UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 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 28, 2019

OR

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

For the transition period from __________ to __________

Commission file number: 001-32598

Entegris, Inc.
(Exact name of registrant as specified in its charter)

Delaware	**41-1941551**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**
129 Concord Road, Billerica, Massachusetts	**01821**
(Address of principal executive offices)	**(Zip Code)**

(978) 436-6500
(Registrant's telephone number, including area code)

None
(Former name, former address and former fiscal year, if changed since last report)

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, $0.01 par value per share	**ENTG**	**The Nasdaq Stock Market LLC**

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. (Check one):

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

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

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

As of October 21, 2019, there were 134,874,386 shares of the registrant's common stock outstanding.

ENTEGRIS, INC. AND SUBSIDIARIES
FORM 10-Q
TABLE OF CONTENTS
FOR THE QUARTER ENDED SEPTEMBER 28, 2019

Cautionary Statements

This Quarterly Report on Form 10-Q contains “forward-looking statements” within the meaning of the Private Securities Litigation Reform Act of 1995. The words “believe,” “expect,” “anticipate,” “intend,” “estimate,” “forecast,” “project,” “should,” “may,” “will,” “would” or the negative thereof and similar expressions are intended to identify such forward-looking statements. These forward-looking statements may include statements about future period guidance or projections; the Company’s performance relative to its markets; market and technology trends, including the duration and drivers of any growth trends; the development of new products and the success of their introductions; the focus of the Company’s engineering, research and development projects; the Company’s ability to execute on its business strategies; the Company’s capital allocation strategy, which may be modified at any time for any reason, including share repurchases, dividends, debt repayments and potential acquisitions; the effect of the Tax Cuts and Jobs Act; the impact of the acquisitions the Company has made and commercial partnerships the Company has established; future capital and other expenditures, including estimates thereof; the Company’s expected tax rate; the impact, financial or otherwise, of any organizational changes; the impact of accounting pronouncements; quantitative and qualitative disclosures about market risk; and other matters. These forward-looking statements are based on current management expectations and assumptions only as of the date of this Quarterly Report, are not guarantees of future performance and involve substantial risks and uncertainties that are difficult to predict and that could cause actual results to differ materially from the results expressed in, or implied by, these forward-looking statements. These risks and uncertainties include, but are not limited to, weakening of global and/or regional economic conditions, generally or specifically in the semiconductor industry, which could decrease the demand for the Company’s products and solutions; the Company’s ability to meet rapid demand shifts; the Company’s ability to continue technological innovation and introduce new products to meet customers’ rapidly changing requirements; the Company’s concentrated customer base; the Company’s dependence on sole source and limited source suppliers; raw material shortages, supply constraints and price increases; the Company’s ability to identify, effect and integrate acquisitions, joint ventures or other transactions; the Company’s ability to effectively implement any organizational changes; the Company’s ability to protect and enforce intellectual property rights; operational, political and legal risks of the Company’s international operations; the increasing complexity of certain manufacturing processes; changes in governmental regulations of the countries in which the Company operates; fluctuations in currency exchange rates; fluctuations in the market price of the Company’s stock; the level of, and obligations associated with, the Company’s indebtedness; and other risk factors and additional information described in the Company’s filings with the Securities and

Exchange Commission, including under the heading “Risks Factors” in Item 1A of the Company’s Annual Report on Form 10-K for the fiscal year ended December 31, 2018, filed on February 11, 2019, and in the Company’s other periodic filings. Except as required under the federal securities laws and the rules and regulations of the Securities and Exchange Commission, the Company undertakes no obligation to update publicly any forward-looking statements or information contained herein, which speak as of their respective dates.

PART 1. FINANCIAL INFORMATION

Item 1. Financial Statements

ENTEGRIS, INC. AND SUBSIDIARIES
CONDENSED CONSOLIDATED BALANCE SHEETS
(Unaudited)

(In thousands, except share and per share data)	September 28, 2019	December 31, 2018
ASSETS		
Current assets:		
Cash and cash equivalents	$ 282,748	$ 482,062
Trade accounts and notes receivable, net of allowance for doubtful accounts of $1,247 and $893	261,306	222,055
Inventories, net	290,270	268,140
Deferred tax charges and refundable income taxes	21,825	17,393
Other current assets	28,091	39,688
Total current assets	884,240	1,029,338
Property, plant and equipment, net of accumulated depreciation of $510,316 and $461,222	470,005	419,529
Other assets:		
Right-of-use assets	48,684	—
Goodwill	659,840	550,202
Intangible assets, net of accumulated amortization of $392,262 and $343,088	367,558	295,687
Deferred tax assets and other noncurrent tax assets	23,191	10,162
Other	14,166	12,723
Total assets	$ 2,467,684	$ 2,317,641
LIABILITIES AND EQUITY		
Current liabilities:		
Long-term debt, current maturities	$ 4,000	$ 4,000
Accounts payable	73,071	93,055
Accrued payroll and related benefits	58,646	78,288
Other accrued liabilities	74,528	62,732
Income taxes payable	2,835	31,593
Total current liabilities	213,080	269,668
Long-term debt, excluding current maturities, net of unamortized discount and debt issuance costs of $9,920 and $11,137	934,080	934,863
Pension benefit obligations and other liabilities	52,906	31,795
Deferred tax liabilities and other noncurrent tax liabilities	103,326	69,290
Long-term lease liability	44,375	—
Commitments and contingent liabilities	—	—
Equity:		
Preferred stock, par value $.01; 5,000,000 shares authorized; none issued and outstanding as of September 28, 2019 and December 31, 2018	—	—
Common stock, par value $.01; 400,000,000 shares authorized; issued and outstanding shares as of September 28, 2019: 135,141,486 and 134,939,086, respectively; issued and outstanding shares as of December 31, 2018: 136,179,381 and 135,976,981, respectively	1,351	1,362
Treasury stock, at cost: 202,400 shares held as of September 28, 2019 and December 31, 2018	(7,112)	(7,112)
Additional paid-in capital	837,212	837,658
Retained earnings	332,579	213,753
Accumulated other comprehensive loss	(44,113)	(33,636)
Total equity	1,119,917	1,012,025
Total liabilities and equity	$ 2,467,684	$ 2,317,641

See the accompanying notes to condensed consolidated financial statements.

ENTEGRIS, INC. AND SUBSIDIARIES
CONDENSED CONSOLIDATED STATEMENTS OF OPERATIONS
(Unaudited)

	Three months ended		Nine months ended	
(In thousands, except per share data)	September 28, 2019	September 29, 2018	September 28, 2019	September 29, 2018
Net sales	$ 394,147	$ 398,597	$ 1,164,068	$ 1,148,855
Cost of sales	223,797	216,881	650,051	608,764
Gross profit	170,350	181,716	514,017	540,091
Selling, general and administrative expenses	71,232	62,358	217,636	185,827
Engineering, research and development expenses	31,173	29,964	90,788	87,781
Amortization of intangible assets	15,152	21,419	50,400	45,102
Operating income	52,793	67,975	155,193	221,381
Interest expense	11,388	7,987	33,587	24,442
Interest income	(1,172)	(309)	(4,020)	(2,613)
Other expense (income), net	934	810	(121,329)	4,826
Income before income tax expense	41,643	59,487	246,955	194,726
Income tax expense	876	11,427	49,533	34,755
Net income	$ 40,767	$ 48,060	$ 197,422	$ 159,971
Basic net income per common share	$ 0.30	$ 0.34	$ 1.46	$ 1.13
Diluted net income per common share	$ 0.30	$ 0.34	$ 1.45	$ 1.12
Weighted shares outstanding:				
Basic	135,092	141,556	135,256	141,613
Diluted	136,530	143,033	136,601	143,308

See the accompanying notes to condensed consolidated financial statements.

ENTEGRIS, INC. AND SUBSIDIARIES
CONDENSED CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME
(Unaudited)

	Three months ended		Nine months ended	
(In thousands)	September 28, 2019	September 29, 2018	September 28, 2019	September 29, 2018
Net income	$ 40,767	$ 48,060	$ 197,422	$ 159,971
Other comprehensive loss, net of tax				
Foreign currency translation adjustments	(6,005)	(1,432)	(10,504)	(10,223)
Pension liability adjustments	17	17	27	70
Other comprehensive loss	(5,988)	(1,415)	(10,477)	(10,153)
Comprehensive income	$ 34,779	$ 46,645	$ 186,945	$ 149,818

See the accompanying notes to condensed consolidated financial statements.

ENTEGRIS, INC. AND SUBSIDIARIES

CONDENSED CONSOLIDATED STATEMENTS OF EQUITY

(In thousands)	Common shares outstanding	Common stock	Treasury shares	Treasury stock	Additional paid-in capital	Retained earnings (deficit)	Foreign currency translation adjustments	Defined benefit pension adjustments	Total
Balance at December 31, 2017	141,283	$ 1,413	—	$ —	$ 867,699	$ 147,418	$ (22,593)	$ (919)	$ 993,018
Shares issued under stock plans	815	8	—	—	(13,658)	—	—	—	(13,650)
Share-based compensation expense	—	—	—	—	4,128	—	—	—	4,128
Repurchase and retirement of common stock	(296)	(3)	—	—	(1,809)	(8,187)	—	—	(9,999)
Dividends declared ($0.07 per share)	—	—	—	—	13	(9,926)	—	—	(9,913)
Pension liability adjustment	—	—	—	—	—	—	—	4	4
Foreign currency translation	—	—	—	—	—	—	3,835	—	3,835
Cumulative effect of change in accounting principle	—	—	—	—	—	(591)	—	—	(591)
Net income	—	—	—	—	—	57,562	—	—	57,562
Balance at March 31, 2018	141,802	$ 1,418	—	$ —	$ 856,373	$ 186,276	$ (18,758)	$ (915)	$ 1,024,394
Shares issued under stock plans	171	1	—	—	2,263	—	—	—	2,264
Share-based compensation expense	—	—	—	—	4,429	—	—	—	4,429
Repurchase and retirement of common stock	(282)	(2)	—	—	(1,708)	(8,291)	—	—	(10,001)
Dividends declared ($0.07 per share)	—	—	—	—	—	(9,953)	—	—	(9,953)
Pension liability adjustment	—	—	—	—	—	—	—	49	49
Foreign currency translation	—	—	—	—	—	—	(12,626)	—	(12,626)
Net income	—	—	—	—	—	54,349	—	—	54,349
Balance at June 30, 2018	141,691	$ 1,417	—	$ —	$ 861,357	$ 222,381	$ (31,384)	$ (866)	$ 1,052,905
Shares issued under stock plans	11	—		—	(137)	—	—	—	(137)
Share-based compensation expense	—	—	—	—	4,170	—	—	—	4,170
Repurchase of common stock	(95)	(1)	(202)	(7,112)	(581)	(2,306)	—	—	(10,000)
Dividends declared ($0.07 per share)	—	—	—	—	—	(9,912)	—	—	(9,912)
Pension liability adjustment	—	—	—	—	—	—	—	17	17
Foreign currency translation	—	—	—	—	—	—	(1,432)	—	(1,432)
Net income	—	—	—	—	—	48,060	—	—	48,060
Balance at September 29, 2018	141,607	$ 1,416	(202)	$ (7,112)	$ 864,809	$ 258,223	$ (32,816)	$ (849)	$ 1,083,671

(In thousands)	Common shares outstanding	Common stock	Treasury shares	Treasury stock	Additional paid-in capital	Retained earnings (deficit)	Foreign currency translation adjustments	Defined benefit pension adjustments	Total
Balance at December 31, 2018	136,179	$ 1,362	(202)	$ (7,112)	$ 837,658	$ 213,753	$ (32,776)	$ (860)	$ 1,012,025
Shares issued under stock plans	572	5		—	(6,817)	—	—	—	(6,812)
Share-based compensation expense	—	—	—	—	4,653	—	—	—	4,653
Repurchase and retirement of common stock	(1,035)	(10)	—	—	(6,364)	(23,413)	—	—	(29,787)
Dividends declared ($0.07 per share)	—	—	—	—	7	(9,517)	—	—	(9,510)
Pension liability adjustment	—	—	—	—	—	—	—	24	24
Foreign currency translation	—	—	—	—	—	—	(2,787)	—	(2,787)
Net income	—	—	—	—	—	32,658	—	—	32,658
Balance at March 30, 2019	135,716	$ 1,357	(202)	$ (7,112)	$ 829,137	$ 213,481	$ (35,563)	$ (836)	$ 1,000,464
Shares issued under stock plans	49	—		—	(572)	—	—	—	(572)
Share-based compensation expense	—	—	—	—	4,936	—	—	—	4,936
Repurchase and retirement of common stock	(422)	(4)	—	—	(2,579)	(12,417)	—	—	(15,000)
Dividends declared ($0.07 per share)	—	—	—	—	—	(9,550)	—	—	(9,550)
Pension liability adjustment	—	—	—	—	—	—	—	(14)	(14)
Foreign currency translation	—	—	—	—	—	—	(1,712)	—	(1,712)
Net income	—	—	—	—	—	123,997	—	—	123,997
Balance at June 29, 2019	135,343	$ 1,353	(202)	$ (7,112)	$ 830,922	$ 315,511	$ (37,275)	$ (850)	$ 1,102,549
Shares issued under stock plans	156	2		—	3,156	—	—	—	3,158
Share-based compensation expense	—	—	—	—	5,326	—	—	—	5,326
Repurchase and retirement of common stock	(358)	(4)	—	—	(2,206)	(12,790)	—	—	(15,000)
Dividends declared ($0.08 per share)	—	—	—	—	14	(10,909)	—	—	(10,895)
Pension liability adjustment	—	—	—	—	—	—	—	17	17
Foreign currency translation	—	—	—	—	—	—	(6,005)	—	(6,005)
Net income	—	—	—	—	—	40,767	—	—	40,767
Balance at September 28, 2019	135,141	$ 1,351	(202)	$ (7,112)	$ 837,212	$ 332,579	$ (43,280)	$ (833)	$ 1,119,917

See the accompanying notes to condensed consolidated financial statements.

ENTEGRIS, INC. AND SUBSIDIARIES
CONDENSED CONSOLIDATED STATEMENTS OF CASH FLOWS
(Unaudited)

(In thousands)	Nine months ended September 28, 2019	Nine months ended September 29, 2018
Operating activities:		
Net income	$ 197,422	$ 159,971
Adjustments to reconcile net income to net cash provided by operating activities:		
Depreciation	54,623	48,236
Amortization	50,400	45,102
Share-based compensation expense	14,915	12,727
Provision for deferred income taxes	(2,123)	(1,066)
Other	14,251	10,584
Changes in operating assets and liabilities:		
Trade accounts and notes receivable	(30,405)	(8,713)
Inventories	(5,689)	(28,788)
Accounts payable and accrued liabilities	(31,911)	(9,440)
Other current assets	11,284	1,390
Income taxes payable and refundable income taxes	(20,574)	(9,193)
Other	1,461	439
Net cash provided by operating activities	253,654	221,249
Investing activities:		
Acquisition of property, plant and equipment	(86,423)	(75,337)
Acquisition of businesses, net of cash acquired	(266,373)	(380,268)
Other	2,815	5,014
Net cash used in investing activities	(349,981)	(450,591)
Financing activities:		
Payments of long-term debt	(2,000)	(27,000)
Payments for dividends	(29,779)	(29,701)
Issuance of common stock	4,351	3,029
Repurchase of common stock	(65,321)	(30,000)
Taxes paid related to net share settlement of equity awards	(8,577)	(14,552)
Other	(502)	1,254
Net cash used in financing activities	(101,828)	(96,970)
Effect of exchange rate changes on cash and cash equivalents	(1,159)	(4,203)
Decrease in cash and cash equivalents	(199,314)	(330,515)
Cash and cash equivalents at beginning of period	482,062	625,408
Cash and cash equivalents at end of period	$ 282,748	$ 294,893

Supplemental Cash Flow Information

(In thousands)	Nine months ended September 28, 2019	Nine months ended September 29, 2018
Non-cash transactions:		
Deferred acquisition payments	$ 32,462	$ —
Contingent consideration obligation	$ 686	$ —
Equipment purchases in accounts payable	$ 3,431	$ 9,464
Dividends payable	$ 307	$ 77
Schedule of interest and income taxes paid:		
Interest paid	$ 37,366	$ 23,070
Income taxes paid, net of refunds received	$ 66,474	$ 44,249

See the accompanying notes to condensed consolidated financial statements.

ENTEGRIS, INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Unaudited)

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Nature of Operations Entegris, Inc. (“Entegris”, “the Company”, “us”, “we”, or “our”) is a leading global developer, manufacturer and supplier of microcontamination control products, specialty chemicals and advanced materials handling solutions for manufacturing processes in the semiconductor and other high-technology industries.

Principles of Consolidation The condensed consolidated financial statements include the accounts of the Company and its majority-owned subsidiaries. Intercompany profits, transactions and balances have been eliminated in consolidation.

Use of Estimates The preparation of condensed consolidated financial statements in conformity with accounting principles generally accepted in the United States requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, particularly receivables, inventories, property, plant and equipment, right-of-use assets, goodwill, intangibles, accrued expenses, short-term and long-term lease liability, income taxes and related accounts, and disclosure of contingent assets and liabilities at the date of the condensed consolidated financial statements and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates.

Basis of Presentation The condensed consolidated financial statements have been prepared in accordance with accounting principles generally accepted in the United States and contain all adjustments considered necessary, and are of a normal recurring nature, to present fairly the financial position as of September 28, 2019 and December 31, 2018, and the results of operations and comprehensive income for the three and nine months ended September 28, 2019 and September 29, 2018, the equity statements as of and for the three and nine months ended September 28, 2019 and September 29, 2018, and cash flows for the nine months ended September 28, 2019 and September 29, 2018.

The condensed consolidated financial statements and accompanying notes are presented as permitted by Form 10-Q and do not contain certain information included in the Company’s annual consolidated financial statements and notes. The information included in this Form 10-Q should be read in conjunction with Management’s Discussion and Analysis and consolidated financial statements and notes thereto included in the Company’s Form 10-K for the year ended December 31, 2018. The results of operations for the three and nine months ended September 28, 2019 are not necessarily indicative of the results to be expected for the full year.

Leases The Company determines if an arrangement is a lease at inception. Right-of-use (ROU) assets include operating leases. Lease liabilities for operating leases are classified in “Other accrued liabilities” and “Long-term lease liabilities” in our condensed consolidated balance sheet. We do not have material financing leases.

Operating assets and liabilities are recognized at commencement date based on the present value of the lease payments over the lease term. As most of our leases do not provide an implicit rate, we use our incremental borrowing rate based on the information available at commencement date in determining the present value of lease payments. We use the implicit rate when readily determinable. The ROU assets includes prepaid lease payments and excludes lease incentives. Lease terms may include options to extend or terminate the lease when it is reasonably certain that the Company will exercise that option. Lease expense for lease payments is recognized on a straight-line basis over the lease term.

Lease and non-lease components are generally accounted for separately for real estate leases. For non-real estate leases, we account for the lease and non-lease components as a single lease component.

Fair Value of Financial Instruments The carrying value of cash equivalents, accounts receivable, accounts payable, accrued payroll and related benefits, and other accrued liabilities approximates fair value due to the short maturity of those items. The fair value of long-term debt, including current maturities, was $959.1 million at September 28, 2019, compared to the carrying amount of long-term debt, including current maturities, of $938.1 million at September 28, 2019.

Recent Accounting Pronouncements Adopted in 2019 In February 2016, the FASB established Topic 842, *Leases*, by issuing Accounting Standards Update (ASU) No. 2016-02, which requires lessees to recognize leases on-balance sheet and disclose key information about leasing arrangements. Topic 842 was subsequently amended by ASU No. 2018-01, Land Easement Practical Expedient for Transition to Topic 842; ASU No. 2018-10, Codification Improvements to Topic 842, Leases; and ASU No. 2018-11, Targeted Improvements. The new standard establishes a right-of-use (ROU) model that requires a lessee to recognize a ROU asset and lease liability on the balance sheet for all leases with a term longer than 12 months. Leases will be classified as finance or operating, with classification affecting the pattern and expense recognition in the income statement.

The Company adopted ASU No. 2016-02 using the modified retrospective method. See Note 9 Leases to the condensed consolidated financial statements for further details.

2. REVENUES

Revenue Recognition Revenue is measured based on consideration specified in a contract with a customer, and excludes any sales incentives and amounts collected on behalf of third parties. The Company recognizes revenue when it satisfies a performance obligation by transferring control over a product or service to a customer.

Taxes assessed by a governmental authority that are both imposed on and concurrent with a specific revenue-producing transaction, that are collected by the Company from a customer, are excluded from revenue.

Shipping and handling costs associated with outbound freight after control over a product has transferred to a customer are accounted for as a fulfillment cost and are included in cost of goods sold.

The Company recognizes the incremental costs of obtaining contracts as an expense when incurred if the amortization period of the assets that the Company otherwise would have recognized is one year or less.

When the Company receives consideration, or such consideration is unconditionally due, from a customer prior to transferring goods or services to the customer under the terms of a sales contract, the Company records deferred revenue, which represents a contract liability. Such deferred revenue typically results from advance payments received on sales of the Company's products. The Company makes the required disclosures below.

The Company does not disclose information about remaining performance obligations that have original expected durations of one year or less.

Nature of goods and services The following is a description of principal activities from which the Company generates its revenues. The Company has three reportable segments. For more detailed information about reportable segments, see note 10 to the condensed consolidated financial statements. For each of the three reportable segments, the recognition of revenue regarding the nature of goods and services provided by the segments are similar and described below. The Company recognizes revenue for product sales at a point in time following the transfer of control of such products to the customer, which generally occurs upon shipment or delivery, depending on the terms of the underlying contracts. For product sales contracts that contain multiple performance obligations, the Company allocates the transaction price to each performance obligation identified in the contract based on relative standalone selling prices, or estimates of such prices, and recognizes the related revenue as control of each individual product is transferred to the customer, in satisfaction of the corresponding performance obligations.

The Company generally recognizes revenue for sales of services when the Company has satisfied the performance obligation.

The Company also enters into arrangements to license its intellectual property. These arrangements typically permit the customer to use a specialized manufacturing process and in return the Company receives a royalty fee. If applicable, the Company recognizes revenue when the subsequent sale or usage occurs.

The Company offers certain customers cash discounts and volume rebates as sales incentives. The discounts and volume rebates are recorded as a reduction in sales at the time revenue is recognized in an amount estimated based on historical experience and contractual obligations. The Company periodically reviews the assumptions underlying its estimates of discounts and volume rebates and adjusts its revenues accordingly.

In addition, the Company offers free product rebates to certain customers. The Company utilizes an adjusted market approach to estimate the stand-alone selling price of the loyalty program and allocates a portion of the consideration received to the free product offering. The free product offering is redeemable upon future purchases of the Company's products. The amount associated with free product rebates is deferred in the balance sheet and is recognized as revenue when the free product is redeemed or when the likelihood of redemption is remote. The Company deems the amount immaterial for disclosure.

The Company provides for the estimated costs of fulfilling our obligations under product warranties at the time the related revenue is recognized. The Company estimates the costs based on historical failure rates, projected repair costs, and knowledge of specific product failures (if any). The specific warranty terms and conditions vary depending upon the product sold and the country in which we do business, but generally include parts and labor over a period generally ranging from 90 days to one year. The Company regularly reevaluates its estimates to assess the adequacy of the recorded warranty liabilities and adjust the amounts as necessary.

The Company's contracts are generally short-term in nature. Most contracts do not exceed twelve months. Payment terms vary by the type and location of the Company's customers and the products or services offered. The term between invoicing and when payment is due is not significant. For certain products or services and customer types, the Company requires payment before the products or services are delivered to the customer. Those customers that prepay are represented by the contract liabilities below until the performance obligations are satisfied.

The following table provides information about contract liabilities from contracts with customers. The contract liabilities are included in other accrued liabilities balance in the condensed consolidated balance sheet.

(In thousands)	September 28, 2019	December 31, 2018
Contract liabilities - current	$ 10,734	$ 15,364

Significant changes in the contract liabilities balances during the period are as follows:

(In thousands)	Nine months ended September 28, 2019
Revenue recognized that was included in the contract liability balance at the beginning of the period	$ (14,565)
Increases due to cash received, excluding amounts recognized as revenue during the period	9,936

3. ACQUISITIONS

Hangzhou Anow Microfiltration Co., Ltd.

On September 17, 2019, the Company acquired Hangzhou Anow Microfiltration Co., Ltd. (Anow), a filtration company for diverse industries including semiconductor, pharmaceutical, and medical. Anow reports into the Microcontamination Control division of the Company. The acquisition was accounted for under the acquisition method of accounting and the results of Anow are included in the Company's condensed consolidated financial statements as of and since September 17, 2019. Costs associated with the acquisition of Anow were $2.0 million and $2.3 million for the three and nine months ended September 28, 2019, respectively, and were expensed as incurred. These costs are included in selling, general and administrative expenses in the Company's condensed consolidated statement of operations. The acquisition does not constitute a material business combination.

The purchase price for Anow is $73.0 million, net of cash acquired. The purchase price includes (1) cash consideration of $62.8 million, or $59.1 million net of cash acquired (subject to revision for certain adjustments), which was funded from the Company's existing cash on hand, (2) deferred payments due to the seller of $10.2 million that are due within one year, and (3) $3.7 million deferred payments due to the seller at the earliest date of September 18, 2021.

The purchase price of Anow exceeds the net of the acquisition-date amounts of the identifiable assets acquired and the liabilities assumed by $25.2 million. Cash flows used to determine the purchase price included strategic and synergistic benefits (investment value) specific to the Company, which resulted in a purchase price in excess of the fair value of identifiable net assets. This additional investment value resulted in goodwill, which is expected to be non-deductible for income tax purposes.

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

(In thousands):	As of September 17, 2019
Trade accounts and note receivable, net	$ 3,455
Inventories, net	4,242
Other current assets	202
Property, plant and equipment	8,863
Identifiable intangible assets	42,179
Other noncurrent assets	1,565
Accounts payable and accrued liabilities	(1,814)
Noncurrent deferred tax liabilities	(10,890)
Net assets acquired	47,802
Goodwill	25,212
Total purchase price, net of cash acquired	$ 73,014

The Company recognized the following finite-lived intangible assets as part of the acquisition of Anow:

(In thousands)	Amount	Weighted average life in years
Developed technology	$ 2,430	10.0
Trademarks and trade names	2,598	10.0
Customer relationships	36,449	20.0
Other	702	3.0
	$ 42,179	19.0

The final valuation of assets acquired and liabilities assumed is expected to be completed as soon as possible, but not later than one year from the acquisition date. Given the size and complexity of the acquisition, the valuation of certain assets and liabilities is still being completed and is subject to final review. To the extent that the Company's estimates require adjustment, the Company will modify the values.

MPD Chemicals

On July 15, 2019, the Company acquired MPD Chemicals (MPD), a provider of advanced materials to the specialty chemical, technology, and life sciences industries. MPD reports into the Specialty Chemicals and Engineered Material division of the Company. The acquisition was accounted for under the acquisition method of accounting and the results of MPD are included in the Company's condensed consolidated financial statements as of and since July 15, 2019. Costs associated with the acquisition of MPD were $2.9 million and $4.0 million for the three and nine months ended September 28, 2019, respectively, and were expensed as incurred. These costs are included in selling, general and administrative expense in the Company's condensed consolidated statement of operations. The acquisition does not constitute a material business combination.

The purchase price for MPD is $162.4 million, net of cash acquired. The purchase price includes (1) cash consideration of $157.9 million (subject to revision for customary working capital adjustments), which was funded from the Company's existing cash on hand, and (2) a fixed deferred payment of $5.0 million that is due on January 15, 2022, recorded at $4.5 million, which represents the fair value of this fixed deferred payment as of the acquisition date.

The fair value of the fixed deferred payment was determined by taking the present value of this fixed deferred payment based on the term and a discount factor. The fixed deferred payment is reflected in pension benefit obligations and other liabilities in the Company's condensed consolidated balance sheets.

The purchase price of MPD exceeds the net of the acquisition-date amounts of the identifiable assets acquired and the liabilities assumed by $51.5 million. Cash flows used to determine the purchase price included strategic and synergistic benefits (investment value) specific to the Company, which resulted in a purchase price in excess of the fair value of identifiable net assets. This additional investment value resulted in goodwill, which is expected to be deductible for income tax purposes.

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

(In thousands):	As of July 15, 2019
Trade accounts and note receivable, net	$ 3,575
Inventories, net	21,899
Other current assets	318
Property, plant and equipment	14,571
Identifiable intangible assets	74,900
Right-of-use assets	3,677
Accounts payable and accrued liabilities	(2,440)
Short-term lease liabilities	(144)
Long-term lease liabilities	(4,016)
Other noncurrent liabilities	(1,416)
Net assets acquired	110,924
Goodwill	51,457
Total purchase price, net of cash acquired	$ 162,381

The Company recognized the following finite-lived intangible assets as part of the acquisition of MPD:

(In thousands)		Amount	Weighted average life in years
Developed technology	$	13,520	12.0
Trademarks and trade names		680	2.0
Customer relationships		60,700	17.0
	$	74,900	16.0

The final valuation of assets acquired and liabilities assumed is expected to be completed as soon as possible, but not later than one year from the acquisition date. Given the size and complexity of the acquisition, the valuation of certain assets and liabilities is still being completed and is subject to final review. To the extent that the Company's estimates require adjustment, the Company will modify the values.

Digital Specialty Chemicals

On March 8, 2019, the Company acquired Digital Specialty Chemicals Limited (DSC), a Toronto, Canada-based provider of advanced materials to the specialty chemical, technology, and pharmaceutical industries. DSC reports into the Specialty Chemicals and Engineered Materials division of the Company. The acquisition was accounted for under the acquisition method of accounting and the results of operations of DSC are included in the Company's condensed consolidated financial statements as of and since March 8, 2019. Costs associated with the acquisition of DSC were $2.1 million for the nine months ended September 28, 2019 and were expensed as incurred. These costs are included in selling, general and administrative expense in the Company's condensed consolidated statements of operations. The acquisition does not constitute a material business combination.

The purchase price for DSC is $64.1 million, net of cash acquired. The purchase price includes (1) cash consideration of $49.9 million, or $49.4 million net of cash acquired, which was funded from the Company's existing cash on hand, (2) a fixed deferred payment of $16.1 million that is due on March 31, 2022, recorded at $14.0 million representing the fair value of this fixed deferred payment as of the acquisition date, and (3) an earnout-based contingent consideration of $0.7 million based on the operating performance of DSC for a twelve-month period ended March 31, 2021.

The fair value of the fixed deferred payment was determined by taking the present value of this fixed deferred payment based on the term and a discount factor. The fixed deferred payment is reflected in pension benefit obligations and other liabilities in the Company's condensed consolidated balance sheets.

Upon closing the acquisition, the Company recorded a contingent consideration obligation of $0.7 million, which represents the fair value of the earnout-based contingent consideration. This amount was estimated based on a Black Scholes model. Subsequent changes in the fair value of this obligation will be recognized as adjustments to the contingent consideration obligation and reflected within the Company's condensed consolidated statements of operations.

The purchase price of DSC exceeds the net of the acquisition-date amounts of the identifiable assets acquired and the liabilities assumed by $36.5 million. Cash flows used to determine the purchase price included strategic and synergistic benefits (investment value) specific to the Company, which resulted in a purchase price in excess of the fair value of identifiable net assets. This additional investment value resulted in goodwill, which is expected to be non-deductible for income tax purposes.

The following table summarizes the provisional allocation of the purchase price to the fair values assigned to the assets acquired and liabilities assumed at the date of the acquisition and as adjusted as of September 28, 2019:

(In thousands):	As of March 8, 2019	As of September 28, 2019
Trade accounts and note receivable, net	$ 1,840	$ 1,840
Inventories, net	5,523	4,307
Other current assets	1,389	1,389
Property, plant and equipment	16,791	16,654
Identifiable intangible assets	7,976	6,870
Right-of-use assets	79	79
Deferred tax asset	1,104	996
Other noncurrent assets	—	28
Accounts payable and accrued liabilities	(2,461)	(2,474)
Deferred tax liabilities	(2,861)	(2,070)
Long-term lease liability	(37)	(37)
Net assets acquired	29,343	27,582
Goodwill	35,133	36,539
Total purchase price, net of cash acquired	$ 64,476	$ 64,121

The allocation of the purchase price to the assets acquired and liabilities assumed is complete with the exception of the value allocated to income tax accounts. To the extent that the Company's estimates require adjustment, the Company will modify the values.

Flex Concepts

On June 26, 2018, the Company acquired Flex Concepts, Inc. (Flex), a technology company focused on single-use fluid handling bags, tubing manifolds and hardware for the life sciences industry. Flex reports into the AMH division of the Company.The purchase price of Flex was for cash consideration of $1.9 million. The transaction was accounted for under the acquisition method of accounting and the results of operations of Flex are included in the Company's condensed consolidated financial statements since June 26, 2018. The acquisition does not constitute a material business combination.

During the year ended December 31, 2018, the Company finalized its fair value determinations of the assets acquired and liabilities assumed. The valuation of the assets acquired and liabilities assumed was 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.

SAES Pure Gas

On June 25, 2018, the Company acquired the SAES Pure Gas business (SPG) from SAES Getters S.p.A. for approximately $352.7 million in cash, or $341.5 million net of cash acquired, funded from the Company's existing cash on hand. The acquisition was accounted for under the acquisition method of accounting and the results of operations of SPG are included in the Company's condensed consolidated financial statements as of and since June 25, 2018. Direct costs of $4.8 million associated with the acquisition of SPG, consisting mainly of professional and consulting fees, were expensed as incurred for the year ended December 31, 2018. These costs are included in selling, general and administrative expense in the Company's condensed consolidated statements of operations.

SPG, based in San Luis Obispo, California, is a leading provider of high-capacity gas purification systems used in semiconductor manufacturing and adjacent markets, and reports into the Microcontamination Control Division of the Company. This acquisition expands the gas purification solutions portfolio in our Microcontamination Control Division with high-capacity products suited for bulk chemical purification applications.

The following table summarizes the final allocation of the purchase price to the fair values assigned to the assets acquired and liabilities assumed at December 31, 2018 and as adjusted as of June 29, 2019:

(In thousands):	As of December 31, 2018	As of June 29, 2019
Trade accounts and note receivable, net	$ 19,173	$ 19,173
Inventories, net	42,758	42,758
Other current assets	1,322	706
Property, plant and equipment	6,653	6,653
Identifiable intangible assets	150,430	150,430
Deferred tax assets	831	734
Other noncurrent assets	12	12
Current liabilities	(26,473)	(26,473)
Deferred tax liabilities	(35,533)	(35,271)
Other noncurrent liabilities	(1,412)	(1,412)
Net assets acquired	157,761	157,310
Goodwill	183,729	184,180
Total purchase price, net of cash acquired	$ 341,490	$ 341,490

The fair value of acquired inventories of $42.8 million is valued at the estimated selling price less cost of disposal and reasonable profit for the selling effort. The fair value write-up of acquired work-in-process and finished goods inventory was $8.9 million, the amount of which was amortized over the expected turn of the acquired inventory. Accordingly, $0.0 million and $2.0 million incremental cost of sales charge associated with the fair value write-up of inventory acquired in the acquisition of SPG was recorded for the three and six months ended June 29, 2019, respectively.

The fair value of acquired property, plant and equipment of $6.7 million is valued at its value-in-use.

The Company recognized the following finite-lived intangible assets as part of the acquisition of SPG:

(In thousands)	Amount	Weighted average life in years
Developed technology	$ 20,070	8.0
Trademarks and trade names	6,670	12.0
Customer relationships	107,790	12.0
Other	15,900	0.9
	$ 150,430	10.0

The acquired identifiable intangible assets are being amortized on a straight-line basis. The fair value of acquired identifiable intangible assets was determined using the “income approach”. In performing these valuations, the key underlying probability-adjusted assumptions of the discounted cash flows were projected revenues, gross margin expectations and operating cost estimates. The valuations were based on the information that was available as of the acquisition date and the expectations and assumptions that have been deemed reasonable by the Company’s management. There are inherent uncertainties and management judgment required in these determinations. The fair value measurements of the assets acquired and liabilities assumed were based on valuations involving significant unobservable inputs, or Level 3 inputs in the fair value hierarchy.

The purchase price of SPG exceeded the net of the acquisition-date amounts of the identifiable assets acquired and the liabilities assumed by $184.2 million. Cash flows used to determine the purchase price included strategic and synergistic benefits (investment value) specific to the Company, which resulted in a purchase price in excess of the fair value of identifiable net assets. The purchase price also included the fair values of other assets that were not identifiable, not separately recognizable under accounting rules (e.g., assembled workforce) or of immaterial value in addition to a going-concern element that represents the Company’s ability to earn a higher rate of return on the group of assets than would be expected on the separate assets as determined during the valuation process. This additional investment value resulted in goodwill. No amount of goodwill is expected to be deductible for income tax purposes.

During the quarter ended June 29, 2019, the Company finalized its fair value determination of the assets acquired and liabilities assumed. The valuation of the assets acquired and liabilities assumed was based on the information that was available as of the acquisitions date, and the expectations and assumptions that have been deemed reasonable by the Company’s management.

Particle Sizing Systems

On January 22, 2018, the Company acquired Particle Sizing Systems, LLC (PSS), which provides particle sizing instrumentation for liquid applications to the semiconductor and life science industries. The acquired assets and assumed liabilities became part of the Company’s Advanced Materials Handling (AMH) segment. The transaction was accounted for under the acquisition method of accounting and the results of operations of PSS are included in the Company's condensed consolidated financial statements since January 22, 2018. The acquisition does not constitute a material business combination.

The purchase price for PSS was cash consideration of $37.3 million, funded from the Company's existing cash on hand. Costs associated with the acquisition of the product line were not significant and were expensed as incurred.

The purchase price of PSS exceeds the net of the acquisition-date amounts of the identifiable assets acquired and the liabilities assumed by $8.8 million. Cash flows used to determine the purchase price included strategic and synergistic benefits (investment value) specific to the Company, which resulted in a purchase price in excess of the fair value of identifiable net assets. This additional investment value resulted in goodwill, which is expected to be deductible for income tax purposes.

During the year ended December 31, 2018, the Company finalized its fair value determinations of the assets acquired and liabilities assumed. The valuation of the assets acquired and liabilities assumed was 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.

4. INVENTORIES

Inventories consist of the following:

(In thousands)	September 28, 2019	December 31, 2018
Raw materials	$ 94,522	$ 100,770
Work-in process	34,851	31,412
Finished goods	160,897	135,958
Total inventories, net	$ 290,270	$ 268,140

5. GOODWILL AND INTANGIBLE ASSETS

Goodwill activity for each period was as follows:

(In thousands)	Specialty Chemicals and Engineered Materials	Microcontamination Control	Advanced Materials Handling	Total
December 31, 2018	$ 301,423	191,708	$ 57,071	$ 550,202
Addition due to acquisitions	86,590	25,214	—	111,804
Purchase accounting adjustments	1,406	451	—	1,857
Foreign currency translation	(3,749)	(274)	—	(4,023)
September 28, 2019	$ 385,670	$ 217,099	$ 57,071	$ 659,840

Identifiable intangible assets at September 28, 2019 and December 31, 2018 consist of the following:

	September 28, 2019		
(In thousands)	Gross carrying Amount	Accumulated amortization	Net carrying value
Developed technology	$ 268,593	$ 197,176	$ 71,417
Trademarks and trade names	28,856	15,767	13,089
Customer relationships	425,371	152,937	272,434
Other	37,000	26,382	10,618
	$ 759,820	$ 392,262	$ 367,558

(In thousands)	December 31, 2018 Gross carrying amount	Accumulated amortization	Net carrying value
Developed technology	$ 248,776	$ 176,421	$ 72,355
Trademarks and trade names	25,643	14,749	10,894
Customer relationships	328,050	133,068	194,982
Other	36,306	18,850	17,456
	$ 638,775	$ 343,088	$ 295,687

Future amortization expense during the remainder of 2019, the next four years and thereafter relating to intangible assets currently recorded in the Company's condensed consolidated balance sheets is estimated at September 28, 2019 to be the following:

(In thousands)	Remaining 2019	2020	2021	2022	2023	Thereafter	Total
Future amortization expense	$ 16,016	50,731	41,587	40,997	39,005	179,222	$ 367,558

6. INCOME TAX

The Company recorded income tax expense of $0.9 million and $49.5 million, respectively, in the three and nine months ended September 28, 2019, compared to income tax expense of $11.4 million and $34.8 million, respectively in the three and nine months ended September 29, 2018. The Company's year-to-date effective tax rate was 20.1% in 2019, compared to 17.8% in 2018.

The increase in the effective tax rate from 2018 to 2019 primarily relates to a discrete charge of $9.4 million in the second quarter of 2019 related to the reversal of a dividend received deduction benefit recorded in 2018. This discrete charge was recorded as a result of the issuance of final regulations during the second quarter. The discrete charge was partially offset by a benefit of $5.3 million recorded in the third quarter based on the filing of the federal tax return. Additionally, in the second quarter of 2019, the Company received a termination fee from Versum Materials, Inc. ("Versum") based on the termination of the merger agreement with Versum and recorded a discrete charge of $23.5 million related to the termination fee, net of associated expenses. As a result of the termination fee, the Company released a valuation allowance on federal capital loss carryforwards and recorded a discrete benefit of $2.9 million. The year-to-date income tax expense in 2019 and 2018 includes discrete benefits of $3.3 million and $6.1 million, respectively, recorded in connection with share-based compensation.

7. EARNINGS PER COMMON SHARE

The following table presents a reconciliation of the denominators used in the computation of basic and diluted earnings per common share (EPS):

	Three months ended		Nine months ended	
(In thousands)	September 28, 2019	September 29, 2018	September 28, 2019	September 29, 2018
Basic—weighted common shares outstanding	135,092	141,556	135,256	141,613
Weighted common shares assumed upon exercise of stock options and vesting of restricted common stock	1,438	1,477	1,345	1,695
Diluted—weighted common shares and common shares equivalent outstanding	136,530	143,033	136,601	143,308

The Company excluded the following shares underlying stock-based awards from the calculations of diluted EPS because their inclusion would have been anti-dilutive for the three and nine months ended September 28, 2019 and September 29, 2018:

	Three months ended		Nine months ended	
(In thousands)	September 28, 2019	September 29, 2018	September 28, 2019	September 29, 2018
Shares excluded from calculations of diluted EPS	6	295	261	253

8. OTHER EXPENSE (INCOME), NET

Other expense (income), net for the three and nine months ended September 28, 2019 and September 29, 2018 consists of the following:

	Three months ended		Nine months ended	
(In thousands)	September 28, 2019	September 29, 2018	September 28, 2019	September 29, 2018
Versum termination fee, net	$ —	$ —	$ (122,000)	$ —
Loss (gain) on foreign currency remeasurement	701	695	(222)	3,637
Other, net	233	115	893	1,189
Other expense (income), net	$ 934	$ 810	$ (121,329)	$ 4,826

Versum termination fee, net
On January 28, 2019, the Company and Versum announced that they had entered into an Agreement and Plan of Merger, dated as of January 27, 2019 (the "Merger Agreement"), pursuant to which they agreed to combine in a merger of equals. On April 8, 2019, Versum announced that its Board of Directors had received a proposal from Merck KGaA to acquire Versum and that its Board of Directors had deemed such proposal as a "Superior Proposal" defined in the merger agreement. On April 12, 2019, the Company received a termination notice from Versum terminating the Merger Agreement. In accordance with the terms of the Merger Agreement, Entegris received a $140.0 million termination fee from Versum in the second quarter of 2019. Also in the second quarter of 2019, the Company paid a fee of $18.0 million to the third-party financial adviser it had engaged to assist with the transaction.

9. LEASES

Adoption of ASC ASU No. 2016-02, *Leases* On January 1, 2019, the Company adopted ASU No. 2016-02 using the modified retrospective method applied to existing leases in place as of January 1, 2019. Leases entered into after January 1, 2019 are presented under the provisions of ASU No. 2016-02, while prior periods are not adjusted and continue to be reported in accordance with previous accounting guidance. Leases commencing or renewing after the adoption date are evaluated based on the guidance in ASU No. 2016-02 and may result in more finance leases being recognized even for the renewal of previously classified operating leases.

The Company elected to adopt the 'package of practical expedients', which permitted the Company not to reassess under the new standard our prior conclusions about lease identification, lease classification and initial direct costs. The Company also elected the practical expedient pertaining to land easements, which allowed the Company to exclude evaluation of all existing land easements in connection with the adoption of the new lease requirements to assess whether they meet the definition of a lease. The Company did not elect the use-of-hindsight practical expedient and therefore did not reassess the lease terms for purposes of calculation of the lease liabilities and right-of-use assets at the adoption date. The Company elected the short-term lease recognition exemption for all leases that qualified. This means, for those leases that qualified, the Company did not recognize right-of-use assets or lease liabilities, and this included not recognizing right-of-use assets or lease liabilities for existing short-term leases of those assets in transition. The Company also elected the practical expedient to not separate lease and non-lease components for all leases other than leases of real estate, and this included not separating lease and non-lease components for all leases other than leases of real estate in transition.

The Company adopted ASU 2016-02 using the modified retrospective method, recognizing the cumulative effect of application as an adjustment to the opening balance sheet. The standard had a material impact on our condensed consolidated balance sheets, but did not have a material impact on our condensed consolidated statement of income or cash flows. The most significant impact was the recognition of the right-of-use asset and lease liabilities for operating leases. As of September 28, 2019, we do not have any material finance leases.

The details of the impact of the changes made to the Company's condensed consolidated balance sheet date as of January 1, 2019, the date of adoption, are reflected in the following table.

(*In thousands*)		Debit/(Credit)
Right-of-use assets	$	46,162
Prepaid rent		(646)
Short-term lease liability		(8,892)
Short-term deferred rent		274
Long-term lease liability		(42,639)
Long-term deferred rent		5,741
Deferred tax asset		11,629
Deferred tax liability		(11,629)

Leases As of September 28, 2019, the Company was obligated under operating lease agreements for certain sales offices and manufacturing facilities, manufacturing equipment, vehicles, information technology equipment and warehouse space. Our leases have remaining lease terms of 1 year to 14 years, some of which may include options to extend the lease for up to 6 years, and some of which may include options to terminate the leases within 1 year. For the nine months ended September 28, 2019, the Company has obtained $5.8 million of operating lease assets in exchange for lease obligations.

As of September 28, 2019, the Company's operating lease components with initial or remaining terms in excess of one year were classified on the condensed consolidated balance sheet as follows:

(*In thousands*)	Classification		September 28, 2019
Assets			
Right-of-use assets	Right-of-use assets	$	48,684
Liabilities			
Short-term lease liability	Other accrued liabilities		8,775
Long-term lease liability	Long-term lease liability		44,375
Total lease liabilities		$	53,150

Expense for leases less than 12 months for the three and nine months ended September 28, 2019 were not material. The components of lease expense for the three and nine months ended September 28, 2019 are as follows:

(*In thousands*)		Three months ended September 28, 2019		Nine months ended September 28, 2019
Operating lease cost	$	3,334	$	9,146

The Company combines the amortization of the ROU assets and the change in the operating lease liability in the same line item in the Statement of Cash Flows. Other information related to the Company's operating leases was as follows:

(*In thousands*)		September 28, 2019
Cash paid for amounts included in the measurement of lease liabilities:		
Operating cash flows from leases	$	8,107
Lease Term and Discount Rate		
Weighted average remaining lease term (years)		8.78
Weighted average discount rate		5.17%

Future minimum lease payments for noncancellable operating leases as of September 28, 2019, were as follows:

(In thousands)	Operating Leases
Remaining 2019	$ 3,074
2020	10,679
2021	8,721
2022	6,846
2023	6,140
Thereafter	32,052
Total	$ 67,512
Less: Interest	14,362
Present value of lease liabilities	$ 53,150

Future minimum lease payments for noncancellable operating leases as of December 31, 2018, were as follows:

(In thousands)	Operating Leases
2019	$ 11,360
2020	8,906
2021	6,836
2022	5,431
2023	5,208
Thereafter	27,153
Total	$ 64,894

10. SEGMENT REPORTING

The Company’s financial segment reporting reflects an organizational alignment intended to leverage the Company’s unique portfolio of capabilities to create value for its customers by developing mission-critical solutions to maximize manufacturing yields and enable higher performance of devices. While these segments have separate products and technical know-how, they share common business systems and processes, technology centers, and strategic and technology roadmaps. The Company leverages its expertise from these three segments to create new and increasingly integrated solutions for its customers. The Company’s business is reported in the following segments:

- **Specialty Chemicals and Engineered Materials (SCEM):** SCEM provides high-performance and high-purity process chemistries, gases, and materials and safe and efficient delivery systems to support semiconductor and other advanced manufacturing processes.
- **Microcontamination Control (MC):** MC solutions to filter and purify critical liquid chemistries and gases used in semiconductor manufacturing processes and other high-technology industries.
- **Advanced Materials Handling (AMH):** AMH develops solutions to monitor, protect, transport, and deliver critical liquid chemistries, wafers, and substrates for a broad set of applications in the semiconductor industry and other high-technology industries.

In the first quarter of 2019, the Company changed its definition of segment profit to include inter-segment sales. The Company updated its recognition of inter-segment sales to recognize the revenue and profit associated with products and components produced in one segment and supplied to another, before being sold to the ultimate end customer. The Company accounts for inter-segment sales and transfers as if the sales or transfers were to third parties, that is, at approximate market prices. Inter-segment sales are presented as an elimination below. Segment profit is defined as net sales less direct and indirect segment operating expenses, including certain general and administrative costs for the Company’s human resources, finance and information technology functions. The remaining unallocated expenses consist mainly of the Company’s corporate functions as well as interest expense, amortization of intangible assets and income tax expense. Prior quarter information has been recast to reflect the change in the Company’s definition of segment profit.

Summarized financial information for the Company’s reportable segments is shown in the following tables.

(In thousands)	Three months ended September 28, 2019	Three months ended September 29, 2018	Nine months ended September 28, 2019	Nine months ended September 29, 2018
Net sales				
SCEM	$ 127,750	$ 131,234	$ 379,772	$ 396,313
MC	155,979	151,478	463,870	395,338
AMH	117,256	123,227	340,835	377,877
Inter-segment elimination	(6,838)	(7,342)	(20,409)	(20,673)
Total net sales	$ 394,147	$ 398,597	$ 1,164,068	$ 1,148,855

(In thousands)	Three months ended September 28, 2019	Three months ended September 29, 2018	Nine months ended September 28, 2019	Nine months ended September 29, 2018
Segment profit				
SCEM	$ 17,074	$ 31,210	$ 65,505	$ 98,859
MC	46,792	42,448	137,241	119,973
AMH	17,077	22,226	54,487	73,231
Total segment profit	$ 80,943	$ 95,884	$ 257,233	$ 292,063

The following table reconciles total segment profit to income before income taxes:

(In thousands)	Three months ended September 28, 2019	Three months ended September 29, 2018	Nine months ended September 28, 2019	Nine months ended September 29, 2018
Total segment profit	$ 80,943	$ 95,884	$ 257,233	$ 292,063
Less:				
Amortization of intangible assets	15,152	21,419	50,400	45,102
Unallocated general and administrative expenses	12,998	6,490	51,640	25,580
Operating income	52,793	67,975	155,193	221,381
Interest expense	11,388	7,987	33,587	24,442
Interest income	(1,172)	(309)	(4,020)	(2,613)
Other expense (income), net	934	810	(121,329)	4,826
Income before income tax expense	$ 41,643	$ 59,487	$ 246,955	$ 194,726

In the following tables, revenue is disaggregated by country or region for the three and nine months ended September 28, 2019 and September 29, 2018, respectively.

	Three months ended September 28, 2019					Nine months ended September 28, 2019				
(In thousands)	SCEM	MC	AMH	Inter-segment	Total	SCEM	MC	AMH	Inter-segment	Total
Taiwan	$ 23,186	$ 32,521	$ 19,164	$ —	$ 74,871	$ 69,943	$ 102,216	$ 50,027	$ —	$ 222,186
United States	40,176	31,186	36,548	(6,838)	101,072	106,590	83,860	110,287	(20,409)	280,328
South Korea	18,441	27,239	20,195	—	65,875	55,463	81,585	52,939	—	189,987
Japan	13,587	25,160	9,417	—	48,164	40,354	74,976	32,761	—	148,091
China	14,699	23,544	12,354	—	50,597	49,269	68,247	32,853	—	150,369
Europe	7,806	9,845	12,587	—	30,238	24,235	32,022	42,594	—	98,851
Southeast Asia	9,855	6,484	6,991	—	23,330	33,918	20,964	19,374	—	74,256
	$ 127,750	$ 155,979	$ 117,256	$ (6,838)	$ 394,147	$ 379,772	$ 463,870	$ 340,835	$ (20,409)	$ 1,164,068

(In thousands)	Three months ended September 29, 2018 SCEM	MC	AMH	Inter-segment	Total	Nine months ended September 29, 2018 SCEM	MC	AMH	Inter-segment	Total
Taiwan	$ 25,436	$ 34,452	$ 18,745	$ —	$ 78,633	$ 79,653	$ 80,556	$ 50,942	$ —	$ 211,151
United States	33,014	24,205	35,745	(7,342)	85,622	99,543	65,794	111,089	(20,673)	255,753
South Korea	21,088	18,893	19,858	—	59,839	62,206	58,698	66,407	—	187,311
Japan	12,141	27,479	12,049	—	51,669	40,707	82,016	35,160	—	157,883
China	18,667	27,360	12,263	—	58,290	50,373	56,417	38,793	—	145,583
Europe	7,579	10,873	16,899	—	35,351	23,345	30,963	49,859	—	104,167
Southeast Asia	13,309	8,216	7,668	—	29,193	40,486	20,894	25,627	—	87,007
	$ 131,234	$ 151,478	$ 123,227	$ (7,342)	$ 398,597	$ 396,313	$ 395,338	$ 377,877	$ (20,673)	$ 1,148,855

Item 2. Management's Discussion and Analysis of Financial Condition and Results of Operations

The following discussion and analysis of the Company's condensed consolidated financial condition and results of operations should be read along with the condensed consolidated financial statements and the accompanying notes to the condensed consolidated financial statements included elsewhere in this Quarterly Report on Form 10-Q. The information, except for historical information, contained in this discussion and analysis or set forth elsewhere in this Quarterly Report on Form 10-Q includes forward-looking statements that involve risks and uncertainties. You should review the section entitled "Risk Factors" in our Annual Report on Form 10-K for the year ended December 31, 2018 as well as in our Quarterly Reports on Form 10-Q and Current Reports on Form 8-K for a discussion of important factors that could cause actual results to differ materially from the results described in or implied by the forward-looking statements contained in the following discussion and analysis. The Company assumes no obligation to publicly release the results of any revision or updates to these forward-looking statements to reflect future events or unanticipated occurrences.

Overview

This overview is not a complete discussion of the Company's financial condition, changes in financial condition and results of operations; it is intended merely to facilitate an understanding of the most salient aspects of the Company's financial condition and operating performance and to provide a context for the detailed discussion and analysis that follows and must be read in its entirety in order to fully understand the Company's financial condition and results of operations.

The Company is a leading global developer, manufacturer and supplier of microcontamination control products, specialty chemicals and advanced materials handling solutions for manufacturing processes in the semiconductor and other high-technology industries. Our mission is to leverage our unique breadth of capabilities to create value for our customers by developing mission-critical solutions to maximize manufacturing yields, reduce manufacturing costs and enable higher device performance.

Our technology portfolio includes approximately 21,000 standard and customized products and solutions to achieve the highest levels of purity and performance that are essential to the manufacture of semiconductors, flat panel displays, light emitting diodes or LEDs, high-purity chemicals, solar cells, gas lasers, optical and magnetic storage devices, and critical components for aerospace, glass manufacturing and biomedical applications. The majority of our products are consumed at various times throughout the manufacturing process, with demand driven in part by the level of semiconductor and other manufacturing activity.

Our most significant customers include semiconductor device manufacturers, semiconductor equipment makers, gas and chemical manufacturing companies, leading wafer grower companies and manufacturers of high-precision electronics. We also sell our products to flat panel display equipment makers, materials suppliers and panel manufacturers, and manufacturers of hard disk drive components and devices. We sell our products worldwide, primarily through our direct sales force and strategic independent distributors located in all major semiconductor markets. Independent distributors are also used in other semiconductor market territories and for specific market segments.

Our business is organized and operated in three operating segments which align with the key elements of the advanced semiconductor manufacturing ecosystem. The Specialty Chemicals and Engineered Materials, or SCEM, segment provides high-performance and high-purity process chemistries, gases, and materials, and safe and efficient delivery systems to support semiconductor and other advanced manufacturing processes. The Microcontamination Control, or MC, segment offers solutions to filter and purify critical liquid chemistries and gases used in semiconductor manufacturing processes and other high-technology industries. The Advanced Materials Handling, or AMH, segment develops solutions to monitor, protect, transport, and deliver critical liquid chemistries, wafers and other substrates for a broad set of applications in the semiconductor industry and other high-technology industries. While these segments have separate products and technical know-how, they share common business systems and processes, technology centers, and strategic and technology roadmaps. We leverage our expertise from these three segments to create new and increasingly integrated solutions for our customers. See note 10 to the condensed consolidated financial statements for additional information on the Company's three segments.

The Company's fiscal year is the calendar period ending each December 31. The Company's fiscal quarters consist of 13-week or 14-week periods that end on Saturday. The Company's fiscal quarters in 2019 end March 30, 2019, June 29, 2019, September 28, 2019 and December 31, 2019. Unaudited information for the three and nine months ended September 28, 2019 and September 29, 2018 and the financial position as of September 28, 2019 and December 31, 2018 are included in this Quarterly Report on Form 10-Q.

Key operating factors Key factors, which management believes have the largest impact on the overall results of operations of the Company, include:

- ***Level of sales*** Since a significant portion of the Company's product costs (except for raw materials, purchased components and direct labor) are largely fixed in the short-to-medium term, an increase or decrease in sales affects gross profits and overall profitability significantly. Also, increases or decreases in sales and operating profitability affect certain costs such as incentive compensation and commissions, which are highly variable in nature. The Company's sales are subject to the effects of industry cyclicality, technological change, substantial competition, pricing pressures and foreign currency fluctuations.

- ***Variable margin on sales*** The Company's variable margin on sales is determined by selling prices and the costs of manufacturing and raw materials. This is affected by a number of factors, which include the Company's sales mix, purchase prices of raw material (especially polymers, membranes, stainless steel and purchased components), domestic and international competition, direct labor costs, and the efficiency of the Company's production operations, among others.

- ***Fixed cost structure*** The Company's operations include a number of large fixed or semi-fixed cost components, which include salaries, indirect labor and benefits, facility costs, lease expenses, and depreciation and amortization. It is not possible to vary these costs easily in the short-term as volumes fluctuate. Accordingly, increases or decreases in sales volume can have a large effect on the usage and productivity of these cost components, resulting in a large impact on the Company's profitability.

Overall Summary of Financial Results

For the three months ended September 28, 2019, net sales decreased 1% to $394.1 million, compared to $398.6 million for the three months ended September 29, 2018. Included in the quarterly sales were net sales primarily associated from acquired businesses of $9.1 million and favorable foreign currency translation effects of $0.2 million. Exclusive of those factors, the Company's sales decreased by $13.7 million to $384.9 million or 3%. The decrease in revenue resulted from decreased customer demand from the semiconductor market compared to the year-ago quarter.

Sales were up $15.3 million, or 4% on a sequential basis over sales of $378.9 million in the second quarter of 2019, including favorable foreign currency translation effects of $0.4 million and sales from acquisitions of $8.7 million. Exclusive of those factors, the Company's sales increased $6.2 million or 2%. The increase in revenue resulted from increased customer demand from the semiconductor market compared to the prior quarter.

The Company announced organizational changes in the third quarter of 2019 that are intended to enable us to be more responsive to our customers, increase our competitiveness, allow for scalable growth and result in significant cost savings. These changes are primarily focused on optimizing our customer-facing organization. As a result of this announcement the Company recorded restructuring charges within cost of goods sold, selling, general and administrative (SG&A) and engineering, research and development of $1.0 million, $5.8 million and $1.7 million, respectively, for the three months ended September 28, 2019. The actions associated with the restructuring plan, including employee separations, are expected to be substantially complete by the end of 2019, and the Company does not anticipate any additional material charges for the remainder of the year.

Reflecting the net sales decrease, the Company's gross profit for the three months ended September 28, 2019 decreased to $170.4 million, down from $181.7 million for the three months ended September 29, 2018. The Company experienced a 43.2% gross margin for the three months ended September 28, 2019, compared to 45.6% in the comparable year-ago period. The gross profit and gross margin figures include an incremental cost of sales charge of $4.5 million and $3.4 million, respectively, associated with the sale of inventory acquired in recent business acquisitions for the three months ended September 28, 2019 and September 29, 2018 and $1.0 million of restructuring charges for the three months ended September 28, 2019 as noted above. Excluding those charges, the Company's gross profit and gross margin for the three months ended September 28, 2019 and September 29, 2018 were $175.9 million and $185.1 million, respectively, and 44.6% and 46.4%, respectively.

The Company's SG&A expenses increased by $8.9 million for the three months ended September 28, 2019 compared to the year-ago quarter, mainly due to higher deal costs and restructuring charges.

As a result of the aforementioned factors, the Company reported net income of $40.8 million, or $0.30 per diluted share, for the quarter ended September 28, 2019, compared to net income of $48.1 million, or $0.34 per diluted share, a year ago.

On July 15, 2019, the Company acquired MPD Chemicals, a provider of advanced materials to the specialty chemical, technology, and life sciences industries. The Company acquired MPD Chemicals for approximately $162.4 million, net of cash acquired, subject to revision for customary working capital adjustments. The Company funded the acquisition from its available cash. The acquisition does not constitute a material business combination.

On September 17, 2019, the Company acquired Hangzhou Anow Microfiltration Co., Ltd., (Anow) a filtration company for diverse industries including semiconductor, pharmaceutical, and medical. The Company acquired Anow for $73.0 million, net of cash acquired, subject to revision for certain adjustments. The Company funded the acquisition from its available cash. The acquisition does not constitute a material business combination.

Cash and cash equivalents were $282.7 million at September 28, 2019, compared with cash and cash equivalents of $482.1 million at December 31, 2018. The Company had outstanding debt of $938.1 million at September 28, 2019, compared to $938.9 million at December 31, 2018.

Critical Accounting Policies

Management's discussion and analysis of financial condition and results of operations are based upon the Company's condensed consolidated financial statements, which have been prepared in accordance with accounting principles generally accepted in the United States. The preparation of these condensed consolidated financial statements requires the Company to make estimates, assumptions and judgments that affect the reported amounts of assets, liabilities, revenues and expenses and related disclosure of contingent assets and liabilities. Actual results may differ from these estimates under different assumptions or conditions.

The critical accounting policies affected most significantly by estimates, assumptions and judgments used in the preparation of the Company's condensed consolidated financial statements are described in Item 7 of its Annual Report on Form 10-K for the year ended December 31, 2018 filed with the Securities and Exchange Commission. On an ongoing basis, the Company evaluates the critical accounting policies used to prepare its condensed consolidated financial statements, including, but not limited to, those related to impairment of long-lived assets, goodwill, income taxes and business acquisitions. There have been no material changes in these aforementioned critical accounting policies.

Three and Nine Months Ended September 28, 2019 Compared to Three and Nine Months Ended September 29, 2018 and Three Months Ended June 29, 2019

The following table compares operating results for the three and nine months ended September 28, 2019 with results for the three and nine months ended September 29, 2018 and three months ended June 29, 2019 both in dollars and as a percentage of net sales, for each caption.

(Dollars in thousands)	Three months ended September 28, 2019		Three months ended September 29, 2018		Three months ended June 29, 2019		Nine months ended September 28, 2019		Nine months ended September 29, 2018	
Net sales	$ 394,147	100.0 %	$ 398,597	100.0 %	$ 378,874	100.0 %	$ 1,164,068	100.0 %	$ 1,148,855	100.0 %
Cost of sales	223,797	56.8	216,881	54.4	212,600	56.1	650,051	55.8	608,764	53.0
Gross profit	170,350	43.2	181,716	45.6	166,274	43.9	514,017	44.2	540,091	47.0
Selling, general and administrative expenses	71,232	18.1	62,358	15.6	64,150	16.9	217,636	18.7	185,827	16.2
Engineering, research and development expenses	31,173	7.9	29,964	7.5	30,624	8.1	90,788	7.8	87,781	7.6
Amortization of intangible assets	15,152	3.8	21,419	5.4	16,591	4.4	50,400	4.3	45,102	3.9
Operating income	52,793	13.4	67,975	17.1	54,909	14.5	155,193	13.3	221,381	19.3
Interest expense	11,388	2.9	7,987	2.0	11,315	3.0	33,587	2.9	24,442	2.1
Interest income	(1,172)	(0.3)	(309)	(0.1)	(1,623)	(0.4)	(4,020)	(0.3)	(2,613)	(0.2)
Other expense (income), net	934	0.2	810	0.2	(122,015)	(32.2)	(121,329)	(10.4)	4,826	0.4
Income before income taxes	41,643	10.6	59,487	14.9	167,232	44.1	246,955	21.2	194,726	16.9
Income tax expense	876	0.2	11,427	2.9	43,235	11.4	49,533	4.3	34,755	3.0
Net income	$ 40,767	10.3 %	$ 48,060	12.1 %	$ 123,997	32.7 %	$ 197,422	17.0 %	$ 159,971	13.9 %

Net sales For the three months ended September 28, 2019, net sales decreased by 1% to $394.1 million, compared to $398.6 million for the three months ended September 29, 2018. An analysis of the factors underlying the decrease in net sales is presented in the following table:

(In thousands)	
Net sales in the quarter ended September 29, 2018	$ 398,597
Decrease associated with volume, pricing and mix	(13,737)
Increase associated with effect of foreign currency translation	196
Increase, net associated with acquired businesses and divestitures	9,091
Net sales in the quarter ended September 28, 2019	$ 394,147

Included in the sales decrease were net sales primarily associated with acquisitions of $9.1 million. In addition, there were favorable foreign currency translation effects of $0.2 million, mainly due to the strengthening of the Japanese yen relative to the U.S. dollar, offset primarily by the weakening of the Korean won relative to the U.S. dollar. Exclusive of these factors, sales decreased $13.7 million, or 3% to $384.9 million for the quarter, mainly from a decreased customer demand from the semiconductor market compared to the year-ago quarter.

Sales percentage on a geographic basis for the three months ended September 28, 2019 and September 29, 2018 and the percentage increase (decrease) in sales for the three months ended September 28, 2019 compared to the sales for the three months ended September 29, 2018 were as follows:

	Three months ended September 28, 2019	Three months ended September 29, 2018	Percentage increase (decrease) in sales
Taiwan	19%	20%	(5)%
North America	25%	21%	18 %
South Korea	17%	15%	10 %
Japan	12%	13%	(7)%
China	13%	15%	(13)%
Europe	8%	9%	(14)%
Southeast Asia	6%	7%	(20)%

Sales were up $15.3 million, or 4% on a sequential basis over sales of $378.9 million for the second quarter of 2019, including favorable foreign currency translation effects of $0.4 million and sales associated with acquisitions of $8.7 million. Exclusive of those factors, the Company's sales increased $6.2 million, or 2%, to $385.1 million. The increase in revenue resulted from increased customer demand from the semiconductor market compared to the previous quarter.

Net sales for the nine months ended September 28, 2019 were $1,164.1 million, up 1% from $1,148.9 million in the comparable year-ago period. An analysis of the factors underlying the increase in net sales is present in the following table:

(In thousands)		
Net sales in the nine months ended September 29, 2018	$	1,148,855
Decrease associated with volume, pricing and mix		(50,972)
Decrease associated with effect of foreign currency translation		(5,802)
Increase, net associated with acquired businesses and divestitures		71,987
Net sales in the nine months ended September 28, 2019	$	1,164,068

Gross profit The Company's gross profit declined 6% for the three months ended September 28, 2019 to $170.4 million, compared to $181.7 million for the three months ended September 29, 2018. The Company experienced a 43.2% gross margin rate for the three months ended September 28, 2019, compared to 45.6% in the comparable year-ago period. The gross profit and gross margin decrease reflects lower factory utilization associated with weaker sales levels and an unfavorable sales mix. The gross profit and gross margin figures include an incremental cost of sales charge of $4.5 million and $3.4 million, respectively, associated with the sale of inventory acquired in recent business acquisitions for the three months ended September 28, 2019 and September 29, 2018 and $1.0 million of restructuring charges for the three months ended September 28, 2019 as noted above. Excluding those charges, the Company's gross profit and gross margin for the three months ended September 28, 2019 and September 29, 2018 were $175.9 million and $185.1 million, respectively, and 44.6% and 46.4%, respectively.

For the nine months ended September 28, 2019, the Company's gross profit declined 5% to $514.0 million, compared to $540.1 million for the nine months ended September 29, 2018. The Company experienced a 44.2% gross margin rate for the nine months ended September 28, 2019, compared to 47.0% in the comparable year-ago period. The gross profit and gross margin decrease reflects lower factory utilization associated with weaker sales levels and an unfavorable sales mix. The gross profit and gross margin figures include an incremental cost of sales charge of $7.3 million and $3.5 million, respectively, associated with the sale of inventory acquired in recent business acquisitions for the nine months ended September 28, 2019 and September 29, 2018 and $1.3 million of restructuring charges for the nine months ended September 28, 2019. Excluding those charges, the Company's gross profit and gross margin for the nine months ended September 28, 2019 and September 29, 2018 were $522.7 million and $543.6 million, respectively, and 44.9% and 47.3%, respectively.

Selling, general and administrative expenses Selling, general and administrative (SG&A) expenses were $71.2 million for the three months ended September 28, 2019, up $8.9 million, or 14%, from the comparable three-month period a year earlier. An analysis of the factors underlying the increase in SG&A is presented in the following table:

(In thousands)		
Selling, general and administrative expenses in the quarter ended September 29, 2018	$	62,358
Deal costs		4,891
Integration costs		1,646
Restructuring costs		5,817
Employee costs		(1,192)
Other decreases, net		(2,288)
Selling, general and administrative expenses in the quarter ended September 28, 2019	$	71,232

SG&A expenses were $217.6 million for the first nine months of 2019, up 17%, compared to SG&A expenses of $185.8 million in the year-ago period. An analysis of the factors underlying changes in SG&A is presented in the following table:

(In thousands)		
Selling, general and administrative expenses in the nine months ended September 29, 2018	$	185,827
Deal costs		20,070
Integration costs		4,633
Restructuring costs		8,887
Professional fees		916
Employee costs		(1,298)
Travel costs		(2,108)
Other increases, net		709
Selling, general and administrative expenses in the nine months ended September 28, 2019	$	217,636

Engineering, research and development expenses The Company's engineering, research and development (ER&D) efforts focus on the support or extension of current product lines, and the development of new products and manufacturing technologies. ER&D expenses were $31.2 million in the three months ended September 28, 2019 compared to $30.0 million in the year-ago period. The increase for the quarter was mainly due to higher employee costs and the acquired SPG business ER&D infrastructure, offset by lower project costs.

ER&D expenses increased 3% to $90.8 million in the first nine months of 2019, compared to $87.8 million in the year ago period, primarily due to higher employee costs and the acquired SPG business ER&D infrastructure, offset by lower project costs.

Amortization expenses Amortization of intangible assets was $15.2 million in the three months ended September 28, 2019 compared to $21.4 million for the three months ended September 29, 2018. The decrease primarily reflects the elimination of amortization expense of $6.4 million for an identifiable backlog intangible asset acquired in the SPG acquisition that became fully amortized in the second quarter of 2019, offset by additional amortization expense of $1.3 million associated with the MPD acquisition acquired in the third quarter of 2019 and the DSC acquisition acquired in the first quarter of 2019.

Amortization of intangible assets was $50.4 million in the first nine months ended September 28, 2019 compared to $45.1 million for the first nine months ended September 29, 2018. The increase reflects additional amortization of $7.0 million for the SPG acquisition, MPD acquisition and DSC acquisition, offset primarily by the elimination of amortization expense of $1.4 million for identifiable developed technology and customer relationships assets acquired in the Poco acquisition.

Interest income Interest income was $1.2 million and $4.0 million in the three and nine months ended September 28, 2019, respectively, compared to $0.3 million and $2.6 million in the three and nine months ended September 29, 2018, respectively. The increase in interest income for the three and nine months ended September 28, 2019 compared to comparable previous year periods was due to higher average cash levels earning a higher interest rate.

Interest expense Interest expense includes interest associated with debt outstanding and the amortization of debt issuance costs associated with such borrowings. Interest expense was $11.4 million in the three months ended September 28, 2019 compared to $8.0 million in the three months ended September 29, 2018. The increase primarily reflects higher average debt levels.

Interest expense was $33.6 million in the nine-month period ended September 28, 2019, compared to $24.4 million in the nine-month period ended September 29, 2018. The increase reflects higher average debt levels.

Other expense (income), net Other expense, net was $0.9 million in the three months ended September 28, 2019 and consisted mainly of foreign currency transaction losses of $0.7 million. Other income, net was $121.3 million in the nine months ended September 28, 2019 and consisted mainly of net proceeds received of $122.0 million resulting from the termination of the merger agreement with Versum.

Other expense, net was $0.8 million in the three months ended September 29, 2018 and consisted mainly of foreign currency transaction losses. Other expense, net was $4.8 million in the nine months ended September 29, 2018 and consisted mainly of foreign currency transaction losses of $3.6 million and penalty charges of $1.0 million.

Income tax expense The Company recorded income tax expense of $0.9 million and $49.5 million, respectively, in the three and nine months ended September 28, 2019, compared to income tax expense of $11.4 million and $34.8 million, respectively, in the three and nine months ended September 29, 2018. The Company's year-to-date effective tax rate was 20.1% in 2019, compared to 17.8% in 2018. The tax rate in 2019 includes a discrete tax charge of $9.4 million related to the reversal of a dividend received deduction recorded in 2018. This discrete charge was recorded as a result of the issuance of final regulations during the second quarter. The discrete charge was partially offset by a benefit of $5.3 million recorded in the third quarter based on the filing of the federal tax return. Additionally, in the second quarter of 2019, the Company received a termination fee from Versum based on the termination of the merger agreement with Versum and recorded a discrete charge of $23.5 million related to the termination fee, net of associated expenses. As a result of the termination fee, the Company released a valuation allowance on federal capital loss carryforwards and recorded a discrete benefit of $2.9 million.

Net income Due to the factors noted above, the Company recorded net income of $40.8 million, or $0.30 per diluted share, in the three-month period ended September 28, 2019, compared to net income of $48.1 million, or $0.34 per diluted share, in the three-month period ended September 29, 2018. In the three-month period ended September 28, 2019, net income, as a percent of net sales, decreased to 10.3% from 12.1% in the year-ago period. In the nine-month period ended September 28, 2019, the Company recorded net income of $197.4 million, or $1.45 per diluted share, compared to net income of $160.0 million, or $1.12 per diluted share, in the nine-month period ended September 29, 2018. In the nine-month period ended September 28, 2019, net income, as a percent of net sales, increased to 17.0% from 13.9% in the year-ago period.

Non-GAAP Measures The Company's condensed consolidated financial statements are prepared in conformity with accounting principles generally accepted in the United States (GAAP). The Company also utilizes certain non-GAAP financial measures as a complement to financial measures provided in accordance with GAAP in order to better assess and reflect trends affecting the

Company's business and results of operations. See the section "Non-GAAP Information" included below in this section for additional detail, including the definition of certain non-GAAP financial measures and the reconciliation of these non-GAAP measures to the Company's GAAP measures.

The Company's principal non-GAAP financial measures are Adjusted EBITDA and Adjusted Operating Income, together with related measures thereof, and non-GAAP Earnings Per Share.

Adjusted EBITDA decreased 3% to $107.5 million in the three-month period ended September 28, 2019, compared to $110.4 million in the three-month period ended September 29, 2018. In the three month-period ended September 28, 2019, Adjusted EBITDA, as a percent of net sales, decreased to 27.3% from 27.7% in the year-ago period. Adjusted EBITDA decreased 4% to $311.8 million in the nine-month period ended September 28, 2019, compared to $325.7 million in the nine-month period ended September 29, 2018. In the nine-month period ended September 28, 2019, Adjusted EBITDA, as a percent of net sales, decreased to 26.8% from 28.4% in the year-ago period.

Adjusted Operating Income decreased 6% to $88.2 million in the three-month period ended September 28, 2019, compared to $93.9 million in the three-month period ended September 29, 2018. Adjusted Operating Income, as a percent of net sales, decreased to 22.4% from 23.6% in the year-ago period. Adjusted Operating Income decreased 7% to $257.2 million in the nine-month period ended September 28, 2019, compared to $277.5 million in the nine-month period ended September 29, 2018. In the nine-month period ended September 28, 2019, Adjusted Operating Income, as a percent of net sales, decreased to 22.1% from 24.2% in the year-ago period.

Non-GAAP Earnings Per Share was $0.50 in the three-month period ended September 28, 2019, compared to $0.46 in the three-month period ended September 29, 2018. Non-GAAP Earnings Per Share was $1.39 in the nine-month period ended September 28, 2019, compared to $1.42 in the nine-month period ended September 29, 2018.

Segment Analysis

The Company reports its financial performance based on three reporting segments. The following is a discussion of the results of operations of these three business segments. In the first quarter of 2019, the Company changed its definition of segment profit to include inter-segment sales. The Company updated its recognition of inter-segment sales to recognize the revenue and profit associated with products and components produced in one segment and supplied to another, before being sold to the ultimate end customer. The Company accounts for inter-segment sales and transfers as if the sales or transfers were to third parties, that is, at approximate market prices. Prior quarter information has been recast to reflect the change in the Company's definition of segment profit. See note 10 to the condensed consolidated financial statements for additional information on the Company's three segments.

The following table presents selected net sales and segment profit data for the Company's three reportable segments for the three months ended September 28, 2019, September 29, 2018 and June 29, 2019 and nine months ended September 28, 2019 and September 29, 2018.

	Three months ended			Nine months ended	
(In thousands)	September 28, 2019	September 29, 2018	June 29, 2019	September 28, 2019	September 29, 2018
Specialty Chemicals and Engineered Materials					
Net sales	$ 127,750	$ 131,234	$ 127,552	$ 379,772	$ 396,313
Segment profit	17,074	31,210	24,000	65,505	98,859
Microcontamination Control					
Net sales	155,979	151,478	150,185	463,870	395,338
Segment profit	46,792	42,448	43,126	137,241	119,973
Advanced Materials Handling					
Net sales	117,256	123,227	107,515	340,835	377,877
Segment profit	17,077	22,226	15,043	54,487	73,231

Specialty Chemicals and Engineered Materials (SCEM)

For the third quarter of 2019, SCEM net sales decreased to $127.8 million, compared to $131.2 million in the comparable period last year. The sales decrease was due to decreased sales of specialty materials, specialty gases and surface prep and integration products, partially offset by sales from the acquisition of DSC in the first quarter of 2019 and the acquisition of MPD in the third quarter of 2019. SCEM reported a segment profit of $17.1 million in the third quarter of 2019, down 45% from $31.2 million in the year-ago period. The segment profit decrease was primarily due to lower gross profit related to the decreased sales, an incremental cost of sales charge of $4.5 million associated with the sale of inventory acquired in recent business acquisitions, unfavorable product mix and a 7% increase in operating expenses, primarily due to restructuring charges.

For the nine months ended September 28, 2019, SCEM net sales decreased to $379.8 million, compared to $396.3 million in the comparable period last year. The sales decrease was mainly due to decreased sales of specialty materials, specialty gases and surface prep and integration products, partially offset by sales from the acquisition of DSC in the first quarter of 2019 and the acquisition of MPD in the third quarter of 2019 and improved sales from advanced deposition products. SCEM reported a segment profit of $65.5 million in the nine months ended September 28, 2019, down 34% from $98.9 million in the year-ago period also due to lower sales levels, an incremental cost of sales charge of $7.3 million associated with the sale of inventory acquired in recent business acquisitions, unfavorable product mix and a 2% increase in operating expenses compared to the same period a year-ago.

Microcontamination Control (MC)

For the third quarter of 2019, MC net sales increased to $156.0 million, compared to $151.5 million in the comparable period last year. The sales increase was mainly due to improved sales from gas microcontamination products and photolithography products, offset partially by weakened sales from new market development products and liquid chemistry filters for wet, etch and clean applications. MC reported a segment profit of $46.8 million in the third quarter of 2019, up 10% from $42.4 million in the year-ago period. The segment profit improvement was primarily due to higher gross profit related to the increased sales, partially offset by a 1% increase in operating expenses.

For the nine months ended September 28, 2019, MC net sales increased to $463.9 million, compared to $395.3 million in the comparable period last year. The sales increase was due to the acquisition of SPG in the second quarter of 2018, which contributed an additional $66.1 million of sales, and improved sales from liquid chemistry filters for wet, etch and clean applications and photolithography products, partially offset by weakened sales from gas microcontamination products. MC reported a segment profit of $137.2 million in the nine months ended September 28, 2019, up 14% from $120.0 million in the year-ago period. The segment profit improvement was primarily due to higher gross profit related to the increased sales, partially offset by a 8% increase in operating expenses, primarily due to higher employee costs and SPG operating infrastructure.

Advanced Materials Handling (AMH)

For the third quarter of 2019, AMH net sales decreased to $117.3 million, compared to $123.2 million in the comparable period last year. The sales decrease was mainly due to decreased sales of fluid handling products and wafer and reticle handling products. AMH reported a segment profit of $17.1 million in the third quarter of 2019, down 23% from $22.2 million in the year-ago period. The segment profit decrease was primarily due to lower gross profit related to the decreased sales and an increase of 5% in operating expenses, primarily due to restructuring charges.

For the nine months ended September 28, 2019, AMH net sales decreased to $340.8 million, compared to $377.9 million in the comparable period last year. This decrease was mainly due to decreased sales of fluid handling products, liquid packaging and dispense products, wafer and reticle handling products and wafer shipping products. AMH reported a segment profit of $54.5 million in the nine months ended September 28, 2019, down 26% from $73.2 million in the year-ago period. The segment profit decrease was primarily due to lower gross profit related the decreased sales.

Unallocated general and administrative expenses

Unallocated general and administrative expenses totaled $13.0 million in the third quarter of 2019, compared to $6.5 million in the third quarter of 2018. The $6.5 million increase mainly reflects an increase in deal and integration costs of $6.5 million referenced in the discussion of SG&A above.

Unallocated general and administrative expenses for the nine months ended September 28, 2019 totaled $51.6 million, up from $25.6 million in the nine months ended September 29, 2018. The $26.1 million increase mainly reflects the deal costs and integration costs of $24.7 million referenced in the discussion of SG&A above.

Liquidity and Capital Resources

Operating activities Cash flows provided by operating activities totaled $253.7 million in the nine months ended September 28, 2019. Operating cash flows reflecting net income adjusted for non-cash expenses (such as depreciation, amortization and share-based compensation) was offset by a net reduction in operating assets and liabilities of $75.8 million, mainly reflecting decreases in accounts payable and accrued liabilities, deferred tax liabilities and income tax payable and increases in accounts receivable.

Accounts receivable increased by $39.3 million during the nine months ended September 28, 2019, or $30.4 million after accounting for foreign currency translation and receivables acquired from acquisitions, mainly reflecting the increase in the Company’s DSO. The Company’s DSO was 60 days at September 28, 2019, compared to 50 days at December 31, 2018. The increase was primarily due to the Company's quarter closing date occurring several days prior to the end of the calendar month, the period during which receivable collections are typically heavy, particularly for the Company's Asia operations.

Inventories increased by $22.1 million during the nine months ended September 28, 2019, or $5.7 million after accounting for foreign currency translation, inventory acquired from acquisitions and the provision for excess and obsolete inventory. The increase reflects higher levels of work-in-progress and finished goods offset by lower levels of raw materials.

Accounts payable and accrued liabilities decreased $27.8 million during the nine months ended September 28, 2019, or $31.9 million after accounting for foreign currency translation and liabilities assumed from acquisitions. The key component of the decrease reflects lower levels of accounts payable and higher incentive compensation payment paid out in 2019 compared to the comparable previous period.

Working capital at September 28, 2019 was $671.2 million, compared to $759.7 million as of December 31, 2018, and included $282.7 million in cash and cash equivalents, compared to cash and cash equivalents of $482.1 million as of December 31, 2018.

Investing activities Cash flows used in investing activities totaled $350.0 million in the nine-month period ended September 28, 2019. Acquisition of property, plant and equipment totaled $86.4 million, which primarily reflected investments in equipment and tooling. As of September 28, 2019, the Company expects its full-year capital expenditures in 2019 to be approximately $110 million. As of September 28, 2019, the Company had outstanding capital purchase obligations of $35.3 million for the construction or purchase of plant and equipment not yet recorded in the Company's condensed consolidated financial statements as the Company had not yet received the related goods or property.

On March 8, 2019, the Company acquired DSC, which provides advanced materials to the specialty chemical, technology and pharmaceutical industries. The total purchase price of the acquisition was $64.1 million. The transaction is described in further detail in note 3 to the Company's condensed consolidated financial statements.

On July 15, 2019, the Company acquired MPD Chemicals, a provider of advanced materials to the specialty chemical, technology, and life sciences industries. The Company acquired MPD Chemicals for approximately $162.4 million, subject to revision for customary working capital adjustments. The transaction is described in further detail in note 3 to the Company's condensed consolidated financial statements.

On September 17, 2019, the Company acquired Anow, a filtration company for diverse industries including semiconductor, pharmaceutical, and medical. The Company acquired Anow for $73.0 million, subject to revision for certain adjustments. The transaction is described in further detail in note 3 to the Company's condensed consolidated financial statements.

Financing activities Cash flows used in financing activities totaled $101.8 million during the nine-month period ended September 28, 2019. This included the Company's payment of $2 million on its senior secured term loan, cash dividends of $29.8 million and the Company's repurchase of shares of the Company's common stock at a total cost of $65.3 million under the stock repurchase program authorized by the Company's Board of Directors. In addition, the Company expended $8.6 million for taxes related to the net share settlement of equity awards under the Company's stock plans, offset in part by proceeds of $4.4 million in connection with common shares issued under the Company's stock plans.

As of September 28, 2019, the Company had outstanding long-term debt, including the current portion thereof, of $938.1 million, related to debt issued by the Company.

The Company has a senior secured revolving commitment facility (the "Revolving Facility") in an aggregate amount of $300 million maturing November 6, 2023. The Revolving Facility bears interest at a rate per annum equal to, at the Company's option, a base rate (such as prime rate or LIBOR) plus, an applicable margin. At September 28, 2019, the only outstanding amounts under the Revolving Facility were undrawn outstanding letters of credit of $0.2 million.

Through September 28, 2019, the Company was in compliance with all applicable financial covenants included in the terms of its debt obligations.

The Company also has lines of credit with two banks that provide for borrowings of Japanese yen for the Company's Japanese subsidiary, equivalent to an aggregate of approximately $11.0 million. There were no outstanding borrowings under these lines of credit at September 28, 2019.

The Company believes that its cash and cash equivalents, funds available under its Revolving Facility and international credit facilities and cash flow generated from operations will be sufficient to meet its working capital and investment requirements for at least the next twelve months. If available liquidity is not sufficient to meet the Company's operating and debt service obligations as they come due, management would need to pursue alternative arrangements through additional equity or debt financing in order to meet the Company's cash requirements. There can be no assurance that any such financing would be available on commercially acceptable terms.

At September 28, 2019, the Company's shareholders' equity was $1,119.9 million, up from $1,012.0 million at the beginning of the year. The increase mainly reflects net income of $197.4 million, an increase to additional paid-in capital of $14.9 million associated with the Company's share-based compensation expense and proceeds of $4.4 million in connection with common shares issued under the Company's stock plan. These increases were offset partly by the repurchase of the Company's common stock at a total cost of $59.8 million, cash dividends declared of $30.0 million, the payment of $8.6 million for taxes related to the net share settlement of equity awards under the Company's stock plans and foreign currency translation effects of $10.5 million, mainly associated with the strengthening of the U.S. dollar versus the Korean won.

As of September 28, 2019, the Company's resources included cash and cash equivalents of $282.7 million, funds available under its $300 million Revolving Facility and international credit facilities, and cash flow generated from operations. As of September 28, 2019, the amount of cash and cash equivalents held by foreign subsidiaries was $178.6 million. These amounts held by foreign subsidiaries, certain of which are associated with indefinitely reinvested foreign earnings, may be subject to U.S. income taxation on repatriation to the United States. The Company does not anticipate the need to repatriate funds associated with indefinitely reinvested foreign earnings to the United States to satisfy domestic liquidity needs arising in the ordinary course of business. The Company believes its existing balances of domestic cash and cash equivalents, available cash and cash equivalents held by foreign subsidiaries not associated with indefinitely reinvested foreign earnings and operating cash flows will be sufficient to meet the Company's domestic cash needs arising in the ordinary course of business for the next twelve months.

Recently adopted accounting pronouncements Refer to note 1 to the Company's condensed consolidated financial statements for a discussion of accounting pronouncements recently adopted.

Recently issued accounting pronouncements Refer to note 1 to the Company's condensed consolidated financial statements for a discussion of accounting pronouncements recently issued by not yet adopted.

Non-GAAP Information The Company's condensed consolidated financial statements are prepared in conformity with accounting principles generally accepted in the United States (GAAP).

The Company also provides certain non-GAAP financial measures as a complement to financial measures provided in accordance with GAAP in order to better assess and reflect trends affecting the Company's business and results of operations. These non-GAAP financial measures include Adjusted EBITDA and Adjusted Operating Income together with related measures thereof, and non-GAAP Earnings Per Share (EPS), as well as certain other supplemental non-GAAP financial measures included in the discussion of the Company's financial results.

Adjusted EBITDA, a non-GAAP financial measure, is defined by the Company as net income before (1) income tax expense, (2) interest expense, (3) interest income, (4) other expense (income), net, (5) charge for fair value write-up of acquired inventory sold, (6) deal costs, (7) integration costs, (8) loss on sale of subsidiary (9) severance and restructuring costs, (10) amortization of intangible assets and (11) depreciation. Adjusted Operating Income, another non-GAAP financial measure, is defined by the Company as Adjusted EBITDA exclusive of the depreciation addback noted above. The Company also utilizes non-GAAP financial measures whereby Adjusted EBITDA and Adjusted Operating Income are each divided by the Company's net sales to derive Adjusted EBITDA Margin and Adjusted Operating Margin, respectively.

Non-GAAP EPS, a non-GAAP financial measure, is defined by the Company as net income before (1) charge for fair value write-up of acquired inventory sold, (2) deal costs, (3) integration costs, (4) severance and restructuring costs, (5) the Versum termination fee, net, (6) loss on sale of subsidiary, (7) amortization of intangible assets, (8) the tax effect of a legal entity restructuring, (9) the tax effect of those adjustments to net income and certain discrete items and (10) the tax effect of the Tax Cuts and Jobs Act, stated on a per share basis.

The Company provides supplemental non-GAAP financial measures to better understand its business and believes these measures provide investors and analysts additional and meaningful information for the assessment of the Company's ongoing results. Management also uses these non-GAAP measures to assist in the evaluation of the performance of its business segments and to make operating decisions.

Management believes the Company's non-GAAP measures help indicate the Company's baseline performance before certain gains, losses or other charges that may not be indicative of the Company's business or future outlook and offer a useful view of business performance in that the measures provide a more consistent means of comparing performance. The Company believes the non-GAAP measures aid investors' overall understanding of the Company's results by providing a higher degree of transparency for such items and providing a level of disclosure that will help investors understand how management plans, measures and evaluates the Company's business performance. Management believes that the inclusion of non-GAAP measures provides greater consistency in its financial reporting and facilitates investors' understanding of the Company's historical operating trends by providing an additional basis for comparisons to prior periods.

Management uses Adjusted EBITDA and Adjusted Operating Income to assist it in evaluations of the Company's operating performance by excluding items that management does not consider as relevant in the results of its ongoing operations. Internally, these non-GAAP measures are used by management for planning and forecasting purposes, including the preparation of internal budgets; for allocating resources to enhance financial performance; for evaluating the effectiveness of operational strategies; and for evaluating the Company's capacity to fund capital expenditures, secure financing and expand its business.

In addition, and as a consequence of the importance of these non-GAAP financial measures in managing its business, the Company's Board of Directors uses non-GAAP financial measures in the evaluation process to determine management compensation.

The Company believes that certain analysts and investors use Adjusted EBITDA, Adjusted Operating Income and non-GAAP EPS as supplemental measures to evaluate the overall operating performance of firms in the Company's industry. Additionally, lenders or potential lenders use Adjusted EBITDA measures to evaluate the Company's creditworthiness.

The presentation of non-GAAP financial measures is not meant to be considered in isolation, as a substitute for, or superior to, financial measures or information provided in accordance with GAAP. Management strongly encourages investors to review the Company's condensed consolidated financial statements in their entirety and to not rely on any single financial measure.

Management notes that the use of non-GAAP measures has limitations:

First, non-GAAP financial measures are not standardized. Accordingly, the methodology used to produce the Company's non-GAAP financial measures is not computed under GAAP and may differ notably from the methodology used by other companies. For example, the Company's non-GAAP measure of Adjusted EBITDA may not be directly comparable to EBITDA or an adjusted EBITDA measure reported by other companies.

Second, the Company's non-GAAP financial measures exclude items such as amortization and depreciation that are recurring. Amortization of intangibles and depreciation have been, and will continue to be for the foreseeable future, a significant recurring expense with an impact upon the Company's results of operations, notwithstanding the lack of immediate impact upon cash flows.

Third, there is no assurance the Company will not have future charges for fair value write-up of acquired inventory, restructuring activities, deal costs, integration costs, or similar items and, therefore, may need to record additional charges (or credits) associated with such items, including the tax effects thereon. The exclusion of these items in the Company's non-GAAP measures should not be construed as an implication that these costs are unusual, infrequent or non-recurring.

Management considers these limitations by providing specific information regarding the GAAP amounts excluded from these non-GAAP financial measures and evaluating these non-GAAP financial measures together with their most directly comparable financial measures calculated in accordance with GAAP. The calculations of Adjusted EBITDA, Adjusted Operating Income, and non-GAAP EPS, and reconciliations between these financial measures and their most directly comparable GAAP equivalents, are presented below in the accompanying tables.

Table of Contents

Reconciliation of GAAP Net Income to Adjusted Operating Income and Adjusted EBITDA

(In thousands)	Three months ended September 28, 2019	Three months ended September 29, 2018	Nine months ended September 28, 2019	Nine months ended September 29, 2018
Net sales	$ 394,147	$ 398,597	$ 1,164,068	$ 1,148,855
Net income	$ 40,767	$ 48,060	$ 197,422	$ 159,971
Adjustments to net income				
Income tax expense	876	11,427	49,533	34,755
Interest expense	11,388	7,987	33,587	24,442
Interest income	(1,172)	(309)	(4,020)	(2,613)
Other expense (income), net	934	810	(121,329)	4,826
GAAP – Operating income	52,793	67,975	155,193	221,381
Charge for fair value write-up of acquired inventory sold	4,483	3,281	7,333	3,489
Deal costs	4,891	—	25,191	5,121
Integration costs	2,398	752	6,582	1,949
Loss on sale of subsidiary	—	466	—	466
Severance and restructuring costs	8,503	—	12,494	—
Amortization of intangible assets	15,152	21,419	50,400	45,102
Adjusted operating income	88,220	93,893	257,193	277,508
Depreciation	19,306	16,537	54,623	48,236
Adjusted EBITDA	$ 107,526	$ 110,430	$ 311,816	$ 325,744
Net income - as a % of net sales	10.3%	12.1%	17.0%	13.9%
Adjusted operating income – as a % of net sales	22.4%	23.6%	22.1%	24.2%
Adjusted EBITDA – as a % of net sales	27.3%	27.7%	26.8%	28.4%

Reconciliation of GAAP Net Income and Earnings per Share to Non-GAAP Net Income and Earnings per Share

(In thousands, except per share data)	Three months ended September 28, 2019	Three months ended September 29, 2018	Nine months ended September 28, 2019	Nine months ended September 29, 2018
Net income	$ 40,767	$ 48,060	$ 197,422	$ 159,971
Adjustments to net income				
Charge for fair value write-up of acquired inventory sold	4,483	3,281	7,333	3,489
Deal costs	4,891	—	25,602	5,121
Integration costs	2,398	752	6,582	1,949
Severance and restructuring costs	8,503	—	12,494	—
Versum termination fee, net	—	—	(122,000)	—
Loss on sale of subsidiary	—	466	—	466
Amortization of intangible assets	15,152	21,419	50,400	45,102
Tax effect of legal entity restructuring	—	—	9,398	—
Tax effect of adjustments to net income and certain discrete tax items[1]	(8,015)	(5,797)	2,274	(12,209)
Tax effect of Tax Cuts and Jobs Act	$ —	$ (2,560)	$ —	$ (418)
Non-GAAP net income	$ 68,179	$ 65,621	$ 189,505	$ 203,471
Diluted earnings per common share	$ 0.30	$ 0.34	$ 1.45	$ 1.12
Effect of adjustments to net income	0.20	0.12	(0.06)	0.30
Diluted non-GAAP earnings per common share	$ 0.50	$ 0.46	$ 1.39	$ 1.42

[1]The tax effect of pre-tax adjustments to net income was calculated using the applicable marginal tax rate for each respective year.

Item 3. Quantitative and Qualitative Disclosures About Market Risk

The Company’s principal financial market risks are sensitivities to interest rates and foreign currency exchange rates. The Company’s interest-bearing cash equivalents and senior secured financing obligation are subject to interest rate fluctuations. The Company’s cash equivalents are instruments with maturities of three months or less. A 100 basis point change in interest rates would potentially increase or decrease annual net income by approximately $0.9 million annually.

The cash flows and results of operations of the Company’s foreign-based operations are subject to fluctuations in foreign exchange rates. The Company occasionally uses derivative financial instruments to manage the foreign currency exchange rate risks associated with its foreign-based operations. At September 28, 2019, the Company had no net exposure to any foreign currency forward contracts.

Item 4. Controls and Procedures

(a) Evaluation of disclosure controls and procedures.
The Company’s management, including the Chief Executive Officer (CEO) and Chief Financial Officer (CFO), has conducted an evaluation of the effectiveness of the Company’s disclosure controls and procedures (as defined under Rules 13a-15(e) and 15d-15(e) promulgated under the Securities Exchange Act of 1934 (the 1934 Act)) as of September 28, 2019. The term “disclosure controls and procedures” means controls and other procedures of a company that are designed to ensure that information required to be disclosed by the company in the reports that it files or submits under the 1934 Act is recorded, processed, summarized and reported within the time periods specified in the SEC’s rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by the company in the reports that it files or submits under the 1934 Act is accumulated and communicated to the company’s management, including its principal executive and principal financial officers, 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 management’s evaluation (with the participation of the Company’s CEO and CFO), as of September 28, 2019, the Company’s CEO and CFO have concluded that the disclosure controls and procedures used by the Company were effective to provide reasonable assurance that information required to be disclosed by the Company in reports that it files or submits under the 1934 Act is recorded, processed, summarized, and reported within the time periods specified in SEC rules and forms, and is accumulated and communicated to management, including its principal executive officer and principal financial officer, as appropriate, to allow timely decisions regarding required disclosure.

(b) Changes in internal control over financial reporting.
There has been no change in the Company’s internal control over financial reporting (as defined in Rules 13a-15(f) and 15d-15(f) under the 1934 Act) identified in connection with the foregoing evaluation of disclosure controls and procedures that occurred during the most recently completed fiscal quarter that has materially affected, or is reasonably likely to materially affect, the Company’s internal control over financial reporting.

The Company acquired Digital Specialty Chemicals Limited (DSC), MPD Chemicals (MPD) and Hangzhou Anow Microfiltration Co., Ltd. (Anow) on March 8, 2019, July 15, 2019 and September 17, 2019, respectively. None of DSC, MPD and Anow is significant to the Company’s financial statements. The Company is continuing to integrate DSC, MPD and Anow into the Company’s internal control over financial reporting, and the foregoing evaluation of the effectiveness of the Company’s disclosure controls and procedures does not include an assessment of those disclosure controls and procedures of DSC, MPD and Anow that are subsumed by internal control over financial reporting.

PART II

OTHER INFORMATION

Item 1. Legal Proceedings

As of September 28, 2019, the Company is subject to various claims, legal actions, and complaints arising in the ordinary course of business. The Company believes the final outcome of these matters will not have a material adverse effect on its condensed consolidated financial statements. The Company expenses legal costs as incurred.

Item 2. Unregistered Sales of Equity Securities and Use of Proceeds.

Issuer Purchases of Equity Securities

The following table provides information concerning shares of the Company's Common Stock $0.01 par value purchased during the three months ended September 28, 2019.

Period	(a) Total Number of Shares Purchased[1]	(b) Average Price Paid per Share	(c) Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs	(d) Maximum Number (or Approximate Dollar Value) of Shares that May Yet Be Purchased Under the Plans or Programs
June 30, 2019 - August 3, 2019	147,200	$39.02	147,200	$125,597,923
August 4, 2019 - August 31, 2019	108,387	$41.82	108,387	$121,064,392
September 1, 2019 - September 28, 2019	102,486	$46.09	102,486	$116,341,259
Total	358,073	$41.89	358,073	$116,341,259

[1] On February 13, 2018, the Company's Board of Directors authorized a repurchase program covering up to an aggregate of $100 million of the Company's common stock, during a period of twenty-four months, in open market transactions and in accordance with one or more pre-arranged stock trading plans to be established in accordance with Rule 10b5-1 under the Securities Exchange Act of 1934, as amended. On November 19, 2018, the Company's Board of Directors authorized the repurchase of up to an additional $250 million in aggregate principal amount of the Company's common stock.

The Company issues common stock awards under its equity incentive plans. In the condensed consolidated financial statements, the Company treats shares of common stock withheld for tax purposes on behalf of its employees in connection with the vesting or exercise of the awards as common stock repurchases because they reduce the number of shares that would have been issued upon vesting or exercise. These withheld shares of common stock are not considered common stock repurchases under the Company's authorized common stock repurchase plan and accordingly are not included in the common stock repurchase totals in the preceding table.

Table of Contents

Item 6. Exhibits

EXHIBIT INDEX

10.1	Separation Agreement and Release, dated as of August 27, 2019, by and between the Company and Gregory Marshall.
31.1	Certification of Chief Executive Officer Pursuant to Exchange Act Rule 13a-14(a).
31.2	Certification of Chief Financial Officer Pursuant to Exchange Act Rule 13a-14(a).
32.1	Certification of Chief Executive Officer and Chief Financial Officer Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
101.INS	XBRL Instance Document - the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document.
101.SCH	XBRL Taxonomy Extension Schema Document
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document
101.LAB	XBRL Taxonomy Extension Label Linkbase Document
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document

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.

ENTEGRIS, INC.

Date: October 24, 2019

/s/ Gregory B. Graves

Gregory B. Graves
Executive Vice President and Chief Financial Officer (on behalf of the registrant and as principal financial officer)

SEPARATION AGREEMENT AND RELEASE

This Separation Agreement and Release ("Agreement") is entered into by and between **Greg Marshall** ("EXECUTIVE") and Entegris, Inc., a Delaware corporation, with corporate headquarters located at 129 Concord Road, Billerica, Massachusetts 01821 ("Entegris"). It shall take effect after the rescission period described in Paragraph 6 has expired. The purpose of this Separation Agreement and Release is to set forth the compensation and benefits being offered to the EXECUTIVE in connection with his retirement from employment with Entegris.

TERMS AND CONDITIONS

In consideration of the recitals stated above and the mutual promises made below, the parties agree as follows:

1. Separation Date -- The last day of EXECUTIVE'S employment with Entegris shall be August 30, 2019 (the "Separation Date"). EXECUTIVE shall continue to receive his base salary, continue to be eligible to participate in Entegris' employee benefits, and continue to vest in any outstanding equity awards relating to shares of Entegris common stock through the Separation Date.

2. Benefits -- Subject to and contingent upon EXECUTIVE'S continued employment through the Separation Date and EXECUTIVE's execution of and compliance with the terms and conditions of this Agreement, and further provided that EXECUTIVE does not revoke this Agreement as provided in Paragraph 6 below, Entegris shall provide EXECUTIVE with the following benefits.

    (a.) Effective as of the date on which the release in Paragraph 4 becomes effective: (i) all outstanding, unvested restricted stock units relating to shares of Entegris common stock that are outstanding and held by EXECUTIVE as of the Separation Date, shall vest in full, (ii) all outstanding, unvested stock options relating to shares of Entegris common stock that are outstanding and held by EXECUTIVE as of the Separation Date shall remain outstanding and eligible to vest on their regularly scheduled vesting dates, (iii) all outstanding, vested stock options relating to shares of Entegris common stock that are outstanding and held by EXECUTIVE (including those that are vested as of the Separation Date and those that vest in accordance with the immediately preceding clause (ii)) shall, once vested, remain exercisable through the earlier of the fourth anniversary of the Separation Date and the regularly scheduled expiration date of such options; (iv) all outstanding performance restricted stock units relating to shares of Entegris common stock that are outstanding and held by EXECUTIVE as of the Separation Date shall remain outstanding and shall be eligible to vest following the completion of the applicable performance period based on actual performance through the end of the performance period, prorated based on a fraction, the numerator of which is the number of days between the first day of the applicable performance period and the Separation Date and the denominator of which is 1,095, and (v) all performance restricted stock units relating to shares of Entegris common stock that are outstanding and held by EXECUTIVE as of the Separation Date that do not vest in accordance with the immediately preceding clause (iv) shall be forfeited.

(b.) EXECUTIVE will be eligible for 6 months of Professional Search outplacement services through Lee Hecht Harrison LLC. Such outplacement services will only be provided to EXECUTIVE so long as EXECUTIVE (i) is actively and diligently cooperating with the outplacement firm, (ii) is using diligent efforts to obtain other employment, and (iii) has not yet accepted new employment. The cost for such services will be paid by Entegris directly to Lee Hecht Harrison LLC.

(c.) Notwithstanding Entegris' requirement that an employee must remain employed with Entegris on January 1, 2020 in order to be receive an award under the Entegris Incentive Plan for the 2019 fiscal year, Entegris will pay EXECUTIVE a pro-rata bonus for fiscal year 2019, less applicable taxes and withholdings. Such amount will be determined in Entegris' discretion based on Entegris' financial performance for 2019 pursuant to the Entegris Incentive Plan and will be pro-rated based on the number of days during fiscal year 2019 during which EXECUTIVE remained employed with Entegris (excluding any period during which EXECUTIVE may serve as a consultant). This pro-rata bonus will be paid at the same time that Entegris pays such bonuses to current Entegris employees, which Entegris anticipates will be in February 2020.

(d.) Entegris shall continue to pay the employer share of EXECUTIVE's currently elected dental insurance benefits, equal to the share of the premium paid by Entegris for active employees with similar or the same coverage, through December 31, 2019, after which EXECUTIVE will be offered COBRA continuation coverage. If enrolled, Entegris will pay the share of the premiums for dental insurance coverage to the same extent it was paying such premiums on EXECUTIVE'S behalf immediately prior to the Separation Date through December 31, 2019. EXECUTIVE is responsible for the full, unsubsidized COBRA premium beginning January 1, 2020.

3. Accrued Payments -- EXECUTIVE will receive pay for the following: (A) EXECUTIVE'S base salary to the extent not previously paid prior to the Separation Date; (B) reimbursement for any unreimbursed business expenses properly incurred by EXECUTIVE in accordance with Entegris policy prior to the Separation Date and properly submitted for reimbursement within sixty (60) days following the Separation Date; (C) such reimbursements and benefits under Entegris' benefit plans, if any, to which EXECUTIVE became entitled prior to the Separation Date, as determined in accordance with Entegris' benefit plans and policies. EXECUTIVE acknowledges that EXECUTIVE will receive payment for these accrued rights within thiry (30) days following the Separation Date whether or not EXECUTIVE signs the release in Paragraph 4.

4. Release -- In exchange for the benefits provided EXECUTIVE under Paragraph 2 of this Agreement, which EXECUTIVE acknowledges that he would not otherwise be entitled, on EXECUTIVE'S own behalf and that of his or her heirs, executors, administrators, beneficiaries, fiduciaries, personal representatives and assigns, EXECUTIVE hereby fully, forever, irrevocably and unconditionally released, remises and discharges Entegris, its

affiliates, subsidiaries, parent companies, predecessors, and successors, and all of their respective past and present officers, directors, stockholders, partners, members, employees, agents, representatives, plan administrators, attorneys, insurers and fiduciaries (each in their individual and corporate capacities) (collectively, the "Released Parties") from any and all claims, charges, complaints, demands, actions, causes of action, suits, rights, debts, sums of money, costs, accounts, reckonings, covenants, contracts, agreements, promises, doings, omissions, damages, executions, obligations, liabilities, and expenses (including attorneys' fees and costs), of every kind and nature that EXECUTIVE ever had or now has against any or all of the Released Parties, whether known or unknown, of any kind or description, including without limitation any causes or action, rights or claims in any way related to, connected with or arising out of EXECUTIVE's employment or its termination or pursuant to Title VII of the Civil Rights Act of 1964, the Civil Rights Act of 1991, the Age Discrimination in Employment Act of 1967 (ADEA), the Civil Rights Act of 1866; the Americans with Disabilities Act; the Family and Medical Leave Act, the Fair Credit Reporting Act, the Genetic Information Nondiscrimination Act, Section 211 of the Energy Reorganization Act, the Older Workers Benefit Protection Act of 1990, the Employee Retirement Income Security Act of 1974, the Pregnancy Discrimination Act, the Equal Pay Act of 1963, all as amended; all claims arising out of the Massachusetts Fair Employment Practices Act, Mass. Gen. Laws ch. 151B, § 1 et seq., the Massachusetts Wage Act, Mass. Gen. Laws ch. 149, § 148 et seq. (Massachusetts law regarding payment of wages and overtime), the Massachusetts Civil Rights Act, Mass. Gen. Laws ch. 12, §§ 11H and 11I, the Massachusetts Equal Rights Act, Mass. Gen. Laws. ch. 93, § 102 and Mass. Gen. Laws ch. 214, § 1C, the Massachusetts Labor and Industries Act, Mass. Gen. Laws ch. 149, § 1 et seq., Mass. Gen. Laws ch. 214, § 1B (Massachusetts right of privacy law), the Massachusetts Maternity Leave Act, Mass. Gen. Laws ch. 149, § 105D, and the Massachusetts Small Necessities Leave Act, Mass. Gen. Laws ch. 149, § 52D, all as amended; the fair employment practices statutes of the state or states in which EXECUTIVE has provided services to Entegris or any predecessor corporation or any other federal, state or local law, regulation or other requirement; all common law claims including, but not limited to, actions in defamation, intentional infliction of emotional distress, misrepresentation, fraud, wrongful discharge, and breach of contract; all claims to any non-vested ownership interest in Entegris, contractual or otherwise; all state and federal whistleblower claims to the maximum extent permitted by law; and any claim or damage arising out of EXECUTIVE's employment with and/or separation from Entegris (including a claim for retaliation) under any common law theory or any federal, state or local statute or ordinance not expressly referenced above.

EXECUTIVE acknowledges and understands that this is a general release and by signing this Agreement, he is giving up EXECUTIVE's rights to file any claim in court, to have EXECUTIVE's claims heard by a jury or judge, and to seek and/or receive any form of compensation from any Released Party arising from his/her employment or separation from employment.

EXECUTIVE further acknowledges that this Agreement does not prohibit EXECUTIVE from, or limit EXECUTIVE's rights in connection with: (i) filing a charge, claim or complaint with the Equal Employment Opportunity Commission (EEOC), the state fair employment practices agency where employee worked (FEP agency), or any other state or federal agency, (ii) participating in or cooperating with any investigation or proceeding conducted by, or communicating with, the EEOC, FEP agency or any other federal, state or local governmental agency, or (iii) filing any claims that cannot be released or waived by law. By signing this release EXECUTIVE is waiving rights to individual monetary recovery from any Released Party based on claims asserted in such a charge or complaint; provided, however, that nothing herein limits EXECUTIVE's right to receive an award from a government agency for information provided to such agency.

5. Acknowledgement of Full Payment -- EXECUTIVE acknowledges and agrees that the payments provided under Paragraph 2 of this Agreement (other than payment of expenses) are in complete satisfaction of any and all compensation due to EXECUTIVE from Entegris, whether for services provided to Entegris or otherwise, through the Separation Date and that, except as expressly provided under this Agreement, no further compensation is owed to EXECUTIVE.

6. Review and Rescission Periods -- EXECUTIVE acknowledges that he has been provided a period of up to twenty-one (21) days in which to consider this Agreement. Once this Agreement is executed, EXECUTIVE may rescind the Agreement, within seven (7) calendar days following the date of signature. To be effective, any rescission within the relevant time periods must be in writing and delivered to Entegris in care of the General Counsel. If sent by mail, any rescission must be postmarked within the relevant time period, must be properly addressed, and must be sent by certified mail, return receipt requested. The benefits described in Paragraph 2 shall not commence or be provided to Executive until this Agreement becomes effective. If EXECUTIVE does not rescind this Agreement, then, at the expiration of such seven (7) day period, this Agreement will take effect as a legally-binding agreement between EXECUTIVE and Entegris on the basis set forth above.

7. Continuing Obligations -- EXECUTIVE acknowledges and reaffirms EXECUTIVE's confidentiality and non-disclosure obligations not to use or disclose any and all non-public information concerning Entegris that EXECUTIVE acquired during the course of EXECUTIVE's employment with Entegris, including any non-public information concerning Entegris' business affairs, business prospects, and financial condition, except as otherwise permitted by Paragraph 10 below.

8. Non-Admission -- Nothing in this Agreement is intended to be nor will it be used as an admission of liability by either party that there has been any violation of state or federal law, employment practice or any other matter.

9. Non-Disparagement -- EXECUTIVE agrees that, to the extent permitted by law and except as otherwise permitted by Paragraph 10 below, EXECUTIVE will not, in public or private, make any false, disparaging, derogatory or defamatory statements, online (including, without limitation, on any social media, networking, or employer review site) or otherwise,

to any person or entity, including, but not limited to, any media outlet, industry group, financial institution or current or former employee, board member, consultant, client or customer of Entegris, regarding Entegris or any of the other Released Parties, or regarding the Entegris' business affairs, business prospects, or financial condition.

10. Scope of Disclosure Restrictions -- Regardless of whether or not this Agreement becomes binding, nothing in this Agreement or elsewhere prohibits EXECUTIVE from communicating with government agencies about possible violations of federal, state, or local laws or otherwise providing information to government agencies or participating in government agency investigations or proceedings. EXECUTIVE is not required to notify Entegris of any such communications; provided, however, that nothing herein authorizes the disclosure of information EXECUTIVE obtained through a communication that was subject to the attorney-client privilege. Further, notwithstanding EXECUTIVE's confidentiality and nondisclosure obligations, EXECUTIVE is hereby advised as follows pursuant to the Defend Trade Secrets Act: "An individual shall not be held criminally or civilly liable under any Federal or State trade secret law for the disclosure of a trade secret that (A) is made (i) in confidence to a Federal, State, or local government official, either directly or indirectly, or to an attorney; and (ii) solely for the purpose of reporting or investigating a suspected violation of law; or (B) is made in a complaint or other document filed in a lawsuit or other proceeding, if such filing is made under seal. An individual who files a lawsuit for retaliation by an employer for reporting a suspected violation of law may disclose the trade secret to the attorney of the individual and use the trade secret information in the court proceeding, if the individual (A) files any document containing the trade secret under seal; and (B) does not disclose the trade secret, except pursuant to court order."

11. Return of Entegris Documents and Other Property -- In signing this Agreement, EXECUTIVE represents and warrants that, as of the Separation Date, EXECUTIVE has returned to Entegris any and all documents, materials and information (whether in hardcopy, on electronic media or otherwise) related to business of Entegris or any of its affiliates and all keys, access cards, credit cards, laptops, computer hardware and software, storage devices (flash drives, thumb drives, etc.), tablets, smartphones, telephones and telephone-related equipment and all other property of Entegris and its affiliates in his/her possession or control. Further, EXECUTIVE represents and warrants that EXECUTIVE has not retained any copy of any documents, materials or information of Entegris or any of its affiliates (whether in hardcopy, on electronic media or otherwise). Recognizing that his/her employment with Entegris has ended, EXECUTIVE agrees that EXECUTIVE will not, for any purpose, attempt to access or use any Entegris computer or computer network or system. Further, EXECUTIVE acknowledges that he has disclosed to Entegris all passwords necessary or desirable to enable Entegris to access all information which EXECUTIVE has password-protected on any of its computer equipment or on its computer network or system.

12. Non-Compete -- EXECUTIVE acknowledges that during the course of employment with Entegris, EXECUTIVE had access to confidential information, which, if disclosed, would assist

in competition against Entegris, and agrees to the following restrictions to protect the goodwill, confidential information and other legitimate interests of Entegris:

EXECUTIVE agrees that, during the period from the Separation Date through August 30, 2020, EXECUTIVE will not, directly or indirectly, whether as owner, partner, investor, consultant, agent, employee, co-venturer or otherwise, compete with Entegris within the United States or in any other country in which Entegris was doing business, or planning to do business, as of the Separation Date. Specifically, but without limiting the foregoing, EXECUTIVE agrees not to work or provide services, in any capacity, whether as an employee, independent contractor or otherwise, whether with or without compensation, to any person or entity, that is engaged in any business that is competitive with the business of Entegris, as conducted or in planning during EXECUTIVE'S employment with Entegris, unless Entegris agrees, in advance and in writing, signed by an expressly authorized representative of Entegris, to EXECUTIVE'S working or providing services for a specified Person. Entegris will so agree provided that it determines, in its sole discretion that EXECUTIVE'S acceptance of a position with such person or provision of such work or services will not result in the use or disclosure of confidential information. EXECUTIVE agrees that Entegris' consent shall be acquired prior to accepting any such position or commencing any business activity, which could be inconsistent with EXECUTIVE'S obligations under this Agreement. EXECUTIVE agrees to provide Entegris with all information that it may reasonably request in order to make a determination as contemplated hereunder.

13. Breach -- In the event of a breach of any of lawful provision of the Agreement by EXECUTIVE, Entegris will be entitled to cease making any payments described in Paragraph 2 and to terminate any unvested performance restricted stock units and stock options. Such a breach will result in the disgorgement of the payments and benefits described in Paragraph 2 of this Agreement by EXECUTIVE, in addition to any and all other rights or remedies Entegris may have at law or in equity (including, with respect to a breach of Paragraphs 9 or 12, injunctive relief); provided, however, that for purposes of this Paragraph 13, EXECUTIVE's challenge to the validity of an ADEA waiver shall not constitute a breach of this Agreement.

14. Governing Law -- This Agreement will be construed and interpreted in accordance with the laws of the Commonwealth of Massachusetts and may be pleaded as a full and complete defense to any action, suit, or proceeding relating to EXECUTIVE's employment with Entegris.

15. Other Provisions -- A waiver of any breach of or failure to comply fully with any provision of this Agreement by either party shall not operate or be construed as a waiver of any subsequent breach thereof or failure to comply. If any portion or provision of this Agreement shall to any extent be deemed invalid or unenforceable, the remainder of this Agreement shall not be affected thereby and each portion and provision of this Agreement shall be valid and enforceable to the fullest extent permitted. To avoid any possible misunderstanding, Entegris intends this Agreement to be a comprehensive statement of the terms of EXECUTIVE's separation. This Agreement supersedes any prior understanding or statement made to EXECUTIVE by Entegris regarding arrangements with Entegris for the period after EXECUTIVE's separation. Any modifications of the terms set forth in this

Agreement must be in writing and signed by EXECUTIVE and an authorized officer of Entegris.

16. Resignation; Entegris Affiliation -- EXECUTIVE hereby resigns from all positions and offices held by Executive with Entegris and its subsidiaries effective as of the Separation Date and agrees to execute all such other documents and form in connection with EXECUTIVE'S resignation as may be requested by Entegris. EXECUTIVE agrees that, following the Separation Date, EXECUTIVE will not hold himself/herself out as an officer, employee, or otherwise as a representative of Entegris.

17. Cooperation -- EXECUTIVE agrees that, to the extent permitted by law, EXECUTIVE shall cooperate fully with Entegris in the investigation, defense or prosecution of any claims or actions which already have been brought, are currently pending, or which may be brought in the future against Entegris by a third party or by or on behalf of Entegris against any third party, whether before a state or federal court, any state or federal government agency, or a mediator or arbitrator. EXECUTIVE's full cooperation in connection with such claims or actions shall include, but not be limited to, being available to meet with Entegris' counsel, at reasonable times and locations designated by Entegris, to investigate or prepare Entegris' claims or defenses, to prepare for trial or discovery or an administrative hearing, mediation, arbitration or other proceeding and to act as a witness when requested by Entegris. EXECUTIVE further agrees that, to the extent permitted by law, EXECUTIVE will notify Entegris promptly in the event that EXECUTIVE is served with a subpoena (other than a subpoena issued by a government agency), or in the event that EXECUTIVE is asked to provide a third party (other than a government agency) with information concerning any actual or potential complaint or claim against Entegris.

18. Consulting Period – Commencing on the Separation Date and ending on December 31, 2019 (the "Consulting Term"), EXECUTIVE will provide services to Entegris as a consultant, reporting to members of the Executive Leadership Team of Entegris. EXECUTIVE agrees to be available to perform EXECUTIVE'S consulting services during normal business hours, at times and on schedules that reasonably accommodate EXECUTIVE'S other personal or business activities. During the Consulting Term, EXECUTIVE shall receive a monthly consulting fee equal to $39,333.25 (the "Consulting Fee"), payable in cash in arrears, with the first payment for the month of September, 2019 to be paid in October, 2019. During the Consulting Term, (a) EXECUTIVE will not be entitled to participate in any compensation and benefit plans, programs and arrangements of Entegris and its subsidiaries, and EXECUTIVE will not make any claim of entitlement under any such plan, program or arrangement on the basis of providing the consulting services; provided that this does not supersede or otherwise affect EXECUTIVE'S right to continued medical, dental or group health benefits following the Separation Date pursuant to COBRA or as otherwise set forth herein, (b) EXECUTIVE will operate at all times as an independent contractor of Entegris and nothing herein shall be construed as creating an employer/employee relationship and (c) as an independent contractor, notwithstanding anything herein to the contrary, EXECUTIVE will be responsible for the payment of all taxes required to be paid with respect to the

Consulting Fee, as Entegris cannot withhold or remit tax payments for its independent contractors.

19. Voluntary Assent -- **This Agreement, including the release of claims set forth above, creates legally binding obligations and Entegris advises EXECUTIVE to consult an attorney before signing this Agreement.** In signing this Agreement, EXECUTIVE gives Entegris assurance that EXECUTIVE has signed it voluntarily and with a full understanding of its terms; that EXECUTIVE has had sufficient opportunity, before signing this Agreement, to consider its terms and has been advised to consult with an attorney, if EXECUTIVE wished to do so, and that, in signing this Agreement, EXECUTIVE has not relied on any promises or representations, express or implied, that are not set forth expressly in this Agreement.

20. Tax Acknowledgment -- In connection with the benefits provided to EXECUTIVE pursuant to this Agreement, Entegris shall withhold and remit to the tax authorities the amounts required under applicable law, and EXECUTIVE shall be responsible for all applicable taxes with respect to such benefits under applicable law. EXECUTIVE acknowledges that he is not relying upon the advice or representation of Entegris with respect to the tax treatment of any of the benefits set forth in this Agreement.

21. Expiration -- This Agreement must be signed and returned to Entegris no later than September 23, 2019, but no earlier than the Separation Date. If EXECUTIVE does not sign and return the Agreement by such date, the Agreement shall expire.

[*The remainder of the page has intentionally been left blank.*]

IN WITNESS WHEREOF, the parties hereto have executed this Agreement on the dates indicated below with the understanding it is to take effect when signed by both parties.

Date: 8/27/2019	/s/ Gregory Marshall Gregory Marshall
Date: 8/27/2019	ENTEGRIS, INC. By /s/ Susan Rice Title Susan Rice, SVP, HR

Exhibit 31.1

CERTIFICATIONS

I, Bertrand Loy, certify that:

1. I have reviewed this Report on Form 10-Q of Entegris, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects, the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

(c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: October 24, 2019	/s/ Bertrand Loy
	Bertrand Loy
	Chief Executive Officer
	(Principal Executive Officer)

Exhibit 31.2

CERTIFICATIONS

I, Gregory B. Graves, certify that:

1. I have reviewed this Report on Form 10-Q of Entegris, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects, the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: October 24, 2019

/s/ Gregory B. Graves

Gregory B. Graves
Chief Financial Officer
(Principal Financial Officer)

EXHIBIT 32.1

CERTIFICATION 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 (the "Report") of Entegris, Inc, a Delaware corporation (the "Company"), for the period ended September 28, 2019 as filed with the Securities and Exchange Commission on the date hereof, Bertrand Loy, President and Chief Executive Officer of the Company, and Gregory B. Graves, Chief Financial Officer of the Company, each hereby certify pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002 that:

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

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

Date: October 24, 2019

/s/ Bertrand Loy

Bertrand Loy
Chief Executive Officer

/s/ Gregory B. Graves

Gregory B. Graves
Chief Financial Officer