

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, DC 20549
FORM 10-Q

(MARK ONE)

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

For the quarterly period ended September 30, 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 November 1, 2022, the registrant had 66,506,770 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	September 30, 2022	December 31, 2021
Current assets:		
Cash and cash equivalents	\$ 884	\$ 966
Short-term investments	1	76
Trade accounts receivable, net of allowance for doubtful accounts of \$11 and \$4 at September 30, 2022 and December 31, 2021, respectively	730	443
Inventories	961	577
Other current assets	215	85
Total current assets	2,791	2,147
Property, plant and equipment, net	655	326
Right-of-use assets	235	184
Goodwill	3,851	1,228
Intangible assets, net	3,653	576
Other assets	187	79
Total assets	\$ 11,372	\$ 4,540
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Short-term debt	\$ 95	\$ 9
Accounts payable	410	168
Accrued compensation	92	132
Income taxes payable	92	25
Lease liabilities	27	18
Deferred revenue and customer advances	103	37
Other current liabilities	192	71
Total current liabilities	1,011	460
Long-term debt, net	4,893	808
Non-current deferred taxes	893	99
Non-current accrued compensation	131	49
Non-current lease liabilities	220	193
Other non-current liabilities	75	44
Total liabilities	7,223	1,653
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; 66.5 and 55.5 shares issued and outstanding at September 30, 2022 and December 31, 2021, respectively	—	—
Additional paid-in capital	2,124	907
Retained earnings	2,233	1,991
Accumulated other comprehensive loss	(208)	(11)
Total stockholders' equity	4,149	2,887
Total liabilities and stockholders' equity	\$ 11,372	\$ 4,540

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

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

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
Net revenues:				
Products	\$ 841	\$ 649	\$ 2,153	\$ 1,911
Services	113	93	308	275
Total net revenues	<u>954</u>	<u>742</u>	<u>2,461</u>	<u>2,186</u>
Cost of revenues:				
Products	506	345	1,243	1,012
Services	58	49	156	148
Total cost of revenues (exclusive of amortization shown separately below)	<u>564</u>	<u>394</u>	<u>1,399</u>	<u>1,160</u>
Gross profit	390	348	1,062	1,026
Research and development	63	52	168	149
Selling, general and administrative	126	95	319	289
Acquisition and integration costs	31	9	41	21
Restructuring and other	5	2	10	10
Amortization of intangible assets	47	15	77	40
Gain on sale of long-lived assets	—	—	(7)	—
Income from operations	<u>118</u>	<u>175</u>	<u>454</u>	<u>517</u>
Interest income	1	—	2	1
Interest expense	80	6	93	19
Other (income) expense, net	(1)	3	(4)	12
Income before income taxes	<u>40</u>	<u>166</u>	<u>367</u>	<u>487</u>
Provision for income taxes	34	34	88	86
Net income	<u>\$ 6</u>	<u>\$ 132</u>	<u>\$ 279</u>	<u>\$ 401</u>
Other comprehensive (loss) income, net of tax:				
Changes in value of financial instruments designated as cash flow hedges	\$ 48	\$ 3	\$ 73	\$ 14
Foreign currency translation adjustments	(227)	(18)	(275)	(32)
Net unrecognized pension gain	5	—	5	—
Total comprehensive (loss) income	<u>\$ (168)</u>	<u>\$ 117</u>	<u>\$ 82</u>	<u>\$ 383</u>
Net income per share:				
Basic	<u>\$ 0.09</u>	<u>\$ 2.39</u>	<u>\$ 4.85</u>	<u>\$ 7.24</u>
Diluted	<u>\$ 0.09</u>	<u>\$ 2.38</u>	<u>\$ 4.84</u>	<u>\$ 7.21</u>
Weighted average common shares outstanding:				
Basic	<u>61.0</u>	<u>55.5</u>	<u>57.4</u>	<u>55.4</u>
Diluted	<u>61.1</u>	<u>55.7</u>	<u>57.6</u>	<u>55.7</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
Net issuance under stock-based plans	0.1		5			5
Shares issued for Atotech Acquisition	10.7		1,186			1,186
Stock-based compensation			10			10
Cash dividend (\$0.22 per common share)				(13)		(13)
Comprehensive income (net of tax):						
Net income				6		6
Other comprehensive loss					(174)	(174)
Balance at September 30, 2022	66.5	\$ —	\$ 2,124	\$ 2,233	\$ (208)	\$ 4,149

	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
Net issuance under stock-based plans	0.1					
Stock-based compensation			9			9
Cash dividend (\$0.22 per common share)				(12)		(12)
Comprehensive income (net of tax):						
Net income				132		132
Other comprehensive loss					(15)	(15)
Balance at September 30, 2021	55.5	\$ —	\$ 893	\$ 1,853	\$ (18)	\$ 2,728

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

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

	Nine Months Ended September 30,	
	2022	2021
Cash flows from operating activities:		
Net income	\$ 279	\$ 401
Adjustments to reconcile net income to net cash provided by operating activities:		
Depreciation and amortization	120	76
Amortization of inventory step-up adjustment to fair value	39	—
Unrealized loss (gain) on derivatives not designated as hedging instruments	6	(1)
Amortization of debt issuance costs and original issue discount	46	2
Gain on sale of long-lived assets	(7)	—
Stock-based compensation	31	28
Provision for excess and obsolete inventory	10	14
Deferred income taxes	4	7
Other	3	1
Changes in operating assets and liabilities, net of acquired assets and liabilities:		
Trade accounts receivable	(37)	(51)
Inventories	(188)	(62)
Other current and non-current assets	2	—
Accounts payable	55	38
Current and non-current accrued compensation	(37)	3
Income taxes payable	(27)	(29)
Other current and non-current liabilities	46	18
Net cash provided by operating activities	345	445
Cash flows from investing activities:		
Acquisition of business, net of cash acquired	(4,473)	(268)
Purchases of investments	(1)	(497)
Maturities of investments	76	342
Sales of investments	—	135
Proceeds from sale of long-lived assets	7	—
Purchases of property, plant and equipment	(109)	(63)
Net cash used in investing activities	(4,500)	(351)
Cash flows from financing activities:		
Proceeds from borrowings, net of deferred financing fees paid	4,985	1
Payments of borrowings	(835)	(13)
Dividend payments	(37)	(36)
Net payments related to employee stock awards	(5)	(14)
Net cash provided by (used in) financing activities	4,108	(62)
Effect of exchange rate changes on cash and cash equivalents	(35)	(7)
(Decrease) increase in cash and cash equivalents	(82)	25
Cash and cash equivalents at beginning of period	966	608
Cash and cash equivalents at end of period	\$ 884	\$ 633

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

1) Basis of Presentation

The terms "MKS" and the "Company" refer to MKS Instruments, Inc. and its subsidiaries. All intercompany accounts and transactions have been eliminated in consolidation. The interim financial data as of September 30, 2022, and for the three and nine months ended September 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 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 then-three divisions in order to simplify its naming convention. These divisions, formerly known as the Vacuum & Analysis Division, the Light & Motion Division and the Equipment & Solutions Division, were renamed the Vacuum Solutions Division ("VSD"), the Photonics Solutions Division ("PSD") and the Equipment Solutions Division ("ESD"), respectively. On August 17, 2022, the Company completed its acquisition of Atotech Limited ("Atotech") and refers to Atotech as its Materials Solutions Division ("MSD"). During the third quarter of 2022, MKS consolidated its Equipment Solutions business, previously ESD, into a component of PSD and prior periods were recast to reflect this change. MKS' reportable segments as of September 30, 2022 consist of its current three divisions, VSD, PSD and MSD. For additional information about the acquisition of Atotech (the "Atotech Acquisition"), see Note 8 to the condensed consolidated financial statements.

2) Revenue from Contracts with Customers

Contract assets as of September 30, 2022 and December 31, 2021 were \$46 and \$4, respectively, with the increase attributable to the Atotech Acquisition. A roll-forward of the Company's deferred revenue and customer advances is as follows:

	Nine Months Ended	
	September 30, 2022	September 30, 2021
Beginning balance, January 1 ⁽¹⁾	\$ 40	\$ 37
Assumed deferred revenue and customer advances from Atotech Acquisition	36	—
Additions to deferred revenue and customer advances	149	68
Amount of deferred revenue and customer advances recognized in income	(121)	(64)
Ending balance, September 30 ⁽²⁾	<u>\$ 104</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 September 30, 2022 included \$103 of current deferred revenue and customer advances and \$1 of non-current deferred revenue. Ending balance as of September 30, 2021 included \$37 of current deferred revenue and customer advances and \$4 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 September 30, 2022			
	VSD	PSD	MSD	Total
Net revenues:				
Products	\$ 450	\$ 227	\$ 164	\$ 841
Services	60	40	13	113
Total net revenues	\$ 510	\$ 267	\$ 177	\$ 954

	Three Months Ended September 30, 2021			
	VSD	PSD	MSD	Total
Net revenues:				
Products	\$ 426	\$ 223	\$ —	\$ 649
Services	57	36	—	93
Total net revenues	\$ 483	\$ 259	\$ —	\$ 742

	Nine Months Ended September 30, 2022			
	VSD	PSD	MSD	Total
Net revenues:				
Products	\$ 1,310	\$ 679	\$ 164	\$ 2,153
Services	181	114	13	308
Total net revenues	\$ 1,491	\$ 793	\$ 177	\$ 2,461

	Nine Months Ended September 30, 2021			
	VSD	PSD	MSD	Total
Net revenues:				
Products	\$ 1,204	\$ 707	\$ —	\$ 1,911
Services	173	102	—	275
Total net revenues	\$ 1,377	\$ 809	\$ —	\$ 2,186

Revenue from certain custom products, including MSD plating lines, and revenue from certain service contracts are recorded over time. Remaining product and services revenues are recorded at a point in time.

3) Investments

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

As of September 30, 2022:	Cost	Gross Unrealized Gains	Gross Unrealized (Losses)	Estimated Fair Value
Short-term investments:				
Time deposits and certificates of deposit	\$ 1	\$ —	\$ —	\$ 1

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

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	<u>\$ 5</u>	<u>\$ 1</u>	<u>\$ —</u>	<u>\$ 6</u>

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 in each of the periods presented.

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 September 30, 2022 and are summarized as follows:

Description	September 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	\$ 17	\$ 17	\$ —	\$ —
Available-for-sale investments:				
Time deposits and certificates of deposit	1	—	1	—
Group insurance contracts	6	—	6	—
Derivatives				
Foreign exchange forward contracts	22	—	22	—
Interest rate hedges - non-current	115	—	115	—
Pension and deferred compensation plan assets	19	—	19	—
Total assets	\$ 180	\$ 17	\$ 163	\$ —
Liabilities:				
Derivatives				
Foreign exchange forward contracts	\$ 16	\$ —	\$ 16	\$ —
Total liabilities	\$ 16	\$ —	\$ 16	\$ —
Reported as follows:				
Assets:				
Cash equivalents	\$ 17	\$ 17	\$ —	\$ —
Short-term investments	1	—	1	—
Other current assets	23	—	23	—
Total current assets	\$ 41	\$ 17	\$ 24	\$ —
Other assets	\$ 139	\$ —	\$ 139	\$ —
Liabilities:				
Other current liabilities	\$ 16	\$ —	\$ 16	\$ —

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	<u>\$ 1</u>	<u>\$ —</u>	<u>\$ 1</u>	<u>\$ —</u>
Other liabilities	<u>\$ 5</u>	<u>\$ —</u>	<u>\$ 5</u>	<u>\$ —</u>

Money Market Funds

Money market funds are classified as 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 retirement benefits of certain of the Company's subsidiaries.

Derivatives

As a result of the Company's global operating activities and variable interest rate borrowings, the Company is exposed to market risks from changes in foreign currency exchange rates and interest rates, which may adversely affect its operating results and financial position. When deemed appropriate, the Company minimizes its risks from foreign currency exchange rate 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, interest rate swaps and interest rate caps 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 and interest rate caps are valued using broker quotations or market transactions.

5) Derivatives

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.

The Company also 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 (income) expense, net.

As of September 30, 2022 and December 31, 2021, the Company had outstanding foreign exchange forward contracts with gross notional values of \$711 and \$241, respectively. The following tables provide a summary of the primary net hedging positions and corresponding fair values held as of September 30, 2022 and December 31, 2021:

	September 30, 2022	
	Gross Notional Value	Fair Value Asset (Liability)
<u>Currency Hedged (Buy/Sell)</u>		
U.S. dollar/Japanese yen	\$ 51	\$ 6
U.S. dollar/South Korean won	105	10
U.S. dollar/euro	13	1
U.S. dollar/U.K. pound sterling	6	1
U.S. dollar/Taiwan dollar	41	3
euro/Chinese renminbi	27	—
U.K. pound sterling/euro	4	—
euro/U.S. dollar	426	(13)
Japanese yen/U.S. dollar	38	(2)
Total	<u>\$ 711</u>	<u>\$ 6</u>
	December 31, 2021	
	Gross Notional Value	Fair Value Asset
<u>Currency Hedged (Buy/Sell)</u>		
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>

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

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
Foreign exchange forward contracts:				
Net gains recognized in accumulated OCI	\$ 48	\$ 3	\$ 73	\$ 14
Net gains (losses) reclassified from accumulated OCI into income	\$ 5	\$ —	\$ 9	\$ (2)

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

Interest Rate Swap and Interest Rate Cap Agreements

The Company has various interest rate swap agreements that exchange a forward-looking term rate based on the variable secured overnight financing rate ("Term SOFR") paid on the outstanding balance of its New Term Loan Facility, as defined and further described in Note 10, to a fixed rate. The Company acquired USD LIBOR interest rate cap agreements as a result of the Atotech Acquisition and is utilizing these agreements to offset the variable Term SOFR rate on its New Term Loan Facility. The Company's USD LIBOR based swaps and USD LIBOR based interest rate caps will convert to Term SOFR after LIBOR's termination in June 2023 according to the terms of each instrument. The table below summarizes interest rate swaps and interest rate caps outstanding at September 30, 2022 and December 31, 2021:

Effective Date	Maturity	Fixed Rate	Notional Amount at Effective Date	Notional Amount at September 30, 2022	September 30, 2022	December 31, 2021
					Fair Value Asset	Fair Value Asset (Liability)
April 5, 2019	March 31, 2023	2.309%	\$ 300	\$ 200	\$ 2	\$ (5)
October 26, 2021	February 28, 2025	0.485%	200	200	17	4
March 31, 2022	February 28, 2025	0.623%	100	100	22	5
September 30, 2022	September 30, 2026	3.156%	350	350	9	—
January 2, 2024	January 31, 2028	2.841%	250	—	7	—
September 30, 2022	September 30, 2027	3.198%	350	350	10	—
January 2, 2024	January 31, 2029	2.986%	250	—	6	—
September 30, 2022	September 30, 2026	3.358%	600	600	10	—
			2,400	1,800	83	4
March 31, 2020	January 31, 2024	1.000%	350	350	16	—
March 31, 2020	January 31, 2024	1.000%	350	350	16	—
			700	700	32	—
			\$ 3,100	\$ 2,500	\$ 115	\$ 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. Changes in the fair value of interest rate caps are recorded immediately in earnings, as the Company has not designated these instruments as hedges and therefore these instruments do not qualify for hedge accounting.

The following table provides a summary of the losses on derivatives not designated as hedging instruments, consisting of balance sheet hedges and interest rate caps:

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
Net losses recognized in income	\$ (11)	\$ (2)	\$ (4)	\$ (9)

Currency Option Agreements

In connection with financing the Atotech Acquisition, the Company issued euro denominated term loan debt. In anticipation of entering into these euro denominated loans, in 2021 the Company purchased foreign currency option contracts to fix the conversion of EUR 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 (income) expense, net.

6) Inventories

Inventories consist of the following:

	September 30, 2022	December 31, 2021
Raw materials	\$ 655	\$ 394
Work-in-process	130	83
Finished goods	176	100
	<u>\$ 961</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. 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. In connection with the Atotech Acquisition, the Company acquired \$69 in right of use assets and \$52 in lease liabilities, primarily related to real estate leases. Approximately \$51 of the acquired right of use assets are finance leases.

8) Acquisitions

Atotech

On August 17, 2022 (the "Effective Date"), the Company completed the Atotech Acquisition, through the acquisition of the entire issued share capital of Atotech by Atotech Manufacturing, Inc. ("Bidco"), a Delaware corporation and indirect wholly owned subsidiary of the Company. The Atotech Acquisition was implemented by means of a scheme of arrangement under the laws of Jersey (the "Scheme") pursuant to the definitive agreement entered into by the Company and Atotech on July 1, 2021, as amended by the Letter Agreement dated October 29, 2021 by and among the Company, Atotech and Bidco and as further amended by the Amendment to the Implementation Agreement dated April 1, 2022 by and among the Company, Atotech and Bidco (together, the "Implementation Agreement").

Atotech develops leading process and manufacturing technologies for advanced surface modification, electroless and electrolytic plating, and surface finishing. Applying a comprehensive systems-and-solutions approach, Atotech's portfolio includes chemistry, equipment, software, and services for innovative and high-technology applications in a wide variety of end markets. Atotech further broadens the Company's capabilities by bringing leadership in critical chemistry solutions for advanced electronics and specialty industrial applications.

On the Effective Date, pursuant to the Scheme and in accordance with terms and conditions of the Implementation Agreement, Bidco acquired each issued and outstanding ordinary share of Atotech in exchange for per share consideration of \$16.20 in cash and 0.0552 of a share of Company common stock. The Company funded the payment of the aggregate cash consideration with a combination of cash on hand and the proceeds from the New Term Loan Facility as defined in Note 10.

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As a result of the Atotech Acquisition, the Company issued an aggregate of 10.7 shares of Company common stock to the former Atotech shareholders.

The preliminary purchase price of Atotech consisted of the following:

Cash consideration to Atotech stockholders, net	\$	2,886
Value of MKS shares issued		1,186
Repayment of Atotech debt ⁽¹⁾		1,545
Settlement of Atotech share-based awards ⁽²⁾		47
Total purchase price, net of cash and cash equivalents acquired	\$	5,664

⁽¹⁾ Represents the cash paid for the outstanding principal of Atotech's senior secured term loans.

⁽²⁾ Represents the amount paid to the holders of Atotech options that became fully vested on the Effective Date and the fair value of vested but unissued Atotech share-based awards.

Under the acquisition method of accounting, the total estimated purchase price is allocated to the acquired tangible and intangible assets and assumed liabilities of Atotech based on their fair values as of the Effective Date, except for contract assets and liabilities, which remain at book value in accordance with Accounting Standards Codification 606. 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 several factors, including (1) broadening its position in key industrial end markets to offer complementary solutions, and (2) leveraging component and systems expertise to provide robust solutions to meet customer evolving technology needs.

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

Cash and cash equivalents	\$	238
Trade accounts receivable		273
Inventories		280
Other current assets		114
Property, plant and equipment		285
Intangible assets		3,251
Goodwill		2,720
Other assets		146
Total assets acquired		7,307
Accounts payable		197
Other current liabilities		203
Non-current deferred taxes		859
Non-current accrued compensation		94
Other non-current liabilities		52
Total liabilities assumed		1,405
Fair value of assets acquired and liabilities assumed		5,902
Less: Cash and cash equivalents acquired		(238)
Total purchase price, net of cash and cash equivalents acquired	\$	5,664

The allocation of estimated purchase consideration to the acquired tangible and intangible assets and assumed liabilities of Atotech is preliminary and subject to change during the measurement period. The Company is in the process of finalizing information related to the allocation of assets acquired and liabilities assumed.

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

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Developed technology	\$	813	9 years
Customer relationships		2,080	16 years
Trade names		195	8 years
Other intangible assets		98	4 years
In process research and development		65	12 years
	<u>\$</u>	<u>3,251</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 net fair value of the acquired intangibles was based upon publicly available benchmarked information as well as a variety of other assumptions, including market participant assumptions, as the preliminary valuation report has not been completed. The valuations were based on the information that was available through the filing date of this 10-Q that existed as of the Effective 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.

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

The results of this acquisition were included in the Company's consolidated statement of operations beginning on August 17, 2022. The Atotech business constitutes the Company's MSD reportable segment (see Note 16).

The Company's condensed consolidated statement of operations for the three and nine months ended September 30, 2022, includes the following amounts of revenue and net income of Atotech since the Effective Date:

	Three and Nine Months Ended September 30, 2022	
Total net revenues	\$	177
Net loss	\$	(44)

During the three and nine months ended September 30, 2022, the Company recognized acquisition and integration costs, substantially all of which related to the Atotech Acquisition.

Pro Forma Results

The following unaudited pro forma financial information presents the combined results of operations of the Company as if the Atotech Acquisition had occurred on January 1, 2021. The unaudited pro forma financial information is not necessarily indicative of what the Company's condensed consolidated results of operations actually would have been had the acquisition occurred at the beginning of the year. In addition, the unaudited pro forma financial information does not attempt to project the future results of operations of the combined Company.

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
Total net revenues	\$ 1,141	\$ 1,125	\$ 3,364	\$ 3,298
Net (loss) income	\$ (34)	\$ 95	\$ 166	\$ 193

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The unaudited pro forma information for the three and nine months ended September 30, 2022 and 2021 give effect primarily to the following:

- Applying the Company's accounting policies;
- Incremental interest expense related to the New Term Loan Facility;
- Incremental amortization of acquired intangible assets related to the estimated fair value from the purchase price allocation;
- The exclusion of inventory step-up amortization from the three and nine months ended September 30, 2022 and the addition of this amortization to the nine months ended September 30, 2021;
- Incremental compensation expense for share-based compensation arrangements; and
- The estimated tax impact of the above adjustments.

Photon Control

On July 15, 2021, the Company completed its acquisition of Photon Control Inc. ("Photon Control") and such acquisition, 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 purchase price 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 non-current 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.

The results of operations of the Photon Control business from the Photon Control Acquisition closing date of July 15, 2021 through December 31, 2021, were not material to the Company's results of operations. The acquisition was also not material to the Company's results of operations for the periods presented on a pro forma basis.

9) 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 printed circuit board ("PCB") via drilling systems and declines in projected operating results for its Equipment Solutions Business ("ESB") reporting unit, the Company evaluated the carrying values of goodwill, purchased intangible assets and other long-lived assets assigned to the reporting unit 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 reporting unit, the Company estimated fair value exceeded carrying value by 10%. The Company determined that there was no triggering event during the quarter ended September 30, 2022 for its ESB reporting unit.

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

	Gross Carrying Amount	Accumulated Impairment Loss	Net
Beginning balance, January 1	\$ 1,373	\$ (145)	\$ 1,228
Acquired goodwill ⁽¹⁾	2,720	—	2,720
Foreign currency translation	(97)	—	(97)
Ending balance, September 30	<u>\$ 3,996</u>	<u>\$ (145)</u>	<u>\$ 3,851</u>

⁽¹⁾ During the three months ended September 30, 2022, the Company recorded goodwill related to the Atotech Acquisition.

Intangible Assets

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

As of September 30, 2022:	Gross	Accumulated Amortization and Impairment Charges	Foreign Currency Translation	Net
Completed technology ⁽¹⁾	\$ 1,369	\$ (280)	\$ (23)	\$ 1,066
Customer relationships ⁽¹⁾	2,398	(155)	(65)	2,178
Patents, trademarks, trade names and other ⁽¹⁾	481	(62)	(10)	409
	<u>\$ 4,248</u>	<u>\$ (497)</u>	<u>\$ (98)</u>	<u>\$ 3,653</u>

⁽¹⁾ During the three months ended September 30, 2022, the Company recorded \$3,251 of separately identified intangible assets related to the Atotech Acquisition, including \$813 in completed technology, \$2,080 in customer relationships and \$358 in patents, trademarks, trade names and other.

As of December 31, 2021:	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, including \$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 nine months ended September 30, 2022 and 2021 was \$77 and \$40, respectively. Aggregate net amortization expense related to acquired intangible assets for future years is as follows:

Year	Amount
2022 (remaining)	\$ 83
2023	327
2024	326
2025	325
2026	310
2027	296
Thereafter	1,930

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

10) Debt

The Company's outstanding debt is as follows:

	September 30, 2022	December 31, 2021
Short-term debt:		
New Term Loan Facility	\$ 92	\$ —
Prior Term Loan Facility	—	9
Japanese lines of credit	3	—
Total short-term debt	\$ 95	\$ 9
Long-term debt:		
New Term Loan Facility, net ⁽¹⁾	\$ 4,893	\$ —
Prior Term Loan Facility, net ⁽¹⁾	—	808
Total long-term debt	\$ 4,893	\$ 808

⁽¹⁾ Net of deferred financing fees, original issuance discount and repricing fees in the aggregate amount of \$204 and \$8 as of September 30, 2022 and December 31, 2021, respectively.

The Company recognized interest expense of \$80 and \$93 for the three and nine months ended September 30, 2022, respectively, and \$6 and \$19 for the three and nine months ended September 30, 2021, respectively.

New Term Loan Facility and New Revolving Facility

In connection with the completion of the Atotech Acquisition, the Company entered into a credit agreement with JPMorgan Chase Bank, N.A., as administrative agent and collateral agent, Barclays Bank PLC, and the lenders from time to time party thereto (the "New Credit Agreement"). The New Credit Agreement provides for (i) a senior secured term loan facility (the "New Term Loan Facility") comprised of three tranches: a USD 1,000 loan (the "USD Tranche A"), a USD 3,600 loan (the "USD Tranche B") and a EUR 600 loan (the "Euro Tranche B"), each of which were borrowed in full on the Effective Date, and (ii) a senior secured revolving credit facility of USD 500 (the "New Revolving Facility" and, together with the New Term Loan Facility, the "New Credit Facilities"), with the commitments under each of the foregoing facilities subject to increase from time to time subject to certain conditions.

Borrowings under the New Credit Facilities 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) with respect to the USD Tranche A, the USD Tranche B and the New Revolving Facility, (x) 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*, or (3) a forward-looking term rate based on Term SOFR (plus an applicable credit spread adjustment) for an interest period of one month, plus 1.00%; and (y) a Term SOFR rate (plus an applicable credit spread adjustment) for the interest period relevant to such borrowing, subject, solely with respect to the USD Tranche B, to a rate floor of 0.50%; and (b) with respect to the Euro Tranche B, a EURIBOR rate determined by reference to the costs of funds for Euro deposits for the interest period relevant to such borrowing adjusted for certain additional costs, subject to a EURIBOR rate floor of 0.0%. The USD Tranche A was issued with original issue discount of 0.25% of the principal amount thereof. The USD Tranche B and the Euro Tranche B were issued with original issue discount of 2.00% of the principal amount thereof. The applicable margin for borrowings under the USD Tranche A is 1.50% with respect to base rate borrowings and 2.50% with respect to Term SOFR borrowings. The applicable margin for borrowings under the USD Tranche B is 1.75% with respect to base rate borrowings and 2.75% with respect to Term SOFR borrowings. The applicable margin for borrowings under the Euro Tranche B is 3.00%. The initial applicable margin for borrowings under the New Revolving Facility is 1.50% with respect to base rate borrowings and 2.50% with respect to Term SOFR borrowings. Commencing with the delivery of financial statements with respect to the first quarter ending after the closing of the New Credit Agreement, the applicable margin for borrowings under the New Revolving Facility is subject to adjustment each fiscal quarter, based on the Company's first lien net leverage ratio as of the end of the preceding quarter.

In addition to paying interest on outstanding principal under the New Credit Facilities, the Company is required to pay a commitment fee in respect of the unutilized commitments under the New Revolving Facility. The initial commitment fee is 0.375% per annum. Commencing with the delivery of financial statements with respect to the first quarter ending after the closing of the New Credit Agreement, the commitment fee is subject to downward adjustment based on the Company's first lien net leverage ratio as of the end of the preceding quarter. The Company must also pay customary letter of credit fees and agency fees.

The Company incurred \$242 of deferred financing fees and original issue discount fees related to the term loans under the New Term Loan Facility, which are included in long-term debt in the accompanying consolidated balance sheets and are being amortized to interest expense over the estimated life of the term loans using the effective interest method. A portion of the deferred financing fees and original issue discount has been accelerated in connection with the debt prepayment and extinguishment of the Prior Term Loan Facility (as defined below).

Under the New 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 incurrences or issuances of certain debt.

If at any time the aggregate amount of outstanding loans, unreimbursed letter of credit drawings and undrawn letters of credit under the New Revolving Facility exceeds the aggregate commitments under the New Revolving Facility, the Company is required to repay outstanding loans and/or cash collateralize letters of credit, with no reduction of the commitment amount.

The Company may voluntarily prepay outstanding loans under the New Credit Facilities from time to time, subject to certain conditions, without premium or penalty other than customary "breakage" costs with respect to Term SOFR or EURIBOR loans; provided, however, that subject to certain exceptions, if on or prior to the date that is twelve months after the closing date of the New Term Loan Facility, the Company prepays any loans under the USD Tranche B or the Euro Tranche B in connection with a repricing transaction, the Company must pay a prepayment premium of 1.00% of the aggregate principal amount of the loans so prepaid. Additionally, the Company may voluntarily reduce the unutilized portion of the commitment amount under the New Revolving Facility.

The Company is required to make scheduled quarterly payments each equal to 1.25% of the original principal amount of the USD Tranche A (increasing to 1.875% in years 3 and 4 and 2.50% in year 5) and 0.25% of the original principal amount of the USD Tranche B and the Euro Tranche B, beginning with the fiscal quarter ending December 31, 2022, with the balance due thereunder on the fifth anniversary of the closing date in the case of the USD Tranche A and the seventh anniversary of the closing date in the case of the USD Tranche B and the Euro Tranche B.

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

The Company incurred \$7 of costs in connection with the New Revolving Facility, which were capitalized and included in other assets in the accompanying consolidated balance sheet and are being amortized to interest expense over the estimated life of four years. As a result of the termination of the Prior ABL Credit Facility (as defined below) concurrently with the Company's entry into the New Revolving Facility, the Company wrote off an immaterial amount of previously capitalized debt issuance costs.

All obligations under the New Credit Facilities are guaranteed by certain of the Company's wholly-owned domestic subsidiaries and are required to be guaranteed by certain of the Company's future wholly-owned 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.

Under the New Credit Agreement, the Company has the ability to incur additional incremental debt facilities in an amount up to (x) the greater of (1) \$1,011 and (2) 75% of consolidated EBITDA, plus (y) an amount equal to the sum of all voluntary prepayments of term loans under the New Term Loan Facility, plus (z) an additional unlimited amount subject to pro forma compliance with certain leverage ratio tests (based on the security and priority of such incremental debt).

Under the USD Tranche A and the New Revolving Facility, so long as any USD Tranche A loans (or commitments in respect thereof) are outstanding as of the end of any fiscal quarter, the Company may not allow its total net leverage ratio as of the end of such fiscal quarter to be greater than 5.50 to 1.00, with an annual step-down of 0.25:1.00 and subject to a step-up of 0.50:1.00 for the four full fiscal quarter period following any material acquisition, not to exceed 5.50 to 1.00.

In addition, in the event there are no loans outstanding under the USD Tranche A, as of the end of any fiscal quarter of the Company when the aggregate amount of loans outstanding under the New Revolving Facility (net of (a) all letters of credit (whether cash collateralized or not) and (b) unrestricted cash of the Company and its restricted subsidiaries) exceeds 35% of the aggregate amount of all commitments under the New Revolving Facility in effect as of such date, the Company may not allow its first lien net leverage ratio as of the end of each such fiscal quarter to be greater than 6.00 to 1.00.

The USD Tranche B and the Euro Tranche B are not subject to financial maintenance covenants.

The New Credit Agreement contains a number of negative covenants that, among other things and subject to certain exceptions, restrict the ability of the Company and each of its subsidiaries to incur additional indebtedness; pay dividends on

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its capital stock or redeem, repurchase or retire its capital stock or its subordinated indebtedness; make investments, loans and acquisitions; create restrictions on the payment of dividends or other amounts to the Company from the Company's restricted subsidiaries or restrictions on the ability of the Company's restricted subsidiaries to incur liens; engage in transactions with its affiliates; sell assets, including capital stock of its subsidiaries; materially alter the business it conducts; consolidate or merge; incur liens; and engage in sale-leaseback transactions.

The New 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 New Credit Facilities will be entitled to take various actions, including the acceleration of amounts due under the New Credit Facilities and all actions permitted to be taken by a secured creditor. As of September 30, 2022, the Company was in compliance with all covenants under the New Credit Agreement.

The proceeds of the New Term Loan Facility were used on the Effective Date, among other things, to fund a portion of the consideration payable in connection with the Atotech Acquisition and to refinance the Prior Term Loan Facility and the Prior ABL Credit Facility and certain indebtedness of Atotech. The Company also paid certain customary fees and expenses of JPMorgan Chase Bank, N.A., Barclays Bank PLC, BofA Securities Inc., Citigroup Global Markets Inc., HSBC Securities (USA) Inc. and Mizuho Bank, Ltd. in their respective capacities as lead arrangers and bookrunners in connection with the New Credit Facilities.

On the Effective Date, in connection with the entry into the New Credit Agreement described above, the Company terminated and prepaid the prior term loan credit facility under that certain Term Loan Credit Agreement, dated as of April 29, 2016, by and among the Company, Barclays Bank PLC and the other financial institutions from time to time party thereto (as amended, the "Prior Term Loan Credit Agreement") and the term loan credit facility thereunder, the "Prior Term Loan Facility") and terminated the prior revolving credit facility under that certain ABL Credit Agreement, dated as of February 1, 2019, by and among the Company, Barclays Bank PLC and the other financial institutions from time to time party thereto (as amended, the "Prior ABL Credit Agreement" and the revolving credit facility thereunder, the "Prior ABL Credit Facility"). At the time of termination, there were approximately \$820 in borrowings outstanding under the Prior Term Loan Facility that were prepaid and no borrowings outstanding under the Prior ABL Credit Facility. The Company has determined the termination to be a full extinguishment of debt and has written off to expense the immaterial remaining balance of deferred finance costs and debt issuance costs related to the Prior Term Loan Facility and the Prior ABL Credit Facility.

As of September 30, 2022, the outstanding principal amount of the New Term Loan Facility was \$5,189 and the weighted average interest rate was 5.6%. As of September 30, 2022, there were no borrowings under the New Revolving Facility.

Lines of Credit and Borrowing Arrangements

Certain of the Company's Japanese subsidiaries have lines of credit and a financing facility with various financial institutions, many of which generally expire and are renewed at three-month intervals with the remaining having no expiration date. The lines of credit and financing facility provided for aggregate borrowings as of September 30, 2022 of up to an equivalent of \$23. There was \$3 outstanding under these arrangements at September 30, 2022. There were no borrowings outstanding under these arrangements at December 31, 2021.

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

<u>Year</u>	<u>Amount</u>
2022 (remaining)	\$ 26
2023	92
2024	98
2025	117
2026	123
2027	767
Thereafter	3,969

11) Product Warranties

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:

	Nine Months Ended September 30,	
	2022	2021
Beginning of period	\$ 21	\$ 18
Assumed product warranty liability from Atotech Acquisition	5	—
Provision for product warranties	20	30
Charges to warranty liability	(21)	(25)
End of period	<u>\$ 25</u>	<u>\$ 23</u>

As of September 30, 2022, short-term product warranties of \$19 and long-term product warranties of \$6 were included within other current liabilities and other non-current liabilities, respectively, within the accompanying condensed consolidated balance sheet. As of September 30, 2021, short-term product warranties of \$22 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.

12) Income Taxes

The Company's effective tax rates for the three and nine months ended September 30, 2022 were 85.5% and 24.1%, respectively. The Company's effective tax rates for the three and nine months ended September 30, 2022 were higher than the U.S. statutory tax rate mainly due to additional estimated accrued withholding taxes related to the Company's change of indefinite reinvestment assertion, non-deductibility of certain costs associated with the Atotech Acquisition, and the U.S. global intangible low-taxed income ("GILTI") inclusion, offset by 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.

The Company's effective tax rates for the three and nine months ended September 30, 2021 were 20.4% and 17.6%, respectively. The Company's effective tax rates for the three and nine months ended September 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.

The Company changed its indefinite reinvestment assertion with respect to certain subsidiaries resulting from the expected increase in debt service costs after the Atotech Acquisition. This resulted in a one-time charge to tax expense of \$30 in the three and nine months ended September 30, 2022 to accrue for expected taxes on accumulated earnings of the relevant subsidiaries.

As of September 30, 2022 and December 31, 2021, the total amounts of gross unrecognized tax benefits, which exclude interest and penalties, were \$69 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 September 30, 2022 and December 31, 2021, the Company had accrued interest on unrecognized tax benefits of approximately \$1 in both periods.

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.

13) Net Income Per Share

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

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
Numerator:				
Net income	\$ 6	\$ 132	\$ 279	\$ 401
Denominator:				
Shares used in net income per common share – basic	61.0	55.5	57.4	55.4
Effect of dilutive securities	0.1	0.2	0.2	0.3
Shares used in net income per common share – diluted	61.1	55.7	57.6	55.7
Net income per common share:				
Basic	\$ 0.09	\$ 2.39	\$ 4.85	\$ 7.24
Diluted	\$ 0.09	\$ 2.38	\$ 4.84	\$ 7.21

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

For the three and nine months ended September 30, 2022 and 2021, the Company had an immaterial quantity of restricted stock units ("RSUs") that were antidilutive and were excluded from the computation of diluted weighted-average shares.

14) 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.

In connection with the Atotech Acquisition, all Atotech time-based RSUs and performance-based RSU awards outstanding immediately prior to the acquisition were cancelled and replaced with the Company's time-based RSUs under the 2022 Plan in accordance with the Implementation Agreement.

Based on a formula in the Implementation Agreement, such cancelled RSUs were replaced with the Company's RSUs, which are subject to the terms and conditions of the 2022 Plan and the related RSU agreements.

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 September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
Cost of revenues	\$ 1	\$ 1	\$ 4	\$ 3
Research and development	1	1	4	3
Selling, general and administrative	8	7	23	22
Total stock-based compensation expense	\$ 10	\$ 9	\$ 31	\$ 28

At September 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 \$57. 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:

	Nine Months Ended September 30, 2022	
	Outstanding RSUs	Weighted Average Grant Date Fair Value Per Share
RSUs – beginning of period	0.5	\$ 127.93
RSUs issued in Atotech Acquisition	0.1	\$ 110.30
Granted	0.5	\$ 113.07
Vested	(0.3)	\$ 118.13
RSUs – end of period	<u>0.8</u>	<u>\$ 120.03</u>

15) 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 nine months ended September 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, second and third quarters of 2022, the Company's Board of Directors declared a cash dividend of \$0.22 per share, which totaled \$37. During the first, second, and third quarters of 2021, the Company's Board of Directors declared a cash dividend of \$0.20 per share \$0.22 per share, and \$0.22 per share, respectively, which totaled \$36.

On October 24, 2022, the Company's Board of Directors declared a quarterly cash dividend of \$0.22 per share, to be paid on December 9, 2022 to stockholders of record as of November 28, 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 New Term Loan Facility and the New Revolving Facility, the Company may be restricted from paying dividends under certain circumstances.

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

The Company has three reportable segments, VSD, PSD and MSD. During the third quarter of 2022, MKS consolidated its Equipment Solutions business, previously ESD, into a component of PSD and prior periods were recast to reflect this change. 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 and allocate resources to the three segments.

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Reportable Segments

VSD delivers foundational technology solutions to leading edge semiconductor manufacturing, advanced electronics and specialty industrial applications. VSD 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, and vacuum technology.

PSD provides a full range of solutions including lasers, beam measurement and profiling, precision motion control, vibration isolation systems, photonics instruments, temperature sensing, opto-mechanical components, optical elements, systems for flexible PCB laser processing, high-speed multilayer ceramic capacitor testing, laser-based systems for high density interconnect PCB and IC substrate manufacturing.

MSD develops leading process and manufacturing technologies for advanced surface modification, electroless and electrolytic plating, and surface finishing. Atotech is a brand within MSD. Applying a comprehensive systems-and-solutions approach, MSD's portfolio includes chemistry, equipment, software, and services for innovative and high-technology applications in a wide variety of end-markets.

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 September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
Vacuum Solutions Division	\$ 510	\$ 483	\$ 1,491	\$ 1,377
Photonics Solutions Division	267	259	793	809
Materials Solutions Division	177	—	177	—
	<u>\$ 954</u>	<u>\$ 742</u>	<u>\$ 2,461</u>	<u>\$ 2,186</u>

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

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
Gross profit by reportable segment:				
Vacuum Solutions Division	\$ 220	\$ 226	\$ 645	\$ 644
Photonics Solutions Division	125	122	372	382
Materials Solutions Division	45	—	45	—
Total gross profit by reportable segment	390	348	1,062	1,026
Operating expenses:				
Research and development	63	52	168	149
Selling, general and administrative	126	95	319	289
Acquisition and integration costs	31	9	41	21
Restructuring and other	5	2	10	10
Amortization of intangible assets	47	15	77	40
Gain on sale of long-lived assets	—	—	(7)	—
Income from operations	118	175	454	517
Interest income	1	—	2	1
Interest expense	80	6	93	19
Other (income) expense, net	(1)	3	(4)	12
Income before income taxes	40	166	367	487
Provision for income taxes	34	34	88	86
Net income	<u>\$ 6</u>	<u>\$ 132</u>	<u>\$ 279</u>	<u>\$ 401</u>

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:

September 30, 2022	Accounts receivable	Inventory	Total
Vacuum Solutions Division	\$ 342	\$ 449	\$ 791
Photonics Solutions Division	185	282	467
Materials Solutions Division	301	230	531
Corporate, Eliminations & Other	(98)	—	(98)
Total segment assets	\$ 730	\$ 961	\$ 1,691

December 31, 2021	Accounts receivable	Inventory	Total
Vacuum Solutions Division	\$ 285	\$ 339	\$ 624
Photonics Solutions Division	182	239	421
Materials Solutions Division	—	—	—
Corporate, Eliminations & Other	(24)	(1)	(25)
Total segment assets	\$ 443	\$ 577	\$ 1,020

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

	September 30, 2022	December 31, 2021
Total segment assets	\$ 1,691	\$ 1,020
Cash and cash equivalents and short-term investments	885	1,042
Other current assets	215	85
Property, plant and equipment, net	655	326
Right-of-use assets	235	184
Goodwill and intangible assets, net	7,504	1,804
Other assets and long-term investments	187	79
Total assets	\$ 11,372	\$ 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.

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
Net revenues:				
United States	\$ 393	\$ 343	\$ 1,112	\$ 917
China	135	80	275	263
Germany	100	37	176	108
South Korea	82	91	260	293
Other	244	191	638	605
	\$ 954	\$ 742	\$ 2,461	\$ 2,186

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.

	September 30, 2022	December 31, 2021
Long-lived assets:		
United States	\$ 497	\$ 412
Germany	123	18
China	120	16
Other	310	128
	\$ 1,050	\$ 574

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

Reportable segment:	September 30, 2022	December 31, 2021
Vacuum Solutions Division	\$ 193	\$ 195
Photonics Solutions Division	1,020	1,033
Materials Solutions Division	2,638	—
Total goodwill	\$ 3,851	\$ 1,228

Major Customers

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

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
Lam Research Corporation	15 %	15 %	15 %	15 %
Applied Materials, Inc.	10 %	11 %	11 %	11 %

17) Restructuring and Other

Restructuring

Restructuring and other costs during the three months ended September 30, 2022 totaled \$5 and were primarily related to executive payments related to the Atotech Acquisition. Restructuring and other costs during nine months ended September 30, 2022 totaled \$10 and were primarily related to severance costs due to a global cost-saving initiative and the closure of two facilities in Europe as well as executive payments related to the Atotech Acquisition. The Company recorded restructuring charges of \$1 and \$6 during the three and nine months ended September 30, 2021, respectively. Restructuring charges for the nine months ended September 30, 2021 primarily related to severance costs due to the announced closing of a facility in Europe, the movement of certain products to low-cost regions, and a global cost saving initiative.

Restructuring activities were as follows:

	Nine Months Ended September 30,	
	2022	2021
Restructuring accrual beginning of period	\$ 3	\$ —
Charged to expense	10	6
Payments and adjustments	(10)	(6)
Restructuring accrual end of period	<u>\$ 3</u>	<u>\$ —</u>

Other

The Company recorded charges of \$1 and \$4 during the three and nine months ended September 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.

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 that we make are the need to generate sufficient cash flows to service and repay our substantial indebtedness we have incurred in connection with our acquisition of Atotech Limited ("Atotech" and such transaction, the "Atotech Acquisition"), which we acquired in August 2022, the terms of our existing term loans under which we incurred such debt, our entry into the chemicals technology business through our acquisition of Atotech, 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, the ability to realize the anticipated synergies, cost savings and other benefits of the Atotech Acquisition, competition from larger, more advanced or more established companies in our markets, the ability to successfully grow our business and the businesses of Atotech and Electro Scientific Industries, Inc., which we acquired in February 2019 and financial risks associated with those and potential future acquisitions, including goodwill and intangible asset impairments, potential adverse reactions or changes to business relationships resulting from the completion of the Atotech Acquisition, manufacturing and sourcing risks, including those associated with limited and sole source suppliers and the impact and duration of supply chain disruptions and component shortages, and changes in global demand and the impact of COVID-19 or any other pandemic with respect to such disruptions, shortages and increases, risks associated with doing business internationally, including trade compliance, regulatory restrictions on our products or components and unfavorable currency exchange and tax rate fluctuations, which risks become more significant as we grow our business internationally and in China specifically, conditions affecting the markets in which we operate, including fluctuations in capital spending in the semiconductor industry and other advanced manufacturing markets, and fluctuations in sales to our major customers or disruptions or delays from third-party service providers upon which our operations may rely, the ability to anticipate and meet customer demand, the challenges, risks and costs involved with integrating or transitioning local and international operations of the companies we have acquired, risks associated with the attraction and retention of key personnel, potential fluctuations in quarterly results, dependence on new product development, rapid technological and market change, acquisition strategy, volatility of stock price, risks associated with chemical manufacturing and environmental regulation compliance, risks related to our products resulting from defects, which would increase our costs and seriously harm our business, financial condition, operating results and customer relationships, financial and legal risk management, risks related to cybersecurity and data privacy threats and the challenges associated with intellectual property protection, and the other important factors described in Part II, Item 1A of this Quarterly Report on Form 10-Q. We are under no obligation to, and expressly disclaims any obligation to, update or alter these forward-looking statements, whether as a result of new information, future events or otherwise, even if subsequent events cause our views to change.

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.

Overview

We enable technologies that transform our world. We deliver foundational technology solutions to leading edge semiconductor manufacturing, advanced electronics and specialty industrial applications. We apply our broad science and engineering capabilities to create instruments, subsystems, systems, process control solutions and specialty chemicals technology that improve process performance, optimize productivity and enable unique innovations for many of the world's leading technology and industrial companies. Our solutions are critical to addressing the challenges of miniaturization and complexity in advanced device manufacturing by enabling increased power, speed and feature enhancement for optimized connectivity. Our solutions are also critical to addressing ever-increasing performance requirements across a wide array of specialty industrial applications.

Acquisition of Atotech

On August 17, 2022, (the "Effective Date"), we completed the Atotech Acquisition, through the acquisition of the entire issued share capital of Atotech by Atotech Manufacturing, Inc. ("Bidco"), a Delaware corporation and indirect wholly owned subsidiary of the Company. The Atotech Acquisition was implemented by means of a scheme of arrangement under the laws of Jersey (the "Scheme") pursuant to the definitive agreement entered into by us and Atotech on July 1, 2021, as amended by the Letter Agreement dated October 29, 2021 by and among us, Atotech and Bidco and as further amended by the Amendment to the Implementation Agreement dated April 1, 2022 by and among us, Atotech and Bidco (together, the "Implementation Agreement"). On the Effective Date, pursuant to the Scheme and in accordance with terms and conditions of the Implementation Agreement, Bidco acquired each issued and outstanding ordinary share of Atotech in exchange for per share consideration of \$16.20 in cash and 0.0552 of a share of Company common stock.

Atotech develops leading process and manufacturing technologies for advanced surface modification, electroless and electrolytic plating, and surface finishing. Applying a comprehensive systems-and-solutions approach, Atotech's portfolio includes chemistry, equipment, software, and services for innovative and high-technology applications in a wide variety of end markets. Atotech further broadens our capabilities by bringing leadership in critical chemistry solutions for advanced electronics and specialty industrial applications.

The total preliminary net purchase price, including cash consideration, net of cash acquired, value of MKS shares issued, repayment of Atotech debt and settlement of certain Atotech share-based awards totaled \$5.7 billion. We funded the payment of the aggregate cash consideration with a combination of cash on hand and the proceeds from the New Term Loan Facility, as defined below. As a result of the Atotech Acquisition, we issued an aggregate of 10.7 million shares of our common stock to the former Atotech shareholders.

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, other than the policies outlined below that were updated as a result of the Atotech Acquisition.

Revenue Recognition

We account for revenue using Accounting Standards Codification 606 ("ASC 606"). We apply ASC 606 using the following steps:

- Identify the contract with a customer
- Identify the performance obligations in the contract
- Determine the transaction price
- Allocate the transaction price to performance obligations in the contract
- Recognize revenue when or as we satisfy a performance obligation

Revenue is recognized when or as obligations under the terms of a contract with our customer has been satisfied and control has transferred to the customer. The majority of our performance obligations, and associated revenue, are transferred to customers at a point in time, generally upon shipment of a product to the customer or receipt of the product by the customer and without significant judgments. We recognize revenue over time for contracts relating to the manufacturing, modifications and retrofits of our plating equipment, as the equipment is built to customer specification, and we have an enforceable right to payment for the performance completed to date. For these sales, we use the cost-to-cost input method to measure progress. In cases, where cost-to-cost is not proportionate to our progress in satisfying the performance obligation because of uninstalled materials, we adjust the measure of progress and recognize revenue to the extent of cost incurred to satisfy the performance obligation under the contract.

Installation services, other than those related to our plating equipment, are not significant, are usually completed in a short period of time and, therefore, are recorded at a point in time when the installation services are completed, rather than over time as they are not material. Extended warranty, service contracts, and repair services, which are transferred to the customer over time, are recorded as revenue as the services are performed. For repair services, we make an accrual at each quarter end based upon historical repair times within our product groups to record revenue based upon the estimated number of days completed to date, which is consistent with ratable recognition.

Revenue is measured as the amount of consideration we expect to receive in exchange for transferring goods or providing services. Performance obligations promised in a contract are identified based on the products or services that will be transferred to the customer that are both capable of being distinct, whereby the customer can benefit from the product or service either on its own or together with other resources that are readily available from third parties or from us, and are distinct in the context of the contract, whereby the transfer of the product or service is separately identifiable from other promises in the contract. Sales, value add, and other taxes we collect concurrent with revenue-producing activities are excluded from revenue. Our normal payment terms are 30 to 60 days but vary by the type and location of our customers and the products or services offered. The time between invoicing and when payment is due is not significant. For certain products and services and customer types, we require payment before the products or services are delivered to, or performed for, the customer. None of our contracts in each of the periods presented contained a significant financing component.

We periodically enter into contracts with our customers in which a customer may purchase a combination of goods and or services, such as products with installation services or extended warranties. These contracts include multiple deliverables that we evaluate to determine if the deliverables are separate performance obligations. Once we determine the performance obligations, we then determine the transaction price, which includes estimating the amount of variable consideration to be included in the transaction price, if any. To the extent the transaction price includes variable consideration, we estimate the amount of variable consideration that should be included in the transaction price utilizing either the expected value method or the most likely amount method, depending on the method we expect to better predict the amount of consideration to which we will be entitled. There are no constraints on the variable consideration recorded. We then allocate the transaction price to each performance obligation in the contract based on a relative stand-alone selling price charged separately to customers or using an expected cost-plus margin method. The corresponding revenues are recognized when or as the related performance obligations are satisfied, which are noted above. The impact of variable consideration was immaterial in each of the periods presented.

We sell separately priced service contracts and extended warranty contracts related to certain of our products, in particular related to our plating and laser-based products. These separately priced contracts generally range from 12 to 60 months. We recognize revenue over the term of the agreement in proportion to the costs expected to be incurred in satisfying the obligations under the contract.

We monitor and track the amount of product returns, provide for sales return allowances and reduce revenue at the time of shipment for the estimated amount of such future returns, based on historical experience. While product returns have historically been within our expectations and established provisions, there is no assurance that we will continue to experience the same return rates that we have in the past. Any significant increase in product return rates could have a material adverse impact on our operating results for the period in which such returns materialize.

While we maintain a credit approval process, significant judgments are made by management in connection with assessing our customers' ability to pay at the time of shipment. Despite this assessment, from time to time, our customers are unable to meet their payment obligations. We continuously monitor our customers' credit-worthiness and use our judgment in establishing a provision for estimated credit losses based upon our historical experience and any specific customer collection issues that we have identified. While such credit losses have historically been within our expectations and the provisions established, there is no assurance that we will continue to experience the same credit loss rates that we have in the past. A significant change in the liquidity or financial position of our customers could have a material adverse impact on the collectability of accounts receivable and our future operating results. Bad debt expense was immaterial in each of the periods presented.

Derivatives

As a result of our global operating activities and variable interest rate borrowings, we are exposed to market risks from changes in foreign currency exchange rates and interest rates, which may adversely affect our operating results and financial position. We enter into derivative instruments for risk management purposes only, including derivatives designated as hedging instruments and those utilized as economic hedges. We do not enter into derivative instruments for trading or speculative purposes.

We have used derivative instruments, such as foreign exchange forward contracts and options, to manage certain foreign currency exposure, and interest rate swaps and interest rate caps to manage interest rate exposure. Changes in fair value of derivative instruments are recognized in the consolidated statement of operations or, if hedge accounting is applied, in other comprehensive income for the effective portion of the changes in fair value. All derivatives are stated at fair value in the balance sheet.

Accounting principles for qualifying hedges require detailed documentation that describes the relationship between the hedging instrument and the hedged item, including, but not limited to, the risk management objectives and hedging strategy and the methods to assess the effectiveness of the hedging relationship. We assess the hedging relationships, both at the inception of the hedge and on an ongoing basis, using either the critical terms matching approach or a regression analysis approach to determine whether the designated hedging instrument is highly effective in offsetting changes in the value of the hedged item.

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

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."

Segments

In the first quarter of 2022, we updated the names of our then-three divisions in order to simplify our naming convention. These divisions, formerly known as the Vacuum & Analysis Division, the Light & Motion Division and the Equipment & Solutions Division, were renamed the Vacuum Solutions Division ("VSD"), the Photonics Solutions Division ("PSD") and the Equipment Solutions Division ("ESD"), respectively. On August 17, 2022, we completed the Atotech Acquisition and refer to Atotech as our Materials Solutions Division ("MSD"). During the third quarter of 2022, we consolidated our Equipment Solutions business, previously ESD, into a component of PSD and prior periods were recast to reflect this change. Our reportable segments now consist of our three divisions, VSD, PSD and MSD.

VSD delivers foundational technology solutions to leading edge semiconductor manufacturing, advanced electronics and specialty industrial applications. VSD 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, and vacuum technology.

PSD provides a full range of solutions including lasers, beam measurement and profiling, precision motion control, vibration isolation systems, photonics instruments, temperature sensing, opto-mechanical components, optical elements, systems for flexible printed circuit board ("PCB") laser processing, high-speed multilayer ceramic capacitor testing, and laser-based systems for high density interconnect PCB and IC substrate manufacturing.

MSD develops leading process and manufacturing technologies for advanced surface modification, electroless and electrolytic plating, and surface finishing. Atotech is now a brand within MSD. Applying a comprehensive systems-and-solutions approach, MSD's portfolio includes chemistry, equipment, software, and services for innovative and high-technology applications in a wide variety of end-markets.

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 end market and Specialty Industrial end market. Our Semiconductor end market remained unchanged.

Net Revenues by Market

<i>(dollars in millions)</i>	Three Months Ended				Nine Months Ended			
	September 30, 2022	% Total	June 30, 2022	% Total	September 30, 2022	% Total	September 30, 2021	% Total
Semiconductor	\$ 541	57%	\$ 515	67%	\$ 1,545	63%	\$ 1,331	61%
Advanced Electronics	185	19%	77	10%	344	14%	342	16%
Specialty Industrial	228	24%	173	23%	572	23%	513	23%
Total net revenues	\$ 954	100%	\$ 765	100%	\$ 2,461	100%	\$ 2,186	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 September 30, 2022, net revenues in our semiconductor market increased by \$26 million or 5%, compared to the prior quarter, and for the nine months ended September 30, 2022, net revenues increased by \$214 million or 16%, compared to the same period in the prior year. The increases in net revenues were mainly due to strong demand and 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 for the nine months ended September 30, 2022, compared to the prior year, was partially due to our acquisition of Photon Control Inc. ("Photon Control") in July 2021.

In October 2022, the U.S. Department of Commerce's Bureau of Industry and Security ("BIS") published regulations that introduce new and novel restrictions related to end-uses in semiconductor, semiconductor manufacturing, supercomputer, and advanced computing, along with certain equipment used to develop and produce them (the "New BIS Rules"). The New BIS Rules restrict our direct and indirect sales to China and primarily impact our Semiconductor Market. Based on our preliminary assessment of the New BIS Rules, we expect an overall annualized reduction of net revenues in the range of \$250 million to \$350 million. While we continue to adjust our policies and practices to ensure compliance with these regulations, and we will seek to mitigate their impact, there can be no assurances that the New BIS Rules will not have an effect on our business greater than our preliminary assessment.

Advanced Electronics Market

This market relates to sales of products for PCB manufacturing, solar, display and electronic component applications, as well as plating chemistry, equipment, services and software used in the manufacturing of electronics components. 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 September 30, 2022, net revenues in our advanced electronics market increased by \$108 million or 140%, compared to the prior quarter, and for the nine months ended September 30, 2022, net revenues increased by \$2 million or 1%, compared to the same period in the prior year. These increases were driven primarily by the Atotech Acquisition, with MSD contributing \$110 million for the three and nine months ended September 30, 2022. These increases were offset by a decrease of \$6 million from customers in VSD for the three months ended September 30, 2022 and \$111 million from customers in PSD for the nine months ended September 30, 2022. PSD has been impacted by decreased industry demand for flexible PCB via drilling systems as customers have temporarily slowed capacity expansion. Demand for flexible PCB via drilling systems, which we report in PSD, and for chemistry solutions, which we report in MSD, have softened due to a decline in end market demand for electronics, such as smartphones and personal computers.

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, as well as functional coatings for corrosion and wear resistance and industrial surface modification and plating.

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.

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.

For the three months ended September 30, 2022, net revenue in our specialty industrial market increased by \$55 million or 32% compared to the prior quarter and for the nine months ended September 30, 2022, net revenues increased \$59 million or 12% compared to the same period in the prior year. These increases were driven primarily by the Atotech Acquisition, with MSD contributing \$61 million for the three and nine months ended September 30, 2022. Though demand across our Specialty Industrial Market remained relatively stable, our general metal finishing business, which we report in MSD, continues to be impacted by supply chain constraints in the automotive market.

International Markets

A significant portion of our net revenues is from sales to customers in international markets. For the nine months ended September 30, 2022 and 2021, international revenues accounted for approximately 55% and 58%, respectively, of our total net revenues. A significant portion of our international net revenues was from China, South Korea and Germany. We expect international net revenues will increase due to the Atotech Acquisition and 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 53% and 28% of our total long-lived assets as of September 30, 2022 and December 31, 2021, respectively. The increase as of September 30, 2022 compared to December 31, 2021, was primarily a result of increased long-lived assets as a result of the Atotech Acquisition, with MSD accounting for approximately 66% of our total international long-lived assets as of September 30, 2022. The increase was also due to increased long-lived assets in one of our Mexico facilities and a 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		Nine Months Ended	
	September 30, 2022	June 30, 2022	September 30, 2022	September 30, 2021
Net revenues:				
Products	88.2%	86.8%	87.5%	87.4%
Services	11.8	13.2	12.5	12.6
Total net revenues	100.0	100.0	100.0	100.0
Cost of revenues:				
Cost of product revenues	53.0	49.3	50.5	46.3
Cost of service revenues	6.1	6.5	6.3	6.8
Total cost of revenues (exclusive of amortization shown separately below)	59.1	55.8	56.8	53.1
Gross profit	40.9	44.2	43.2	46.9
Research and development	6.6	6.9	6.8	6.8
Selling, general and administrative	13.2	13.2	13.0	13.2
Acquisition and integration costs	3.2	0.3	1.7	0.9
Restructuring and other	0.5	0.4	0.4	0.5
Amortization of intangible assets	4.9	2.0	3.1	1.8
Gain on sale of long-lived assets	—	—	(0.3)	—
Income from operations	12.5	21.4	18.5	23.7
Interest income	0.1	0.1	0.1	—
Interest expense	8.4	0.9	3.8	0.9
Other (income) expense, net	(0.1)	0.3	(0.2)	0.5
Income before income taxes	4.3	20.3	15.0	22.3
Provision for income taxes	3.6	3.4	3.6	3.9
Net income	0.7%	16.9%	11.4%	18.4%

Net Revenues

	Three Months Ended		Nine Months Ended	
	September 30, 2022	June 30, 2022	September 30, 2022	September 30, 2021
<i>(dollars in millions)</i>				
Products	\$ 841	\$ 664	\$ 2,153	\$ 1,911
Services	113	101	308	275
Total net revenues	\$ 954	\$ 765	\$ 2,461	\$ 2,186

For the three months ended September 30, 2022, net product revenues increased \$177 million compared to the prior quarter, and for the nine months ended September 30, 2022, net product revenues increased \$242 million compared to the same period in the prior year. These increases were primarily due to the Atotech Acquisition with MSD contributing \$164 million for the three and nine months ended September 30, 2022. Additional increases for the nine months ended September 30, 2022, were primarily due to volume increases in sales to our semiconductor market in VSD and PSD, partially offset by decreases in sales to our advanced electronics market, primarily in PSD due to decreased industry demand for flexible PCB via drilling systems 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 September 30, 2022, net service revenues increased \$12 million compared to the prior quarter and were primarily related to increases in our advanced electronics and specialty industrial markets, mainly as a result of the Atotech Acquisition. For the nine months ended September 30, 2022, net service revenues increased \$33 million compared to the same period in the prior year and were partially related to the Atotech Acquisition, as well as increases in VSD and PSD from increases in our semiconductor and advanced electronics markets.

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

<i>(dollars in millions)</i>	Three Months Ended		Nine Months Ended	
	September 30, 2022	June 30, 2022	September 30, 2022	September 30, 2021
Net revenues:				
Vacuum Solutions Division	\$ 510	\$ 507	\$ 1,491	\$ 1,377
Photonics Solutions Division	267	258	793	809
Materials Solutions Division	177	—	177	—
Total net revenues	\$ 954	\$ 765	\$ 2,461	\$ 2,186

For the nine months ended September 30, 2022, net revenues from VSD increased \$114 million compared to the same period in the prior year. This increase was largely reflective of volume increases in the semiconductor market.

For the three months ended September 30, 2022, net revenues from PSD increased \$9 million compared to the prior quarter, primarily due to increases in net revenues from our semiconductor market. For the nine months ended September 30, 2022, net revenues decreased \$16 million compared to the same period in the prior year due to decreases in our advanced electronics market primarily due to decreased industry demand for flexible PCB via drilling systems and other products for the consumer electronics market offset by volume increases in the semiconductor market.

For the three and nine months ended September 30, 2022, net revenues from MSD increased \$177 million compared to the prior quarter and the same period in the prior year, primarily due to increases in revenue from our advanced electronics and specialty industrial markets. Revenues from this segment consist of revenues from the Atotech business from August 17, 2022 through September 30, 2022.

Gross margin

	Three Months Ended			Nine Months Ended		
	September 30, 2022	June 30, 2022	% Points Change	September 30, 2022	September 30, 2021	% Points Change
Gross margin as a percentage of net revenues:						
Products	39.8%	43.2%	(3.4)%	42.3%	47.0%	(4.7)%
Services	48.5	50.0	(1.5)	49.4	46.1	3.3
Total gross margin	40.8%	44.2%	(3.4)%	43.1%	46.9%	(3.8)%

Gross margin for our products decreased for the three and nine months ended September 30, 2022, compared to the prior quarter and compared to the same period in the prior year. 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. Additionally, as a result of the Atotech Acquisition, we preliminarily incurred an \$89 million step-up to fair value adjustment on acquired inventory, of which \$39 million was amortized during the three and nine months ended September 30, 2022 and negatively impacted our gross margin. The remaining step-up to fair value adjustment on acquired inventory will be amortized during the three months ending December 31, 2022. The decreases in our gross margin for the

three and nine months ended September 30, 2022 compared to the three months ended June 30, 2022 and the same period in the prior year, was partially offset by higher revenue volumes and, for the nine months ended September 30, 2022, favorable product mix.

Gross margin for our services decreased for the three months ended September 30, 2022, compared to the prior quarter primarily due to higher materials costs and unfavorable absorption. Gross margin for our services increased for the nine months ended September 30, 2022, compared to the same period in the prior year, which 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 on service-related parts.

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

	Three Months Ended			Nine Months Ended		
	September 30, 2022	June 30, 2022	% Points Change	September 30, 2022	September 30, 2021	% Points Change
Gross margin as a percentage of net revenues:						
Vacuum Solutions Division	43.1 %	43.2 %	(0.1)%	43.3 %	46.8 %	(3.5)%
Photonics Solutions Division	46.9	46.0	0.9	46.9	47.2	(0.3)
Materials Solutions Division	25.1	—	25.1	25.1	—	25.1
Total gross margin	40.8%	44.2%	(3.4)%	43.1%	46.9%	(3.8)%

Gross margin for VSD decreased for the nine months ended September 30, 2022 compared to the same period in the prior year, primarily due to higher material costs reflective of global component shortages, higher logistics costs and unfavorable overhead absorption. This decrease in gross margin was partially offset by favorable product mix and higher revenue volumes.

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

Gross margin for MSD was 25.1% of net revenues for the three and nine months ended September 30, 2022. This included a charge of \$39 million of inventory step-up amortization related to the Atotech Acquisition.

Research and development

	Three Months Ended		Nine Months Ended	
	September 30, 2022	June 30, 2022	September 30, 2022	September 30, 2021
<i>(dollars in millions)</i>				
Research and development	\$ 63	\$ 53	\$ 168	\$ 149

For the three months ended September 30, 2022, research and development expenses increased \$10 million compared to the prior quarter, primarily due to the Atotech Acquisition. For the nine months ended September 30, 2022, research and development expenses increased \$19 million compared to the same period in the prior year, primarily due to an increase of \$10 million resulting from the Atotech Acquisition. The remaining increase of \$9 million was primarily due to increases of \$5 million in compensation-related costs, \$2 million in occupancy and depreciation costs and \$1 million in consulting costs.

Our research and development efforts are primarily focused on developing and improving our instruments, components, subsystems and process control solutions to improve process performance and productivity. We have thousands of products, and our research and development efforts primarily consist of a large number of projects related to these products, none of which is individually material to us. Projects typically have a duration of less than 36 months but may be extended for development of new products. 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. In our chemistry and equipment plating businesses, a majority of our R&D investment supports existing customers' product improvement needs and their short-term R&D goals, which enables us to pioneer new high-value solutions while limiting commercial risk. 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		Nine Months Ended	
	September 30, 2022	June 30, 2022	September 30, 2022	September 30, 2021
Selling, general and administrative	\$ 126	\$ 101	\$ 319	\$ 289

For the three months ended September 30, 2022, selling, general and administrative expenses increased \$25 million compared to the prior quarter, primarily due to an increase of \$33 million from the Atotech Acquisition. Excluding MSD, VSD and PSD had a decrease of \$7 million, primarily related to a decrease of \$5 million in compensation-related costs. For the nine months ended September 30, 2022, selling, general and administrative expenses increased \$30 million compared to the same period in the prior year, primarily due to an increase of \$33 million from the Atotech Acquisition. Excluding MSD, the remaining VSD and PSD businesses decreased \$3 million, primarily due to a decrease of \$4 million in compensation-related costs.

Acquisition and integration costs

<i>(dollars in millions)</i>	Three Months Ended		Nine Months Ended	
	September 30, 2022	June 30, 2022	September 30, 2022	September 30, 2021
Acquisition and integration costs	\$ 31	\$ 2	\$ 41	\$ 21

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

Restructuring and other

<i>(dollars in millions)</i>	Three Months Ended		Nine Months Ended	
	September 30, 2022	June 30, 2022	September 30, 2022	September 30, 2021
Restructuring and other	\$ 5	\$ 3	\$ 10	\$ 10

Restructuring and other costs during the three months ended September 30, 2022 were primarily related to executive payments made related to the Atotech Acquisition. Restructuring and other costs during the nine months ended September 30, 2022 were primarily related to severance costs due to a global cost-saving initiative and the closure of two facilities in Europe as well as executive payments related to the Atotech Acquisition. Restructuring and other costs during the nine months ended September 30, 2021 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 closure of two facilities in Europe and the movement of certain products to low-cost regions.

Amortization of intangible assets

<i>(dollars in millions)</i>	Three Months Ended		Nine Months Ended	
	September 30, 2022	June 30, 2022	September 30, 2022	September 30, 2021
Amortization of intangible assets	\$ 47	\$ 15	\$ 77	\$ 40

For the three months ended September 30, 2022, amortization of intangible assets increased by \$32 million compared to the prior quarter, due to amortization of intangible assets from the Atotech Acquisition. For the nine months ended September 30, 2022, amortization of intangible assets increased by \$37 million, compared to the same period in the prior year, due to amortization of intangible assets from the Atotech Acquisition and the acquisition of Photon Control.

Gain on sale of long-lived assets

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

For the nine months ended September 30, 2022, we recorded a gain from the sale of a minority interest investment in a private company.

Interest expense, net

<i>(dollars in millions)</i>	Three Months Ended		Nine Months Ended	
	September 30, 2022	June 30, 2022	September 30, 2022	September 30, 2021
Interest expense, net	\$ 79	\$ 6	\$ 91	\$ 18

For the three and nine months ended September 30, 2022, interest expense, net increased compared to the three months ended June 30, 2022 and the nine months ended September 30, 2021, respectively, primarily due to borrowings on the New Term Loan Facility we entered into in connection with the Atotech Acquisition.

Other (income) expense, net

<i>(dollars in millions)</i>	Three Months Ended		Nine Months Ended	
	September 30, 2022	June 30, 2022	September 30, 2022	September 30, 2021
Other (income) expense, net	\$ (1)	\$ 2	\$ (4)	\$ 12

Other (income) expense, net, for the three and nine months ended September 30, 2022 and the three months ended June 30, 2022, consist primarily of net foreign exchange and fair value gains and losses. The nine months ended September 30, 2021 included a fair value loss of \$10 million resulting from hedges of the Canadian dollar related to the funding of our acquisition of Photon Control.

<i>(dollars in millions)</i>	Three Months Ended		Nine Months Ended	
	September 30, 2022	June 30, 2022	September 30, 2022	September 30, 2021
Provision for income taxes	\$ 34	\$ 26	\$ 88	\$ 86

Our effective tax rates for the three months ended September 30, 2022 and June 30, 2022 were 85.5% and 17.0%, respectively. The effective tax rate for the three months ended September 30, 2022 was higher than the U.S. statutory tax rate mainly due to additional estimated accrued withholding taxes related to our change in indefinite reinvestment assertion, non-deductibility of certain costs associated with the Atotech Acquisition, and the U.S. global intangible low-taxed income ("GILTI") inclusion, offset by the U.S. deduction for foreign derived intangible income ("FDII") and the geographic mix of income earned by the our international subsidiaries being taxed at rates lower than the U.S. statutory tax rate. The effective tax rate for the three months ended June 30, 2022 was lower than the U.S. statutory tax rate mainly due to the U.S. deduction for 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 GILTI inclusion.

Our effective tax rates for the nine months ended September 30, 2022 and September 30, 2021 were 24.1% and 17.6%, respectively. The effective tax rates for the nine months ended September 30, 2022 was higher than the U.S. statutory tax rate mainly due to additional withholding taxes related to our change in indefinite reinvestment assertion, non-deductibility of certain costs associated with the Atotech Acquisition, and the GILTI inclusion, offset by the U.S. deduction for FDII and the geographic mix of income earned by the our international subsidiaries being taxed at rates lower than the U.S. statutory tax rate. The effective tax rate for the nine months ended September 30, 2021 was lower than the U.S. statutory tax rate mainly due to the geographic mix of income earned by the Company's international subsidiaries being taxed at rates lower than the U.S. statutory tax rate, benefits of stock compensation, and the U.S. deduction for FDII offset by the U.S. tax effects of the 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.

The Company changed its indefinite reinvestment assertion with respect to certain subsidiaries resulting from the expected increase in debt service costs after the Atotech Acquisition. This resulted in a one-time charge to tax expense of \$30 million in the three and nine months ended September 30, 2022 to accrue for expected taxes on accumulated earnings of the relevant subsidiaries.

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 have an unfavorable impact on our effective tax rate after the Atotech Acquisition, since Atotech operates primarily in jurisdictions with tax rates higher than the U.S. tax rate. However, the geographic mix of pre-tax income can change based on multiple factors, resulting in changes to the effective tax rate in future periods. While we believe we have adequately provided for all tax positions, amounts asserted by taxing authorities could materially differ from our accrued positions as a result of uncertain and complex application of tax law and regulations. Additionally, the recognition and measurement of certain tax benefits include estimates and judgment by management. Accordingly, we could record additional provisions or benefits for U.S. federal, state, and foreign tax matters in future periods as new information becomes available.

Liquidity and Capital Resources

Cash and cash equivalents and short-term marketable investments at September 30, 2022 and December 31, 2021 totaled \$885 million and \$1.0 billion, respectively. The decrease primarily related to the use of cash to fund the payment of a portion of the purchase price for the Atotech Acquisition. 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 \$345 million for the nine months ended September 30, 2022, resulting from net income of \$279 million, which included non-cash charges of \$252 million, offset by a net increase in working capital of \$186 million. The net increase in working capital was primarily due to increases in inventory of \$188 million and trade accounts receivable of \$37 million, as a result of increased business levels and timing of sales, a decrease of \$37 million in accrued compensation resulting from the payment of variable compensation, and a decrease in income taxes payable of \$27 million. These increases in working capital were partially offset by an increase in accounts payable of \$55 million and other current and non-current liabilities of \$46 million.

Net cash used in investing activities was \$4.5 billion for the nine months ended September 30, 2022, primarily due to \$4.5 billion used for the Atotech Acquisition and \$109 million in capital expenditures, partially offset by \$76 million in maturities of investments.

Net cash used in financing activities was \$4.1 billion for the nine months ended September 30, 2022, primarily due to \$5.0 billion in net proceeds from the New Term Loan Facility offset by \$835 million of payments of borrowings, primarily related to payment of the Prior Term Loan Facility, \$37 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, second and third quarters of 2022, which totaled \$37 million. On October 24, 2022, our Board of Directors declared a quarterly cash dividend of \$0.22 per share to be paid on December 9, 2022 to stockholders of record as of November 28, 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 New Term Loan Facility and New Revolving Facility, each as defined and described further below, we may be restricted from paying dividends under certain circumstances.

Atotech Acquisition

On August 17, 2022, we completed the Atotech Acquisition. The total preliminary net purchase price, including cash consideration, net of cash acquired, value of MKS shares issued, repayment of Atotech debt and settlement of share-based awards

totalled \$5.7 billion. We funded the payment of the aggregate cash consideration with a combination of cash on hand and the proceeds from the New Term Loan Facility, as defined below. As a result of the Atotech Acquisition, we issued an aggregate of 10.7 million shares of our common stock to the former Atotech shareholders. Additional information regarding the funding of the Atotech Acquisition and the New Term Loan Facility, the New Revolving Facility and the replacement of the Prior Term Loan Facility and the Prior ABL Credit Facility, is discussed under "Acquisition of Atotech" above and in Note 10 to the Notes to the Condensed Consolidated Financial Statements.

In connection with the completion of the Atotech Acquisition, we entered into a credit agreement with JPMorgan Chase Bank, N.A., as administrative agent and collateral agent, Barclays Bank PLC, and the lenders from time to time party thereto (the "New Credit Agreement"). The New Credit Agreement provides for (i) a senior secured term loan facility (the "New Term Loan Facility") comprised of three tranches: a USD 1 billion loan (the "USD Tranche A"), a USD 3.6 billion loan (the "USD Tranche B") and a EUR 600 million loan (the "Euro Tranche B"), each of which were borrowed in full on the Effective Date, and (ii) a senior secured revolving credit facility of USD 500 million (the "New Revolving Facility" and, together with the New Term Loan Facility, the "New Credit Facilities"), with the commitments under each of the foregoing facilities subject to increase from time to time subject to certain conditions.

Borrowings under the New Credit Facilities bear interest at a rate per annum equal to, at our option, any of the following, plus, in each case, an applicable margin: (a) with respect to the USD Tranche A, the USD Tranche B and the New Revolving Facility, (x) 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*, or (3) a forward-looking term rate based on the secured overnight financing rate ("Term SOFR") (plus an applicable credit spread adjustment) for an interest period of one month, plus 1.00%; and (y) a Term SOFR rate (plus an applicable credit spread adjustment) for the interest period relevant to such borrowing, subject, solely with respect to the USD Tranche B, to a rate floor of 0.50%; and (b) with respect to the Euro Tranche B, a EURIBOR rate determined by reference to the costs of funds for Euro deposits for the interest period relevant to such borrowing adjusted for certain additional costs, subject to a EURIBOR rate floor of 0.00%. The USD Tranche A was issued with original issue discount of 0.25% of the principal amount thereof. The USD Tranche B and the Euro Tranche B were issued with original issue discount of 2.00% of the principal amount thereof. The applicable margin for borrowings under the USD Tranche A is 1.50% with respect to base rate borrowings and 2.50% with respect to Term SOFR borrowings. The applicable margin for borrowings under the USD Tranche B is 1.75% with respect to base rate borrowings and 2.75% with respect to Term SOFR borrowings. The applicable margin for borrowings under the Euro Tranche B is 3.00%. The initial applicable margin for borrowings under the New Revolving Facility is 1.50% with respect to base rate borrowings and 2.50% with respect to Term SOFR borrowings. Commencing with the delivery of financial statements with respect to the first quarter ending after the closing of the New Credit Agreement, the applicable margin for borrowings under the New Revolving Facility is subject to adjustment each fiscal quarter, based on our first lien net leverage ratio as of the end of the preceding quarter.

In addition to paying interest on outstanding principal under the New Credit Facilities, we are required to pay a commitment fee in respect of the unutilized commitments under the New Revolving Facility. The initial commitment fee is 0.375% per annum. Commencing with the delivery of financial statements with respect to the first quarter ending after the closing of the New Credit Agreement, the commitment fee is subject to downward adjustment based on our first lien net leverage ratio as of the end of the preceding quarter. We must also pay customary letter of credit fees and agency fees.

We incurred \$242 million of deferred financing fees and original issue discount fees related to the term loans under the New Term Loan Facility, which are included in long-term debt in the accompanying consolidated balance sheets and are being amortized to interest expense over the estimated life of the term loans using the effective interest method. As of September 30, 2022, the remaining balance of deferred financing fees and original issue discount of the New Term Loan Facility was \$204 million. A portion of the deferred financing fees and original issue discount has been accelerated in connection with the debt prepayment and extinguishment of the Prior Term Loan Facility (as defined below).

Under the New 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 incurrences or issuances of certain debt.

If at any time the aggregate amount of outstanding loans, unreimbursed letter of credit drawings and undrawn letters of credit under the New Revolving Facility exceeds the aggregate commitments under the New Revolving Facility, we are required to repay outstanding loans and/or cash collateralize letters of credit, with no reduction of the commitment amount.

We may voluntarily prepay outstanding loans under the New Credit Facilities from time to time, subject to certain conditions, without premium or penalty other than customary "breakage" costs with respect to Term SOFR or EURIBOR loans; provided, however, that subject to certain exceptions, if on or prior to the date that is twelve months after the closing date of the New Term Loan Facility, we prepay any loans under the USD Tranche B or the Euro Tranche B in connection with a repricing transaction, we must pay a prepayment premium of 1.00% of the aggregate principal amount of the loans so prepaid. Additionally, we may voluntarily reduce the unutilized portion of the commitment amount under the New Revolving Facility.

We are required to make scheduled quarterly payments each equal to 1.25% of the original principal amount of the USD Tranche A (increasing to 1.875% in years 3 and 4 and 2.50% in year 5) and 0.25% of the original principal amount of the USD Tranche B and the Euro Tranche B, beginning with the fiscal quarter ending December 31, 2022, with the balance due thereunder on the fifth anniversary of the closing date in the case of the USD Tranche A and the seventh anniversary of the closing date in the case of the USD Tranche B and the Euro Tranche B.

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

We incurred \$7 million of costs in connection with the New Revolving Facility, which were capitalized and included in other assets in the accompanying consolidated balance sheet and are being amortized to interest expense over the estimated life of four years. As a result of our Prior ABL Credit Facility (as defined below) being terminated concurrently with our entry into the New Revolving Facility, we wrote off an immaterial amount of previously capitalized debt issuance costs.

All obligations under the New Credit Facilities are guaranteed by certain of our wholly-owned domestic subsidiaries and are required to be guaranteed by certain of our future wholly-owned domestic subsidiaries and are secured by substantially all of our assets and the assets of such subsidiaries, subject to certain exceptions and exclusions.

Under the New Credit Agreement, we have the ability to incur additional incremental debt facilities in an amount up to (x) the greater of (1) \$1.01 billion and (2) 75% of consolidated EBITDA, plus (y) an amount equal to the sum of all voluntary prepayments of term loans under the New Term Loan Facility, plus (z) an additional unlimited amount subject to pro forma compliance with certain leverage ratio tests (based on the security and priority of such incremental debt).

Under the USD Tranche A and the New Revolving Facility, so long as any USD Tranche A loans (or commitments in respect thereof) are outstanding as of the end of any fiscal quarter, we may not allow our total net leverage ratio as of the end of such fiscal quarter to be greater than 5.50 to 1.00, with an annual step-down of 0.25:1.00 and subject to a step-up of 0.50:1.00 for the four full fiscal quarter period following any material acquisition, not to exceed 5.50 to 1.00.

In addition, in the event there are no loans outstanding under the USD Tranche A, as of the end of any fiscal quarter of ours when the aggregate amount of loans outstanding under the New Revolving Facility (net of (a) all letters of credit (whether cash collateralized or not) and (b) unrestricted cash of ours and our restricted subsidiaries) exceeds 35% of the aggregate amount of all commitments under the New Revolving Facility in effect as of such date, we may not allow our first lien net leverage ratio as of the end of each such fiscal quarter to be greater than 6.00 to 1.00.

The USD Tranche B and the Euro Tranche B are not subject to financial maintenance covenants.

The New Credit Agreement contains a number of negative covenants that, among other things and subject to certain exceptions, restrict our ability and each of our subsidiaries to incur additional indebtedness; pay dividends on our capital stock or redeem, repurchase or retire our capital stock or our subordinated indebtedness; make investments, loans and acquisitions; create restrictions on the payment of dividends or other amounts to us from our restricted subsidiaries or restrictions on the ability of our restricted subsidiaries to incur liens; engage in transactions with our affiliates; sell assets, including capital stock of our subsidiaries; materially alter the business it conducts; consolidate or merge; incur liens; and engage in sale-leaseback transactions.

The New 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 New Credit Facilities will be entitled to take various actions, including the acceleration of amounts due under the New Credit Facilities and all actions permitted to be taken by a secured creditor. At September 30, 2022, we were in compliance with all covenants under the New Credit Agreement.

The proceeds of the New Term Loan Facility were used on the Effective Date, among other things, to fund a portion of the consideration payable in connection with the Atotech Acquisition and to refinance the Prior Term Loan Facility, the Prior ABL Credit Facility and certain indebtedness of Atotech. We also paid certain customary fees and expenses of JPMorgan Chase Bank, N.A., Barclays Bank PLC, BofA Securities Inc., Citigroup Global Markets Inc., HSBC Securities (USA) Inc. and Mizuho Bank, Ltd. in their respective capacities as lead arrangers and bookrunners in connection with the New Credit Facilities.

On the Effective Date, in connection with the entry into the New Credit Agreement described above, we terminated and prepaid the prior term loan credit facility under that certain Term Loan Credit Agreement, date as of April 29, 2016, by and among us, Barclays Bank PLC and the other financial institutions from time to time party thereto (as amended, the "Prior Term Loan Credit Agreement" and the term loan credit facility thereunder, the "Prior Term Loan Facility") and terminated the prior revolving credit facility under that certain ABL Credit Agreement, dated as of February 1, 2019, by and among the us, Barclays Bank PLC and the other financial institutions from time to time party thereto (as amended, the "Prior ABL Credit Agreement" and the revolving credit facility thereunder, the "Prior ABL Credit Facility"). At the time of termination, there were approximately \$820 million in borrowings outstanding under the Prior Term Loan Facility that were prepaid and no borrowings outstanding under the Prior ABL Credit Facility. We have determined the termination to be a full extinguishment of debt and have written off to expense the immaterial remaining balance of deferred finance costs and debt issuance costs related to the Prior Term Loan Facility and Prior ABL Credit Facility.

As of September 30, 2022, the outstanding principal amount of the New Term Loan Facility was \$5.2 billion and the weighted average interest rate was 5.6%. As of September 30, 2022, there were no borrowings under the New Revolving Facility.

Lines of Credit and Borrowing Arrangements

Certain of our Japanese subsidiaries have lines of credit and a financing facility with various financial institutions, many of which generally expire and are renewed at three-month intervals with the remaining having no expiration date. The lines of credit and financing facility provided for aggregate borrowings as of September 30, 2022 of up to an equivalent of \$23 million. Total borrowings outstanding under these arrangements were \$2 million as of September 30, 2022. There were no borrowings under these arrangements at December 31, 2021.

Interest Rate Swap and Interest Rate Cap Agreements

We have various interest rate swap agreements as described further in Note 5 to the Condensed Consolidated Financial Statements that exchange the variable Term SOFR rate to a fixed rate in order to manage the exposure to interest rate fluctuations associated with the variable Term SOFR rate paid on the outstanding balance of the New Term Loan Facility. We acquired USD LIBOR interest rate cap agreements as a result of the Atotech Acquisition and we are utilizing these agreements to offset the variable Term SOFR rate on our New Term Loan Facility. Our USD LIBOR based swaps and USD LIBOR based interest rate caps will convert to Term SOFR after LIBOR's termination in June 2023 according to the terms of each instrument.

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, other than those described below which relate to the Atotech Acquisition.

Purchase Commitments

As of September 30, 2022, MSD had purchase commitments for certain inventory components and other equipment and services used in normal operations totaling \$95 million. The majority of these purchase commitments covered by these arrangements are for periods of less than one year.

Leases

We have various operating and finance leases for real estate and non-real estate items. The non-real estate leases are mainly comprised of automobiles but also include office equipment and other lower-valued items. Future payments related to operating and finance leases are as follows:

<i>(dollars in millions)</i>	Operating Leases	Finance Leases
2022 (remaining)	\$ 7	\$ 3
2023	24	6
2024	21	5
2025	19	5
2026	16	4
Thereafter	164	22
Total lease payments	<u>251</u>	<u>45</u>
Less: imputed interest	47	2
Total lease liabilities	<u>\$ 204</u>	<u>\$ 43</u>

Debt

Contractual maturities of our debt obligations as of September 30, 2022 are as follows:

(dollars in millions)

<u>Year</u>		<u>Amount</u>
2022 (remaining)	\$	26
2023		92
2024		98
2025		117
2026		123
2027		767
Thereafter		3,969

Pension

As a result of the Atotech Acquisition, we have additional defined benefit plans which mainly cover current and former employees in Germany. As of September 30, 2022, the estimated benefit payments related to these plans over the next 10 years amount to approximately \$80 million.

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 September 30, 2022, there were no material changes in our exposure to market risk from December 31, 2021, other than the items outlined below, which reflect the Atotech Acquisition.

Foreign Exchange Rate Risk

We enter into forward exchange contracts to reduce currency exposure arising from intercompany sales of inventory. We also enter into forward exchange contracts to reduce foreign exchange risks arising from the change in fair value of certain foreign currency denominated assets and liabilities.

At September 30, 2022, we had forward exchange contracts with notional amounts totaling \$711 million outstanding and a net fair value liability of \$6 million. The potential fair value loss for a hypothetical 10% adverse change in the currency exchange rate on our forward exchange contracts at September 30, 2022 would be immaterial.

Interest Rate Risk

We hold our cash, cash equivalents and short-term investments for working capital purposes. Some of the securities we invest in are subject to market risk. This means that a change in prevailing interest rates may cause the principal amount of such investments to fluctuate. To minimize this risk, we maintain our portfolio of cash, cash equivalents and short-term investments in a variety of securities, including money market funds and government debt securities. Due to the short-term nature of these instruments, we believe that we do not have any material exposure to changes in the fair value of our investment portfolio as a result of changes in interest rates. Declines in interest rates, however, would reduce future interest income. The effect of a hypothetical 10% increase or decrease in overall interest rates would not have had a material impact on our operating results or the total fair value of our portfolio.

We have various interest rate swap agreements as described further in "Management's Discussion and Analysis of Financial Condition and Results of Operations – Critical Accounting Policies and Estimates - Derivatives" that exchange the variable Term SOFR interest rate to a fixed rate in order to manage the exposure to interest rate fluctuations associated with the variable Term SOFR interest rate paid on the outstanding balance of the New Term Loan Facility. We acquired USD LIBOR interest rate cap agreements as a result of the Atotech Acquisition and we are utilizing these agreements to offset the variable Term SOFR rate on our New Term Loan Facility. Our USD LIBOR based swaps and USD LIBOR based interest rate caps will convert to Term SOFR after LIBOR's termination in June 2023 according to the terms of each instrument.

We are exposed to market risks related to fluctuations in interest rates related to our New Term Loan Facility. As of September 30, 2022, the principal outstanding on our New Term Loan Facility was \$5.2 billion, at a weighted average interest rate of 5.6%. A 10% increase or decrease in the weighted average interest rate as of September 30, 2022 would increase or decrease annual interest expense by approximately \$32 million, excluding the effect of our interest rate hedges. Because the notional amount of our interest rate hedges as of September 30, 2022 equals approximately 50% of the principal outstanding on our New Term Loan Facility, the resulting net impact to interest expense would be approximately \$16 million.

ITEM 4. CONTROLS AND PROCEDURES.

Evaluation of Disclosure Controls and Procedures

Our management, with the participation of our Chief Executive Officer and Chief Financial Officer, evaluated the effectiveness of our disclosure controls and procedures as of September 30, 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 September 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 September 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 I, Item 1 of this Quarterly Report on Form 10-Q.

ITEM 1A. RISK FACTORS.

The following risk factors amend and restate in their entirety the risk factors included under Item 1A of Part I of the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2021, filed with the Securities and Exchange Commission (the "SEC") on February 28, 2022.

Summary of Risk Factors

Acquisition Risks

- The Atotech Acquisition involves numerous risks, and we may not be able to effectively integrate Atotech's business and operations or realize the expected benefits from the acquisition, which could materially harm our operating results.
- As part of our business strategy, we have entered into and may continue to pursue business combinations and acquisitions that may be difficult to identify and complete, challenging and costly to integrate, disruptive to our business and our management, and/or dilutive to stockholder value.

Financial Risks

- Our consolidated indebtedness has increased substantially as a result of the Atotech Acquisition, which increased level of indebtedness could adversely affect us, including by decreasing our business flexibility.
- The terms of our New Term Loan Facility and New Revolving Facility impose significant financial obligations and risks upon us, limit our ability to take certain actions, and could discourage a change in control.
- A material amount of our assets represents goodwill and intangible assets, and our net income would be reduced if our goodwill or intangible assets become impaired.

Risks Related to Our Operations

- Supply chain disruptions and other manufacturing interruptions or delays have affected our ability to meet customer demand and have led to higher costs, while the failure to estimate customer demand accurately has resulted in excess or obsolete inventory, all of which has negatively impacted, and we expect will continue to impact, our business.
- Our dependence on sole and limited source suppliers and international suppliers could affect our ability to manufacture products and systems.
- Our failure to successfully manage the transition of certain of our products to other manufacturing locations and/or to contract manufacturers would likely harm our business, financial condition and operating results.
- Our products could contain defects, which would increase our costs and seriously harm our business, financial condition, operating results and customer relationships.
- Chemical manufacturing is inherently hazardous and could result in accidents that disrupt our operations or expose us to significant losses or liabilities.
- We outsource a number of services to third-party service providers, which decreases our control over the performance of these functions. Disruptions or delays at our third-party service providers could adversely impact our operations.
- The loss of net revenues from any one of our major customers would likely have a material adverse effect on us.
- Key personnel may be difficult to attract and retain.

Risks Related to Our Industries and Markets

- The semiconductor, electronics manufacturing and automotive industries we serve are characterized by periodic fluctuations that may cause a reduction in demand for our products.
- Many of the markets and industries we serve are highly competitive, are subject to rapid technological advancement, and have narrow design windows, and if we fail to introduce new and innovative products or improve our existing products, or

if our products or the applications we invest in do not achieve widespread adoption, our business, financial condition and operating results will be harmed.

- We offer products for multiple markets and must face the challenges of supporting the distinct needs of each of the markets we serve.

Risks Related to Operating a Global Business

- We face significant risks associated with doing business internationally.
- We face significant risks associated with doing increased business in China in particular.
- Unfavorable currency exchange rate fluctuations may lead to lower operating results or may cause us to change customer pricing, which could result in reduced sales and losses.

Risks Related to the COVID-19 Pandemic and other Widespread Health Crises

- The COVID-19 pandemic has negatively impacted our business, and the pandemic and other widespread health crises may have a materially adverse effect on our business, financial condition and operating results.

Legal, Tax, Regulatory and Compliance Risks

- If significant tariffs or other trade restrictions on our products or components that are imported from or exported to China continue or are increased, our business, financial condition and operating results may be materially harmed.
- We are subject to international trade compliance regulations, and violations of those regulations could result in fines or trade restrictions, which could have a material adverse effect on us.
- Changes in tax rates or tax regulation or the termination of tax incentives could affect our operating results.
- Many of our products and customers are subject to numerous laws regulating the production and use of chemical substances, and some of our products may need to be reformulated or discontinued to comply with these laws and regulations.
- We are subject to environmental regulations. If we fail to comply with these regulations, our business could be harmed.
- We are exposed to various risks related to legal proceedings, including product liability claims, intellectual property infringement claims, contractual claims and securities class action litigation, which if successful, could have a material adverse effect on our commercial relationships, business, financial condition and operating results.

Risks Related to Cybersecurity, Data Privacy and Intellectual Property Protection

- We are exposed to risks related to cybersecurity threats and incidents and subject to restrictions of and changes in laws and regulations governing data privacy and data protection that could have a material adverse effect on our business.
- Our proprietary technology is important to the continued success of our business. Our failure to protect this proprietary technology may significantly impair our competitive position.

Risks Related to Owning Our Common Stock

- Our quarterly operating results have fluctuated, and are likely to continue to vary significantly, which may result in volatility in the market price of our common stock.
- The future exercise of registration rights may adversely affect the market price of our common stock.
- The market price of our common stock has fluctuated and may continue to fluctuate for reasons over which we have no control.

Risk Factors

Acquisition Risks

The Atotech Acquisition involves numerous risks, and we may not be able to effectively integrate Atotech business and operations or realize the expected benefits from the acquisition, which could materially harm our operating results.

Our acquisition of Atotech Limited ("Atotech") in August 2022 (the "Atotech Acquisition") has significantly increased our size, including with respect to revenue, product offerings, number of employees and facilities. Atotech's products and technology, and certain of its markets and customer base, are significantly different from our historical experience. In particular, we do not have previous experience in the specialty chemistry industry, which Atotech serves. Atotech's chemistry business is also subject to highly complex environmental regulations, across multiple jurisdictions around the globe, and may expose us to significant additional liabilities for past or future activities.

The combination of our businesses could make it more difficult to maintain relationships with customers, employees or suppliers. Integrating Atotech's business and operations with ours has been and will continue to be complex, challenging and time-consuming and has required and continues to require significant efforts and expenditures, and we may not be able to achieve the integration in an effective, complete, timely or cost-efficient manner.

Other potential risks related to the Atotech Acquisition include our ability to:

- expand our financial and management controls and reporting systems and procedures to integrate and manage Atotech;
- integrate our information technology systems to enable the management and operation of the combined business;
- realize expected synergies resulting from the Atotech Acquisition;
- maintain and improve Atotech's operations;
- avoid lost revenue due to customer confusion and misinformation regarding the Atotech Acquisition, and retain and expand Atotech's customer base while aligning our sales efforts;
- avoid lost revenue resulting from the distraction or confusion of our personnel as a consequence of the Atotech Acquisition and ongoing integration efforts;
- retain key Atotech personnel;
- recognize and capitalize on technology enhancement opportunities presented by our combined businesses;
- adequately familiarize ourselves with Atotech's products and technology and certain of its markets and customer base such that we can manage Atotech's business effectively; and
- successfully integrate our respective corporate cultures such that we achieve the benefits of acting as a unified company.

Other potential risks related to the Atotech Acquisition include:

- operating in geographies that are new to us;
- the assumption of unknown or contingent liabilities, or other unanticipated events or circumstances; and
- the potential to incur or record significant cash or non-cash charges or write down the carrying value of intangible assets and goodwill obtained in the Atotech Acquisition, which could adversely impact our cash flow or lower our earnings in the period or periods for which we incur such charges or write down such assets.

If we are unable to successfully or timely integrate the operations of Atotech's business into our business, we may be unable to realize the revenue growth, synergies and other anticipated benefits resulting from the Atotech Acquisition and our business could be adversely affected. Additionally, we have incurred and will continue to incur transaction-related costs, including legal, regulatory and other costs associated with implementing integration plans, including facilities and systems consolidation costs and employment-related costs. Although we expect that the elimination of duplicative costs, as well as the realization of other efficiencies related to the integration of the businesses, should allow us to offset certain transaction and integration-related costs over time, this net benefit may not be achieved in the near term, or at all. Further, we may not realize the expected benefits from the Atotech Acquisition. Atotech's business and operations may not achieve the anticipated revenues and operating results. Any of the foregoing risks could materially harm our combined business, financial condition and results of operations.

As part of our business strategy, we have entered into and may continue to pursue business combinations and acquisitions that may be difficult to identify and complete, challenging and costly to integrate, disruptive to our business and our management, and/or dilutive to stockholder value.

As a part of our business strategy, we have entered into and continue to pursue business combinations and acquisitions. Our ability to successfully identify suitable acquisition targets, complete acquisitions on acceptable terms, and efficiently, effectively and profitably integrate and operate our acquired businesses is critical to our growth. We may not be able to identify target companies that meet our strategic objectives or successfully negotiate and complete acquisitions with companies we have identified on acceptable terms. Further, we may incur significant expense in pursuing acquisitions that cannot be completed, or are significantly delayed, due to regulatory or other restrictions. Additionally, our credit facilities only permit us to make acquisitions under certain circumstances, and also restrict our ability to incur additional indebtedness in certain circumstances. As a result, our ability to pursue our acquisition strategy may be hindered by our indebtedness. Moreover, we may not realize the benefits we anticipate from these acquisitions, because of significant challenges, such as:

- The difficulty, distraction, resource requirements, cost and disruption of integrating the operations, technology and personnel of the acquired companies;
- The potential disruption of our ongoing business and distraction of management;
- Possible internal control or other compliance weaknesses of the acquired companies;
- Significant expenses related to the acquisitions, including any resulting shareholder litigation;
- The assumption of unknown or contingent liabilities associated with acquired businesses;
- The potential to incur or record significant cash or non-cash charges or write down the carrying value of intangible assets and goodwill obtained in the acquisitions, which could adversely impact our cash flow or lower our earnings in the period or periods for which we incur such charges or write down such assets;
- Potentially incompatible cultural differences between us and the companies we acquire;
- Incorporating the acquired companies' technology and products into our current and future product lines, and successfully generating market demand for these expanded product lines;
- Potential additional geographic dispersion of operations;
- The difficulty in achieving anticipated synergies and efficiencies;
- The difficulty in leveraging the acquired companies' and our combined technologies and capabilities across our product lines and customer base;
- Burdensome requirements or conditions imposed by government regulators in connection with their review of acquisitions, including divestitures and restrictions on the conduct of our business or the business of the acquired companies; and
- Our ability to retain key customers, suppliers and employees of the acquired companies.

We may also face competitive disadvantages by selling products that are new to us and/or selling products in markets and geographies that are new to us. In addition, if we are not successful in completing acquisitions or integrating acquired businesses, we may be required to re-evaluate our growth strategy. We may incur substantial expenses and devote significant management time and resources to complete acquisitions that may not generate the financial results we planned to achieve. We may also choose to close or divest certain sectors or divisions of acquired companies, which could require us to record losses and/or spend cash relating to such closures or divestitures.

We continue to experience significant risks associated with the acquisition of Electro Scientific Industries, Inc. (the "ESI Merger"), which we completed in 2019, including our ability to retain key personnel and to realize the anticipated growth in net revenues from the acquired business, as well as the potential to incur or record significant cash or non-cash charges or write down the carrying value of intangible assets and goodwill obtained in the ESI Merger, which could adversely impact our cash flow or lower our earnings in the period or periods for which we incur such charges or write down such assets.

In addition, we could use substantial portions of our available cash for all or a portion of the purchase price of future acquisitions. We could also issue additional securities as consideration for or to finance these acquisitions, which could cause significant stockholder dilution, or obtain additional debt financing, which would increase our costs, reduce our future cash flow and subject us to covenants and other restrictions that may impede our ability to manage our operations, without achieving the desired accretion to our business.

As a result of our previous acquisitions, we presently have several different decentralized operating and accounting systems. We will need to continue to modify our accounting policies, internal controls, procedures and compliance programs to provide consistency across all of our operations. In order to increase efficiency and operating effectiveness and improve corporate visibility into our decentralized operations, we continue to review opportunities to integrate Enterprise Resource Planning systems where practical. Any

future implementations may risk potential disruption of our operations during the conversion periods and the implementations could require significantly more management time and higher implementation costs than currently estimated.

Financial Risks

Our consolidated indebtedness has increased substantially as a result of the Atotech Acquisition, which increased level of indebtedness could adversely affect us, including by decreasing our business flexibility.

As of September 30, 2022, we had approximately \$5.2 billion of indebtedness outstanding under our senior secured term loan facility (the "New Term Loan Facility"), comprised of a \$1.0 billion loan (the "USD Tranche A"), a \$3.6 billion loan (the "USD Tranche B") and a EUR 600 million loan (the "Euro Tranche B"), and we have \$500 million of available borrowing capacity under our senior secured revolving credit facility (the "New Revolving Facility"). This level of indebtedness could have the effect, among other things, of reducing our flexibility to respond to changing business, industry and economic conditions, limiting our ability to obtain financing in the future and increasing interest expense.

We also have incurred and will continue to incur various costs and expenses associated with our indebtedness. The amount of cash required to pay interest on our increased indebtedness levels following completion of the Atotech Acquisition, and the demands on our cash resources that come from that debt, are significantly greater than the amount of cash flows required to service the levels of indebtedness we have incurred prior to the Atotech Acquisition. Our increased levels of indebtedness following completion of the Atotech Acquisition could also reduce funds available for working capital, capital expenditures, acquisitions and other general corporate purposes and may create competitive disadvantages relative to other companies with lower debt levels. If we do not achieve the expected benefits and cost savings from the Atotech Acquisition, or if the financial performance of the combined company does not meet current expectations, then our ability to service our indebtedness may be adversely impacted.

Despite our current level of indebtedness, we and our subsidiaries may still be able to incur more indebtedness. Although our debt agreements contain restrictions on the incurrence of additional indebtedness, these restrictions are subject to certain qualifications and exceptions, and thus, additional indebtedness may be incurred in compliance with these restrictions. This could further exacerbate the risks we describe.

Moreover, we may be required to raise substantial additional financing to fund working capital, capital expenditures, acquisitions or other general corporate requirements. Our ability to arrange additional financing or refinancing will depend on, among other factors, our financial position and performance, as well as prevailing market conditions and other factors beyond our control. There can be no assurance that we will be able to obtain additional financing or refinancing on terms acceptable to us or at all.

The terms of our New Term Loan Facility and New Revolving Facility impose significant financial obligations and risks upon us, limit our ability to take certain actions, and could discourage a change in control.

As of September 30, 2022, the total principal balance of our USD Tranche A was \$1.0 billion, the total principal balance of our USD Tranche B was \$3.6 billion and the total principal balance of our Euro Tranche B was EUR 600 million. Our New Revolving Facility provides us with a senior secured revolving credit facility of up to \$500 million. We have not borrowed against our New Revolving Facility as of September 30, 2022.

All amounts outstanding under the New Term Loan Facility and the New Revolving Facility bear interest at a variable interest rate. Although we hedge some of the variable interest rate exposure, if interest rates increase, variable rate debt will create higher debt service requirements, which would adversely affect our cash flows. In addition, our credit ratings could affect the cost and availability of future borrowings and, accordingly, our cost of capital. The ratings of our indebtedness reflect each nationally recognized statistical rating organization's opinion of our financial strength, operating performance and ability to meet our debt obligations. We cannot make any assurances that we will achieve or maintain a particular rating in the future.

Our New Term Loan Facility and New Revolving Facility contain several negative covenants that, among other things and subject to certain exceptions, restrict our ability and/or our subsidiaries' ability to:

- Incur additional indebtedness;
- Pay certain dividends on our capital stock or redeem, repurchase or retire certain capital stock or certain other indebtedness;
- Make certain investments, loans and acquisitions;
- Engage in certain transactions with our affiliates;
- Sell assets, including capital stock of our subsidiaries;
- Materially alter the business we conduct;

- Consolidate or merge;
- Incur liens; and
- Engage in sale-leaseback transactions.

In addition, the USD Tranche A and the New Revolving Facility require that we meet certain financial covenants based on a consolidated leverage ratio test. Under the USD Tranche A and the New Revolving Facility, so long as any loans under the USD Tranche A (or commitments in respect thereof) are outstanding, our total net leverage ratio cannot exceed 5.50 to 1.00, with an annual step-down of 0.25:1.00 and subject to a step-up of 0.50:1.00 for the four full fiscal quarter period following any material acquisition, not to exceed 5.50 to 1.00. In addition, whenever there are no loans under the USD Tranche A (or commitments in respect thereof) outstanding and the aggregate amount of loans outstanding under the New Revolving Facility (net of (a) all letters of credit (whether cash collateralized or not) and (b) unrestricted cash of us and our restricted subsidiaries) exceeds 35% of the aggregate commitments under the New Revolving Facility, our first lien net leverage ratio cannot exceed 6.00 to 1.00.

Our ability to comply with these provisions may be affected by events beyond our control, including prevailing economic, financial and industry conditions. These restrictions on our ability to engage in or benefit from these actions may also limit our flexibility in planning for, or reacting to, changes in and opportunities for our business, such as limiting our ability to engage in mergers and acquisitions. This could place us at a competitive disadvantage. If the matters described in our other risk factors result in a material adverse effect on our business, financial condition or operating results, we may be unable to comply with the terms of our credit facilities or experience an event of default.

Our New Term Loan Facility and New Revolving Facility contain customary events of default, including:

- Failure to make required payments;
- Failure to comply with certain agreements or covenants;
- Materially breaching any representation or warranty;
- Failure to pay, or cause acceleration of, certain other indebtedness;
- Certain events of bankruptcy and insolvency;
- Failure to pay certain judgments; and
- A change in control of us.

The amount of cash available to us for repayment of amounts owed under these credit facilities will depend on our usage of our existing cash balances and our operating performance and ability to generate cash flow from operations, which will be subject to financial, business and other factors affecting our operations, many of which are beyond our control. We cannot provide any assurances that we will generate sufficient cash flow from operations to service our debt obligations. Any failure to repay these obligations as they become due would result in an event of default under the credit facilities.

If an event of default occurs, the lenders may end their obligation to make loans to us under the credit facilities and may declare any outstanding indebtedness under these credit facilities immediately due and payable. In such case, we would need to obtain additional financing or significantly deplete our available cash, or both, to repay this indebtedness. Any additional financing may not be available on reasonable terms or at all, and significant depletion of our available cash would harm our ability to fund our operations or execute our broader corporate objectives. If we were unable to repay outstanding indebtedness following an event of default, then in addition to other available rights and remedies, the lenders could initiate foreclosure proceedings on substantially all of our assets. Any such foreclosure proceedings or other rights and remedies successfully implemented by the lenders in an event of default would have a material adverse effect on our business, financial condition and operating results.

Further, because a change in control of us constitutes an event of default under these credit facilities, this may be a deterrent to some potential acquirers, as it would likely require an acquirer to repay any outstanding borrowings under these credit facilities.

A material amount of our assets represents goodwill and intangible assets, and our net income would be reduced if our goodwill or intangible assets become impaired.

As of September 30, 2022, our goodwill and intangible assets, net, represented approximately \$7.5 billion, or 65% of our total assets. Goodwill is generated in our acquisitions when the cost of an acquisition exceeds the fair value of the net tangible and identifiable intangible assets we acquire. For example, as a result of the Atotech Acquisition, we added significant additional goodwill and intangible assets. Goodwill and indefinite-lived intangible assets are subject to an impairment analysis at least annually based on the fair value of the reporting unit. Intangible assets relate primarily to the developed technologies, customer relationships and patents and trademarks acquired by us as part of our acquisitions of other companies and are subject to an impairment analysis whenever events or changes in circumstances exist that indicate that the carrying value of the intangible asset might not be recoverable. We will

continue to monitor and evaluate the carrying value of goodwill and intangible assets. If market and economic conditions or business performance deteriorate, the likelihood that we would record an impairment charge would increase, which impairment charge could materially and adversely affect our financial condition and operating results.

Risks Related to Our Operations

Supply chain disruptions and other manufacturing interruptions or delays have affected our ability to meet customer demand and have led to higher costs, while the failure to estimate customer demand accurately has resulted in excess or obsolete inventory, all of which has negatively impacted, and we expect will continue to impact, our business.

Our business depends on the timely supply of products and services that meet the rapidly changing technical and volume requirements of our customers, which depends in part on the timely delivery of raw materials, parts, components and subassemblies from suppliers, including contract manufacturers. For example, since the first quarter of 2021, we have experienced significant constraints due to global supply chain disruptions, including procuring electronic components, which have negatively impacted, and continue to impact, our sales, costs and margins, and our ability to produce timely products to meet customer demand. Cyclical industry conditions and volatility of demand for our products increase capital, technical, operational and other risks for us and for companies throughout our supply chain. We have experienced, and we expect to continue to experience, significant disruptions in our supply chain, interruptions of our manufacturing operations, delays in our ability to deliver products or services, increased costs, price volatility, and customer order cancellations, which have been, or may in the future be, as a result of:

- Volatility in the availability and cost of materials, including rare earth elements, whether due to interruptions in production by suppliers, allocations of products to other purchasers, fluctuations in foreign currency exchange rates, changes in worldwide price levels, whether as a result of inflationary pressures or otherwise, environmental limitations, geopolitical issues or other factors;
- Pandemics such as COVID-19, natural disasters or other events beyond our control (such as earthquakes at our facilities in California and Oregon, floods or storms, wildfires, power outages (particularly rolling blackouts recently experienced in China), regional economic downturns, social unrest, political instability, terrorism, or acts of war), particularly where we or our suppliers, subcontractors and contract manufacturers conduct manufacturing;
- Global logistics network challenges, such as limited availability of and constraints on freight capacity;
- Information technology or infrastructure failures; and
- New laws or regulations.

For example, our Materials Solutions Division uses certain raw materials derived from petrochemical based feedstocks, the prices of which have historically been subject to periods of rapid and significant upward and downward movement. We may not always be able to pass on price increases, or price increases by our suppliers, to our customers due to competitive pricing pressure, and, even when we are able to do so, there may be a delay between price increases in raw materials and our ability to increase the prices of our products.

In addition, if we need to rapidly increase our business and manufacturing capacity to meet increases in demand or expedited shipment schedules, this may exacerbate any interruptions in our manufacturing operations and supply chain and the associated effect on our working capital. Moreover, if actual demand for our products is different than expected, we may purchase more/fewer parts than necessary or incur costs for canceling, postponing or expediting delivery of parts. If we purchase inventory in anticipation of customer demand that does not materialize, or if our customers reduce or delay orders, we may incur excess inventory charges. Any of these factors could materially and adversely affect our business, financial condition and operating results.

Our dependence on sole and limited source suppliers and international suppliers has negatively impacted, and could continue to impact, our ability to manufacture products and systems.

We rely on sole and limited source suppliers and international suppliers for some of our raw materials, components, subassemblies and software that are critical to manufacturing our products and/or our testing and operations processes due to unique properties or component designs as well as specialized quality and performance requirements. For example, our Materials Solutions Division relies on a local basis on single principal suppliers of palladium, its most significant raw material input by value. Our reliance on sole and limited source suppliers and international suppliers involves a number of risks, including:

- The inability to obtain an adequate supply of required raw materials or components;
- Quality and reliability problems with raw materials or components, which in turn adversely affects our products' quality and reliability;
- Prohibitively higher raw material or component prices due to the imposition of tariffs;

- Supply chain disruptions, including as a result of the relocation of our low-cost and sole and limited source suppliers to less-developed countries, such as the movement of some suppliers from China to the Philippines or Vietnam;
- Reduced control over pricing and timing of delivery of raw materials and components;
- The inability of our suppliers to develop technologically advanced products to support our growth and development of new products;
- The unavailability of service and/or spare parts for critical capital equipment; and
- The inability or unwillingness of our suppliers to continue to offer supplies or services on commercially acceptable terms.

At times, we have not been able to, and in the future, we may not be able to, obtain and qualify alternative sources of these components on favorable terms, on a timely basis, or at all, whether because there are a limited number of suppliers or because we have entered into supply agreements with certain suppliers that contain certain minimum purchase requirements. The use of alternative sources could also require us to redesign our products, resulting in increased costs, likely shipping delays and the potential need to requalify products with customers, particularly those who have "copy exact" requirements. Any inability to redesign our products could result in further costs and shipping delays. Increased costs would decrease our profit margins if we could not pass the costs to our customers. Further, shipping delays could damage our relationships with customers and have a material adverse effect on our business and operating results.

Our failure to successfully manage the transition of certain of our products to other manufacturing locations and/or to contract manufacturers would likely harm our business, financial condition and operating results.

As part of our continuous cost-reduction efforts, we continue to relocate the manufacturing of certain of our existing product lines and subassemblies to, and initiate the manufacturing of certain new products in, our facilities in China, Israel, Romania and Singapore, as well as to our significant subcontracted operations in Mexico and selected contract manufacturers in Asia. In the future, we may expand the level of manufacturing, administrative and certain other operations that we move to other global locations to take advantage of cost efficiencies available to us in those locations. However, we may not achieve the significant cost savings or other benefits that we anticipate from moving manufacturing and other operations, and costs may increase as development and manufacturing expertise increase and labor, material, shipping and facility-related costs rise, as we have seen in our manufacturing locations in China. If these costs increase to the extent that we no longer realize suitable gross margins from our products manufactured in these countries, we may need to relocate the manufacturing of these products to other lower-cost regions. Additionally, if we are unable to successfully manage the relocation, initiation or oversight of the manufacturing of these products, our business, financial condition and operating results would be harmed.

In particular, transferring product lines to other manufacturing locations and/or to our contract manufacturers' facilities often requires us to transplant complex manufacturing equipment and processes across a large geographical distance and to train a completely new workforce concerning the use of this equipment and these processes. In addition, certain of our customers may require the requalification of products supplied to them in connection with the relocation of manufacturing operations. If we are unable to manage these transfers and training smoothly and comprehensively, or if we are unable to requalify products in a timely manner, we could suffer manufacturing and supply chain delays, excessive product defects, harm to our operating results and our reputation with our customers, and loss of customers. Further, the utilization of overseas manufacturing locations and contract manufacturers may require additional transportation and shipping providers, customs tariffs or export licenses, which may be difficult or costly to obtain.

Additionally, qualifying contract manufacturers and commencing volume production is expensive and time-consuming, and there is no guarantee we will continue to do so successfully. Further, our reliance on contract manufacturers reduces our control over the assembly process, quality assurance, production costs and material and component supply for our products. If we fail to manage our relationships with our contract manufacturers, or if any of our contract manufacturers experience financial difficulty, or delays, disruptions, capacity constraints or quality control problems in their operations, our ability to ship products to our customers could be impaired and our competitive position and reputation could be harmed. Further, if we or our contract manufacturers are unable to negotiate with suppliers for reduced material or component costs, our operating results could be harmed.

In addition, our contract manufacturers may terminate our agreements with them upon prior notice to us or immediately for reasons such as if we become insolvent, or if we fail to perform a material obligation under the agreements. If we are required to change contract manufacturers or assume internal manufacturing operations for any reason, including the termination of one of our contract manufacturing contracts, we will likely suffer manufacturing and shipping delays, lost sales, increased costs and damage to our customer relationships, any of which would harm our business, financial condition and operating results.

Our products could contain defects, which would increase our costs and seriously harm our business, financial condition, operating results and customer relationships.

Many of our products are inherently complex in design and, in some cases, require extensive customization and/or ongoing regular maintenance. Further, the manufacturing of these products often involves a highly complex and precise process and the

utilization of specially qualified materials or components that conform to stringent specifications. Many of our products also require highly skilled labor. As a result of the technical complexity of these products, design defects, skilled labor turnover, changes in our or our suppliers' manufacturing processes or the inadvertent use of defective or nonconforming materials by us or our suppliers could adversely affect our manufacturing yields and product reliability. This could in turn harm our business, operating results, financial condition and customer relationships.

We provide warranties for our products, and we accrue allowances for estimated warranty costs at the time we recognize revenue for the sale of the products. The determination of such allowances requires us to make estimates of product return rates and expected costs to repair or replace the products under warranty. We establish warranty reserves based on historical warranty costs for our products. If actual return rates or repair and replacement costs differ significantly from our estimates, our operating results would be negatively impacted.

Our customers may discover defects in our products after the products have been fully deployed and operated under peak stress conditions. In addition, some of our products are combined with products from other suppliers, which may contain defects. Further, some of our customers use our products in ways other than their intended purpose. As a result, should problems occur, it may be difficult to identify the source of the problem. If we are unable to promptly identify and fix defects or other problems, we could experience, among other things:

- Loss of customers;
- Increased costs of product returns and warranty expenses;
- Increased costs required to analyze and mitigate the defects or problems;
- Damage to our reputation;
- Failure to attract new customers or achieve market acceptance;
- Diversion of development, engineering and service resources; and/or
- Legal action by our customers.

The occurrence of any of these factors could seriously harm our business, financial condition and operating results.

Chemical manufacturing is inherently hazardous and could result in accidents that disrupt our operations or expose us to significant losses or liabilities.

The hazards associated with chemical manufacturing and the related storage and transportation of chemical raw materials, products and wastes are inherent in operating our Materials Solutions Division. These hazards could lead to an interruption or suspension of operations and have a material adverse effect on the productivity and profitability of a particular manufacturing facility or on our business as a whole. Potential risks include storage tank leaks and ruptures, explosions and fires, and chemical spills and other discharges or releases of toxic or hazardous substances or gases. These risks could be caused or exacerbated by mechanical failures, unscheduled downtime, labor difficulties, transportation interruptions, inclement weather, natural disasters, cybersecurity breaches or terrorist attacks. These hazards may result in personal injury and loss of life, damage to property, and contamination of the environment, which may result in a suspension of operations and the imposition of civil or criminal fines, penalties and other sanctions, cleanup costs, and claims by our employees, governmental entities or third parties. We are dependent on the continued operation of our production facilities, and the loss or shutdown of operations at any of our major operating facilities could have a material adverse effect on our business, financial condition and operating results.

We outsource a number of services to third-party service providers, which decreases our control over the performance of these functions. Disruptions or delays at our third-party service providers could adversely impact our operations.

We outsource a number of services, including certain information technology systems management, logistics functions, contract manufacturing and accounting functions, to third-party service providers. While outsourcing arrangements may lower our cost of operations, they also reduce our direct control over the services rendered. This diminished control may have an adverse effect on the quality or quantity of services rendered, on our ability to quickly respond to changing market conditions, or on our ability to ensure compliance with all applicable domestic and foreign laws and regulations. If we do not effectively develop and manage our outsourcing strategies, if required export and other governmental approvals are not timely obtained, if our third-party service providers do not perform as anticipated, or do not adequately protect our data from cyber-related security breaches, or if there are delays or difficulties in enhancing business processes, we may experience operational difficulties (such as limitations on our ability to pay suppliers in a timely manner), increased costs, manufacturing or service interruptions or delays, loss of intellectual property rights or other sensitive data, quality and compliance issues, and challenges in managing our product inventory or recording and reporting financial and management information, any of which could materially and adversely affect our business, financial condition and operating results.

The loss of net revenues from any one of our major customers would likely have a material adverse effect on us.

Our top ten customers accounted for approximately 47%, 44% and 33% of our net revenues for 2021, 2020 and 2019, respectively. Our top two customers, Lam Research Corporation and Applied Materials, Inc., together accounted for approximately 27%, 24% and 18% of net revenues for 2021, 2020 and 2019, respectively. In any one reporting period, a single customer or several customers may contribute even a larger percentage of our consolidated net revenues. Further, our Equipment Solutions business, a component of our Photonics Solutions Division, also depends on a few significant customers for a large portion of its revenue in any given quarter. While the Atotech Acquisition has mitigated our reliance on these customers to some degree, the loss of any of these customers or any significant reduction in orders by these customers, including reductions due to economic, market or competitive conditions, would likely still have a material adverse effect on our business, financial condition and operating results. None of our significant customers has entered into an agreement with us requiring it to purchase any minimum quantity of our products.

Attempts to lessen the adverse effect of any loss or reduction of net revenues through the rapid addition of new customers would be difficult because a relatively small number of companies dominate the semiconductor and electronics manufacturing industries. Further, prospective customers typically require lengthy qualification periods prior to placing volume orders with a new supplier. Our future success will continue to depend upon:

- Our ability to maintain relationships with existing key customers;
- Our ability to attract new customers and satisfy any required qualification periods;
- Our ability to introduce new products in a timely manner for existing and new customers;
- The successes of our original equipment manufacturer ("OEM") customers in creating demand for their capital equipment products that incorporate our products; and
- Our ability to gain significant customers in new, emerging segments of our markets.

Key personnel has been, and may continue to be, difficult to attract and retain.

Our ability to maintain and grow our business is directly related to the service of our employees in each area of our business, as we consider talent to be a significant asset. Our performance is directly tied to our ability to hire, train, motivate and retain qualified personnel, including highly skilled technical, financial, managerial, and sales and marketing personnel. There is significant competition for personnel in the technology and sciences marketplace, particularly in certain geographies where we are located, including the Boston area, the Orange County, California area, the San Francisco Bay area, China, Germany, Japan and Singapore. Also, as a result of the COVID-19 pandemic, employees in our industries are increasingly able to work remotely, which could increase employee mobility and turnover, making it more difficult for us to attract and retain employees. In addition, many of our product manufacturing processes and product service require deep technical expertise, and it can be particularly challenging to identify and attract candidates and retain employees possessing such expertise. We have experienced, and may continue to experience, attrition in certain key positions. A related challenge is that a significant portion of our technical talent is nearing retirement age, and we may have difficulty attracting a sufficient number of employees with the necessary skills to replace them. If we are unable to hire sufficient numbers of qualified employees or retain and motivate existing employees, including our employees from the Atotech Acquisition, our business and operating results would be harmed.

Risks Related to Our Industries and Markets

The semiconductor, electronics manufacturing and automotive industries we serve are characterized by periodic fluctuations that may cause a reduction in demand for our products.

Our business has depended upon the capital expenditures of semiconductor device manufacturers (which in turn depends upon the demand for semiconductors) and the capital expenditures for electronics manufacturing. As a result of the Atotech Acquisition, we also expect to experience increased dependence on the automotive industry. All of these industries have historically experienced cyclical variations in product supply and demand. For example, our sales to semiconductor capital equipment manufacturers and semiconductor device manufacturers sequentially increased 32% in 2021, sequentially increased 49% in 2020 and sequentially decreased 19% in 2019. These sometimes sudden and severe cycles can result from many factors, including overall consumer and industrial spending and demand for electronic products that drive manufacturer production. These cycles can also result from manufacturers' capacity utilization, timing of new product introductions, demand for customers' products, inventory levels relative to demand, access to affordable capital, labor conditions, prices of commodities and energy costs. The timing, severity and duration of these cycles are difficult to predict, and we may not be able to respond effectively to these cycles.

During downturns in the semiconductor and electronics manufacturing industries, periods of overcapacity have resulted in rapid and significantly reduced demand for our products, which may result in lower gross margins due to reduced absorption of manufacturing overhead, as our ability to reduce our cost structure rapidly and effectively in response to such downturns is limited by the fixed nature of many of our expenses in the near term. During downturns in the automotive industry, we would expect a similar

effect on the gross margins of our Materials Solutions Division. Further, our ability to reduce our long-term expenses is constrained by our need to continue investment in next-generation product technology and to support and service our products. In addition, due to the relatively long manufacturing lead times for some of the products we sell to these industries, we may incur expenditures or purchase raw materials or components for products we are unable to sell. As a result, downturns in these industries may materially harm our business, financial condition and operating results. Conversely, during upturns in these industries, we may have difficulty rapidly and effectively increasing our manufacturing capacity to meet sudden increases in customer demand. If we fail to do so, we may lose business to our competitors and our relationships with our customers may be harmed.

Many of the markets and industries we serve are highly competitive, are subject to rapid technological advancement, and have narrow design windows, and if we fail to introduce new and innovative products or improve our existing products, or if our products or the applications we invest in do not achieve widespread adoption, our business, financial condition and operating results will be harmed.

We operate in highly competitive markets characterized by rapid technological advances, frequent product introductions and enhancements, changing customer requirements, evolving industry standards, substantial capital investment and increasing price pressure. Our success depends upon our ability to continuously develop, market and support superior products, processes and solutions. Factors that could harm our competitive position include:

- Our failure to anticipate demand for and internally develop or acquire new, improved and disruptive technologies;
- Our investment in emerging applications that do not achieve widespread adoption or significant growth;
- Delays in introducing new, enhanced and differentiated products, many of which are difficult to design and manufacture because of their sophistication and complexity;
- Reduced manufacturing capabilities, customer service or support;
- Our inability to have semiconductor device manufacturers direct semiconductor capital equipment manufacturers to use our products at their semiconductor fabrication facilities;
- Our inability to have global electronics OEMs specify our products in their manufacturing processes for the rigid printed circuit board manufacturers they use;
- Failure of customers to achieve market demand for their products that incorporate our technologies;
- Efforts of customers to internally develop products that compete with our technologies or to engage subcontract manufacturers or system integrators to manufacture competitive products on their behalf;
- Competitors that develop products that offer superior performance or technological features;
- Competitors with greater financial, technical, marketing and other resources, including ownership by or affiliations with members of government, political entities or larger, multinational businesses, which may offer a number of competitive advantages, such as the ability to incur lower costs due to control over sources of components and raw materials or exclusive agreements with suppliers thereof;
- Competitors with greater recognition and stronger presences in specific product niches and/or regions, including in the specialty chemicals industry;
- Competitors, particularly in China, that are able to develop low-cost competitive products;
- Difficulties in displacing competitors' products that are designed into customers' products;
- Pricing pressure from customers and competitors, particularly new competitors that offer aggressive price and payment terms in an attempt to gain market share, and especially during cyclical downturns in our markets, when end-markets become more sensitive to costs and competitors are more likely to seek to maintain or increase market share, reduce inventory or introduce more technologically advanced or lower-cost products; and
- Industry consolidation among competitors, which could exacerbate certain of these factors.

Certain of these factors could cause customers to defer or cancel orders for our products and/or place orders for our competitors' products. This is particularly significant to us, as our success depends on many of our products being designed into new generations of equipment and manufacturing processes. Certain markets in which we operate, such as the semiconductor capital equipment market and the mobile phone market, which is part of our industrial technologies market, experience cyclical downturns and unevenness in capital spending. If we are unable to introduce new products in a timely manner or are otherwise unsuccessful in making sales to customers, we may miss market upturns or fail to have our products or subsystems designed into our customers' products. For example, new products designed by capital equipment manufacturers historically have had a lifespan of five to fifteen years. We must develop

products that are technologically advanced in a timely manner so that they are positioned to be chosen for use in each successive generation of capital equipment.

These factors could also prompt us to agree to pricing concessions or extended payment terms with our customers, in an effort to expand into new markets, gain volume orders or improve customer cost of ownership in highly competitive applications. In other cases, we may discontinue selling certain products if we cannot offset price erosion through shifts in operations.

Finally, these factors could render the portfolios of products or lines of business from which we generate significant net revenues obsolete. For example, our Materials Solutions Division has lost business to customers who identify alternative materials or processes and therefore no longer require as much or any specialty chemicals. If our customers or the industries we serve shift to other technologies, our business, financial condition and operating results would be harmed.

We offer products for multiple markets and must face the challenges of supporting the distinct needs of each of the markets we serve.

We offer products for very diverse markets, the scope and number of which expanded as a result of the Atotech Acquisition. Because we operate in multiple markets, we must work constantly to understand the needs, standards and technical requirements of many different applications within these markets, and must devote significant resources to developing different products for these markets. Product development is costly and time consuming. We must anticipate trends in our customers' industries and develop products before our customers' products and processes are commercialized. If we do not anticipate our customers' needs and future activities, we may invest substantial resources in developing products that do not achieve broad market acceptance. Our growth prospects rely in part on successful entry into new markets, which depends on displacing competitors who are more familiar with these markets and better known to customers. In many cases, we are attempting to enter or expand our presence in these new markets with newly introduced products that are not yet proven in the industry. Our decision to continue to offer products to a given market or to penetrate new markets is based in part on our judgment of the size, growth rate, profitability and other factors that contribute to the attractiveness of a particular market. If our product offerings in any particular market are not competitive, our analyses of a market are incorrect or our sales and marketing approach for a market is ineffective, we may not achieve anticipated growth rates in this market, and our business, financial condition and operating results would be harmed.

Further, serving diverse markets requires an understanding of different sales cycles and customer types, and the development and maintenance of a complex global sales team and sales channels to support the markets' differing needs. It also requires dynamic operations that can support both complex, customized product builds as well as quick turn-around for commercial off-the-shelf sales. If we fail to provide sales and operational support for our diverse markets, our business, financial condition and operating results would be harmed.

Risks Related to Operating a Global Business

We face significant risks associated with doing business internationally.

We face significant risks from our substantial operations in, and sales to, international markets, which has considerably increased following the completion of the Atotech Acquisition in August 2022. Our presence and operations in international markets, and the risks associated with doing business internationally, may continue to change and will likely increase if our business grows. These risks, many of which we have experienced, include:

- Adverse changes or instability in political or economic conditions in countries or regions where we and our customers and suppliers are located, including currency devaluations, debt defaults, lack of liquidity and recessions;
- Challenges of administering our diverse business and product lines globally;
- Actions of government regulatory authorities, including embargoes, sanctions (including "anti-blocking" rules), executive orders, import, export, and reexport restrictions, antiboycott laws, tariffs (including anti-dumping and countervailing duties), currency controls, trade restrictions and trade barriers (including retaliatory actions), license requirements (including license-specific restrictions and provisos), citizenship requirements, environmental requirements and other rules and regulations (including extraterritorial rules and regulations) applicable to the manufacture, import, export and reexport of our products, all of which may be complicated and conflicting, require significant investments in cost, time and resources for compliance, and impose strict and severe penalties for noncompliance;
- Political and social attitudes, laws, rules, regulations and policies within countries that favor domestic companies over non-domestic companies, including customer- or government-supported efforts to promote the development and growth of local competitors;
- Greater risk of violations of U.S. and international laws and regulations, including anti-corruption and trade laws, by our employees, sales representatives, distributors or other agents;

- Ambiguous or vague laws that make collecting payments or seeking recourse difficult;
- Increased credit risk and differing financial conditions of customers and distributors, resulting in longer accounts receivable collection periods and payment cycles, increased bad debt write-offs and additions to reserves;
- Overlapping, burdensome and differing tax structures and laws;
- Potential for certain tax benefits to be revoked or reclaimed;
- Reduced, inconsistent or differing protection of intellectual property, including unequal recognition and treatment of multi-national corporations' rights by hostile or indifferent governments;
- Increasingly stringent privacy, security, consumer and data protection laws, including the E.U. General Data Protection Regulation, the Data Security Law of China and the China Personal Information Protection Law;
- Shipping, logistics and other supply chain complications or cargo security requirements, including forced-labor mitigation rules and inflationary rates of shipping costs;
- Adverse currency exchange rate fluctuations;
- Restrictions on currency conversion or the transfer of funds, including restrictions on certain financial institutions themselves;
- Compliance costs, withholding taxes and legal and contractual restrictions associated with repatriating overseas earnings;
- Increased risk of exposure to significant health concerns (such as Monkeypox, COVID-19, Sudden Acute Respiratory Syndrome, Avian Influenza and the H7N9, Ebola or Zika viruses);
- Differences in business practices, culture, language and management style;
- Complex, burdensome and differing labor and employment laws and practices;
- Changing labor conditions and difficulties staffing, managing, and rationalizing our foreign operations, including, rising wages and other labor costs, retention of employees, the formation of labor unions and works councils and the maintenance of defined benefit pension plans;
- Nationalization or other expropriation of private enterprises or land;
- Involuntary geopolitical annexations or accessions through military force or otherwise; and
- Increased risk of exposure to civil unrest, terrorism, government sanctioned and non-government sanctioned acts of violence, and military activities.

If we experience any of the risks associated with doing business internationally, our business, financial condition and operating results could be significantly harmed.

We have significant facilities and operations and a considerable number of employees in Israel. A number of our products are manufactured in facilities located in Israel. The Middle East remains a volatile region, and the future of peace efforts between Israel and neighboring countries remains extremely uncertain. Any armed conflicts or significant political instability in the region is likely to negatively affect business conditions and could significantly disrupt our operations in Israel. Further, many of our employees in Israel may be called for active military duty under emergency circumstances. If a military conflict or war arises, our operations in Israel could be disrupted by the absence of one or more key employees or a significant number of other employees. Any such disruptions could adversely affect our business.

Our Materials Solutions Division has limited operations and employees in Russia and Belarus. Historically, we have made immaterial sales into Russia and Belarus. As a result of the ongoing military conflict between Russia and Ukraine, including the imposition of sanctions on Russia, Belarus and related parties, our sales operations in those countries have been disrupted and our sales into those countries have ceased. Any additional disruptions, including the expansion of sanctions in connection with the conflict, could adversely affect our business.

The U.S. government continues to take action against certain of our customers, particularly our customers located in Asia, including indictments for various criminal charges, and in some cases, restrictions on doing business with these customers (or restrictions on third parties from engaging designated entities), including the suspension of our ability to fill outstanding orders. These actions have caused us, and may in the future cause us, to lose anticipated revenue from product sales, the amount of which could be significant. In addition, these or other customers could elect to purchase products from unaffected non-U.S. competitors, even when trade restrictions are not in place, jeopardizing our long-term relationship with them. Further, compliance with regulatory restrictions may cause us to breach contractual obligations, which could result in costs, penalties and litigation.

Additionally, potential customers in certain countries, particularly in Asia, have a strong preference for technology and products developed by suppliers based in their home countries. The trade dispute between the U.S. government and the Chinese government has reinforced and broadened this preference, as potential and existing customers seek to avoid the uncertainty related to the trade dispute. While we have attempted to mitigate these issues by establishing a significant local presence in many of these countries, companies like us that are based elsewhere remain at a disadvantage.

Our operations and assets in China are subject to significant political and economic uncertainties.

The Atotech Acquisition has significantly increased our operations and assets in China. Accordingly, political, economic and social conditions in China could affect our business, financial condition and operating results. In addition, Chinese laws and regulations often change or influence political, economic and social conditions in China. Accordingly, changes in Chinese laws and regulations, or their interpretation, or the imposition of unexpected or confiscatory taxation, restrictions on currency conversion, imports and sources of supply, devaluations of currency, or the nationalization or other expropriation of private enterprises may have a materially adverse effect on our business, financial condition, and operating results. Under its current leadership, the Chinese government has pursued economic reform policies that encourage private economic activity, foreign investments and greater economic decentralization. There is no assurance, however, that the Chinese government will continue to pursue these policies, or that it will not significantly alter these policies without notice.

If we repatriate funds from our Chinese operations to fund working capital requirements in jurisdictions outside of China, to pay dividends, or otherwise, we will be required to comply with the procedures and regulations of applicable Chinese law, which may significantly limit our ability to extract cash from our Chinese operations. Furthermore, under the Enterprise Income Tax Law and the regulation on the implementation of the Enterprise Income Tax Law, absent application of a relevant treaty, a withholding tax of 10% will normally apply to dividends payable to non-Chinese investors which are derived from sources within China. Any changes to these procedures and regulations, or our failure or inability to comply with these or other procedures and regulations, could prevent us from repatriating funds from our Chinese operations or subject us to other forms of taxation and/or penalties, which could have a materially adverse effect on our business, financial condition, and operating results. Failure to comply with applicable laws, regulations and/or rules in relation to foreign exchange control, including the Administrative Regulations on Foreign Exchange of China, could subject us to administrative penalties (such as warnings and/or fines), as well as criminal liabilities in severe situations.

The Chinese economy differs from the economies of most developed countries in many respects, including the amount of government involvement, level of development, growth rate, control of foreign exchange and allocation of resources. While the Chinese economy has experienced significant growth over the past decades, growth has been uneven, both geographically and among various sectors of the economy. The Chinese economy may not continue to grow or grow at a steady and uniform rate. Any slowdown may have a negative effect on our Chinese operations and our business in general. The various macroeconomic measures and monetary policies adopted by the Chinese government to guide economic growth and the allocation of resources may not be effective in sustaining the growth rate of the Chinese economy. If Chinese growth stagnates or there is an economic downturn in China, our business, financial condition, and operating results may be materially adversely affected.

Uncertainties presented by the Chinese legal system could limit the legal protections available to us and subject us to legal risks, which could have a material adverse effect on our business, financial condition, and operating results.

Our operations in China, as well as those of our customers and suppliers in China, are subject to applicable Chinese laws, rules and regulations. The Chinese legal system is based on written statutes. Prior court decisions may be cited for reference but have little value as precedents, although the judicial interpretations issued by the Supreme Court of China have binding effect. Additionally, Chinese statutes are often principle-oriented and require detailed interpretations by enforcement bodies to further apply and enforce such laws.

Beginning with the "Open Door Policy" in 1978, "Reform and Opening-Up" in 1979 and the "Socialist Market Economy" in 1992, the Chinese government has been developing a comprehensive system of commercial laws, and progress has been made in introducing laws and regulations dealing with economic matters such as foreign investment, corporate organization and governance, commerce, taxation, and trade. However, China has not developed a fully integrated legal system, and recently enacted laws and regulations may not sufficiently cover all aspects of economic activities in China. In particular, because some of these laws and regulations are relatively new and the Chinese legal system continues to rapidly evolve, and because of the limited volume of published court of arbitration decisions and their nonbinding nature (except for the judicial interpretations issued by the Supreme Court of China), the interpretation and enforcement of these laws and regulations involve uncertainties. In addition, the Chinese legal system is based in part on government policies and internal rules, some of which may not be published on a timely basis or at all, and some of which may have retroactive effect. As a result, we may not be aware of our violation of these policies and rules until sometime after the violation. Any administrative and court proceedings in China may be protracted, resulting in substantial costs and diversion of resources and management attention. Since Chinese administrative and court authorities have significant discretion to interpret and implement statutory, regulatory, and contractual terms, it may be more difficult to predict and evaluate the outcome of administrative and court proceedings and the level of legal protection in China than in more developed legal systems. These

uncertainties may also impede our ability to enforce the contracts we have entered into in China. As a result, these uncertainties could have a material adverse effect on our business, financial condition, and operating results.

The Chinese government's control of currency conversion and expatriation of funds may affect our liquidity.

The Chinese government imposes controls on the convertibility of Renminbi ("RMB") into foreign currencies and, in certain cases, the remittance of currency out of China. Substantially all revenues of our Chinese subsidiaries are denominated in RMB. Shortages in the availability of foreign currency in China may restrict the ability of our Chinese subsidiaries to remit sufficient foreign currency to pay dividends or to make other payments to us, or otherwise to satisfy their foreign currency-denominated obligations. Under existing Chinese foreign exchange regulations, payments of current account items, including profit distributions, interest payments and trade-related payments, can be made in foreign currencies without prior approval from China's State Administration of Foreign Exchange ("SAFE") by complying with certain procedural requirements, including, among others, submission of relevant documentary evidence of such transactions to designated foreign exchange banks in China for processing of relevant payments. We are required to present relevant documentary evidence of such transactions and conduct such transactions at designated foreign exchange banks in China. However, for any Chinese company, dividends can be declared and paid only out of the retained earnings of that company under Chinese law and may be subject to taxation. In accordance with relevant Chinese laws and their articles of association, each of our Chinese subsidiaries is required to set aside 10% of its after-tax profits based on Chinese accounting standards as statutory reserve until such reserve reaches 50% of its registered capital. As a result, our Chinese subsidiaries may be unable to transfer cash outside of China, whether in the form of dividends, loans, or advances. These restrictions and requirements could reduce the amount of distributions that we receive from our Chinese subsidiaries, which would restrict our ability to fund our operations, generate income, pay dividends and service our indebtedness.

Furthermore, approval from or registration with SAFE or its local branch is required where RMB will be converted into foreign currencies and remitted out of China for payments of capital account items, such as the repayment of loans denominated in foreign currencies. Without prior approval from or registration with SAFE or its local branch, cash generated by our Chinese subsidiaries may not be used to repay debt owed by such subsidiaries to entities outside China, or make other payments of capital account items outside China. The Chinese government may also restrict access in the future to foreign currencies for current account transactions. Additionally, because repatriation of funds of our Chinese subsidiaries requires the prior approval of SAFE and/or its authorized bank and/or compliance with certain procedural requirements, such repatriation could be delayed, restricted or limited. There can be no assurance that the rules and regulations pursuant to which SAFE grants or denies such approval or stipulates procedural requirements will not change in a way that adversely affects the ability of our Chinese subsidiaries to expatriate funds out of China. Future measures, including any additional requirements to repatriate profits earned in China, may increase our regulatory compliance burden.

Lastly, any allotment of funds from us to our Chinese subsidiaries, either as a shareholder loan or as an increase in registered capital, is subject to registration with Chinese governmental authorities. These limitations on the flow of funds could restrict our ability to act in response to changing market conditions.

Changes in the Chinese government's policy on foreign investment in China may adversely affect our business and operating results.

The Special Administrative Measures for Foreign Investment Access (Negative List) (2021 Edition) and the Special Administrative Measures for Foreign Investment Access in Pilot Free Trade Zones (Negative List) (2021 Edition) (together, the "Negative Lists"), each of which became effective on January 1, 2022, identify the industrial areas that are restricted or prohibited for foreign investors. The business of our Chinese subsidiaries does not fall within any such restricted or prohibited area and their business scope was approved by the Chinese foreign investment regulatory authority upon their establishment.

The Negative Lists may be updated from time to time, and there can be no assurance that the Chinese government will not change its policies in a manner that would render part or all of our business to fall within the restricted or prohibited categories. If we cannot obtain approval from the relevant approval authorities to engage in a business that becomes prohibited or restricted for foreign investors, we may be forced to sell or restructure our business in China. If we are forced to adjust our corporate structure or business as a result of changes in government policy on foreign investment, it could adversely affect our reputation, business, financial condition, and operating results.

The Foreign Investment Law of the People's Republic of China ("Foreign Investment Law") was formally adopted by the National People's Congress of China and promulgated on March 15, 2019 and came into effect on January 1, 2020, replacing the Sino-foreign Equity Joint Ventures Law, the Sino-Foreign Cooperative Joint Ventures Law and the Wholly Foreign-Owned Enterprise Law with a single unified law aimed at promoting foreign investment by better protecting the rights and interests of foreign investors and standardizing management of foreign investment. While the current policy of the Chinese government appears to be one of economic reform to encourage foreign investment and greater economic decentralization, there is no assurance that such a policy will continue to prevail or that our operations will not be adversely affected should there be any policy changes. Also, the Foreign Investment Law was formulated to establish regulatory principles governing foreign investment in China, with detailed implementation regulations and rules to be enacted by relevant regulatory authorities. As such, uncertainties exist regarding the interpretation and implementation of

the Foreign Investment Law and the evolution of the regulatory landscape of foreign investment. The breach of or non-compliance with the Foreign Investment Law or other foreign investment-related laws and regulations may result in the Chinese authorities suspending, withdrawing or terminating our business license, causing us to cease production of all or certain of our products, which would materially and adversely affect our business and financial performance. For example, the Foreign Investment Law imposes enhanced information reporting obligations on foreign investors and the applicable foreign-invested entities, and requires reorganization of foreign-invested enterprises' corporate governance for conformity with the Company Law of China. The Foreign Investment Law may have a material impact on certain aspects of our current corporate governance practices and business operations, and may result in increased compliance costs. In addition, depending on the seriousness of the circumstances, noncompliance with information reporting obligations, concealment of information and providing misleading or false information could result in monetary fines or criminal charges.

Unfavorable currency exchange rate fluctuations may lead to lower operating results or may cause us to change customer pricing, which could result in reduced sales and losses.

Although we report our financial position and operating results in U.S. dollars, a significant portion of our net revenues are from customers in international markets where we invoice in currencies other than the U.S. dollar, and we have facilities where costs are incurred in currencies other than the U.S. dollar. In addition, we carry certain assets and liabilities in currencies other than the U.S. dollar. The indebtedness we incurred in connection with the Atotech Acquisition includes a Euro tranche of EUR 600 million. Currency exchange rate fluctuations could have an adverse effect on our assets, liabilities, net revenues, expenses and operating results and we could experience losses with respect to our hedging activities. Unfavorable exchange rate fluctuations could require us to increase or decrease prices to customers, which could result in lower net revenues from such customers. Alternatively, if we do not adjust the prices for our products in response to unfavorable currency fluctuations, our operating results would be adversely affected by declining net revenues or profit margins for our products. Such exchange rate fluctuations could also increase the costs and expenses of our non-U.S. operations when translated into U.S. dollars or require us to modify our current business practices. In addition, most sales made by our foreign subsidiaries are denominated in the currency of the country in which these products are sold and the currency they receive in payment for such sales could be less valuable on a U.S. dollar basis at the time of receipt as a result of exchange rate fluctuations. We enter into foreign exchange forward contracts to reduce a portion of our currency exposure arising from intercompany sales of inventory as well as intercompany accounts receivable and intercompany loans. However, we cannot be certain that our efforts will be adequate to protect us from significant exchange rate fluctuations or that such efforts will not expose us to additional exchange rate risks.

Risks Related to the COVID-19 Pandemic and other Widespread Health Crises

The COVID-19 pandemic has negatively impacted our business, and the pandemic and other widespread health crises may have a materially adverse effect on our business, financial condition and operating results.

The COVID-19 pandemic has subjected, and the evolution of the COVID-19 pandemic or the emergence of other widespread health crises may continue to subject, our business, financial condition and operating results to a number of risks, including:

- Supply chain disruptions and other operational challenges, including shortages of and significant price increases and increased lead times for raw materials, components and subassemblies, increased employee turnover, increased health and safety measures, site closures, and other restrictions on the movement of people, goods and raw materials, which could frustrate our ability to obtain materials from suppliers and meet customer demand, in each case on favorable terms, on a timely basis, or at all, harming our relationships with customers, creating opportunities for competitors and exposing us to contractual disputes or liability;
- The implementation of government mandates and other regulatory actions, including business shutdowns, manufacturing restrictions, and quarantines, which could reduce or halt our operations or the operations of our customers and suppliers, carry into the future for an extended or unknown duration, and contain complex requirements that make compliance difficult;
- Decreased employee productivity or availability, whether due to illnesses or due to the measures we or government authorities may take to mitigate their spread and effects, including site closures, restrictions on travel and vaccine mandates, which could lead to employee attrition; and
- A decline in industry and global economic conditions that reduces demand from and weakens the financial health of our customers, resulting in delayed or canceled orders, requests for payment deferrals or other contract modifications, and, if we do not anticipate significant or sudden decreases in order patterns, excess inventory.

These risks may be heightened in certain geographies, segments and markets, or under certain other circumstances. For example, in the first half of 2020, our research and defense market was negatively impacted by university and research lab closures caused by the COVID-19 pandemic. In addition, in 2020, the general metal finishing business of our Materials Solutions Division was

negatively impacted by temporary shutdowns of OEMs in the global automotive markets. Since the first quarter of 2021, we have experienced significant constraints due to global supply chain disruptions, including procuring electronic components, which have negatively impacted, and continue to impact, our sales, costs and margins, and our ability to produce timely products to meet customer demand. In addition, since 2021, we believe certain of our semiconductor market customers have increased order volumes to mitigate the impact of supply chain constraints arising from the COVID-19 pandemic, which could lead to a future decrease in order volumes. In the future, and particularly in light of the Atotech Acquisition, we will be more likely to be affected by government mandates in China, where we and our customers and suppliers have a significant presence and where the government has taken and may continue to take strict measures to eliminate the spread of COVID-19. We are more likely to be affected by supply chain disruptions where we rely on sole and limited source suppliers for raw materials, components and subassemblies critical to the manufacturing of our products due to unique properties or component designs, including customers' "copy exact" requirements, or specialized quality and performance requirements. In addition, the effects of the COVID-19 pandemic and other widespread health crises could exacerbate the other risks described here and in our future filings with the SEC.

Legal, Tax, Regulatory and Compliance Risks

If significant tariffs or other trade restrictions on our products or components that are imported from or exported to China continue or are increased, our business, financial condition and operating results may be materially harmed.

Trade tensions between the United States and China have increased substantially in recent years, resulting in significant tariff increases, additional sanctions against specified entities, and the broadening of restrictions and license requirements for specified uses of those of our products that are subject to these restrictions, including restrictions surrounding specific product groups, applications and/or end uses. U.S. Government concerns relate to, among other things, national security concerns and the concept of 'military/civil fusion' in China - a national strategy in which military technologies are developed or produced alongside commercial, non-military items, often by private or quasi-government companies. In addition to targeted comprehensive sanctions against specific firms, in recent years, "Entity List" designations and "military end-user" controls have been significantly modified, as were some rules relating to items produced outside the United States that incorporate more than de minimis levels of U.S. controlled content or derived from (i.e., the "direct product" of) U.S. origin technologies. Most recently, the U.S. Department of Commerce's Bureau of Industry and Security ("BIS") published regulations that introduce new and novel restrictions related to end-uses in semiconductor, semiconductor manufacturing, supercomputer, and advanced computing, along with certain equipment used to develop and produce them (the "New BIS Rules"). These regulations have resulted in, and may in the future result in, additional export license requirements on shipments of our products, parts and supplies, loss of business and increased administrative burdens. While we continue to adjust our policies and practices to ensure compliance with these regulations, and we will seek to mitigate their impact, there can be no assurances that current or future regulations and tariffs will not have a material adverse effect on our business.

Since the beginning of 2019, the pace at which regulatory changes have been implemented has been extraordinarily high, which increases the resources needed to monitor and comply with the regulation, while heightening the risk of non-compliance. Between May 2019 and August 2020, BIS added China-based Huawei Technologies Co., Ltd. ("Huawei") and a total of 152 of its affiliates onto its Entity List, thereby requiring an export license for the sale of U.S. items to Huawei. In May 2020, BIS also modified the Foreign Direct Product rule to further restrict Huawei's ability to directly or indirectly source U.S. origin items, and then modified the existing "military end-use" rule, expanding the scope of products and technologies that would require licenses for military end-uses, primarily in China. BIS further named 103 specific companies as "military end users" (mostly in China). In December 2020, Hong Kong lost its favorable trade status and BIS added Semiconductor Manufacturing International Corporation ("SMIC") and ten of its affiliates, along with 66 other companies to the Entity List. BIS continues to add Chinese-based companies onto its Entity List. Accordingly, we have implemented additional monitoring processes and suspended orders from Huawei, SMIC and certain other designated Chinese-based customers, where those orders are subject to U.S. jurisdiction. We have also been negatively impacted by the cancellation of orders from customers who are suppliers to these firms. In October 2022, the New BIS Rules imposed new restrictions on our ability to sell, ship, service and support certain equipment and otherwise conduct business with certain counterparties, primarily China-based companies involved in semiconductor manufacturing, which we expect to negatively impact our revenues. The New BIS Rules are complex, and we are working on assessing their full impact. At the same time, BIS also added numerous China-based companies, including companies with which we do business, to its "Unverified List." Their placement on this list may be an indication of additional future restrictions placed on them by BIS.

Increased restrictions on China may lead to regulatory retaliation by the Chinese government and possibly further escalate geopolitical tensions between China and Taiwan. China has adopted, and announced its intention to further adopt, new regulations, which could have an adverse effect on our operations. For example, in response to the imposition of U.S. tariffs in 2018 and 2019, China imposed its own retaliatory tariffs. In May 2019, China's Ministry of Commerce announced an "unreliable entity list" under which non-Chinese entities that cut off supply to Chinese companies may be subject to government action. In September 2020, it disclosed potential enforcement mechanisms in the form of an "Unreliable Entity List." This regulation has yet to be implemented, and its effects are unknown at this time.

The ongoing geopolitical and economic uncertainty between the United States and China caused by recent tariffs, Entity List and "military end user" designations, foreign-made product rules and the New BIS Rules, and the unknown impact of current and future Chinese trade regulations, may continue to cause increased costs, as well as restrictions on our ability to sell, or a decreased demand from customers to purchase, our products, directly and indirectly, which could materially harm our business, financial condition and operating results. This trade uncertainty has caused, and may continue to cause, customers to delay or cancel orders, as they limit expenditures that could be affected by future actions and evaluate ways to mitigate their own tariff and cost exposure by sourcing from locally-based suppliers or suppliers based in other countries. Such delays and cancellations could have a material impact on our business, financial condition and operating results. It is possible that additional restrictions on trade will be imposed, and that existing tariffs will be increased on imports of our products or the components used in our products and/or that our business will be impacted by additional retaliatory tariffs or restrictions imposed and/or increased by China or other countries in response to existing or future tariffs, causing us to potentially lose additional sales and customers, incur increased costs and lower margins, seek alternative suppliers, raise prices or make changes to our operations, any of which could materially harm our business, financial condition and operating results.

We are subject to international trade compliance regulations, and violations of those regulations could result in fines or trade restrictions, which could have a material adverse effect on us.

We are subject to trade compliance laws in both the United States and other jurisdictions where we operate. For example, exports of our products and technology developed or manufactured in the United States are subject to export controls imposed by the U.S. Government and administered by the U.S. Departments of Commerce and, to a lesser extent, State and Treasury. Export regulations govern exports of our products and technology developed or manufactured in other countries, including, for example, Austria, China, France, Germany, Israel, Romania and Singapore. In certain instances, these regulations may require obtaining licenses from the administering agency prior to exporting products or technology to international locations or foreign nationals, including foreign nationals employed by us in the United States and abroad. For products and technology subject to the U.S. Export Administration Regulations administered by BIS, the requirement for a license is dependent on the type and end use of the product and technology, the final destination and the identity and nationality of the end user. Virtually all exports from the United States of defense articles subject to the International Traffic in Arms Regulations, administered by the Department of State's Directorate of Defense Trade Controls, require a license. The Israeli Ministry of Economy and the Defense Export Control Agency of the Israeli Ministry of Defense administer similar export regulations and license requirements, which apply to many of our products and technology developed or manufactured in Israel. In addition, the Romanian Ministry of Foreign Affairs and the Department for Export Controls administer similar export regulations and license requirements, which apply to many of our products and technology developed or manufactured in Romania. Obtaining export licenses can be difficult and time-consuming, and we may not be successful in obtaining them. Failure to obtain export licenses to enable product and technology exports could reduce our net revenues, harm our relationships with our customers and could adversely affect our business, financial condition and operating results. Compliance with export regulations may also subject us to additional fees and costs. The absence of comparable export restrictions on competitors, whether due to technical specifications or the competitor's geography, may adversely affect our competitive position. In addition, if we or our international representatives or distributors fail to comply with any of these export regulations, we or they could be subject to civil and criminal and monetary and non-monetary penalties and costly consent decrees, and we could experience disruptions to our business, restrictions on our ability to export products and technology, damage to our reputation and significant harm to our business and operating results. While we have implemented policies and procedures to comply with these laws, we cannot be certain that our employees, contractors, suppliers or agents will not violate such laws or our policies.

Changes in tax rates or tax regulation or the termination of tax incentives could affect our operating results.

As a global company, we are subject to taxation in the United States and various other countries. Significant judgment is required to determine and estimate worldwide tax liabilities. Our future annual and quarterly effective tax rates could be affected by numerous factors, including changes in the applicable tax laws; composition of pre-tax income in countries with differing tax rates; our determinations of tax liabilities; and/or valuation of our deferred tax assets and liabilities.

The enactment of the Tax Cuts and Jobs Act (the "TCJA") in December 2017 significantly affected U.S. tax law by changing how the United States imposes tax on multinational corporations. The U.S. Department of Treasury has broad authority under the TCJA to issue regulations and interpretive guidance. Some of the proposed and final regulations that have been issued regarding the TCJA have been challenged in court. We have applied available guidance to estimate our tax obligations, but new guidance issued by the U.S. Treasury Department may cause us to adjust our tax estimates in future periods. The ultimate impact of the TCJA on our U.S. tax liabilities is based upon our understanding and interpretation of the regulatory guidance that has been issued regarding the TCJA.

On October 4, 2021, 136 members of the Organization for Economic Co-operation and Development ("OECD") agreed to a global minimum tax rate of 15%. On December 20, 2021, OECD published its model rules on the agreed minimum tax known as the Global Anti-Base Erosion ("GloBE") rules. The GloBE rules provide a framework for a coordinated multi-country system of taxation intended to ensure large multinational enterprise groups pay a minimum level of tax on the income arising in each of the jurisdictions where they operate. Individual country legislation is expected in 2022 and the expected effective date of such legislation is in 2023.

Additionally, on August 16, 2022, the Inflation Reduction Act (the "IRA") was signed into law. The IRA contains corporate tax reforms, including a 15% minimum tax on the adjusted financial statement income of certain large corporations and a 1% excise tax on certain publicly traded corporations that buy back stock from their shareholders. As a result of the IRA, we could be subject to an increase in our effective tax rate, which would adversely impact our financial results.

We are subject to regular examination by the U.S. Internal Revenue Service and state, local and foreign tax authorities. We regularly assess the likelihood of favorable or unfavorable outcomes resulting from these examinations to determine the adequacy of our provision for income taxes. Although we believe our tax estimates are reasonable, we can make no assurances that any final determination of tax liability will not be materially different from the treatment reflected in our historical income tax provisions and accruals, which could materially and adversely affect our financial condition and operating results.

We qualify for tax incentives based on our ability to meet, on a continuing basis, various tests relating to our employment levels, research and development expenditures and other qualification requirements in a particular jurisdiction. While we intend to operate in such a manner to maintain and maximize our tax incentives, we can make no assurances that we have so qualified or that we will so qualify for any particular year or jurisdiction. If we fail to qualify or remain qualified for certain tax incentives, the tax incentives we previously received may be terminated and/or retroactively revoked, requiring repayment of past tax benefits, and we would be subject to an increase in our effective tax rate, which would adversely impact our financial results.

Many of our products and customers are subject to numerous laws regulating the production and use of chemical substances, and some of our products may need to be reformulated or discontinued to comply with these laws and regulations.

As our Materials Solutions Division manufactures specialty chemicals, we are subject to chemicals approvals, registrations and regulations around the world, including the European Union regulation on Registration, Evaluation, Authorisation, and Restriction of Chemicals ("EU REACH") regulation, the Toxic Substances Control Act ("TSCA") in the United States, and similar laws and regulations in certain other jurisdictions in which we and our customers operate. In recent years, changes to existing laws and regulations and the adoption of new laws and regulations have imposed new obligations, including restrictions and prohibitions on highly hazardous substances, could also force us to reformulate or discontinue certain of our products.

Governmental, regulatory, and societal demands for increasing levels of product safety and environmental protection are resulting in increased pressure for more stringent regulatory control with respect to the chemical industry, including with respect to manufacturing, importing and using chemicals. For example, the EU REACH imposes comprehensive compliance obligations and establishes mechanisms to identify and restrict high-concern chemicals, and comparable regulatory requirements have now been adopted in several other countries. As another example, in the United States, the core provisions of the TSCA were amended in June 2016 for the first time in nearly 40 years. Among the more significant changes, the amended TSCA mandates risk evaluation of existing "high priority" chemicals. In addition, the U.S. Environmental Protection Agency (the "EPA") must make a no "unreasonable risk" finding before a new chemical can be fully commercialized. These laws and regulations generally create uncertainty about whether existing chemicals important to our business may be designated for restriction and whether the approval process for new chemicals may become more difficult and costly. These changes could adversely impact our ability to supply certain products to our customers and could also result in compliance obligations, fines, ongoing monitoring and other future business activity restrictions, which could have a material adverse effect on our business, financial condition and operating results.

Perfluorooctanesulfonic acid ("PFOS") and other per- and polyfluoroalkyl substances ("PFAS") are chemical agents that have been targeted for risk assessment, restriction, regulation and high-priority remediation and are the subject of litigation and governmental investigations in the United States and other countries. While we have developed a suite of products that do not require any PFAS chemicals and, when adopted by the industry, will obviate the need for PFAS-containing mist suppressants and wetting agents, we continue to sell a limited number of products that contain permissible levels of PFAS. We have been named as a defendant in a lawsuit related to PFAS and we have received a request for information from, and responded to, a state agency.

International environmental protection requirements, including chemicals regulation requirements, and enforcement of these requirements, may become more stringent in the future and could result in material costs relating to regulatory compliance, liabilities, litigation proceedings, or other impacts, such as restrictions or prohibitions on our products. Future regulatory or other developments could also restrict or eliminate the use of, or require us to make modifications to, our products, packaging, manufacturing processes, transportation methods, and technology, which could have a material adverse effect on our business, financial condition, and operating results. Our production facilities require permits, such as environmental, operating, and product-related permits and import/export permits, which are subject to renewal and, in some circumstances, revocation. We may not obtain the necessary permits, existing permits may be discontinued, and any newly issued permits may contain significant and costly new requirements. If a permit for a production facility would not be renewed or would be revoked, the facility may need to be closed temporarily or permanently, which may have a material adverse effect on our business, financial condition and operating results. Failure to obtain or maintain permits for our facilities or other failure to comply with applicable environmental regulations could result in the shutdown of, or suspension of operations at, our plants.

Many of our customers are subject to the same or similar environmental regulations. The impact of these regulations on our customers and our customers' ability to comply with these regulations is outside of our control. However, noncompliance by our

customers could have an indirect negative effect on our business. We must monitor relevant chemical regulatory developments in order to limit the associated risks of new developments by triggering countermeasures, such as alternative products and phase-outs, at the right time.

We are subject to environmental regulations. If we fail to comply with these regulations, our business could be harmed.

Our operations are subject to various federal, state, local and international laws and regulations relating to environmental protection, including those governing discharges of pollutants into the air, water and land, the generation, use, handling, storage, transportation, treatment and disposal of hazardous substances, waste and other materials and the cleanup of contaminated sites. In the United States, we are subject to the federal regulation and control of the EPA, and we are subject to regulations and controls of comparable authorities in other countries. Some of our operations, including our chemical operations, require environmental permits and controls to prevent and reduce air and water pollution, and these permits are subject to modification, renewal and revocation by issuing authorities. Future developments, administrative actions or liabilities relating to environmental matters, including sanctions such as capital expenditure obligations, clean-up and removal costs, long-term monitoring and maintenance costs, costs of waste disposal, natural resource damages and payments for property damage and personal injury, could have a material adverse effect on our business, financial condition or operating results.

Although we believe that our safety procedures for using, handling, storing and disposing of such materials comply with the standards required by applicable federal, state, local and international laws and regulations, we cannot completely eliminate the risk of accidental contamination or injury from these materials, including risks related to our chemical products, which are inherently hazardous. We have been, and may in the future be, subject to claims by employees or third parties alleging contamination or injury, and could be liable for damages, which liability could exceed the amount of our liability insurance coverage (if any) and the resources of our business.

Certain portions of the soil at the former facility of our Spectra-Physics lasers business, located in Mountain View, California, and certain portions of the aquifer surrounding the facility, through which contaminated groundwater flows, are part of an EPA-designated Superfund site and are subject to a cleanup and abatement order from the California Regional Water Quality Control Board. Spectra-Physics, which we acquired as part of the Newport acquisition in April 2016 and which had been acquired by Newport in 2004, along with other entities with facilities located near the Mountain View, California facility, were identified as responsible parties with respect to this Superfund site, due to releases of hazardous substances during the 1960s, 1970s and 1980s. Spectra-Physics and the other responsible parties entered into cost-sharing agreements covering the costs of remediating the off-site groundwater impact. The site is mature, and investigations, monitoring and remediation efforts by the responsible parties have been ongoing for approximately 30 years. We have certain ongoing costs related to investigation, monitoring and remediation of the site that have not been material to us as a whole in the recent past. However, while we benefitted from the indemnification of certain costs by a third party in the past, that indemnification is now in a transition period, and we will become subject to a greater portion of costs of remediation going forward. Our ultimate costs of remediation and other potential liabilities are difficult to predict. In the event that the EPA and the California Regional Water Quality Control Board determine that the site cleanup requires additional measures to ensure that it meets current standards for environmental contamination, or if they enhance any of the applicable required standards, we will likely become subject to additional remediation obligations in the future. In addition to our investigation, monitoring and remediation obligations, we may be liable for property damage or personal injury claims relating to this site. While we are not aware of any material claims at this time, such claims could be made against us in the future. If significant costs or other liability relating to this site arise in the future, our business, financial condition and operating results would be adversely affected.

In addition, some of our Materials Solutions Division's manufacturing facilities and former facilities have an extended history of chemical manufacturing operations or other industrial activities, and contaminants have been detected at some of those sites. We or our predecessors have in the past been, and are currently, required to remediate contamination at several of these current and former sites, and there remains some risk that further investigation and remediation might be necessary.

The environmental regulations that we are subject to include a variety of federal, state, local and international regulations that restrict the use and disposal of materials used in the manufacture of our products or require design changes or recycling of our products. If we fail to comply with any present or future regulations, we could be subject to future liabilities, the suspension of manufacturing or a prohibition on the sale of products we manufacture. In addition, these regulations could restrict our ability to equip our facilities or could require us to acquire costly equipment, or to incur other significant expenses to comply with environmental regulations, including expenses associated with the recall of any non-compliant product and the management of historical waste. For example, in addition to EU REACH, which regulates the use of certain hazardous substances in certain products, the European Union has enacted the Waste Electrical and Electronic Equipment Directive, which requires the collection, reuse and recycling of waste from certain products. Compliance with such laws requires significant resources. These regulations may require us to redesign our products or source alternative components to ensure compliance with applicable requirements, for example by mandating the use of different types of materials in certain components. Any such redesign or alternative sourcing may increase the cost of our products, adversely impact the performance of our products, add greater testing lead-times for product introductions, or in some cases limit the markets for certain products. Further, such environmental laws are frequently amended, which increases the cost and complexity of compliance. For example, such amendments have in the past, and may in the future, result in certain of our products falling in the scope of a

directive, even if they were initially exempt. In addition, certain of our customers, particularly OEM customers whose end products may be subject to these directives, may require that the products we supply to them comply with these directives, even if not mandated by law. Because certain directives, for example, those issued from the EU, are implemented in individual member states, compliance is particularly challenging. Our failure to comply with any of such regulatory requirements or contractual obligations could result in our being directly or indirectly liable for costs, fines or penalties and third-party claims, and could jeopardize our ability to conduct business in certain countries.

We are exposed to various risks related to legal proceedings, including, for example, product liability claims, intellectual property infringement claims, contractual claims and securities class action litigation, which if successful, could have a material adverse effect on our commercial relationships, business, financial condition and operating results.

From time to time, we may be involved in legal proceedings, enforcement actions or claims regarding product performance, product warranty, product certification, product liability, patent infringement, misappropriation of trade secrets, other intellectual property rights, antitrust, environmental regulations, securities, contracts, unfair competition, employment, workplace safety, and other matters. We can provide no assurance of the outcome of these legal proceedings, enforcement actions or claims or that the insurance we maintain will be adequate to cover them.

For example, some of our products, such as certain ultrafast lasers, are used in medical and scientific research applications where malfunctions could result in serious injury. Certain of our products may be hazardous if not operated properly or if defective. Other products of ours, including our chemicals products, are inherently hazardous and must be used with particular care. We are exposed to significant risks for product liability claims in the event of a significant line down situation or if death, personal injury or property damage results from the handling, use or storage of our products, including our chemical products. We may experience material product liability losses in the future. We currently maintain insurance for certain product liability claims. However, our insurance coverage may not continue to be available on acceptable terms, if at all. This insurance coverage also may not adequately cover liabilities that we incur. Further, if our products are defective, we may be required to recall or redesign these products. A successful claim against us that exceeds our insurance coverage level or that is not covered by insurance, or any product recall, could have a material adverse effect on our commercial relationships, business, financial condition and operating results.

In addition, securities class action lawsuits and derivative lawsuits are often brought against companies who have entered into business combinations and acquisitions. We were previously involved in securities class action litigation in connection with the acquisitions of Newport and ESI. In each case, the plaintiffs alleged, among other things, that the then-current directors of the acquired company breached their fiduciary duties to their respective shareholders by agreeing to sell the company through an inadequate and unfair process, leading to inadequate and unfair consideration, by agreeing to unfair deal protection devices, and by omitting material information from the proxy statement. We, or the companies we acquire, may be subject to additional securities class action litigation in connection with other recently completed or future business combinations and acquisitions.

Regardless of the outcome, securities class action litigation such as this can be time-consuming, result in significant expense to us and divert attention and resources of our management and other key employees. Costs and expenses, or an unfavorable outcome in such cases, could exceed applicable insurance coverage, if any. Any such unfavorable outcome could have a material adverse effect on our business, financial condition, operating results and cash flows.

With respect to our intellectual property, we have from time to time received claims from third parties alleging that we are infringing certain trademarks, patents or other intellectual property rights held by them. Such infringement claims have in the past and may in the future result in litigation or enforcement action. Any such action could be protracted and costly, and we could become subject to damages for infringement, or to an injunction preventing us from making, selling or using certain of our products or services, or using certain of our trademarks. Such claims could also result in the necessity of obtaining a license or paying damages relating to one or more of our products, services or current or future technologies, which may not be available on commercially reasonable terms or at all. Any intellectual property action and the failure to obtain necessary licenses or other rights or develop substitute technology may divert management's attention from other matters and could have a material adverse effect on our business, financial condition and operating results. In addition, the terms of some of our customer contracts require us to indemnify the customer for any claim of infringement brought by a third party based on our products. Claims of this kind may have a material adverse effect on our commercial relationships, business, financial condition or operating results.

Although our standard commercial documentation sets forth the terms and conditions that we intend to apply to commercial transactions with our business partners, counterparties to these transactions may not explicitly agree to our terms and conditions. In situations where we engage in business with a third party without an explicit written agreement regarding the applicable terms and conditions, or where the commercial documentation applicable to the transaction is subject to interpretation, we may have disputes with those third parties regarding the applicable terms and conditions of our transaction with them. These disputes could result in deterioration of commercial relationships, costly and time-consuming litigation or additional concessions or obligations being offered by us to resolve these disputes, or could impact our net revenue or cost recognition. Any of these outcomes could materially and adversely affect our business, financial condition and operating results.

In addition, from time to time in the normal course of business we indemnify parties with whom we enter into contractual relationships, including customers, suppliers, consultants and lessors, with respect to certain matters. We have agreed, under certain conditions, to hold these parties harmless against specified losses, such as those arising from a breach of representations or covenants, negligence or willful misconduct, and other third-party claims that our products and/or technologies infringe intellectual property rights. We may be compelled to enter into or accrue for probable settlements of alleged indemnification obligations, or we may be subject to potential liability arising from our customers' involvement in legal disputes. In addition, notwithstanding the provisions related to limitations on our liability that we seek to include in our business agreements, the counterparties to such agreements may dispute our interpretation or application of such provisions, and a court of law may not interpret or apply such provisions in our favor, any of which could result in an obligation for us to pay significant additional damages and engage in costly legal proceedings. It is difficult to determine the maximum potential amount of liability under any indemnification obligations, whether or not asserted, due to the unique facts and circumstances likely to be involved in any particular claim. Our business, financial condition and operating results in a reported fiscal period could be materially and adversely affected if we expend significant amounts in defending or settling any asserted claims, regardless of their merit or outcomes.

Legal proceedings, enforcement actions and claims, whether with or without merit, and associated internal investigations, may be time-consuming and expensive to prosecute, defend or conduct; divert management's attention and other resources; inhibit our ability to sell our products or services; result in adverse judgments for damages, injunctive relief, penalties and fines; and negatively affect our business. We can make no assurances regarding the outcome of current or future legal proceedings, enforcement actions, claims or investigations or that the insurance we maintain will be adequate to cover them.

Risks Related to Cybersecurity, Data Privacy and Intellectual Property Protection

We are exposed to risks related to cybersecurity threats and incidents and subject to restrictions of and changes in laws and regulations governing data privacy and data protection that could have a material adverse effect on our business.

We rely on various information technology networks and systems, some of which are managed by third parties, to process, transmit and store electronic information and to carry out and support a variety of business activities, including finance and accounting, order management, human resources, communications, manufacturing, research and development, intellectual property, supply chain management, sales and IT, including critical functions such as internet connectivity, network communications, and email. Some of these activities are processed via Software-as-a-Service ("SaaS") products provided by third parties and hosted on their own networks and servers, or third-party networks and servers. The data on such various information technology networks and systems includes confidential information, personally identifiable information, transactional information and intellectual property belonging to us and our employees, customers, suppliers and other business partners.

Like other companies, we are subject to ongoing cybersecurity threats, including hacking, phishing, malware, ransomware, denial of service attacks, and other attacks. These threats may be related to employee error or misuse to sophisticated and targeted attempts by bad actors to gain unauthorized access to information systems. We and our third-party vendors have experienced, and expect to continue to be subject to, cybersecurity threats and incidents, including industry-wide vulnerabilities, such as Log4j, which was reported in December 2021. We cannot guarantee that these and other attacks will not have an impact in the future.

Despite the implementation of a variety of security controls and measures, as well as those of our third-party vendors, there is no assurance that such actions will be sufficient to prevent a cybersecurity incident due to attacks by hackers, employee error or malfeasance, computer viruses, malware and ransomware, telecommunication failures, systems failures, natural disasters, or other catastrophic events. We also face the challenge of supporting our older systems and implementing necessary upgrades. Further, as we transition to using more cloud-based solutions that are dependent on the internet or other networks to operate, we may become a greater target for cyber threats. As cyber threats continue to rapidly evolve and become increasingly more difficult to detect and defend against, our current security controls and measures may not be effective in preventing cybersecurity incidents and we may not have the capabilities to detect certain vulnerabilities. These risks may be further amplified by the increased reliance on remote access to IT systems as a result of use of SaaS software and cloud services as well as employees working remotely in response to the COVID-19 pandemic. Additionally, our merger, acquisition and divestiture activity may also require transitions to or from, and the integration of, various information management systems. Those systems that we acquire or that are used by acquired entities or businesses may also pose security risks of which we are unaware or unable to mitigate, particularly during the transition of these systems.

While we continue to assess and address the implications of existing and new domestic and foreign regulations relating to data privacy, the evolving regulatory landscape presents a number of legal and operational challenges, and our efforts to comply with these regulations may be unsuccessful. For example, regulations in the European Union and China have established a prohibition on the transfer of personally identifiable information from their respective countries to other countries whose laws do not protect personal data to an adequate level of privacy or security. While we have utilized certain permitted approaches for transferring personally identifiable information from these countries to the United States, these approaches may be reviewed and invalidated by courts or regulatory bodies and we may be required to ascertain an alternative legal basis for such transfers.

A failure to comply with the ever-changing regulatory landscape, or a breach of our operational or security systems or infrastructure, or those of our customers, suppliers and other business partners, could disrupt our business; result in the disclosure, misuse, corruption or loss of confidential information, including intellectual property, personally identifiable information and other critical data of ours and our employees, customers, suppliers and other business partners; result in competitive disadvantages to the extent the information is competitively sensitive; damage our reputation; affect our relationships with our employees, customers, suppliers and other business partners, including loss of confidence which could lead to loss of or reduction in orders; decrease the value of our investment in research, development and engineering; adversely affect our business operations, including disruption of manufacturing processes; cause losses; result in liability under contracts; result in litigation; result in investigations; require notifications to regulatory authorities and impacted individuals; result in significant penalties and/or fines from regulatory bodies, including privacy laws and export control laws; add to the complexity of our compliance obligations; and increase our cybersecurity protection and remediation costs.

The costs of compliance with, and other burdens imposed by, privacy, cybersecurity, data protection and data localization laws, regulations and policies, including restrictions on marketing activities, could have a material adverse effect on our business, financial condition and operating results. Further, customers and third-party providers increasingly demand rigorous contractual provisions regarding privacy, cybersecurity, data protection, confidentiality, and intellectual property, which may also increase our overall compliance burden.

Although we maintain insurance related to cybersecurity risks, all of these costs, expenses, liability and other matters may not be covered adequately by insurance and may result in an increase in our costs for insurance or insurance not being available to us on economically feasible terms, or at all. Insurers may also deny us coverage as to any future claim. Any of these results could harm our business, financial condition and reputation.

Our proprietary technology is important to the continued success of our business. Our failure to protect this proprietary technology may significantly impair our competitive position.

Our success and ability to compete depend in large part upon protecting our proprietary technology. We rely on a combination of patent, trademark and trade secret protection and other agreements, such as nondisclosure agreements and other contractual agreements with our employees and third parties, to protect our proprietary rights. The steps we have taken may not be sufficient to prevent the misappropriation of our intellectual property, particularly in countries outside the United States, where the laws may not protect our proprietary rights as fully as in the United States. For example, the patent prosecution and enforcement systems within China, where we have a significant customer base and manufacturing presence, both of which have considerably increased following the completion of the Atotech Acquisition, are less robust than these systems in certain other jurisdictions and as a result, we may be limited in our ability to enforce our intellectual property rights there. We may also be at a disadvantage in any enforcement proceeding in China as a foreign entity seeking protection against a Chinese company. Patent and trademark laws and trade secret protection may not be adequate to deter third party infringement or misappropriation of our patents, trademarks, trade secrets and similar proprietary rights. In addition, patents issued to us may be challenged, invalidated or circumvented. The loss or expiration of any of our key patents could lead to a significant loss of sales of certain of our products and could materially affect our future operating results. We have in the past and may in the future be subject to or may initiate interference proceedings or validity challenges in the U.S. Patent and Trademark Office, or similar international agencies, which can demand significant financial and management resources. The process of seeking patent protection can be time consuming and expensive and patents may not be issued from currently pending or future applications. Moreover, our existing patents or any new patents that may be issued may not be sufficient in scope or strength to provide meaningful protection or any commercial advantage to us. We may initiate claims, enforcement actions or litigation against third parties for infringement of our proprietary rights in order to determine the scope and validity of our proprietary rights or the proprietary rights of our competitors, which claims could result in costly litigation, the diversion of our technical and management personnel and the assertion of counterclaims by defendants, including counterclaims asserting invalidity of our patents. We will take such actions where we believe that they are of sufficient strategic or economic importance to us to justify the cost.

Risks Related to Owning Our Common Stock

Our quarterly operating results have fluctuated, and are likely to continue to vary significantly, which may result in volatility in the market price of our common stock.

A substantial portion of our shipments occurs shortly after an order is received, and therefore we generally operate with a relatively low level of backlog. As a result, a decrease in demand for our products from one or more customers could occur with limited advance notice and could have a significant adverse effect on our operating results in any particular period. Further, we often recognize a significant portion of the revenue of certain of our business lines in the last month of each fiscal quarter, due in part to the tendency of some customers to wait until late in a quarter to commit to purchase our products as a result of capital expenditure approvals and budgeting constraints occurring at the end of a quarter, or the hope of obtaining more favorable pricing from a competitor. Thus, variations in timing of sales can cause significant fluctuations in our quarterly sales, gross margin and profitability. In addition, orders expected to ship in one period could shift to another period due to changes in the timing of our customers' purchase

decisions, requests for rescheduled delivery dates, material shortages, manufacturing capacity constraints or logistics delays. Our orders are generally subject to rescheduling without penalty or cancellation without penalty other than reimbursement in certain cases for certain labor and material costs. Our operating results for a particular period may be adversely affected if our customers, particularly our largest customers, cancel or reschedule orders, or if we cannot fill orders in time due to material shortages, capacity constraints or unexpected delays in manufacturing, testing, shipping, delivery or product acceptance. Also, we base our manufacturing plans on our forecasted product mix. If the actual product mix varies significantly from our forecast, we may not be able to fill some orders, which would result in delays in the shipment of our products and could shift sales to a subsequent period. Moreover, a significant percentage of our expenses are fixed and based in part on expectations of net revenues. Our inability to adjust spending quickly enough to compensate for any shortfall would magnify the adverse impact of a shortfall in net revenues on our operating results.

Customers of our high-value, more complex products often require substantial time to qualify our products and make purchase decisions. In addition, some of our sales to defense and security customers are under major defense programs that involve lengthy competitive bidding and qualification processes. These customers often perform, or require us to perform, extensive configuration, testing and evaluation of our products before committing to purchasing them, which can require a significant upfront investment in time and resources. The sales cycle for these products from initial contact through shipment varies significantly, is difficult to predict and can last more than a year. If we fail to anticipate the likelihood of, or the costs or timing associated with, sales of these products, or the cancellation or rescheduling of orders for these products, our business and operating results would be harmed.

Our worldwide sales to customers in the research and defense markets rely to a large extent on government funding for research and defense-related programs. Any decline in government funding as a result of reduced budgets in connection with fiscal austerity measures, revised budget priorities or other causes would likely result in reduced sales of our products that are purchased either directly or indirectly with government funding, which would have an adverse impact on our operating results. Concerns regarding the global availability of credit may also make it more difficult for our customers to raise capital, whether debt or equity, to finance their projects and purchases of capital equipment, which would adversely affect sales of our products and therefore harm our business and operating results.

Market seasonality also causes fluctuations in our operating results. Our Materials Solutions Division generally experiences its strongest revenue in the second half of the fiscal year, mostly driven by consumption trends during the holiday season, and its lowest revenue in the first quarter of the fiscal year, mostly driven by the slowdown in production in China as a result of the Chinese New Year. In addition, we typically experience our strongest revenue in the research market in the fourth quarter of our fiscal year as a result of government spending patterns, and our highest revenue in the electronics manufacturing market in the second half of our fiscal year as a result of consumer spending during the holiday season.

Other factors that could cause fluctuations in our financial results include:

- A worldwide economic slowdown or disruption in the global financial markets;
- Fluctuations in our customers' capital spending, industry cyclicality (particularly in the semiconductor, electronics manufacturing and automotive industries), levels of government funding available to our customers (particularly in the life and health sciences, and research and defense markets) and other economic conditions within the markets we serve;
- The timing of the receipt of orders within a given period;
- Demand for our products and the products sold by our customers;
- Disruption in sources of supply;
- Production capacity constraints;
- Regulatory and trade restrictions in the countries we manufacture and sell our products;
- Specific features requested by customers;
- Natural disasters or other events beyond our control (such as earthquakes, floods or storms, regional economic downturns, pandemics, social unrest, political instability, terrorism, or acts of war);
- The timing of product shipments and revenue recognition within a given quarter;
- Changes in our pricing practices or in the pricing practices of our competitors or suppliers, including as a result of inflationary pressures;
- Our and our competitors' timing in introducing new products;
- Engineering and development investments relating to new product introductions, and significant changes to our manufacturing and outsourcing operations;

- Market acceptance of any new or enhanced versions of our products;
- The timing and level of inventory obsolescence, scrap and warranty expenses;
- The availability, quality and cost of components and raw materials we use to manufacture our products;
- Changes in our effective tax rates;
- Changes in our capital structure, including cash, marketable securities and debt balances, and changes in interest rates;
- Changes in bad debt expense based on the collectability of our accounts receivable;
- The timing, type and size of acquisitions and divestitures, and related expenses and charges;
- Fluctuations in currency exchange rates;
- Our expense levels;
- Impairment of goodwill and amortization of intangible assets; and
- Fees, expenses and settlement costs or judgments against us relating to litigation or regulatory compliance.
- As a result of these factors, among others, we may experience quarterly or annual fluctuations in our operating results, and our operating results for any period may fall below our expectations or the expectations of public market analysts or investors. In any such event, the price of our common stock could fluctuate or decline significantly. Consequently, we believe that quarter-to-quarter and year-to-year comparisons of our operating results, or any other similar period-to-period comparisons, may not be reliable indicators of our future performance.

The future exercise of registration rights may adversely affect the market price of our common stock.

In connection with the Atotech Acquisition, we entered into an agreement (the "Investor Rights Agreement") with Carlyle Partners VI Cayman Holdings L.P., CEP IV Participations S.A.R.L. Sicar and Gamma Holding Company Limited (collectively, the "Carlyle Shareholders") to grant the Carlyle Shareholders certain registration rights with respect to the shares of our common stock they received upon consummation of the Atotech Acquisition (the "Company Shares"). As of the closing of the Atotech Acquisition, the Carlyle Shareholders beneficially own approximately 13% of our outstanding common stock. Pursuant to the Investor Rights Agreement, the Carlyle Shareholders have registration rights for the Company Shares and we filed a resale "shelf" registration statement to register such Company Shares and are obligated to use commercially reasonable efforts to keep such registration statement effective thereafter.

In addition, and alternatively, shares of common stock that are owned by the Carlyle Shareholders will become eligible for sale in the public market to the extent permitted by the provisions of Rule 144 and Rule 701 under the Securities Act of 1933, as amended. If these additional shares of common stock are sold, or if it is perceived that they will be sold, in the public market, the trading price of our common stock could decline.

Sales of a substantial number of shares of our common stock pursuant to the resale registration statement in the public market could occur at any time the registration statement remains effective. In addition, the Carlyle Shareholders can request underwritten offerings to sell their securities. These sales, or the perception in the market that the holders of a large number of shares intend to sell shares, could reduce the market price of our common stock.

The market price of our common stock has fluctuated and may continue to fluctuate for reasons over which we have no control.

The stock market has from time to time experienced, and is likely to continue to experience, extreme price and volume fluctuations. For example, the closing price of our common stock ranged from a high of \$180.69 to a low of \$82.31 between January 1, 2022 and September 30, 2022. Prices of securities of technology companies have been especially volatile and have often fluctuated for reasons that are unrelated to the operating performance of the companies. Historically, the market price of shares of our common stock has fluctuated greatly and could continue to fluctuate due to a variety of factors. In the past, companies that have experienced volatility in the market price of their stock have been the objects of securities class action litigation. If we become the subject of securities class action litigation, it could result in substantial costs and a diversion of our management's attention and resources.

We may not pay dividends on our common stock.

Holders of our common stock are only entitled to receive dividends when and if they are declared by our Board of Directors. Our credit facilities restrict our ability to pay dividends on our capital stock under certain circumstances. Although we have declared cash dividends on our common stock since 2011, and occasionally increased the dividends from prior quarters, we are not required to do so, and we may reduce or eliminate our cash dividend in the future. This could adversely affect the market price of our common stock.

Some provisions of our restated articles of organization, as amended, our amended and restated by-laws and Massachusetts law could discourage potential acquisition proposals and could delay or prevent a change in control.

Anti-takeover provisions could diminish opportunities for stockholders to participate in tender offers, including tender offers at a price above the then-current market price of our common stock. Such provisions may also inhibit increases in the market price of our common stock that could result from takeover attempts. For example, while we have no present plans to issue any preferred stock, our Board of Directors, without further stockholder approval, may issue preferred stock that could have the effect of delaying, deterring or preventing a change in control of us. The issuance of preferred stock could adversely affect the voting power of the holders of our common stock, including the loss of voting control to others. In addition, our amended and restated by-laws provide for a classified Board of Directors consisting of three classes. Our classified board could also have the effect of delaying or deterring a change in control of our Company.

ITEM 6. EXHIBITS.

Exhibit No.	Exhibit Description
+3.1 (1)	Restated Articles of Organization of the Registrant
+3.2 (2)	Articles of Amendment to Restated Articles of Organization of the Registrant, as filed with the Secretary of State of Massachusetts on May 18, 2001
+3.3 (3)	Articles of Amendment to Restated Articles of Organization of the Registrant, as filed with the Secretary of State of Massachusetts on May 16, 2002
+3.4 (4)	Amended and Restated By-Laws of the Registrant
+10.1 (5)	Investor Rights Agreement, dated August 17, 2022, by and among MKS Instruments, Inc. and the Carlyle Stockholders
+10.2 (5)	Credit Agreement, dated as of August 17, 2022, by and among MKS Instruments, Inc., the lenders and letter of credit issuers party thereto and JPMorgan Chase Bank, N.A., as administrative agent and collateral agent
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

- (1) Incorporated by reference to the Registration Statement on Form S-4 (File No. 333-49738), filed with the Securities and Exchange Commission on November 13, 2000.
- (2) Incorporated by reference to the Registrant's Quarterly Report on Form 10-Q for the quarter ended June 30, 2001 (File No. 000-23621), filed with the Securities and Exchange Commission on August 14, 2001.
- (3) Incorporated by reference to the Registrant's Quarterly Report on Form 10-Q for the quarter ended June 30, 2002 (File No. 000-23621), filed with the Securities and Exchange Commission on August 13, 2002.
- (4) Incorporated by reference to the Registrant's Current Report on Form 8-K (File No. 000-23621), filed with the Securities and Exchange Commission on May 6, 2014.
- (5) Incorporated by reference to the Registration Statement on Form 8-K (File No. 000-23621), filed with the Securities and Exchange Commission on August 17, 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: November 7, 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: November 7, 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: November 7, 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 September 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: November 7, 2022

/s/ John T.C. Lee

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

Dated: November 7, 2022

/s/ Seth H. Bagshaw

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