

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 June 30, 2022

or

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

For the transition period from _____ to _____

Commission file number 0-23621

MKS INSTRUMENTS, INC.

(Exact name of registrant as specified in its charter)

Massachusetts
(State or other jurisdiction
of incorporation or organization)

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

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

01810
(Zip Code)

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

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

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

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

As of July 26, 2022, the registrant had 55,742,376 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 per share data)
 (Unaudited)

ASSETS	June 30, 2022	December 31, 2021
Current assets:		
Cash and cash equivalents	\$ 1,065	\$ 966
Short-term investments	2	76
Trade accounts receivable, net of allowance for doubtful accounts of \$4 at June 30, 2022 and December 31, 2021	481	443
Inventories	689	577
Other current assets	112	85
Total current assets	<u>2,349</u>	<u>2,147</u>
Property, plant and equipment, net	377	326
Right-of-use assets	170	184
Goodwill	1,220	1,228
Intangible assets, net	544	576
Other assets	89	79
Total assets	<u>\$ 4,749</u>	<u>\$ 4,540</u>
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Short-term debt	\$ 11	\$ 9
Accounts payable	181	168
Accrued compensation	84	132
Income taxes payable	31	25
Lease liabilities	18	18
Deferred revenue and customer advances	51	37
Other current liabilities	81	71
Total current liabilities	<u>457</u>	<u>460</u>
Long-term debt, net	804	808
Non-current deferred taxes	101	99
Non-current accrued compensation	46	49
Non-current lease liabilities	180	193
Other non-current liabilities	32	44
Total liabilities	<u>1,620</u>	<u>1,653</u>
Commitments and contingencies (Note 18)		
Stockholders' equity:		
Preferred Stock, \$0.01 par value per share, 2 shares authorized; none issued and outstanding	—	—
Common Stock, no par value, 200 shares authorized; 55.7 and 55.5 shares issued and outstanding at June 30, 2022 and December 31, 2021, respectively	—	—
Additional paid-in capital	923	907
Retained earnings	2,240	1,991
Accumulated other comprehensive loss	(34)	(11)
Total stockholders' equity	<u>3,129</u>	<u>2,887</u>
Total liabilities and stockholders' equity	<u>\$ 4,749</u>	<u>\$ 4,540</u>

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

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

	Three Months Ended June 30,		Six Months Ended June 30,	
	2022	2021	2022	2021
Net revenues:				
Products	\$ 664	\$ 657	\$ 1,312	\$ 1,262
Services	101	93	195	182
Total net revenues	<u>765</u>	<u>750</u>	<u>1,507</u>	<u>1,444</u>
Cost of revenues:				
Products	377	345	737	667
Services	50	50	98	100
Total cost of revenues (exclusive of amortization shown separately below)	<u>427</u>	<u>395</u>	<u>835</u>	<u>767</u>
Gross profit	338	355	672	677
Research and development	53	50	105	97
Selling, general and administrative	101	97	193	193
Acquisition and integration costs	2	6	10	12
Restructuring and other	3	3	5	8
Amortization of intangible assets	15	13	30	25
Gain on sale of long-lived assets	—	—	(7)	—
Income from operations	<u>164</u>	<u>186</u>	<u>336</u>	<u>342</u>
Interest income	1	—	1	—
Interest expense	7	6	13	12
Other expense (income), net	<u>2</u>	<u>8</u>	<u>(3)</u>	<u>9</u>
Income before income taxes	156	172	327	321
Provision for income taxes	<u>26</u>	<u>26</u>	<u>54</u>	<u>52</u>
Net income	<u>\$ 130</u>	<u>\$ 146</u>	<u>\$ 273</u>	<u>\$ 269</u>
Other comprehensive income, net of tax:				
Changes in value of financial instruments designated as cash flow hedges	\$ 8	\$ —	\$ 25	\$ 11
Foreign currency translation adjustments	<u>(38)</u>	<u>5</u>	<u>(48)</u>	<u>(14)</u>
Total comprehensive income	<u>\$ 100</u>	<u>\$ 151</u>	<u>\$ 250</u>	<u>\$ 266</u>
Net income per share:				
Basic	<u>\$ 2.33</u>	<u>\$ 2.64</u>	<u>\$ 4.90</u>	<u>\$ 4.86</u>
Diluted	<u>\$ 2.32</u>	<u>\$ 2.63</u>	<u>\$ 4.89</u>	<u>\$ 4.83</u>
Weighted average common shares outstanding:				
Basic	<u>55.7</u>	<u>55.4</u>	<u>55.6</u>	<u>55.3</u>
Diluted	<u>55.8</u>	<u>55.7</u>	<u>55.8</u>	<u>55.6</u>

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 per share data)
(Unaudited)

	Common Stock		Additional Paid-In Capital	Retained Earnings	Accumulated Other Comprehensive Loss	Total Stockholders' Equity
	Shares	Amount				
Balance at December 31, 2021	55.5	\$ —	\$ 907	\$ 1,991	\$ (11)	\$ 2,887
Net issuance under stock-based plans	0.1		(6)			(6)
Stock-based compensation			8			8
Cash dividend (\$0.22 per common share)				(12)		(12)
Comprehensive income (net of tax):						
Net income				143		143
Other comprehensive income					7	7
Balance at March 31, 2022	55.6	\$ —	\$ 909	\$ 2,122	\$ (4)	\$ 3,027
Net issuance under stock-based plans	0.1		1			1
Stock-based compensation			13			13
Cash dividend (\$0.22 per common share)				(12)		(12)
Comprehensive income (net of tax):						
Net income				130		130
Other comprehensive loss					(30)	(30)
Balance at June 30, 2022	55.7	\$ —	\$ 923	\$ 2,240	\$ (34)	\$ 3,129

	Common Stock		Additional Paid-In Capital	Retained Earnings	Accumulated Other Comprehensive Loss	Total Stockholders' Equity
	Shares	Amount				
Balance at December 31, 2020	55.2	\$ —	\$ 873	\$ 1,488	\$ —	\$ 2,361
Net issuance under stock-based plans	0.1		(5)			(5)
Stock-based compensation			10			10
Cash dividend (\$0.20 per common share)				(11)		(11)
Comprehensive income (net of tax):						
Net income				122		122
Other comprehensive loss					(8)	(8)
Balance at March 31, 2021	55.3	\$ —	\$ 878	\$ 1,599	\$ (8)	\$ 2,469
Net issuance under stock-based plans	0.1		(3)			(3)
Stock-based compensation			9			9
Cash dividend (\$0.22 per common share)				(12)		(12)
Comprehensive income (net of tax):						
Net income				146		146
Other comprehensive income					5	5
Balance at June 30, 2021	55.4	\$ —	\$ 884	\$ 1,733	\$ (3)	\$ 2,614

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)

	Six Months Ended June 30,	
	2022	2021
Cash flows from operating activities:		
Net income	\$ 273	\$ 269
Adjustments to reconcile net income to net cash provided by operating activities:		
Depreciation and amortization	56	49
Unrealized loss on derivatives not designated as hedging instruments	7	7
Gain on sale of long-lived assets	(7)	—
Stock-based compensation	21	19
Provision for excess and obsolete inventory	7	9
Deferred income taxes	(2)	10
Other	2	—
Changes in operating assets and liabilities:		
Trade accounts receivable	(53)	(43)
Inventories	(133)	(38)
Other current and non-current assets	5	7
Accounts payable	15	38
Current and non-current accrued compensation	(49)	(18)
Income taxes payable	(11)	(42)
Other current and non-current liabilities	15	25
Net cash provided by operating activities	146	292
Cash flows from investing activities:		
Purchases of investments	(1)	(397)
Maturities of investments	76	205
Sales of investments	—	135
Proceeds from sale of long-lived assets	7	—
Purchases of property, plant and equipment	(83)	(43)
Net cash used in investing activities	(1)	(100)
Cash flows from financing activities:		
Proceeds from borrowings	6	1
Payments of borrowings	(8)	(11)
Dividend payments	(24)	(23)
Net payments related to employee stock awards	(5)	(8)
Net cash used in financing activities	(31)	(41)
Effect of exchange rate changes on cash and cash equivalents	(15)	(4)
Increase in cash and cash equivalents	99	147
Cash and cash equivalents at beginning of period	966	608
Cash and cash equivalents at end of period	\$ 1,065	\$ 755

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 June 30, 2022, and for the three and six months ended June 30, 2022, 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, 2021 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, 2021 filed with the U.S. Securities and Exchange Commission on February 28, 2022.

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, inventory valuation, warranty costs, stock-based compensation, intangible assets, goodwill, other long-lived assets and other acquisition expenses 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.

In the first quarter of 2022, MKS updated the names of its three divisions in order to simplify its naming convention. These three divisions, formerly known as the Vacuum & Analysis Division, the Light & Motion Division and the Equipment & Solutions Division, are now referred to as the Vacuum Solutions Division ("VSD"), the Photonics Solutions Division ("PSD") and the Equipment Solutions Division ("ESD"), respectively. MKS' reportable segments continue to be its three divisions.

2) Revenue from Contracts with Customers

Contract assets as of June 30, 2022 and December 31, 2021 were immaterial. A roll-forward of the Company's deferred revenue and customer advances is as follows:

	Six Months Ended	
	June 30, 2022	June 30, 2021
Beginning balance, January 1 ⁽¹⁾	\$ 40	\$ 37
Additions to deferred revenue and customer advances	91	76
Amount of deferred revenue and customer advances recognized in income	(78)	(72)
Ending balance, June 30 ⁽²⁾	<u>\$ 53</u>	<u>\$ 41</u>

(1) Beginning balance as of January 1, 2022 included \$37 of current deferred revenue and customer advances and \$3 of non-current deferred revenue. Beginning balance as of January 1, 2021 included \$31 of current deferred revenue and customer advances and \$6 of non-current deferred revenue.

(2) Ending balance as of June 30, 2022 included \$51 of current deferred revenue and customer advances and \$2 of non-current deferred revenue. Ending balance as of June 30, 2021 included \$36 of current deferred revenue and customer advances and \$5 of non-current deferred revenue.

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

Disaggregation of Revenue

The following tables summarize revenue from contracts with customers:

	Three Months Ended June 30, 2022			
	VSD	PSD	ESD	Total
Net revenues:				
Products	\$ 445	\$ 207	\$ 12	\$ 664
Services	62	21	18	101
Total net revenues	<u>\$ 507</u>	<u>\$ 228</u>	<u>\$ 30</u>	<u>\$ 765</u>

	Three Months Ended June 30, 2021			
	VSD	PSD	ESD	Total
Net revenues:				
Products	\$ 399	\$ 176	\$ 82	\$ 657
Services	59	17	17	93
Total net revenues	<u>\$ 458</u>	<u>\$ 193</u>	<u>\$ 99</u>	<u>\$ 750</u>

	Six Months Ended June 30, 2022			
	VSD	PSD	ESD	Total
Net revenues:				
Products	\$ 861	\$ 417	\$ 34	\$ 1,312
Services	120	39	36	195
Total net revenues	<u>\$ 981</u>	<u>\$ 456</u>	<u>\$ 70</u>	<u>\$ 1,507</u>

	Six Months Ended June 30, 2021			
	VSD	PSD	ESD	Total
Net revenues:				
Products	\$ 778	\$ 341	\$ 143	\$ 1,262
Services	116	34	32	182
Total net revenues	<u>\$ 894</u>	<u>\$ 375</u>	<u>\$ 175</u>	<u>\$ 1,444</u>

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

3) Investments

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

As of June 30, 2022:	Cost	Gross Unrealized Gains	Gross Unrealized (Losses)	Estimated Fair Value
Short-term investments:				
Time deposits and certificates of deposit	\$ 1	\$ —	\$ —	\$ 1
Banker's acceptance drafts	1	—	—	1
	<u>\$ 2</u>	<u>\$ —</u>	<u>\$ —</u>	<u>\$ 2</u>

As of June 30, 2022:	Cost	Gross Unrealized Gains	Gross Unrealized (Losses)	Estimated Fair Value
Long-term investments:				
Group insurance contracts	\$ 5	\$ 1	\$ —	\$ 6

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

As of December 31, 2021:	Cost	Gross Unrealized Gains	Gross Unrealized (Losses)	Estimated Fair Value
Short-term investments:				
Available-for-sale investments:				
Time deposits and certificates of deposit	\$ 22	\$ —	\$ —	\$ 22
Commercial paper	42	—	—	42
U.S. treasury obligations	11	—	—	11
U.S. agency obligations	1	—	—	1
	<u>\$ 76</u>	<u>\$ —</u>	<u>\$ —</u>	<u>\$ 76</u>

As of December 31, 2021:	Cost	Gross Unrealized Gains	Gross Unrealized (Losses)	Estimated Fair Value
Long-term investments:				
Group insurance contracts	\$ 5	\$ 1	\$ —	\$ 6

Management has the ability to liquidate certain of the Company's investments in order to meet the Company's liquidity needs in the next 12 months. Accordingly, certain investments with contractual maturities greater than one year from the date of purchase are classified as short-term on the accompanying balance sheets.

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 six months ended June 30, 2022 and 2021.

4) Fair Value Measurements

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

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

- Level 1 Quoted prices in active markets for identical assets or liabilities as of the reporting date. Active markets are those in which transactions for the asset or liability occur in sufficient frequency and volume to provide pricing information on an ongoing basis.
- Level 2 Observable inputs other than Level 1 prices, such as quoted prices for similar assets or liabilities; quoted prices in markets that are not active; or other inputs that are observable or can be corroborated by observable market data for substantially the full term of the assets or liabilities. Level 2 assets and liabilities include debt securities with quoted prices that are traded less frequently than exchange-traded instruments or securities or derivative contracts that are valued using a pricing model with inputs that are observable in the market or can be derived principally from or corroborated by observable market data.
- Level 3 Unobservable inputs that are supported by little or no market activity and that are significant to the fair value of the assets or liabilities. Level 3 assets and liabilities include financial instruments whose value is determined using pricing models, discounted cash flow methodologies, or similar techniques, as well as instruments for which the determination of fair value requires significant management judgment or estimation.

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

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

Assets and liabilities of the Company are measured at fair value on a recurring basis as of June 30, 2022 and are summarized as follows:

Description	June 30, 2022	Fair Value Measurements at Reporting Date Using		
		Quoted Prices in Active Markets for Identical Assets or Liabilities (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets:				
Cash equivalents:				
Money market funds	\$ 306	\$ 306	\$ —	\$ —
Available-for-sale investments:				
Time deposits and certificates of deposit	1	—	1	—
Banker's acceptance drafts	1	—	1	—
Group insurance contracts	6	—	6	—
Derivatives				
Foreign exchange forward contracts	13	—	13	—
Interest rate hedge - non-current	29	—	29	—
Pension and deferred compensation plan assets	21	—	21	—
Total assets	<u>\$ 377</u>	<u>\$ 306</u>	<u>\$ 71</u>	<u>\$ —</u>
Liabilities:				
Derivatives – foreign exchange forward contracts	\$ 1	\$ —	\$ 1	\$ —
Total liabilities	<u>\$ 1</u>	<u>\$ —</u>	<u>\$ 1</u>	<u>\$ —</u>
Reported as follows:				
Assets:				
Cash equivalents	\$ 306	\$ 306	\$ —	\$ —
Short-term investments	2	—	2	—
Other current assets	13	—	13	—
Total current assets	<u>\$ 321</u>	<u>\$ 306</u>	<u>\$ 15</u>	<u>\$ —</u>
Other assets	<u>\$ 56</u>	<u>\$ —</u>	<u>\$ 56</u>	<u>\$ —</u>
Liabilities:				
Other current liabilities	<u>\$ 1</u>	<u>\$ —</u>	<u>\$ 1</u>	<u>\$ —</u>

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

Assets and liabilities of the Company are measured at fair value on a recurring basis as of December 31, 2021 and are summarized as follows:

Description	December 31, 2021	Fair Value Measurements at Reporting Date Using		
		Quoted Prices in Active Markets for Identical Assets or Liabilities (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets:				
Cash equivalents:				
Money market funds	\$ 55	\$ 55	\$ —	\$ —
U.S. treasury obligations	175	—	175	—
Available-for-sale investments:				
Time deposits and certificates of deposit	22	—	22	—
Commercial paper	42	—	42	—
U.S. treasury obligations	11	—	11	—
U.S. agency obligations	1	—	1	—
Group insurance contracts	6	—	6	—
Derivatives				
Foreign exchange forward contracts	3	—	3	—
Foreign currency options	3	—	3	—
Interest rate hedge - non-current	9	—	9	—
Pension and deferred compensation plan assets	20	—	20	—
Total assets	<u>\$ 347</u>	<u>\$ 55</u>	<u>\$ 292</u>	<u>\$ —</u>
Liabilities:				
Derivatives				
Foreign exchange forward contracts	\$ 1	\$ —	\$ 1	\$ —
Interest rate hedge - non-current	5	—	5	—
Total liabilities	<u>\$ 6</u>	<u>\$ —</u>	<u>\$ 6</u>	<u>\$ —</u>
Reported as follows:				
Assets:				
Cash equivalents	\$ 230	\$ 55	\$ 175	\$ —
Short-term investments	76	—	76	—
Other current assets	6	—	6	—
Total current assets	<u>\$ 312</u>	<u>\$ 55</u>	<u>\$ 257</u>	<u>\$ —</u>
Other assets	<u>\$ 35</u>	<u>\$ —</u>	<u>\$ 35</u>	<u>\$ —</u>
Liabilities:				
Other current liabilities	\$ 1	\$ —	\$ 1	\$ —
Other liabilities	<u>\$ 5</u>	<u>\$ —</u>	<u>\$ 5</u>	<u>\$ —</u>

Money Market Funds

Money market funds are cash equivalents.

Pension and Deferred Compensation Plan Assets

The pension and deferred compensation plan assets represent investments in mutual funds, exchange traded funds, government securities and other time deposits. These investments are set aside for the retirement benefit of the employees of certain of the Company's subsidiaries.

Derivatives

As a result of the Company's global operating activities, the Company is exposed to market risks from changes in foreign currency exchange rates and variable interest rates, which may adversely affect its operating results and financial position.

When deemed appropriate, the Company minimizes its risks from foreign currency exchange rate and interest rate fluctuations through the use of derivative financial instruments. The principal market in which the Company executes its foreign currency contracts and options and interest rate swaps is the institutional market in an over-the-counter environment with a relatively high level of price transparency. The market participants are typically large commercial banks. The foreign exchange forward contracts and options and interest rate swaps are valued using broker quotations or market transactions.

5) Derivatives

The Company enters into derivative instruments for risk management purposes only, including derivatives designated as hedging instruments and those utilized as economic hedges. The Company operates internationally and, in the normal course of business, is exposed to fluctuations in interest rates and foreign exchange rates. These fluctuations can increase the costs of financing, investing and operating the business. The Company uses derivative instruments, such as foreign exchange forward contracts and options, 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 material non-performance by any of these counterparties.

Foreign Exchange Forward Contracts

The Company hedges a portion of its forecasted foreign currency-denominated intercompany sales of inventory, over a maximum period of eighteen months, using foreign exchange forward contracts accounted for as cash-flow hedges. To the extent these derivatives are effective in offsetting 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 other comprehensive income ("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 foreign exchange forward contracts are classified in the condensed 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 June 30, 2022 and December 31, 2021, the Company had outstanding foreign exchange forward contracts with gross notional values of \$246 and \$241, respectively. The following tables provide a summary of the primary net hedging positions and corresponding fair values held as of June 30, 2022 and December 31, 2021:

<u>Currency Hedged (Buy/Sell)</u>	June 30, 2022	
	Gross Notional Value	Fair Value ⁽¹⁾
U.S. dollar/Japanese yen	\$ 66	\$ 5
U.S. dollar/South Korean won	111	5
U.S. dollar/euro	17	1
U.S. dollar/U.K. pound sterling	7	—
U.S. dollar/Taiwan dollar	45	2
Total	<u>\$ 246</u>	<u>\$ 13</u>

<u>Currency Hedged (Buy/Sell)</u>	December 31, 2021	
	Gross Notional Value	Fair Value ⁽¹⁾
U.S. dollar/Japanese yen	\$ 60	\$ 2
U.S. dollar/South Korean won	108	1
U.S. dollar/euro	15	—
U.S. dollar/U.K. pound sterling	11	—
U.S. dollar/Taiwan dollar	47	—
Total	<u>\$ 241</u>	<u>\$ 3</u>

(1) Represents receivable amount included in other current assets in the condensed consolidated balance sheet.

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The foreign exchange forward 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 consolidated balance sheet.

Interest Rate Swap Agreements

The Company entered into interest rate swap agreements that exchange the variable LIBOR interest rate paid on the outstanding balance of its Term Loan Facility, as defined and further described in Note 9, to a fixed rate. The table below summarizes interest rate hedges outstanding at June 30, 2022 and December 31, 2021:

Trade Date	Effective Date	Maturity	Fixed Rate	Notional Amount at Effective Date	June 30, 2022 Notional Amount	June 30, 2022 Fair Value Asset (Liability)	December 31, 2021 Fair Value Asset (Liability)
April 3, 2019	April 5, 2019	March 31, 2023	2.309 %	\$ 200	\$ 200	\$ 1	\$ (5)
October 29, 2020	October 26, 2021	February 28, 2025	0.485 %	\$ 200	\$ 200	13	4
October 29, 2020	March 31, 2022	February 28, 2025	0.623 %	\$ 100	\$ 100	15	5
Total						\$ 29	\$ 4

The interest rate swaps are recorded at fair value on the balance sheet and changes in the fair value are recognized in OCI. To the extent these arrangements are no longer effective hedges, any ineffectiveness measured in the hedging relationships is recorded immediately in earnings in the period it occurs.

Currency Option Agreements

In connection with financing the pending acquisition of Atotech Limited ("Atotech"), the Company expects to issue euro denominated term loan debt. In 2021, the Company purchased foreign currency option contracts to fix the conversion of €300 into U.S. dollars. The options settled on January 31, 2022 and the Company recorded a gain of \$5, net of premiums, which is included in other expense (income), net.

Trade Date	Effective Date	Maturity	Fixed Rate	Notional Amount in EUR	June 30, 2022 Notional Amount in U.S. dollars	June 30, 2022 Fair Value Asset (Liability)	December 31, 2021 Fair Value Asset (Liability)
October 26, 2021	October 26, 2021	January 31, 2022	1.162 %	€ 300	\$ —	\$ —	\$ 3

The currency options were recorded at fair value on the balance sheet and changes in the fair value were recognized immediately in earnings. The fair value asset was classified in other current assets in the condensed consolidated balance sheet.

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

	Three Months Ended June 30,		Six Months Ended June 30,	
	2022	2021	2022	2021
Foreign exchange forward contracts:				
Net gains recognized in accumulated OCI	\$ 8	\$ —	\$ 26	\$ 11
Net gains (losses) reclassified from accumulated OCI into income	\$ 3	\$ —	\$ 4	\$ (2)

The net amount of existing gains as of June 30, 2022 expected to be reclassified from OCI into earnings within the next 12 months is immaterial.

The Company enters into foreign exchange forward 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 cash flow hedging instruments and gains or losses from these derivatives are recorded immediately in other expense (income), net.

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

	Three Months Ended June 30,		Six Months Ended June 30,	
	2022	2021	2022	2021
Foreign exchange forward contracts:				
Net gains (losses) recognized in income	\$ 1	\$ (6)	\$ 7	\$ (7)

6) Inventories

Inventories consist of the following:

	June 30, 2022	December 31, 2021
Raw materials	\$ 490	\$ 394
Work-in-process	92	83
Finished goods	107	100
	<u>\$ 689</u>	<u>\$ 577</u>

7) Leases

The Company has various operating leases for real estate and non-real estate items. 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. As most of the Company's leases do not provide an implicit rate, an incremental borrowing rate is used based on the estimated rate of interest for collateralized borrowing over a similar term of the lease payments at commencement date.

The elements of lease expense were as follows:

	Three Months Ended June 30,	
	2022	2021
Lease cost:		
Operating lease	\$ 7	\$ 6
Short-term lease	1	1
Total lease cost	<u>\$ 8</u>	<u>\$ 7</u>
	Six Months Ended June 30,	
	2022	2021
Lease cost:		
Operating lease cost	\$ 14	\$ 14
Short-term lease	2	2
Total lease cost	<u>\$ 16</u>	<u>\$ 16</u>

The weighted average discount rate and the weighted average remaining lease term were 3.0% and 14.1 years, respectively, as of June 30, 2022. The weighted average discount rate and the weighted average remaining lease term were 2.9% and 14.6 years, respectively, as of June 30, 2021. Operating cash flows used for operating leases for the six months ended June 30, 2022 and 2021 were \$12 in each period. Operating cash flows used for operating leases for the six months ended June 30, 2022 and 2021 were net of \$1 and \$8, respectively, in tenant improvement allowance receipts.

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Future lease payments under non-cancelable leases as of June 30, 2022 are detailed as follows:

2022 (remaining)	\$	12
2023		23
2024		20
2025		18
2026		15
Thereafter		158
Total lease payments		246
Less: imputed interest		48
Total operating lease liabilities	\$	198

The remaining 2022 lease payment amount includes an immaterial amount of tenant improvement allowances. Amounts presented above do not include payments relating to immaterial leases excluded from the balance sheet, as these operating leases had terms of less than twelve months.

8) Goodwill and Intangible Assets

Goodwill

The Company's methodology for allocating the purchase price relating to purchase acquisitions is determined through established and generally accepted valuation techniques. Goodwill is measured as the excess of the cost of the acquisition over the sum of the amounts assigned to tangible and identifiable intangible assets acquired less liabilities assumed. The Company assigns assets acquired (including goodwill) and liabilities assumed to one or more reporting units as of the date of acquisition. 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. During the quarter ended June 30, 2022, following softening industry demand for flexible PCB via drilling equipment and declines in projected operating results for ESD, the Company evaluated the carrying values of goodwill, purchased intangible assets and other long-lived assets assigned to ESD and determined the carrying values were recoverable. The Company performed its analysis using the income approach and key underlying assumptions included forecasted revenue, gross profit and operating margin as well as discount rate. Fair value estimates are based on complex series of judgments about future events and uncertainties and rely heavily on estimates and assumptions that have been deemed reasonable by the Company's management. There are inherent uncertainties and management judgment required in these determinations. In its quantitative assessment of the ESD reporting unit, the Company estimated fair value exceeded carrying value by 10%.

The changes in the carrying amount of goodwill and accumulated impairment loss during the six months ended June 30, 2022 were as follows:

	Gross Carrying Amount	Accumulated Impairment Loss	Net
Beginning balance, January 1	\$ 1,373	\$ (145)	\$ 1,228
Foreign currency translation	(8)	—	(8)
Ending balance, June 30	\$ 1,365	\$ (145)	\$ 1,220

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Intangible Assets

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

<u>As of June 30, 2022:</u>	Gross	Accumulated Amortization and Impairment Charges	Foreign Currency Translation	Net
Completed technology	\$ 556	\$ (260)	\$ —	\$ 296
Customer relationships	318	(135)	(2)	181
Patents, trademarks, trade names and other	123	(55)	(1)	67
	<u>\$ 997</u>	<u>\$ (450)</u>	<u>\$ (3)</u>	<u>\$ 544</u>

<u>As of December 31, 2021:</u>	Gross	Accumulated Amortization and Impairment Charges	Foreign Currency Translation	Net
Completed technology ⁽¹⁾	\$ 556	\$ (242)	\$ —	\$ 314
Customer relationships ⁽¹⁾	318	(126)	—	192
Patents, trademarks, trade names and other ⁽¹⁾	123	(52)	(1)	70
	<u>\$ 997</u>	<u>\$ (420)</u>	<u>\$ (1)</u>	<u>\$ 576</u>

⁽¹⁾ During the twelve months ended December 31, 2021, the Company recorded \$121 of separately identified intangible assets related to its acquisition of Photon Control, representing \$110 in completed technology, \$9 in customer relationships and \$2 in patents, trademarks, trade names and other.

Aggregate amortization expense related to acquired intangible assets for the six months ended June 30, 2022 and 2021 was \$30 and \$25, respectively. Aggregate net amortization expense related to acquired intangible assets for future years is as follows:

<u>Year</u>	<u>Amount</u>
2022 (remaining)	\$ 30
2023	58
2024	57
2025	56
2026	52
2027	52
Thereafter	183

The table above excludes \$56 of indefinite-lived trademarks and trade names that were not subject to amortization.

9) Debt

The Company's outstanding debt is as follows:

	June 30, 2022	December 31, 2021
Short-term debt:		
Term Loan Facility	\$ 9	\$ 9
Japanese lines of credit	2	—
Total short-term debt	<u>\$ 11</u>	<u>\$ 9</u>
Long-term debt:		
Term Loan Facility, net ⁽¹⁾	<u>\$ 804</u>	<u>\$ 808</u>

⁽¹⁾ Net of deferred financing fees, original issuance discount and repricing fees in the aggregate amount of \$7 and \$8 as of June 30, 2022 and December 31, 2021, respectively.

The Company recognized interest expense of \$7 and \$13 for the three and six months ended June 30, 2022, respectively, and \$6 and \$12 for the three and six months ended June 30, 2021, respectively.

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 (as amended, the "Term Loan Credit Agreement") with Barclays Bank PLC, as administrative agent and collateral agent, and the lenders from time to time party thereto, which provided a senior secured term loan credit facility (the "Term Loan Facility") in the original principal amount of \$780. The Company has entered into seven amendments to the Term Loan Credit Agreement since 2016. The Term Loan Facility is subject to increase at the Company's option and subject to receipt of lender commitments in accordance with the Term Loan Credit Agreement. The maturity date of the Term Loan Facility is February 2, 2026. As of June 30, 2022, borrowings under the Term Loan Facility bear interest per annum at one of the following rates selected by the Company: (a) a base rate determined by reference to the highest of (1) the federal funds effective rate plus 0.50%, (2) the "prime rate" quoted in *The Wall Street Journal*, (3) a LIBOR rate determined by reference to the costs of funds for U.S. dollar deposits for an interest period of one month adjusted for certain additional costs, plus 1.00%, and (4) a floor of 1.00%, plus, in each case, an applicable margin of 0.75%; 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 of 1.75%. 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.

Under the Term Loan Credit Agreement, the Company has the ability to incur additional incremental debt facilities in an amount up to (x) the greater of (1) \$600 and (2) 100% of consolidated EBITDA, plus (y) an amount equal to the sum of all voluntary prepayments of term loans under the Term Loan Facility, plus (z) an additional unlimited amount subject to pro forma compliance with a secured leverage ratio test of 3.25:1.00.

The Company is required to make scheduled quarterly amortization payments each equal to 0.25% of the original principal amount of the Term Loan Facility.

As of June 30, 2022, after giving effect to all amendments and repayments prior to such date, the outstanding principal amount of the Term Loan Facility was \$820, and the interest rate was 2.8%.

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 secured 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 June 30, 2022, the Company was in compliance with all covenants under the Term Loan Credit Agreement.

Senior Secured Asset-Based Revolving Credit Facility

In February 2019, in connection with the completion of the acquisition of Electro Scientific Industries, Inc. (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, subject to a borrowing base limitation (the "ABL Facility"). The Company has entered into two amendments to the ABL Credit Agreement since 2019. As of June 30, 2022, after giving effect to all amendments, 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

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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. The Company has not borrowed against the ABL Facility to date.

As of June 30, 2022, 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%, plus, in each case, an applicable margin ranging from 0.25% to 0.50%; 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%, plus, in each case, an applicable margin ranging from 1.25% to 1.50%. 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 unused commitments thereunder equal to 0.25% per annum. The Company must also pay customary letter of credit fees and agency fees.

Under the ABL Facility, the Company is required to prepay amounts outstanding under the ABL Facility (1) if amounts outstanding under the ABL Facility exceed the lesser of (a) the commitment amount and (b) the borrowing base, in an amount required to reduce such shortfall, (2) if amounts outstanding under the ABL Facility in any currency other than U.S. dollars exceed the sublimit for such currency, in an amount required to reduce such shortfall, and (3) during any period in which the Company has excess availability less than the greater of (a) 10.0% of the lesser of (x) the commitment amount and (y) the borrowing base (the "Line Cap") and (b) \$9 for 3 consecutive business days, until the time when the Company has excess availability equal to or greater than the greater of (A) 10.0% of the Line Cap and (B) \$9 for 30 consecutive days, or during the continuance of an event of default, with immediately available funds in its blocked accounts.

There is no scheduled amortization under the ABL Facility. Any principal amount outstanding under the ABL Facility is due and payable in full on the fifth anniversary of the closing date, subject to a springing maturity in the event that term loans under the Term Loan Facility in an aggregate amount of at least \$100 have an earlier maturity date than the ABL Facility.

All obligations under the ABL Facility are guaranteed by certain of the Company's domestic subsidiaries and are secured 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 Line Cap and (b) \$9 until the time when the Company has excess availability equal to or greater than the greater of (a) 10.0% of the Line Cap and (b) \$9 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, 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.

Lines of Credit and 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 June 30, 2022 of up to an equivalent of \$25. There was \$2 outstanding under these arrangements at June 30, 2022. There were no borrowings outstanding under these arrangements at December 31, 2021.

Contractual maturities of the Company's debt obligations as of June 30, 2022 are as follows:

Year	Amount
2022 (remaining)	\$ 7
2023	9
2024	9
2025	9
2026	788

10) Product Warranties

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The Company provides for the estimated costs to fulfill customer warranty obligations upon the recognition of the related revenue. The Company's warranty obligations are 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. The Company engages in extensive product quality programs and processes, including actively monitoring and evaluating the quality of its component suppliers.

Product warranty activities were as follows:

	Six Months Ended June 30,	
	2022	2021
Beginning of period	\$ 21	\$ 18
Provision for product warranties	12	22
Charges to warranty liability	(14)	(16)
End of period	\$ 19	\$ 24

As of June 30, 2022, short-term product warranties of \$18 and long-term product warranties of \$1 were included within other current liabilities and other non-current liabilities, respectively, within the accompanying condensed consolidated balance sheet. As of June 30, 2021, short-term product warranties of \$21 and long-term product warranties of \$3 were included within other current liabilities and other non-current liabilities, respectively, within the accompanying condensed consolidated balance sheet.

11) Income Taxes

The Company's effective tax rates for the three and six months ended June 30, 2022 were 17.0% and 16.6%, respectively. The Company's effective tax rates for the three and six months ended June 30, 2022 were lower than the U.S. statutory tax rate mainly due to the U.S. deduction for foreign derived intangible income ("FDII") and the geographic mix of income earned by the Company's international subsidiaries being taxed at rates lower than the U.S. statutory tax rate, offset by the U.S. global intangible low-taxed income ("GILTI") inclusion.

The Company's effective tax rates for the three and six months ended June 30, 2021 were 15.1% and 16.2%, respectively. The Company's effective tax rates for the three and six months ended June 30, 2021 were lower than the U.S. statutory tax rate mainly due to the U.S. deduction for FDII, windfall benefits from stock compensation, and the geographic mix of income earned by the Company's international subsidiaries being taxed at rates lower than the U.S. statutory tax rate, offset by the GILTI inclusion and additional withholding taxes on inter-company distributions due to the United Kingdom's withdrawal from the European Union.

As of June 30, 2022 and December 31, 2021, the total amounts of gross unrecognized tax benefits, which exclude interest and penalties, were \$38 and \$43, respectively. 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 June 30, 2022 and December 31, 2021, the Company had accrued interest on unrecognized tax benefits of approximately \$1 in each period.

Over the next 12 months it is reasonably possible that the Company may recognize approximately \$1 of previously net unrecognized tax benefits, excluding interest and penalties, related to various U.S. federal 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 2018 through the present. The U.S. statute of limitations for the one-time tax reported in 2017 remains open until 2024. The statute of limitations for the Company's tax filings in other jurisdictions varies between fiscal years 2016 through the present. The Company has certain federal credit carryforwards and state tax loss and credit carryforwards that are open to examination for tax years 2002 through the present.

12) Net Income Per Share

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

	Three Months Ended June 30,		Six Months Ended June 30,	
	2022	2021	2022	2021
Numerator:				
Net income	\$ 130	\$ 146	\$ 273	\$ 269
Denominator:				
Shares used in net income per common share – basic	55.7	55.4	55.6	55.3
Effect of dilutive securities	0.1	0.3	0.2	0.3
Shares used in net income per common share – diluted	55.8	55.7	55.8	55.6
Net income per common share:				
Basic	\$ 2.33	\$ 2.64	\$ 4.90	\$ 4.86
Diluted	\$ 2.32	\$ 2.63	\$ 4.89	\$ 4.83

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")) had been converted to such common shares, and if such assumed conversion is dilutive.

For the three and six months ended June 30, 2022 and 2021, the Company had an immaterial quantity of RSUs that had no impact on the computation of diluted weighted-average shares.

13) Stock-Based Compensation

Prior to May 10, 2022, the Company granted RSUs to employees and directors under the 2014 Stock Incentive Plan (the "2014 Plan"). Following shareholder approval of the 2022 Stock Incentive Plan (the "2022 Plan" and, together with the 2014 Plan, the "Plans") on May 10, 2022, the Company discontinued granting RSUs to employees and directors under the 2014 Plan and began granting them under the 2022 Plan. The Plans are administered by the Compensation Committee of the Company's Board of Directors. The Plans are 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 enable these individuals to participate in the long-term growth of the Company.

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

	Three Months Ended June 30,		Six Months Ended June 30,	
	2022	2021	2022	2021
Cost of revenues	\$ 2	\$ 1	\$ 3	\$ 2
Research and development	2	1	3	2
Selling, general and administrative	9	7	15	15
Total pre-tax stock-based compensation expense	\$ 13	\$ 9	\$ 21	\$ 19

At June 30, 2022, the total compensation expense related to unvested stock-based awards granted to employees and directors under the Plans that had not been recognized was \$54. The Company determines the fair value of RSUs based on the closing market price of the Company's common stock on the date of the award and estimates the fair value of employee stock purchase plan rights using the Black-Scholes valuation model. Such values are recognized as expense on a straight-line basis for time-based awards and using the accelerated graded vesting method for performance-based awards, both over the requisite service periods.

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

	Six Months Ended June 30, 2022	
	Outstanding RSUs	Weighted Average Grant Date Fair Value Per Share
RSUs – beginning of period	0.5	\$ 127.93
Granted	0.4	\$ 113.14
Vested	(0.2)	\$ 119.15
RSUs – end of period	<u>0.7</u>	<u>\$ 122.15</u>

The Company had an immaterial amount of stock appreciation rights outstanding as of June 30, 2022 and December 31, 2021.

14) Stockholders' Equity

Share Repurchase Program

On July 25, 2011, the Company's Board of Directors approved a share repurchase program for the repurchase of up to an aggregate of \$200 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 2.6 shares of common stock for approximately \$127 pursuant to the program since its adoption. During the three and six months ended June 30, 2022 and 2021, 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. During each of the first and second quarters of 2022, the Company's Board of Directors declared a cash dividend of \$0.22 per share, which totaled \$24. During the first and second quarters of 2021, the Company's Board of Directors declared a cash dividend of \$0.20 per share and \$0.22 per share, respectively, which totaled \$23.

On July 25, 2022, the Company's Board of Directors declared a quarterly cash dividend of \$0.22 per share to be paid on September 9, 2022 to stockholders of record as of August 8, 2022.

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.

15) Acquisition

Photon Control

On July 15, 2021, the Company completed its acquisition of Photon Control (the "Photon Control Acquisition"), pursuant to a definitive agreement (the "Arrangement Agreement"). Photon Control designs, manufactures and distributes a wide range of optical sensors and systems to measure temperature and position used in semiconductor wafer fabrication. At the effective time of the Photon Control Acquisition and pursuant to the terms and conditions of the Arrangement Agreement, each share of Photon Control's common stock issued and outstanding as of immediately prior to the effective time of the Photon Control Acquisition, was converted into the right to receive CAD 3.60 per share in cash, without interest and subject to deduction for any required withholding tax. The Company funded the payment of the aggregate consideration with available cash on hand. Photon Control is included in the Company's PSD segment.

The purchase price of Photon Control consisted of the following:

Cash paid for outstanding shares	\$	302
Less: Cash and cash equivalents acquired		(34)
Total purchase price, net of cash and cash equivalents acquired	\$	<u>268</u>

Under the acquisition method of accounting, the total estimated acquisition consideration is allocated to the acquired tangible and intangible assets and assumed liabilities of Photon Control 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 and none of this goodwill or intangible assets will be deductible for tax purposes. The Company believes the amount of goodwill relative to identifiable intangible assets relates to enhancing the Company's Surround the Chamber® offering by adding optical sensors for temperature control for critical etch and deposition applications in semiconductor wafer fabrication.

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

Current assets	\$	51
Intangible assets		121
Goodwill		168
Other non-current assets		9
Total assets acquired		<u>349</u>
Current liabilities		14
Non-current deferred taxes		32
Other long-term liabilities		1
Total liabilities assumed		<u>47</u>
Fair value of assets acquired and liabilities assumed		302
Less: Cash and cash equivalents acquired		(34)
Total purchase price, net of cash and cash equivalents acquired	\$	<u>268</u>

The acquired intangible assets are being amortized on a straight-line basis, which approximates the economic use of the assets over their estimated useful lives.

The following table reflects the allocation of the acquired intangible assets and related estimate of useful lives at the date of the Photon Control Acquisition:

Completed technology	\$	110	9 years
Customer relationships		9	10 years
Backlog		2	1.5 years
	\$	<u>121</u>	

The fair value of the acquired intangible assets was determined using the income approach. In performing these valuations, the key underlying assumptions used included the appropriate discount rates as well as forecasted revenue growth rates, gross profit and operating margins. Fair value estimates are based on complex series of judgments about future events and uncertainties and rely heavily on estimates and assumptions. 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.

16) Business Segment, Geographic Area, 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

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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, temperature sensing, 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 primarily serves the semiconductor, advanced electronics and specialty industrial markets.

The Company's Chief Operating Decision Maker ("CODM"), which is the Company's Chief Executive Officer, 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.

Reportable Segments

VSD 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.

PSD provides a broad range of instruments, components and subsystems which are derived from the Company's core competencies in lasers, photonics, optics, temperature sensing, precision motion control and vibration control.

ESD provides a range of laser-based systems and test products, including laser-based systems for printed circuit board ("PCB") manufacturing, which includes flexible interconnect PCB processing systems and high density interconnect solutions for rigid PCB manufacturing and substrate processing, and multi-layer ceramic capacitor test 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 groups similar products within its three reportable segments.

The following table sets forth net revenues by reportable segment:

	Three Months Ended		Six Months Ended June 30,	
	June 30, 2022	June 30, 2021	2022	2021
Vacuum Solutions Division	\$ 507	\$ 458	\$ 981	\$ 894
Photonics Solutions Division	228	193	456	375
Equipment Solutions Division	30	99	70	175
	<u>\$ 765</u>	<u>\$ 750</u>	<u>\$ 1,507</u>	<u>\$ 1,444</u>

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

	Three Months Ended June 30,		Six Months Ended June 30,	
	2022	2021	2022	2021
Gross profit by reportable segment:				
Vacuum Solutions Division	\$ 219	\$ 212	\$ 425	\$ 417
Photonics Solutions Division	109	90	222	172
Equipment Solutions Division	10	53	25	88
Total gross profit by reportable segment	338	355	672	677
Operating expenses:				
Research and development	53	50	105	97
Selling, general and administrative	101	97	193	193
Acquisition and integration costs	2	6	10	12
Restructuring and other	3	3	5	8
Amortization of intangible assets	15	13	30	25
Gain on sale of long-lived assets	—	—	(7)	—
Income from operations	164	186	336	342
Interest income	1	—	1	—
Interest expense	7	6	13	12
Other expense (income), net	2	8	(3)	9
Income before income taxes	156	172	327	321
Provision for income taxes	26	26	54	52
Net income	\$ 130	\$ 146	\$ 273	\$ 269

The following table sets forth capital expenditures by reportable segment for the three and six months ended June 30, 2022 and 2021:

	Three Months Ended June 30,		Six Months Ended June 30,	
	2022	2021	2022	2021
Vacuum Solutions Division	\$ 55	\$ 8	\$ 65	\$ 17
Photonics Solutions Division	8	5	16	17
Equipment Solutions Division	1	3	2	9
Total capital expenditures	\$ 64	\$ 16	\$ 83	\$ 43

Capital expenditures for the three and six months ended June 30, 2022 included a \$42 million purchase and expansion of a facility in South Korea.

The following table sets forth depreciation and amortization by reportable segment for the three and six months ended June 30, 2022 and 2021:

	Three Months Ended June 30,		Six Months Ended June 30,	
	2022	2021	2022	2021
Vacuum Solutions Division	\$ 6	\$ 6	\$ 12	\$ 12
Photonics Solutions Division	13	10	26	19
Equipment Solutions Division	9	9	18	18
Total depreciation and amortization	\$ 28	\$ 25	\$ 56	\$ 49

Interest income, interest expense and income tax expense are not presented by reportable segment because the necessary information is not classified within the segments nor used by the CODM.

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The following table sets forth segment assets by reportable segment:

June 30, 2022	Accounts receivable	Inventory	Total
Vacuum Solutions Division	\$ 344	\$ 421	\$ 765
Photonics Solutions Division	162	202	364
Equipment Solutions Division	35	67	102
Corporate, Eliminations & Other	(60)	(1)	(61)
Total segment assets	\$ 481	\$ 689	\$ 1,170

December 31, 2021	Accounts receivable	Inventory	Total
Vacuum Solutions Division	\$ 285	\$ 339	\$ 624
Photonics Solutions Division	146	177	323
Equipment Solutions Division	36	62	98
Corporate, Eliminations & Other	(24)	(1)	(25)
Total segment assets	\$ 443	\$ 577	\$ 1,020

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

	June 30, 2022	December 31, 2021
Total segment assets	\$ 1,170	\$ 1,020
Cash and cash equivalents and short-term investments	1,067	1,042
Other current assets	112	85
Property, plant and equipment, net	377	326
Right-of-use assets	170	184
Goodwill and intangible assets, net	1,764	1,804
Other assets and long-term investments	89	79
Total assets	\$ 4,749	\$ 4,540

Geographic Area

Information about the Company's operations by geographic area is presented in the tables below. Net revenues from unaffiliated customers are based on the location in which the sale originated. Intercompany sales between geographic areas are at tax transfer prices and have been eliminated from consolidated net revenues. North America includes revenue from the United States and an immaterial amount of revenue from Canada.

	Three Months Ended June 30,		Six Months Ended June 30,	
	2022	2021	2022	2021
Net revenues:				
North America	\$ 356	\$ 292	\$ 736	\$ 574
South Korea	95	104	177	202
China	82	102	140	183
Other Asia	169	191	330	370
Europe	63	61	124	115
	\$ 765	\$ 750	\$ 1,507	\$ 1,444

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.

Long-lived assets:	June 30, 2022	December 31, 2021
United States	\$ 227	\$ 292
Mexico	223	133
Asia	133	106
Europe	35	36
	\$ 618	\$ 567

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

	June 30, 2022	December 31, 2021
Reportable segment:		
Vacuum Solutions Division	\$ 195	\$ 195
Photonics Solutions Division	552	558
Equipment Solutions Division	473	475
Total goodwill	\$ 1,220	\$ 1,228

Major Customers

The following customers represented greater than 10% of the Company's net revenues as follows:

	Three Months Ended June 30,		Six Months Ended June 30,	
	2022	2021	2022	2021
Lam Research Corporation	15 %	12 %	16 %	13 %
Applied Materials, Inc.	13 %	11 %	12 %	11 %

17) Restructuring and Other

Restructuring

The Company recorded restructuring charges of \$3 and \$5 during the three and six months ended June 30, 2022, respectively, primarily related to severance costs due to a global cost-saving initiative and the closure of two facilities in Europe. The Company recorded restructuring charges of \$2 and \$5 during the three and six months ended June 30, 2021, respectively, primarily related to severance costs due to the announced closing of a facility in Europe and the movement of certain products to low-cost regions in the three months ended June 30, 2021, and a global cost saving initiative in the three months ended March 31, 2021.

Restructuring activities were as follows:

	Six Months Ended June 30,	
	2022	2021
Restructuring accrual beginning of period	\$ 3	\$ 1
Charged to expense	5	5
Payments and adjustments	(6)	(5)
Restructuring accrual end of period	\$ 2	\$ 1

Other

The Company recorded charges of \$1 and \$3 during the three and six months ended June 30, 2021, respectively, related to duplicate facility costs.

18) Commitments and Contingencies

Litigation

On March 25, 2016, two putative class action lawsuits captioned Dixon Chung v. Newport Corp., et al., and Hubert C. Pincon v. Newport Corp., et al., 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 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. The lawsuits alleged that Newport's directors breached their fiduciary duties to Newport's stockholders in connection with the sale of Newport, which led to inadequate and unfair consideration, by agreeing to unfair deal protection devices and by omitting material information from the proxy statement. The complainants also alleged that the Company, Newport and Merger Sub aided and abetted the directors' alleged breaches of their fiduciary duties and sought monetary damages, including pre- and post-judgment interest. The District Court consolidated the actions, and plaintiffs filed first amended complaint on October 24, 2016 and a second amended complaint on July 12, 2017, each of which were captioned In re Newport Corporation Shareholder Litigation, and made substantially similar allegations and sought monetary damages, including pre- and post-judgment interest. The District Court denied plaintiffs' motion for leave to file a third amended complaint on October 10, 2019 and thereafter entered summary judgment for the defendants on January 23, 2020. On March 30, 2022, the Nevada Supreme Court entered an order affirming in their entirety the District Court's orders granting defendants' motion for summary judgment and denying plaintiffs' motion for leave to file an amended complaint.

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

Atotech

On July 1, 2021, the Company entered into a definitive agreement with Atotech (as amended from time to time, the "Implementation Agreement") to acquire Atotech, a leading process chemicals technology company and a market leader in advanced electroplating solutions. Pursuant to the Implementation Agreement, the Company agreed to pay \$16.20 per share in cash and 0.0552 of a share of MKS common stock for each outstanding common share of Atotech (the "Atotech Acquisition"). The final value of the consideration will be determined at the time of the closing of the Atotech Acquisition, which is subject to obtaining the required sanction by the Royal Court of Jersey and the satisfaction of customary closing conditions. The Company's obligation to complete the Atotech Acquisition is not subject to any financing condition. The Company intends to fund the cash portion of the transaction with a combination of available cash on hand and committed term loan debt financing.

In connection with entering into the Implementation Agreement, the Company entered into (a) a debt commitment letter, dated as of July 1, 2021, with JPMorgan Chase Bank, N.A. and Barclays Bank PLC (the "Commitment Parties") and (b) joinders to such commitment letter to add certain additional lender parties (together with the Commitment Parties, the "2021 Commitment Parties") dated as of July 23, 2021 ((a) and (b) together, the "2021 Commitment Letter"), pursuant to which, subject to the terms and conditions set forth therein, the 2021 Commitment Parties committed to provide (i) a senior secured term loan credit facility in an aggregate principal amount of \$5,300, which would refinance the Term Loan Facility and be used to finance a portion of the Atotech Acquisition and refinance certain existing indebtedness of Atotech and (ii) a senior secured revolving credit facility with aggregate total commitments of \$500, which would replace the ABL Facility.

On April 1, 2022, the Company entered into an amendment to the Implementation Agreement (the "Amendment"), providing for additional time for the satisfaction of certain closing conditions set forth in the Implementation Agreement, including approval of the Atotech Acquisition by the Royal Court of Jersey and receipt of regulatory approvals ("Clearances"), such that the Long Stop Date (as defined in the Implementation Agreement) was extended from March 31, 2022 to September 30, 2022.

In addition, the Amendment amended certain provisions related to obtaining the Clearances, the timing of the closing date and the obligations of the parties with respect to the debt financing contemplated in connection with the Atotech Acquisition and provides for the automatic termination of the Implementation Agreement if the closing has not occurred by the Long Stop Date.

In connection with the Amendment, the Company terminated the 2021 Commitment Letter and entered into (a) a new debt commitment letter, dated as of April 1, 2022, with the Commitment Parties and (b) joinders to such commitment letter to add certain additional lender parties (together with the Commitment Parties, the "2022 Commitment Parties") dated as of April 4, 2022 ((a) and (b) together, the "2022 Commitment Letter"), pursuant to which, among other things, the 2022 Commitment Parties committed to provide the Company with (i) a senior secured term loan B credit facility consisting of a \$4,250 term loan B and (ii) a senior secured term loan A credit facility consisting of a \$1,000 term loan A ((i) and (ii) together, the "2022 New Term Loan Facilities") and (iii) a senior secured revolving credit facility with aggregate total commitments of \$500 (the

"2022 New Revolving Credit Facility"). The 2022 New Term Loan Facilities and the 2022 New Revolving Credit Facility would replace the Term Loan Facility and the ABL Facility, respectively, be used to finance a portion of the Atotech Acquisition, to refinance certain existing indebtedness of Atotech, to pay fees and expenses in connection with the Atotech Acquisition, and, in the case of the 2022 New Revolving Credit Facility, be used for working capital and for general corporate purposes.

On April 11, 2022, in connection with the 2022 Commitment Letter, the Company completed the syndication of the 2022 New Term Loan Facilities, comprised of (i) two tranches of term loan B: a tranche of \$3,600 at the secured overnight financing rate ("SOFR") plus 2.75%, a floor of 0.50% and 2.0% of original issue discount ("OID"), and a Euro tranche of EUR 600 at EURIBOR plus 3.00%, a floor of 0.00% and 2.00% of OID; and (ii) a \$1,000 term loan A at SOFR plus 2.50%, a floor of 0.00% and 0.25% of OID.

The 2022 Commitment Parties' obligations under the 2022 Commitment Letter and the closing and initial funding under the 2022 New Term Loan Facilities and the 2022 New Revolving Credit Facility are subject to certain customary conditions including, without limitation, the consummation of the Atotech Acquisition in accordance with the Implementation Agreement, the accuracy of specified representations and warranties of the Company and other customary closing conditions.

19) Subsequent Events

On July 28, 2022, the Company and Atotech received unconditional merger approval from China's State Administration for Market Regulation for the Atotech Acquisition. The Atotech Acquisition has now received all required regulatory clearances and is anticipated to close on August 17, 2022, subject to obtaining the required sanction by the Royal Court of Jersey and the satisfaction of customary closing conditions.

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 manufacturing and sourcing risks, including the impact and duration of supply chain disruptions, component shortages and price increases, and changes in global demand and the impact of the COVID-19 pandemic with respect to such disruptions, shortages and price increases, our ability to complete the acquisition of Atotech Limited ("Atotech"), the terms of our existing term loan, the terms and availability of financing for the Atotech Acquisition (as defined below), the substantial indebtedness we expect to incur in connection with the Atotech Acquisition and the need to generate sufficient cash flows to service and repay such debt, our entry into Atotech's chemicals technology business, in which we do not have experience and which may expose us to significant additional liabilities, the risk of litigation relating to the Atotech Acquisition, the risk that disruption from the Atotech Acquisition materially and adversely affects our businesses and operations and those of Atotech, the ability to realize the anticipated synergies, cost savings and other benefits of the Atotech Acquisition, competition from larger or more established companies in our and Atotech's respective markets, the ability to successfully grow our business and the businesses of Atotech, Photon Control Inc. ("Photon Control"), which we acquired in July 2021, and Electro Scientific Industries, Inc. ("ESI"), which we acquired in February 2019, potential adverse reactions or changes to business relationships resulting from pendency or completion of the Atotech Acquisition, conditions affecting the markets in which we and Atotech operate, including the fluctuations in capital spending in the semiconductor industry and other advanced manufacturing markets, and fluctuations in sales to our and Atotech's major customers, the ability to anticipate and meet customer demand, 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, volatility of stock price, international operations, financial risk management, and the other factors described in our Annual Report on Form 10-K for the year ended December 31, 2021 and any subsequent Quarterly Reports on Form 10-Q, as filed with the U.S. Securities and Exchange Commission (the "SEC"). Additional risk factors may be identified from time to time in MKS' future filings with the SEC. We are under no obligation to, and expressly disclaim 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 report.

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 condensed consolidated financial statements. Historically, we have compared our current quarter results to the same period in the prior year. Beginning in the first quarter of 2022, given the nature of our business, in particular cyclical variations in the semiconductor market, we have changed our basis of comparison to the prior quarter.

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, 2021.

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, 2021 in the section captioned "Management's Discussion and Analysis of Financial Condition and Results of Operations – Critical Accounting Policies and Estimates."

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, temperature sensing, 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. We primarily serve the semiconductor, advanced electronics and specialty industrial markets.

Pending Acquisition of Atotech

On July 1, 2021, we entered into a definitive agreement with Atotech (as amended from time to time, the "Implementation Agreement") to acquire Atotech, a leading process chemicals technology company and a market leader in advanced electroplating solutions. Pursuant to the Implementation Agreement, we agreed to pay \$16.20 per share in cash and 0.0552 of a share of our common stock for each outstanding common share of Atotech (the "Atotech Acquisition"). The final value of the consideration will be determined at the time of the closing of the Atotech Acquisition, which is subject to obtaining the required sanction by the Royal Court of Jersey and the satisfaction of customary closing conditions. Our obligation to complete the Atotech Acquisition is not subject to any financing condition. We intend to fund the cash portion of the transaction with a combination of available cash on hand and committed term loan debt financing.

On April 1, 2022, we entered into an amendment to the Implementation Agreement (the "Amendment"), providing for additional time for the satisfaction of certain closing conditions set forth in the Implementation Agreement, including approval of the Atotech Acquisition by the Royal Court of Jersey and receipt of regulatory approvals ("Clearances"), such that the Long Stop Date (as defined in the Implementation Agreement) was extended from March 31, 2022 to September 30, 2022.

In addition, the Amendment amended certain provisions related to obtaining the Clearances, the timing of the closing date and the obligations of the parties with respect to the debt financing contemplated in connection with the Atotech Acquisition and provides for the automatic termination of the Implementation Agreement if the closing has not occurred by the Long Stop Date.

In connection with the Amendment, we terminated our debt commitment letter, dated as of July 1, 2021, and entered into (a) a new debt commitment letter, dated as of April 1, 2022, with JPMorgan Chase Bank, N.A. and Barclays Bank PLC (the "Commitment Parties") and (b) joinders to such commitment letter to add certain additional lender parties (together with the Commitment Parties, the "2022 Commitment Parties") dated as of April 4, 2022 ((a) and (b) together, the "2022 Commitment Letter"), pursuant to which, among other things, the 2022 Commitment Parties committed to provide us with (i) a senior secured term loan B credit facility consisting of a \$4.25 billion term loan B and (ii) a senior secured term loan A credit facility consisting of a \$1.0 billion term loan A ((i) and (ii) together, the "2022 New Term Loan Facilities") and (iii) a senior secured revolving credit facility with aggregate total commitments of \$500 million (the "2022 New Revolving Credit Facility"). The 2022 New Term Loan Facilities and the 2022 New Revolving Credit Facility would refinance the Term Loan Facility and the ABL Facility (each as defined below), respectively, be used to finance a portion of the Atotech Acquisition, to refinance certain existing indebtedness of Atotech, to pay fees and expenses in connection with the Atotech Acquisition, and, in the case of the 2022 New Revolving Credit Facility, be used for working capital and for general corporate purposes.

On April 11, 2022, in connection with the 2022 Commitment Letter, we completed the syndication of the 2022 New Term Loan Facilities, comprised of (i) two tranches of term loan B: a tranche of \$3.6 billion at the secured overnight financing rate ("SOFR") plus 2.75%, a floor of 0.50% and 2.0% of original issue discount ("OID"), and a Euro tranche of EUR 600 million at EURIBOR plus 3.00%, a floor of 0.00% and 2.00% of OID; and (ii) a \$1.0 billion term loan A at SOFR plus 2.50%, a floor of 0.00% and 0.25% of OID.

The 2022 Commitment Parties' obligations under the 2022 Commitment Letter and the closing and initial funding under the 2022 New Term Loan Facilities and the 2022 New Revolving Credit Facility are subject to certain customary conditions including, without limitation, the consummation of the Atotech Acquisition in accordance with the Implementation Agreement, the accuracy of specified representations and warranties made by us and other customary closing conditions.

For additional information about the commitment letter we entered into on July 1, 2021, which we terminated in connection with the 2022 Commitment Letter, see Note 18 to the Condensed Consolidated Financial Statements.

On July 28, 2022, Atotech and we received unconditional merger approval from China's State Administration for Market Regulation for the Atotech Acquisition. The Atotech Acquisition has now received all required regulatory clearances and is anticipated to close on August 17, 2022, subject to obtaining the required sanction by the Royal Court of Jersey and the satisfaction of customary closing conditions.

Segments

In the first quarter of 2022, we updated the names of our three divisions in order to simplify our naming conventions. Our reportable segments continue to be our three divisions.

The Vacuum Solutions Division ("VSD"), formerly the Vacuum & Analysis Division, 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 Photonics Solutions Division ("PSD"), formerly the Light & Motion Division, provides a broad range of instruments, components and subsystems, which are derived from our core competencies in lasers, photonics, optics, temperature sensing, precision motion control and vibration control.

The Equipment Solutions Division ("ESD"), formerly the Equipment & Solutions Division, provides a range of laser-based systems and test products, including laser-based systems for printed circuit board ("PCB") manufacturing, which include flexible interconnect PCB processing systems and high-density interconnect solutions for rigid PCB manufacturing and substrate processing, and multi-layer ceramic capacitor test systems.

Markets

Beginning with the first quarter of 2022, we changed how we present revenue to better represent the end markets we serve and to enable investors to better understand the key drivers of our business. We separated what we previously categorized as Advanced Markets into our Advanced Electronics and Specialty Industrial end markets. Our Semiconductor end market remained unchanged.

Net Revenues by Market

(dollars in millions)	Three Months Ended				Six Months Ended			
	June 30, 2022	% Total	March 31, 2022	% Total	June 30, 2022	% Total	June 30, 2021	% Total
Semiconductor	\$ 515	67%	\$ 488	66%	\$ 1,003	67%	\$ 843	58%
Advanced Electronics	77	10%	82	11%	159	10%	252	18%
Specialty Industrial	173	23%	172	23%	345	23%	349	24%
Total net revenues	\$ 765	100%	\$ 742	100%	\$ 1,507	100%	\$ 1,444	100%

Semiconductor Market

This market primarily relates to products used in major semiconductor processing steps, such as depositing thin films of material onto silicon wafer substrates, etching, cleaning, lithography, metrology and inspection. A significant portion of our sales is anticipated to continue to be derived from products sold to semiconductor capital equipment manufacturers and semiconductor device manufacturers.

While the semiconductor device manufacturing market is global, major semiconductor manufacturers are concentrated in China, Japan, South Korea, Taiwan and the United States. The semiconductor 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 industry.

For the three months ended June 30, 2022, net revenues in our semiconductor market increased by \$27 million or 6%, compared to the prior quarter and for the six months ended June 30, 2022, net revenues increased by \$160 million or 19%, compared to the same period in the prior year. These increases in net revenues were mainly due to volume increases and were broad-based across VSD and PSD, although supply constraints continue to affect our ability to fully meet customer demand. We expect these constraints to continue in the near-term. The increase in net revenues from PSD included contributions from our acquisition of Photon Control.

Advanced Electronics Market

This market primarily relates to sales of products for PCB manufacturing, solar, display and electronic component applications. These applications include flexible and rigid PCB processing/fabrication, glass coating and electronic thin films. Electronic thin films are a primary component of numerous electronic products, including flat panel displays, light emitting diodes, solar cells and data storage media. Advanced electronics manufacturers are located globally.

For the three months ended June 30, 2022, net revenues in our advanced electronics market decreased by \$5 million or 6%, compared to the prior quarter and for the six months ended June 30, 2022, net revenues decreased by \$93 million or 37%, compared to the same period in the prior year. This market has been impacted by decreased industry demand for flexible PCB via drilling equipment. This demand has continued to soften as customers have temporarily slowed capacity expansion, due in part to softness in smartphone demand. In addition, net revenues for our products for the consumer electronics markets have decreased.

Specialty Industrial Market

This market primarily relates to sales of products for industrial, life and health sciences, and research and defense applications.

Industrial

Industrial technologies encompass a wide range of diverse applications, such as laser marking, measurement and scribing, natural gas and oil production and environmental monitoring. Our industrial customers are located globally.

Life and Health Sciences

Our products for life and health sciences are used in a diverse array of applications, including bioimaging, medical instrument sterilization, medical device manufacturing, analytical, diagnostic and surgical instrumentation, consumable medical supply manufacturing and pharmaceutical production. Our life and health sciences customers are located globally.

Research and Defense

Our products for research and defense are sold to government, university and industrial laboratories for applications involving research and development in materials science, physical chemistry, photonics, optics and electronics materials. Our products are also sold for monitoring and defense applications, including surveillance, imaging and infrastructure protection. Major equipment providers and research laboratories are concentrated in China, Europe, Japan, South Korea, Taiwan and the United States.

For the three months ended June 30, 2022, net revenue in our specialty industrial market decreased by \$1 million or 1% compared to the prior quarter and for the six months ended June 30, 2022, net revenues decreased \$4 million or 1% compared to the same period in the prior year. Although revenue in our specialty industrial market decreased slightly, demand across specialty industrial applications was steady.

International Markets

A significant portion of our net revenues is from sales to customers in international markets. For the six months ended June 30, 2022 and 2021, international revenues accounted for approximately 52% and 60%, respectively, of our total net revenues. A significant portion of our international net revenues was from China and South Korea. We expect international net revenues will continue to represent a significant percentage of our total net revenues for the foreseeable future.

Long-lived assets located outside of the United States accounted for approximately 65% and 50% of our total long-lived assets as of June 30, 2022 and December 31, 2021, respectively. The increase as of June 30, 2022 compared to December 31, 2021, was primarily a result of increased long-lived assets in our Mexico facility and the purchase and expansion of a facility in South Korea. 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.

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		Six Months Ended	
	June 30, 2022	March 31, 2022	June 30, 2022	June 30, 2021
Net revenues:				
Products	86.8%	87.4%	87.1%	87.4%
Services	13.2	12.6	12.9	12.6
Total net revenues	100.0	100.0	100.0	100.0
Cost of revenues:				
Cost of product revenues	49.3	48.5	48.9	46.2
Cost of service revenues	6.5	6.5	6.5	6.9
Total cost of revenues (exclusive of amortization shown separately below)	55.8	55.0	55.4	53.1
Gross profit	44.2	45.0	44.6	46.9
Research and development	6.9	7.0	7.0	6.7
Selling, general and administrative	13.2	12.5	12.8	13.4
Acquisition and integration costs	0.3	1.1	0.7	0.8
Restructuring and other	0.4	0.3	0.3	0.6
Amortization of intangible assets	2.0	2.0	2.0	1.7
Gain on sale of long-lived assets	—	(1.0)	(0.5)	—
Income from operations	21.4	23.1	22.3	23.7
Interest income	0.1	—	0.1	—
Interest expense	0.9	0.8	0.9	0.9
Other expense (income), net	0.3	(0.8)	(0.2)	0.6
Income before income taxes	20.3	23.1	21.7	22.2
Provision for income taxes	3.4	3.8	3.6	3.6
Net income	16.9%	19.3%	18.1%	18.6%

Net Revenues

(dollars in millions)

	Three Months Ended		Six Months Ended	
	June 30, 2022	March 31, 2022	June 30, 2022	June 30, 2021
Products	\$ 664	\$ 648	\$ 1,312	\$ 1,262
Services	101	94	195	182
Total net revenues	\$ 765	\$ 742	\$ 1,507	\$ 1,444

For the three months ended June 30, 2022, net product revenues increased \$16 million compared to the prior quarter, and for the six months ended June 30, 2022, net product revenues increased \$50 million compared to the same period in the prior year. These increases were primarily attributable to volume increases in our semiconductor market, partially offset by decreases in our advanced electronics market, primarily in ESD due to decreased industry demand for flexible PCB via drilling equipment and other products for the consumer electronics markets.

Net 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. For the three months ended June 30, 2022, net service revenues increased \$7 million compared to the prior quarter, and for the six months ended June 30, 2022, net service revenues increased \$13 million compared to the same period in the prior year. We recorded increases in both periods in our semiconductor and advanced electronics markets.

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

(dollars in millions)

	Three Months Ended		Six Months Ended	
	June 30, 2022	March 31, 2022	June 30, 2022	June 30, 2021
Net revenues:				
Vacuum Solutions Division	\$ 507	\$ 474	\$ 981	\$ 894
Photonics Solutions Division	228	228	456	375
Equipment Solutions Division	30	40	70	175
Total net revenues	\$ 765	\$ 742	\$ 1,507	\$ 1,444

For the three months ended June 30, 2022, net revenues from VSD increased \$33 million compared to the prior quarter, and for the six months ended June 30, 2022, net revenues increased \$87 million compared to the same period in the prior year. These increases were largely reflective of volume increases in the semiconductor market.

For the three months ended June 30, 2022, net revenues from PSD were flat compared to the prior quarter, with increases in net revenues from our semiconductor market offsetting decreases in net revenues from our advanced electronics market. For the six months ended June 30, 2022, net revenues increased \$81 million compared to the same period in the prior year, reflective of volume increases in the semiconductor market, including contributions from our acquisition of Photon Control.

For the three months ended June 30, 2022, net revenues from ESD decreased \$10 million compared to the prior quarter, and for the six months ended June 30, 2022, net revenues decreased \$105 million compared to the same period in the prior year. These decreases were due to decreased industry demand for flexible PCB via drilling equipment that has continued to soften as customers have temporarily slowed capacity expansion, due in part to softness in smartphone demand.

Gross Margin

	Three Months Ended			Six Months Ended		
	June 30, 2022	March 31, 2022	% Points Change	June 30, 2022	June 30, 2021	% Points Change
Gross margin as a percentage of net revenues:						
Products	43.2 %	44.4 %	(1.2)%	43.8 %	47.1 %	(3.3)%
Services	50.0	49.2	0.8	49.6	45.5	4.1
Total gross margin	44.2 %	45.0 %	(0.8)%	44.6 %	46.9 %	(2.3)%

Gross margin for our products decreased for the three and six months ended June 30, 2022, compared to the prior quarter and compared to the same period in the prior year, respectively. The decreases in gross margin were primarily due to higher materials costs reflective of global component shortages, higher logistics costs and unfavorable overhead absorption arising from the effect of component shortages on manufacturing efficiencies. The decrease in our product gross margin for the six months ended June 30, 2022, compared to the same period in the prior year, was partially offset by higher revenue volumes, favorable product mix and lower warranty costs.

Gross margin for our services increased for the three and six months ended June 30, 2022, compared to the prior quarter and compared to the same period in the prior year, respectively. The increase in our service gross margin for the six months ended June 30, 2022, compared to the same period in the prior year, was reflective of our efforts to transition customers to higher-value offerings such as service contracts and the mix of products serviced. This increase was partially offset by unfavorable overhead efficiency and higher excess and obsolete charges on service-related parts.

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

	Three Months Ended			Six Months Ended		
	June 30, 2022	March 31, 2022	% Points Change	June 30, 2022	June 30, 2021	% Points Change
Gross margin as a percentage of net revenues:						
Vacuum Solutions Division	43.2 %	43.5 %	(0.3)%	43.4 %	46.7 %	(3.3)%
Photonics Solutions Division	48.1	49.6	(1.5)	48.9	45.9	3.0
Equipment Solutions Division	30.7	36.9	(6.2)	34.2	50.1	(15.9)
Total gross margin	44.2 %	45.0 %	(0.8)%	44.6 %	46.9 %	(2.3)%

Gross margin for VSD decreased for the three months ended June 30, 2022 compared to the prior quarter, and gross margin for VSD decreased for the six months ended June 30, 2022 compared to the same period in the prior year, in each case primarily due to higher material costs reflective of global component shortages, higher logistics costs and unfavorable overhead absorption. These decreases in gross margin were partially offset by favorable product mix and higher revenue volumes.

Gross margin for PSD decreased for the three months ended June 30, 2022, compared to the prior quarter, primarily due to higher material costs reflective of global component shortages, higher logistics costs and unfavorable product mix. Gross margin for PSD increased for the six month period ended June 30, 2022, compared to the same period in the prior year, primarily due to higher revenue volumes and favorable product mix, partially offset by unfavorable absorption, higher material costs reflective of global component shortages and higher logistics costs.

Gross margin for ESD decreased for the three months ended June 30, 2022, compared to the prior quarter, and gross margin for ESD decreased for the six months ended June 30, 2022 compared to the same period in the prior year, in each case primarily due to unfavorable absorption, from lower revenue volumes, unfavorable product mix, and higher logistics costs.

Research and Development

<i>(dollars in millions)</i>	Three Months Ended		Six Months Ended	
	June 30, 2022	March 31, 2022	June 30, 2022	June 30, 2021
Research and development	\$ 53	\$ 52	\$ 105	\$ 97

For the six months ended June 30, 2022, research and development expenses increased \$8 million compared to the same period in the prior year, primarily due to increases of \$5 million in compensation-related costs, \$1 million in consulting costs and \$1 million in occupancy costs, reflective of increased research and development headcount.

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 products have continuously advanced as we strive to meet our customers' evolving needs. We have developed, and continue to develop, new products to address industry trends, such as the shrinking of integrated circuit critical dimensions and technology inflections, and, in the flat panel display and solar markets, the transition to larger substrate sizes, which require more advanced processing and process control technology, the continuing drive toward more complex and accurate components and devices within the handset and tablet market, the transition to 5G for both devices and infrastructure, supporting the growth in units and via counts of the high density interconnect PCB drilling market, and the industry transition to electric cars in the automotive market. In addition, we have developed, and continue to develop, products that support the migration to new classes of materials, ultra-thin layers, and 3D structures that are used in small geometry manufacturing. Research and development expenses consist primarily of salaries and related expenses for personnel engaged in research and development, fees paid to consultants, material costs for prototypes and other expenses related to the design, development, testing and enhancement of our products.

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

Selling, General and Administrative

<i>(dollars in millions)</i>	Three Months Ended		Six Months Ended	
	June 30, 2022	March 31, 2022	2022	2021
Selling, general and administrative	\$ 101	\$ 92	\$ 193	\$ 193

For the three months ended June 30, 2022, selling, general and administrative expenses increased \$9 million sequentially, with \$5 million in increases from annual compensation adjustments, including equity award grants. The remaining increases were primarily for consulting and professional fees, marketing and related travel costs and information technology-related costs.

Acquisition and Integration Costs

<i>(dollars in millions)</i>	Three Months Ended		Six Months Ended	
	June 30, 2022	March 31, 2022	2022	2021
Acquisition and integration costs	\$ 2	\$ 8	\$ 10	\$ 12

Acquisition and integration costs during the three months ended June 30, 2022 and March 31, 2022 and the six months ended June 30, 2022, were primarily related to consulting and professional fees related to our pending acquisition of Atotech. Acquisition and integration costs for the six months ended June 30, 2021, were primarily related to consulting and professional fees related to our acquisition of Photon Control, the pending acquisition of Atotech and a proposed acquisition that was not consummated.

Restructuring and other

<i>(dollars in millions)</i>	Three Months Ended		Six Months Ended	
	June 30, 2022	March 31, 2022	June 30, 2022	June 30, 2021
Restructuring and other	\$ 3	\$ 2	\$ 5	\$ 8

Restructuring and other costs during the three and six months ended June 30, 2022, were primarily related to severance costs due to a global cost-saving initiative and the closure of two facilities in Europe. Restructuring and other costs during the three months ended March 31, 2022 were primarily related to the closure of a facility in Europe. Restructuring and other costs during the three and six months ended June 30, 2021 were primarily related to duplicate facility costs attributed to entering into new facility leases, severance costs due to a global cost-saving initiative, costs related to the pending closure of a facility in Europe and movement of certain products to low-cost regions.

Amortization of Intangible Assets

<i>(dollars in millions)</i>	Three Months Ended		Six Months Ended	
	June 30, 2022	March 31, 2022	June 30, 2022	June 30, 2021
Amortization of intangible assets	\$ 15	\$ 15	\$ 30	\$ 25

For the six months ended June 30, 2022, amortization of intangible assets increased by \$5 million, compared to the same period in the prior year, due to amortization expense from our acquisition of Photon Control.

Gain on sale of long-lived assets

<i>(dollars in millions)</i>	Three Months Ended		Six Months Ended	
	June 30, 2022	March 31, 2022	June 30, 2022	June 30, 2021
Gain on sale of long-lived assets	\$ —	\$ (7)	\$ (7)	\$ —

For the three months ended March 31, 2022 and the six months ended June 30, 2022, we recorded a gain from the sale of a minority interest investment in a private company.

Other Expense (Income), Net

<i>(dollars in millions)</i>	Three Months Ended		Six Months Ended	
	June 30, 2022	March 31, 2022	June 30, 2022	June 30, 2021
Other expense (income), net	\$ 2	\$ (5)	\$ (3)	\$ 9

Other expense (income), net, for the three months ended June 30, 2022 and six months ended June 30, 2021, consisted primarily of net foreign exchange and fair value losses.

Other expense (income), net, for the three months ended March 31, 2022 and the six months ended June 30, 2022, consisted primarily of net foreign exchange and fair value gains.

Provision for Income Taxes

<i>(dollars in millions)</i>	Three Months Ended		Six Months Ended	
	June 30, 2022	March 31, 2022	2022	2021
Provision for income taxes	\$ 26	\$ 28	\$ 54	\$ 52

Our effective tax rates for the three months ended June 30, 2022 and March 31, 2022 were 17.0% and 16.3%, respectively. The effective tax rates for the three months ended June 30, 2022 and March 31, 2022 were lower than the U.S. statutory tax rate mainly due to the U.S. deduction for foreign derived intangible income ("FDII") and the geographic mix of income earned by the Company's international subsidiaries being taxed at rates lower than the U.S. statutory tax rate, offset by the U.S. global intangible low-taxed income inclusion ("GILTI").

Our effective tax rates for the six months ended June 30, 2022 and June 30, 2021 were 16.6% and 16.2%, respectively. The effective tax rates for the six months ended June 30, 2022 and June 30, 2021 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, benefits of stock compensation, and the U.S. deduction for FDII offset by the U.S. tax effects of the U.S. GILTI inclusion and the write-off of deferred tax assets related to certain foreign net operating losses.

Over the next 12 months, it is reasonably possible that we may recognize approximately \$1 million of previously net unrecognized tax benefits, excluding interest and penalties, related to U.S. 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 2018 through the present. The U.S. statute of limitation for the one-time tax reported in 2017 remains open until 2024. The statute of limitations for our tax filings in other jurisdictions varies between fiscal years 2016 through the present. We also have certain federal credit carryforwards and state tax loss and credit carryforwards that are open to examination for tax years 2002 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 the impact of tax legislation, further interpretations and guidance from U.S. federal and state governments on the impact of proposed regulations issued by the Internal Revenue Service, further interpretations and guidance from foreign governments, the geographic composition of our pre-tax income, and changes in income tax reserves for unrecognized tax benefits. We monitor these factors and timely adjust our estimates of the effective tax rate accordingly. We expect that the geographic mix of pre-tax income will continue to have a favorable impact on our effective tax rate. However, the geographic mix of pre-tax income can change based on multiple factors, resulting in changes to the effective tax rate in future periods. While we believe we have adequately provided for all tax positions, amounts asserted by taxing authorities could materially differ from our accrued positions as a result of uncertain and complex application of tax law and regulations. Additionally, the recognition and measurement of certain tax benefits include estimates and judgment by management. Accordingly, we could record additional provisions or benefits for U.S. federal, state, and foreign tax matters in future periods as new information becomes available.

On March 28, 2022, the Biden Administration released its fiscal year 2023 budget blueprint, which includes an increase to the corporate tax rate from 21% to 28%, an increase to GILTI taxes, reductions of the FDII benefit, a new minimum tax based on an Organization of Economic Co-operation and Development agreement and other provisions. If these tax proposals are enacted in their current form, we expect our income tax expense would materially increase.

Liquidity and Capital Resources

Cash and cash equivalents and short-term marketable investments at June 30, 2022 and December 31, 2021 totaled \$1.1 billion and \$1.0 billion, respectively. The primary driver in our current and anticipated future cash flows is, and we expect 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 \$146 million for the six months ended June 30, 2022, resulting from net income of \$273 million, which included non-cash charges of \$84 million, offset by a net increase in working capital of \$211 million. The net increase in working capital was primarily due to increases in inventory of \$133 million and trade accounts receivable of \$53 million, as a result of increased business levels and timing of sales, and a decrease of \$49 million in accrued compensation resulting from the payment of variable compensation. These increases in working capital were partially offset by an increase in accounts payable and accrued expenses of \$30 million.

Net cash used in investing activities was \$1 million for the six months ended June 30, 2022, primarily due to \$83 million in purchases of property, plant and equipment, which included a \$42 million purchase and expansion of a facility in South Korea, partially offset by \$76 million in maturities of investments.

Net cash used in financing activities was \$31 million for the six months ended June 30, 2022, primarily due to \$24 million of dividend payments and \$5 million related to net tax payments on the vesting of employee stock awards.

Holders of our common stock are entitled to receive dividends when and if they are declared by our Board of Directors. Our Board of Directors declared a cash dividend of \$0.22 per share during each of the first and second quarters of 2022, which totaled \$24 million. On July 25, 2022, our Board of Directors declared a quarterly cash dividend of \$0.22 per share to be paid on September 9, 2022 to stockholders of record as of August 8, 2022. 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, each as defined and described further below, we may be restricted from paying dividends under certain circumstances.

Atotech Acquisition

On July 1, 2021, we entered into an Implementation Agreement to acquire Atotech, a leading process chemicals technology company and a market leader in advanced electroplating solutions. Pursuant to the Implementation Agreement, we agreed to pay \$16.20 per share in cash and 0.0552 of a share of our common stock for each outstanding common share of Atotech. The final value of the consideration will be determined at the time of the closing of the Atotech Acquisition, which is subject to obtaining the required sanction by the Royal Court of Jersey and the satisfaction of customary closing conditions. Our obligation to complete the Atotech Acquisition is not subject to any financing condition. Additional information regarding the funding of the acquisition and the 2022 New Term Loan Facilities, the 2022 New Revolving Credit Facility and the replacement of the Term Loan Facility and the ABL Facility, is discussed under "Pending Acquisition of Atotech" above and in Note 18 to the Notes to the Condensed Consolidated Financial Statements.

Senior Secured Term Loan Credit Facility

In connection with the completion of the acquisition of Newport Corporation ("Newport") in 2016 (the "Newport Merger"), we entered into a term loan credit agreement (as amended, the "Term Loan Credit Agreement") with Barclays Bank PLC, as administrative agent and collateral agent, and the lenders from time to time party thereto, which provided a senior secured term loan credit facility (the "Term Loan Facility") in the original principal amount of \$780 million. We have entered into seven amendments to the Term Loan Credit Agreement since 2016. The Term Loan Facility is subject to increase at our option and subject to receipt of lender commitments in accordance with the Term Loan Credit Agreement. The maturity date of the Term Loan Facility is February 2, 2026. As of June 30, 2022, 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 Offered 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 1.00%, plus, in each case, an applicable margin of 0.75%; 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 of 1.75%. 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.

Under the Term Loan Credit Agreement, we have the ability to incur additional incremental debt facilities in an amount up to (x) the greater of (1) \$600 million and (2) 100% of consolidated EBITDA, plus (y) an amount equal to the sum of all voluntary prepayments of term loans under the Term Loan Facility, plus (z) an additional unlimited amount subject to pro forma compliance with a secured leverage ratio test of 3.25:1.00.

We are required to make scheduled quarterly amortization payments each equal to 0.25% of the original principal amount of the Term Loan Facility. As of June 30, 2022, the remaining balance of deferred finance fees, original issue discount and repricing fees related to the term loans under the Term Loan Facility was \$7 million.

As of June 30, 2022, after giving effect to all amendments and repayments prior to such date, the outstanding principal amount of the Term Loan Facility was \$820 million, and the interest rate was 2.8%.

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 secured 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 June 30, 2022, we were in compliance with all covenants under the Term Loan Credit Agreement.

Senior Secured Asset-Based Revolving Credit Facility

In February 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 the ABL Facility of up to \$100 million, subject to a borrowing base limitation. We have entered into two amendments to the ABL Credit Agreement since 2019. As of June 30, 2022, after giving effect to all amendments, 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 million. We have not borrowed against the ABL Facility to date.

As of June 30, 2022, any 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%, plus, in each case, an applicable margin ranging from 0.25% to 0.50%; 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%, plus, in each case, an applicable margin ranging from 1.25% to 1.50%. 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.

Under the ABL Facility, we are required to prepay amounts outstanding under the ABL Facility (1) if amounts outstanding under the ABL Facility exceed the lesser of (a) the commitment amount and (b) the borrowing base, in an amount required to reduce such shortfall, (2) if amounts outstanding under the ABL Facility in any currency other than U.S. dollars exceed the sublimit for such currency, in an amount required to reduce such shortfall, and (3) during any period in which we have excess availability less than the greater of (a) 10.0% of the lesser of (x) the commitment amount and (y) the borrowing base (the "Line Cap") and (b) \$9 million for 3 consecutive business days, until the time when we have excess availability equal to or greater than the greater of (A) 10.0% of the Line Cap and (B) \$9 million for 30 consecutive days, or during the continuance of an event of default, with immediately available funds in our blocked accounts.

There is no scheduled amortization under the ABL Facility. Any principal amount outstanding under the ABL Facility is due and payable in full on the fifth anniversary of the closing date, subject to a springing maturity in the event that term loans under the Term Loan Facility in an aggregate amount of at least \$100 million have an earlier maturity date than the ABL Facility.

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

From the time when we have excess availability less than the greater of (a) 10.0% of the Line Cap and (b) \$9 million until the time when we have excess availability equal to or greater than the greater of (a) 10.0% of the Line Cap and (b) \$9 million for 30 consecutive days, or during the continuance of an event of default, the ABL Credit Agreement requires that we maintain a fixed charge coverage ratio, 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.

Lines of Credit and 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 June 30, 2022 of up to an equivalent of \$25 million. Total borrowings outstanding under these arrangements were \$2 million at June 30, 2022. There were no borrowings outstanding under these arrangements at December 31, 2021.

Interest Rate Swap Agreements

We entered into various interest rate swap agreements as described further in Note 5 to the Condensed Consolidated Financial Statements that exchange the variable LIBOR interest rate to a fixed rate in order to manage the exposure to interest rate fluctuations associated with the variable LIBOR interest rate paid on the outstanding balance of the Term Loan Facility. We expect to enter into interest rate swap agreements in order to manage the exposure to interest rate fluctuations associated with the variable SOFR of the 2022 New Term Loan Facilities.

Contractual Obligations

There have been no 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, 2021.

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, 2021 filed with the Securities and Exchange Commission on February 28, 2022. As of June 30, 2022, there were no material changes in our exposure to market risk from December 31, 2021.

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 June 30, 2022. 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 June 30, 2022, 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 June 30, 2022 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.

For a description of our material legal proceedings, see Note 18 to the Notes to the Condensed Consolidated Financial Statements contained in Part 1, Item 1 of this Quarterly Report on Form 10-Q.

ITEM 1A. RISK FACTORS.

Information regarding risk factors affecting the Company's business is discussed in the section entitled "Risk Factors" in the Company's Annual Report on Form 10-K for the year ended December 31, 2021 filed with the Securities and Exchange Commission on February 28, 2022.

ITEM 6. EXHIBITS.

Exhibit No.	Exhibit Description
+2.1 (1)	Amendment to Implementation Agreement, dated April 1, 2022, by and among Atotech Limited, MKS Instruments, Inc. and Atotech Manufacturing, Inc.
+3.1 (2)	Restated Articles of Organization of the Registrant
+3.2 (3)	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 (4)	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 (5)	Amended and Restated By-Laws of the Registrant
+10.1 (1)	Commitment Letter, by and among MKS Instruments, Inc., JPMorgan Chase Bank, N.A. and Barclays Bank PLC, dated as of April 1, 2022
+10.2 (6)*	2022 Stock Incentive Plan
+10.3 (7)*	Form of Restricted Stock Unit Agreement for Non-Employee Directors under the 2022 Stock Incentive Plan
+10.4 (7)*	Form of Restricted Stock Unit Agreement for Employees under the 2022 Stock Incentive Plan
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.DEF	Inline XBRL Taxonomy Extension Definition Linkbase Document
101.LAB	Inline XBRL Taxonomy Extension Label Linkbase Document
101.PRE	Inline XBRL Taxonomy Extension Presentation Linkbase Document
104	Cover Page Interactive Data File (formatted as inline XBRL with applicable taxonomy extension information contained in Exhibits 101)

+ Previously filed

* Management contract or compensatory plan arrangement

- (1) 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 April 1, 2022.
- (2) 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.
- (3) 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.
- (4) 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.
- (5) Incorporated by reference to the Registrant's Current Report on Form 8-K (File No. 000-23621), filed with the Securities and Exchange Commission on May 6, 2014.

- (6) Incorporated by reference to the Registration Statement on Form S-8 (File No. 333-264817), filed with the Securities and Exchange Commission on May 10, 2022.
- (7) 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 11, 2022.

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: August 3, 2022

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: August 3, 2022

/s/ John T.C. Lee

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

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

I, Seth H. Bagshaw, certify that:

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

Dated: August 3, 2022

/s/ Seth H. Bagshaw

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

CERTIFICATION OF CHIEF EXECUTIVE OFFICER AND CHIEF FINANCIAL OFFICER
PURSUANT TO 18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Quarterly Report on Form 10-Q of MKS Instruments, Inc. (the "Company") for the period ended June 30, 2022 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: August 3, 2022

/s/ John T.C. Lee

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

Dated: August 3, 2022

/s/ Seth H. Bagshaw

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