 2019. The ABL Facility includes borrowing capacity in the form of letters of credit up to $25.0 million.

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

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

If at any time the aggregate amount of outstanding loans, protective advances, unreimbursed letter of credit drawings and undrawn letters of credit under the ABL Facility exceeds the lesser of (a) the commitment amount and (b) the borrowing base, we are required to repay outstanding loans and/or cash collateralize letters of credit, with no reduction of the commitment amount. During any period that the amount available under the ABL Facility is less than the greater of (i) $8.5 million and (ii) 10.0% of the lesser of (1) the commitment amount and (2) the borrowing base for three consecutive business days, until the time when excess availability has been at least the greater of (i) $8.5 million and (ii) 10.0% of the lesser of (1) the commitment amount and (2) the borrowing base, in each case, for 30 consecutive calendar days (a "Cash Dominion Period"), or during the continuance of an event of default, we are required to repay outstanding loans and/or cash collateralize letters of credit with the cash that it is required to deposit daily in a collection account maintained with the administrative agent under the ABL Facility. During a Cash Dominion Period, we may make borrowings under the ABL Facility subject to the satisfaction of customary funding conditions.

There is no scheduled amortization under the ABL Facility. The principal amount outstanding under the ABL Facility is due and payable in full on the fifth anniversary of the closing date.

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

From the time when we have excess availability less than the greater of (a) 10.0% of the lesser of (1) the commitment amount and (2) the borrowing base and (b) $8.5 million, until the time when we have excess availability equal to or greater than the greater of (a) 10.0% of the lesser of (1) the commitment amount and (2) the borrowing base and (b) $8.5 million for 30 consecutive days, or during the continuance of an event of default, the ABL Credit Agreement requires us to maintain a Fixed Charge Coverage Ratio (as defined in the ABL Credit Agreement) tested on the last day of each fiscal quarter of at least 1.0 to 1.0.

The ABL Credit Agreement also contains customary representations and warranties, affirmative covenants and provisions relating to events of default. If an event of default occurs, the lenders under the ABL Facility will be entitled to take various actions, including the acceleration of amounts due under the ABL Facility and all actions permitted to be taken by a secured creditor. We have not borrowed against the ABL Facility to date.

Lines of Credit and Short-Term Borrowing Arrangements

Our Japanese subsidiaries have lines of credit and a financing facility with various financial institutions, many of which generally expire and are renewed at three-month intervals with the remaining having no expiration date. The lines of credit and financing facility provided for aggregate borrowings as of September 30, 2020 of up to an equivalent of $31.7 million U.S. dollars. Total borrowings outstanding under these arrangements were $3.0 million and $3.1 million at September 30, 2020 and December 31, 2019, respectively.

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

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, 2019.

Recently Issued Accounting Pronouncements

In March 2020, the Financial Accounting Standards Board ("FASB") issued Accounting Standards Update ("ASU") No. 2020-04, "Reference Rate Reform (Topic 848): Facilitation of the Effects of Reference Rate Reform on Financial Reporting." This standard provides temporary optional expedients and exceptions to accounting guidance on contract modifications and hedge accounting to ease entities' financial reporting burdens as the market transitions from the LIBOR and other interbank offered rates to alternative reference rates. The standard was effective upon issuance and generally can be applied through December 31, 2022. We are in the process of evaluating the requirements of this standard and have not yet determined the impact of adoption on our consolidated financial statements.

In December 2019, the FASB issued ASU 2019-12, "Income Taxes (Topic 740)." This standard simplifies the accounting for income taxes by removing certain exceptions to the general principles in Topic 740. The amendments also improve consistent application and simplify U.S. GAAP for other areas of Topic 740 by clarifying and amending existing guidance. This standard is effective for annual periods beginning after December 15, 2021, including interim periods within those fiscal years beginning after December 15, 2022. We evaluated the requirements of this ASU and the impact of pending adoption on our consolidated financial statements. We do not expect that the impact of these changes will be material to our financial position, results of operations and cash flows.

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, 2019 filed with the Securities and Exchange Commission on February 28, 2020. As of September 30, 2020, there were no material changes in our exposure to market risk from December 31, 2019.

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, 2020. 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, 2020, 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, 2020, 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.

In 2016, two putative class actions lawsuit captioned Dixon Chung v. Newport Corp., et al., Case No. A-16-733154-C, and Hubert C. Pincon v. Newport Corp., et al., Case No. A-16-734039-B, were filed in the District Court, Clark County, Nevada on behalf of a putative class of stockholders of Newport Corporation ("Newport") for claims related to the merger agreement ("Newport Merger Agreement") between the Company, Newport, and a wholly-owned subsidiary of the Company ("Merger Sub"). The lawsuits named as defendants the Company, Newport, Merger Sub, and certain then current and former members of Newport's board of directors. Both complaints alleged that Newport directors breached their fiduciary duties to Newport's stockholders by agreeing to sell Newport through an inadequate and unfair process, which led to inadequate and unfair consideration, by agreeing to unfair deal protection devices and by omitting material information from the proxy statement. The complaints also alleged that the Company, Newport and Merger Sub aided and abetted the directors' alleged breaches of their fiduciary duties. The Court consolidated the actions, and plaintiffs later filed an amended complaint captioned In re Newport Corporation Shareholder Litigation, Case No. A-16-733154-B, in the District Court, Clark County, Nevada, on behalf of a putative class of Newport's stockholders for claims related to the Newport Merger Agreement. The amended complaint alleged Newport's former board of directors breached their fiduciary duties to Newport's stockholders and that the Company, Newport and Merger Sub had aided and abetted these breaches and sought monetary damages, including pre- and post-judgment interest. In June 2017, the Court granted defendants' motion to dismiss and dismissed the amended complaint against all defendants but granted plaintiffs leave to amend.

On July 27, 2017, plaintiffs filed a second amended complaint containing substantially similar allegations but naming only Newport's former directors as defendants. On August 8, 2017, the Court dismissed the Company and Newport from the action. The second amended complaint seeks monetary damages, including pre- and post-judgment interest. The Court granted a motion for class certification on September 27, 2018, appointing Mr. Pincon and Locals 302 and 612 of the International Union of Operating Engineers - Employers Construction Industry Retirement Trust as class representatives. On June 11, 2018, plaintiff Dixon Chung was voluntarily dismissed from the litigation. On August 9, 2019, plaintiffs filed a motion for leave to file a third amended complaint, which was denied on October 10, 2019. On August 23, 2019, defendants filed a motion for summary judgment. On January 23, 2020, the court entered its findings of fact, conclusions of law, and order granting defendants' motion for summary judgment. On February 18, 2020, plaintiffs filed a notice of appeal from the court's order granting defendants' motion for summary judgment, as well as from the court's prior orders granting defendants' motion for a bench trial and denying plaintiffs' motion for leave to file an amended complaint. On March 20, 2020, plaintiffs filed a motion to retax and settle costs, and defendants filed a motion for costs, interest, and attorneys' fees. On August 4, 2020, the court issued a bench ruling granting in part and denying in part defendants' motion for costs, interest, and attorneys' fees, and granting in part and denying in part plaintiffs' motion to retax and settle costs.

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

ITEM 1A. RISK FACTORS

Information regarding risk factors affecting the Company's business are discussed in the section entitled "Risk Factors" in the Company's Annual Report on Form 10-K for the year ended December 31, 2019 (the "Annual Report"), the section entitled "Risk Factors" in the Company's Quarterly Report on Form 10-Q for the period ended March 31, 2020 (the "Quarterly Report for Q1 2020"), which section is incorporated by reference herein, and the section entitled "Risk Factors" in the Company's Quarterly Report on Form 10-Q for the period ended June 30, 2020 (the "Quarterly Report for Q2 2020"), which section is incorporated by reference herein. The risk factor disclosures in the Annual Report and in the Quarterly Report for Q1 2020 are updated by the information relating to certain export license requirements related to China that is described in the Quarterly Report for Q2 2020. There have been no other material changes to the risk factors as described in our Annual Report, our Quarterly Report for Q1 2020 and our Quarterly Report for Q2 2020.

ITEM 6. EXHIBITS.

Exhibit No.	Exhibit Description
+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
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	Inline XBRL Instance Document – the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document
101.SCH	Inline XBRL Taxonomy Extension Schema Document
101.CAL	Inline XBRL Taxonomy Extension Calculation Linkbase Document
101.LAB	Inline XBRL Taxonomy Extension Label Linkbase Document
101.PRE	Inline XBRL Taxonomy Extension Presentation Linkbase Document
101.DEF	Inline XBRL Taxonomy Extension Definition Linkbase Document
104	Cover Page Interactive Data File (formatted as inline XBRL with applicable taxonomy extension information contained in Exhibits 101)

+ 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 (File No. 000-23621), filed with the Securities and Exchange Commission on August 14, 2001.

(3) Incorporated by reference to the Registrant's Quarterly Report on Form 10-Q for the quarter ended June 30, 2002 (File No. 000-23621), filed with the Securities and Exchange Commission on August 13, 2002.

(4) Incorporated by reference to the Registrant's Current Report on Form 8-K (File No. 000-23621), filed with the Securities and Exchange Commission on May 6, 2014.

SIGNATURES

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

MKS INSTRUMENTS, INC.

Date: November 3, 2020

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, John T.C. Lee, 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.

Dated: November 3, 2020

/s/ John T.C. Lee

John T.C. Lee
President and Chief Executive Officer
(Principal Executive Officer)

EXHIBIT 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

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.

Dated: November 3, 2020

/s/ Seth H. Bagshaw

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

EXHIBIT 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

In connection with the Quarterly Report on Form 10-Q of MKS Instruments, Inc. (the "Company") for the period ended September 30, 2020 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), the undersigned, John T.C. Lee, President and Chief Executive Officer of the Company, and Seth H. Bagshaw, Senior Vice President, Chief Financial Officer and Treasurer of the Company, each hereby certifies, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that, based on his knowledge:

(1) The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Dated: November 3, 2020

/s/ John T.C. Lee
John T.C. Lee
President and Chief Executive Officer
(Principal Executive Officer)

Dated: November 3, 2020

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