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 AND EXCHANGE ACT OF 1934
For the quarterly period ended March 30, 2019

or

☐ TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES AND EXCHANGE ACT OF 1934
For the transition period from __________ to __________

Commission File Number: 000-02382

MTS SYSTEMS CORPORATION

(Exact name of Registrant as specified in its charter)

Minnesota	**41-0908057**
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)
14000 Technology Drive Eden Prairie, Minnesota	**55344**
(Address of principal executive offices)	(Zip Code)

Registrant's telephone number, including area code: (952) 937-4000

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 and post such files). ☒ Yes ☐ No

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

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

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, $0.25 par value	MTSC	The Nasdaq Stock Market LLC

As of May 2, 2019, there were 17,954,477 shares of common stock outstanding.

MTS Systems Corporation
Quarterly Report on Form 10-Q
For the Three Months Ended March 30, 2019

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PART I – FINANCIAL INFORMATION
Item 1. Financial Statements

MTS SYSTEMS CORPORATION
Consolidated Balance Sheets
(in thousands, except per share data)

	March 30, 2019		September 29, 2018	
	(Unaudited)		(Note)	
Assets				
Current assets				
Cash and cash equivalents	$	74,122	$	71,804
Accounts receivable, net of allowance for doubtful accounts of $5,277 and $5,004, respectively		117,349		122,243
Unbilled accounts receivable, net		71,175		70,474
Inventories, net		179,071		139,109
Prepaid expenses and other current assets		32,307		24,572
Total current assets		474,024		428,202
Property and equipment, net		88,126		90,269
Goodwill		403,425		369,275
Intangible assets, net		287,101		246,138
Other long-term assets		3,900		2,263
Deferred income taxes		4,058		3,249
Total assets	$	1,260,634	$	1,139,396
Liabilities and Shareholders' Equity				
Current liabilities				
Current maturities of long-term debt, net	$	28,076	$	32,738
Accounts payable		39,941		47,886
Accrued payroll and related costs		39,181		43,554
Advance payments from customers		102,033		80,131
Accrued warranty costs		4,741		5,418
Accrued income taxes		5,709		4,928
Accrued dividends		5,328		5,312
Other accrued liabilities		34,494		19,146
Total current liabilities		259,503		239,113
Long-term debt, less current maturities, net		436,344		355,640
Deferred income taxes		50,659		46,482
Non-current accrued income taxes		6,985		6,158
Defined benefit pension plan obligation		9,581		9,177
Other long-term liabilities		12,508		4,894
Total liabilities		775,580		661,464
Shareholders' Equity				
Common stock, $0.25 par value; 64,000 shares authorized: 17,900 and 17,856 shares issued and outstanding as of March 30, 2019 and September 29, 2018, respectively		4,475		4,464
Additional paid-in capital		176,918		171,407
Retained earnings		308,279		300,585
Accumulated other comprehensive income (loss)		(4,618)		1,476
Total shareholders' equity		485,054		477,932
Total liabilities and shareholders' equity	$	1,260,634	$	1,139,396

Note: The Consolidated Balance Sheet as of September 29, 2018 has been derived from the audited consolidated financial statements at that date.

The accompanying Notes to Consolidated Financial Statements (Unaudited) are an integral part of these consolidated financial statements.

MTS SYSTEMS CORPORATION
Consolidated Statements of Income (Unaudited)
(in thousands, except per share data)

	Three Months Ended		Six Months Ended	
	March 30, 2019	March 31, 2018	March 30, 2019	March 31, 2018
Revenue				
Product	$ 206,690	$ 165,453	$ 381,769	$ 334,694
Service	26,356	25,870	54,458	50,791
Total revenue	233,046	191,323	436,227	385,485
Cost of Sales				
Product	129,579	101,133	237,746	201,627
Service	16,117	15,365	32,826	31,105
Total cost of sales	145,696	116,498	270,572	232,732
Gross profit	87,350	74,825	165,655	152,753
Operating expenses				
Selling and marketing	33,395	30,597	65,484	62,625
General and administrative	22,105	18,992	43,183	39,554
Research and development	7,676	8,626	14,848	17,467
Total operating expenses	63,176	58,215	123,515	119,646
Income from operations	24,174	16,610	42,140	33,107
Interest expense, net	(7,368)	(6,708)	(14,186)	(13,512)
Other income (expense), net	270	274	319	51
Income before income taxes	17,076	10,176	28,273	19,646
Income tax provision (benefit)	2,916	1,738	3,612	(21,943)
Net income	$ 14,160	$ 8,438	$ 24,661	$ 41,589
Earnings per share				
Basic				
Earnings per share	$ 0.74	$ 0.44	$ 1.28	$ 2.17
Weighted average common shares outstanding	19,251	19,150	19,234	19,137
Diluted				
Earnings per share	$ 0.73	$ 0.44	$ 1.27	$ 2.16
Weighted average common shares outstanding	19,441	19,273	19,393	19,258
Dividends declared per share	$ 0.30	$ 0.30	$ 0.60	$ 0.60

The accompanying Notes to Consolidated Financial Statements (Unaudited) are an integral part of these consolidated financial statements.

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MTS SYSTEMS CORPORATION

Consolidated Statements of Comprehensive Income (Unaudited)

(in thousands)

	Three Months Ended		Six Months Ended	
	March 30, 2019	March 31, 2018	March 30, 2019	March 31, 2018
Net income	$ 14,160	$ 8,438	$ 24,661	$ 41,589
Other comprehensive income (loss), net of tax				
Foreign currency translation gain (loss) adjustments	(1,168)	5,172	(2,671)	7,671
Derivative instruments				
Unrealized net gain (loss)	(392)	240	(1,808)	1,270
Net (gain) loss reclassified to earnings	(567)	687	(1,481)	790
Defined benefit pension plan				
Unrealized net gain (loss)	959	(641)	(586)	(271)
Net (gain) loss reclassified to earnings	95	95	191	186
Currency exchange rate gain (loss)	146	(181)	261	(268)
Other comprehensive income (loss)	(927)	5,372	(6,094)	9,378
Comprehensive income (loss)	$ 13,233	$ 13,810	$ 18,567	$ 50,967

The accompanying Notes to Consolidated Financial Statements (Unaudited) are an integral part of these consolidated financial statements.

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MTS SYSTEMS CORPORATION
Consolidated Statements of Shareholders' Equity (Unaudited)
(in thousands)

	Three Months Ended March 30, 2019					
	Common Stock					
	Shares Issued	Amount	Additional Paid-In Capital	Retained Earnings	Accumulated Other Comprehensive Income (Loss)	Total Shareholders' Equity
Balance, December 29, 2018	17,872	$ 4,468	$ 173,065	$ 299,493	$ (3,691)	$ 473,335
Total comprehensive income	—	—	—	14,160	(927)	13,233
Exercise of stock options	3	1	105	—	—	106
Stock-based compensation	10	2	3,237	—	—	3,239
Issuance for employee stock purchase plan	16	4	553	—	—	557
Common stock purchased and retired	(1)	—	(42)	—	—	(42)
Dividends, $0.30 per share	—	—	—	(5,374)	—	(5,374)
Balance, March 30, 2019	17,900	$ 4,475	$ 176,918	$ 308,279	$ (4,618)	$ 485,054

	Six Months Ended March 30, 2019					
	Common Stock					
	Shares Issued	Amount	Additional Paid-In Capital	Retained Earnings	Accumulated Other Comprehensive Income (Loss)	Total Shareholders' Equity
Balance, September 29, 2018	17,856	$ 4,464	$ 171,407	$ 300,585	$ 1,476	$ 477,932
Total comprehensive income	—	—	—	24,661	(6,094)	18,567
Cumulative effect of accounting change	—	—	—	(6,227)	—	(6,227)
Exercise of stock options	3	1	143	—	—	144
Stock-based compensation	33	8	5,211	—	—	5,219
Issuance for employee stock purchase plan	16	4	553	—	—	557
Common stock purchased and retired	(8)	(2)	(396)	—	—	(398)
Dividends, $0.60 per share	—	—	—	(10,740)	—	(10,740)
Balance, March 30, 2019	17,900	$ 4,475	$ 176,918	$ 308,279	$ (4,618)	$ 485,054

	Three Months Ended March 31, 2018					
	Common Stock		Additional Paid-In Capital	Retained Earnings	Accumulated Other Comprehensive Income (Loss)	Total Shareholders' Equity
	Shares Issued	Amount				
Balance, December 30, 2017	17,780	$ 4,445	$ 164,577	$ 289,105	$ 3,453	$ 461,580
Total comprehensive income	—	—	—	8,438	5,372	13,810
Stock-based compensation	—	—	1,663	—	—	1,663
Issuance for employee stock purchase plan	12	3	530	—	—	533
Common stock purchased and retired	—	—	(13)	—	—	(13)
Dividends, $0.30 per share	—	—	—	(5,343)	—	(5,343)
Balance, March 31, 2018	17,792	$ 4,448	$ 166,757	$ 292,200	$ 8,825	$ 472,230

	Six Months Ended March 31, 2018					
	Common Stock		Additional Paid-In Capital	Retained Earnings	Accumulated Other Comprehensive Income (Loss)	Total Shareholders' Equity
	Shares Issued	Amount				
Balance, September 30, 2017	17,760	$ 4,440	$ 163,632	$ 261,258	$ (553)	$ 428,777
Total comprehensive income	—	—	—	41,589	9,378	50,967
Cumulative effect of accounting change	—	—	(33)	33	—	—
Exercise of stock options	4	1	211	—	—	212
Stock-based compensation	30	7	3,171	—	—	3,178
Issuance for employee stock purchase plan	12	3	530	—	—	533
Common stock purchased and retired	(14)	(3)	(754)	—	—	(757)
Dividends, $0.60 per share	—	—	—	(10,680)	—	(10,680)
Balance, March 31, 2018	17,792	$ 4,448	$ 166,757	$ 292,200	$ 8,825	$ 472,230

The accompanying Notes to Consolidated Financial Statements (Unaudited) are an integral part of these consolidated financial statements.

MTS SYSTEMS CORPORATION
Consolidated Statements of Cash Flows (Unaudited)
(in thousands)

	Six Months Ended	
	March 30, 2019	March 31, 2018
Cash Flows from Operating Activities		
Net income	$ 24,661	$ 41,589
Adjustments to reconcile net income to net cash provided by (used in) operating activities		
Stock-based compensation	4,689	3,290
Fair value adjustment to acquired inventory	984	—
Net periodic pension benefit cost	584	597
Depreciation and amortization	18,468	17,348
(Gain) loss on sale or disposal of property and equipment	510	159
Amortization of debt issuance costs	2,099	2,626
Deferred income taxes	(1,243)	(30,654)
Bad debt provision (recovery), net	503	1,201
Other	—	(111)
Changes in operating assets and liabilities		
Accounts receivable and unbilled accounts receivable	(3,763)	24,174
Inventories, net	(12,942)	(14,441)
Prepaid expenses	(4,106)	(2,374)
Accounts payable	(10,378)	(901)
Accrued payroll and related costs	(5,629)	(11,921)
Advance payments from customers	4,653	5,891
Accrued warranty costs	(671)	157
Other assets and liabilities	12,250	628
Net Cash Provided by (Used in) Operating Activities	30,669	37,258
Cash Flows from Investing Activities		
Purchases of property and equipment	(9,349)	(5,368)
Proceeds from sale of property and equipment	10	69
Purchases of business, net of acquired cash	(81,826)	—
Other	(285)	823
Net Cash Provided by (Used in) Investing Activities	(91,450)	(4,476)
Cash Flows from Financing Activities		
Proceeds from issuance of long-term debt	80,391	—
Payment of long-term debt	(1,423)	(45,949)
Payment of debt component of tangible equity units	(4,818)	(4,498)
Payment of debt issuance costs for revolving credit facility	(542)	—
Receipts under short-term borrowings	30,000	7,750
Payments under short-term borrowings	(30,000)	(7,750)
Cash dividends	(10,724)	(10,667)
Proceeds from exercise of stock options and employee stock purchase plan	701	745
Payments to purchase and retire common stock	(398)	(757)
Net Cash Provided by (Used in) Financing Activities	63,187	(61,126)
Effect of Exchange Rate Changes on Cash and Cash Equivalents	(88)	3,989
Cash and Cash Equivalents		
Increase (decrease) during the period	2,318	(24,355)
Balance, beginning of period	71,804	108,733
Balance, end of period	$ 74,122	$ 84,378
Supplemental Disclosures		
Cash paid during the period for		
Interest	$ 12,065	$ 11,314
Income taxes	6,280	4,954
Non-cash investing and financing activities		
Dividends declared not yet paid	5,328	5,291

The accompanying Notes to Consolidated Financial Statements (Unaudited) are an integral part of these consolidated financial statements.

MTS SYSTEMS CORPORATION
Notes to Consolidated Financial Statements (Unaudited)
(Dollars and shares in thousands, unless otherwise noted)

NOTE 1 BASIS OF PRESENTATION

The consolidated financial statements include the accounts of MTS Systems Corporation and its wholly owned subsidiaries. Significant intercompany account balances and transactions have been eliminated.

The terms "MTS," "we," "us," "the Company" or "our" in this Quarterly Report on Form 10-Q, unless the context otherwise requires, refer to MTS Systems Corporation and its wholly owned subsidiaries.

We have prepared the interim unaudited consolidated financial statements included herein pursuant to the rules and regulations of the United States (U.S.) Securities and Exchange Commission (SEC). The information furnished in these consolidated financial statements includes normal recurring adjustments and reflects all adjustments that are, in our opinion, necessary for a fair presentation of such financial statements. The consolidated financial statements are prepared in accordance with U.S. Generally Accepted Accounting Principles (GAAP). GAAP requires us to make estimates and assumptions that affect amounts reported. Certain information and footnote disclosures normally included in financial statements prepared in accordance with GAAP have been condensed or omitted pursuant to SEC rules and regulations. The accompanying consolidated financial statements should be read in conjunction with the audited consolidated financial statements and notes thereto included in our Annual Report on Form 10-K for the fiscal year ended September 29, 2018 filed with the SEC. Interim results of operations for the second fiscal quarter ended March 30, 2019 are not necessarily indicative of the results to be expected for the full fiscal year.

We have a 5-4-4 week, quarterly accounting cycle with our fiscal year ending on the Saturday closest to September 30. Fiscal year 2019 ending on September 28, 2019 will consist of 52 weeks. Fiscal year 2018 ended on September 29, 2018 and consisted of 52 weeks.

Changes to Significant Accounting Policies

The following accounting policies have been updated since our fiscal year 2018 Annual Report on Form 10-K.

Revenue Recognition
As described in Note 2, we adopted Accounting Standards Update (ASU) No. 2014-09, *Revenue from Contracts with Customers (Topic 606),* followed by related amendments on September 30, 2018 under the modified retrospective transition method. Our new revenue recognition accounting policy and disclosures relative to this guidance are included in Note 3.

NOTE 2 RECENTLY ISSUED ACCOUNTING PRONOUNCEMENTS

Leases
In February 2016, the Financial Accounting Standards Board (FASB) issued ASU No. 2016-02, *Leases (Topic 842),* followed by related amendments (collectively, "the new lease standard"), which requires lessees to recognize most leases on the balance sheet for the rights and obligations created by those leases. Under the new lease standard, a company recognizes a right-of-use asset, representing the right to use the underlying asset for the lease term, and a corresponding lease liability for all leases with terms greater than 12 months. The new guidance requires enhanced disclosures regarding the amount, timing and uncertainty of cash flows arising from a company's leases. Adoption of the new lease standard is required for annual periods beginning after December 15, 2018, including interim periods within that annual period, which is our fiscal year 2020. The new guidance is required to be adopted using a modified retrospective transition method, and an optional transition method may be elected to use the effective date as the date of initial application on transition.

We intend to adopt the new lease standard for our fiscal year 2020 under the optional transition method with an effective date of September 29, 2019. As a result, we will not adjust our comparative period financial information or make the new required lease disclosures for periods before the effective date, and we will record the impact from adoption as a cumulative-effect reduction to retained earnings as of the effective date. We are currently planning to elect the package of practical expedients to not reassess prior conclusions related to contracts containing leases, lease classification and initial direct costs, and we are currently evaluating the other practical expedients available under the new guidance. We continue to make progress with preparation for the adoption and implementation of the new lease standard, including assessing the completeness of our lease arrangements, evaluating practical expedients and accounting policy elections, revising our lease-related accounting policies, assessing impacts to controls, and implementing a lease software solution. We anticipate the adoption of the new lease standard will result in an increase in assets and liabilities on our Consolidated Balance Sheet. The impact on our Consolidated Statement of Income and Consolidated Statement of Cash Flows is being evaluated. We continue to evaluate the impact that these changes in methodology will have on our financial condition, results of operations and disclosures.

Other

In June 2016, the FASB issued ASU No. 2016-13, *Financial Instruments—Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments*, which changes the accounting for credit losses on instruments measured at amortized cost by adding an impairment model that is based on expected losses rather than incurred losses. An entity will recognize as an allowance its estimate of expected credit losses, which is believed to result in more timely recognition of such losses as the standard eliminates the probable initial recognition threshold. In November 2018, the FASB issued ASU No. 2018-19, *Codification Improvements to Topic 326, Financial Instruments–Credit Losses*, which clarifies that a receivable arising from an operating lease that is accounted for by a lessor in accordance with Topic 842 is not within the scope of Subtopic 326. These standards are required to be adopted for annual periods beginning after December 15, 2019, including interim periods within that annual period, which is our fiscal year 2021. The amendments are to be applied using a modified retrospective approach as a cumulative-effect adjustment to retained earnings as of the beginning of the first reporting period in which adopted. Early adoption is permitted for annual periods beginning after December 15, 2018, including interim periods within that annual period, which is our fiscal year 2020. We have not yet evaluated the impact the adoption of this guidance may have on our financial condition, results of operations or disclosures.

In August 2018, the FASB issued ASU No. 2018-13, *Fair Value Measurements (Topic 820): Disclosure Framework–Changes to the Disclosure Requirements for Fair Value Measurement*, which eliminates, amends and adds disclosure requirements for fair value measurements. The standard is required to be adopted for annual periods beginning after December 15, 2019, including interim periods within that annual period, which is our fiscal year 2021. Certain disclosures in the amendment are to be applied using a retrospective approach while other disclosures are to be applied using a prospective approach. Early adoption is permitted. We have not yet evaluated the impact the adoption of this guidance may have on our financial condition, results of operations or disclosures.

In August 2018, the FASB issued ASU No. 2018-14, *Compensation–Retirement Benefits–Defined Benefit Plans–General (Subtopic 715-20): Disclosure Framework–Changes to the Disclosure Requirements for Defined Benefit Plans*, which eliminates, amends and adds disclosure requirements for defined benefit pension and other postretirement plans. The standard is required to be adopted for annual periods ending after December 15, 2020, which is our fiscal year 2021. The amendment is to be applied using a retrospective approach with early adoption permitted. We have not yet evaluated the impact the adoption of this guidance may have on our financial condition, results of operations or disclosures.

Adopted

In May 2014, the FASB issued ASU No. 2014-09, *Revenue from Contracts with Customers (Topic 606),* followed by related amendments (collectively, "the new revenue standard" or "ASC 606") to provide a single, comprehensive revenue recognition model for all contracts with customers. Under the new revenue standard, a company recognizes revenue to depict the transfer of promised goods or services to a customer in an amount that reflects the consideration a company expects to receive in exchange for those goods or services. Determination of when and how revenue is recognized is based on a five-step analysis. Enhanced disclosures regarding the nature, amount, timing and uncertainty of revenue and cash flows arising from a company's contracts with customers are required.

We adopted the new revenue standard on September 30, 2018 for our fiscal year 2019 under the modified retrospective transition method. As of September 30, 2018, we recorded a cumulative-effect reduction to the opening balance of our fiscal year 2019 retained earnings of $6,227, net of tax, for the net deferral of previously recognized revenue and related cost of sales, partially offset by the capitalization and deferral of pre-contract costs. The comparative information has not been restated and continues to be reported under the accounting standards in effect for those periods. See Note 3 for our new revenue recognition accounting policy and disclosures relative to this guidance.

In March 2016, the FASB issued ASU No. 2016-04, *Liabilities—Extinguishments of Liabilities (Subtopic 405-20): Recognition of Breakage for Certain Prepaid Stored-Value Products*, which amends existing guidance on extinguishing financial liabilities for certain prepaid stored-value products. The new standard requires recognition of the expected breakage amount or the value that is ultimately not redeemed either proportionally in earnings as redemption occurs or when redemption is remote, if issuers are not entitled to breakage. We adopted the new standard on a modified retrospective basis for the annual period ending September 28, 2019, including interim periods within that annual period. The adoption of this guidance had no impact on our financial condition, results of operations or disclosures.

In October 2016, the FASB issued ASU No. 2016-16, *Income Taxes (Topic 740), Intra-Entity Transfers of Assets Other Than Inventory*, which requires companies to account for the income tax effects of intercompany sales and transfers of assets other than inventory when the transfer occurs. Current guidance requires companies to defer the income tax effects of intercompany transfers of assets until the asset has been sold to an outside party or otherwise recognized. We adopted the new standard on a modified retrospective basis for the annual period ending September 28, 2019, including interim periods within that annual period. The adoption of this guidance had no impact on our financial condition, results of operations or disclosures.

In March 2017, the FASB issued ASU No. 2017-07, *Compensation - Retirement Benefits (Topic 715): Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost,* which changes how employers that sponsor defined benefit pension or other postretirement benefit plans present the net periodic benefit cost in the income statement. The new guidance requires the service cost component of net periodic benefit cost to be presented in the same income statement line items as other employee compensation costs arising from services rendered during the period, with only the service cost component eligible for capitalization in assets. Other components of the net periodic benefit cost are to be stated separately from the line items that include the service cost and outside of operating income. These components are not eligible for capitalization in assets. We adopted the new standard for the annual period ending September 28, 2019, including interim periods within that annual period, retrospectively for the presentation in the income statement of the service cost component and the other components of net periodic pension cost and prospectively for the capitalization in assets of the service cost component of net periodic pension cost. The adoption of this guidance did not have a material impact on our current or prior year financial condition, results of operations or disclosures. Therefore, the comparative information has not been restated and continues to be reported under the accounting standards in effect for those periods.

In August 2017, the FASB issued ASU No. 2017-12, *Derivatives and Hedging (Topic 815): Targeted Improvements to Accounting for Hedging Activities*, which amends the hedge accounting model in Accounting Standards Codification (ASC) 815 to enable entities to better portray the economics of their risk management activities in the financial statements and enhance the transparency and understandability of hedge results. We early adopted the new standard on a modified retrospective basis for the annual period ending September 28, 2019, including interim periods within that annual period. The adoption of this guidance had no impact on our current or prior year financial condition, results of operations or disclosures.

NOTE 3 REVENUE

Adoption
We adopted the new revenue standard on September 30, 2018 for our fiscal year 2019 under the modified retrospective transition method. We applied the new revenue standard to all contracts which were not completed as of the effective date and elected not to apply contract modification guidance retrospectively. As a result of adoption, we recorded a cumulative-effect reduction to the opening balance of our fiscal year 2019 retained earnings of $6,227, net of tax, for the net deferral of previously recognized revenue and related cost of sales, partially offset by the capitalization and deferral of pre-contract costs.

The timing of revenue recognition for the majority of our products and contracts remains substantially unchanged under the new revenue standard, with the exception of certain contracts in our Test & Simulation segment (Test & Simulation). Dependent on contract-specific terms that evidence customer control of the work in process or an enforceable right to payment with no alternative use, certain contracts have a delay in revenue recognition until the customer takes control of the product, while certain contracts accelerate the recognition of revenue over the life of the contract. Under the new revenue standard, certain costs to obtain contracts (i.e., pre-contract costs) are capitalized at contract inception and recognized as revenue is earned. While we do not expect the adoption of the new revenue standard to have a significant impact on annual revenue recognized, our financial condition or results of operations, we do expect that it will have an impact on the timing of revenue recognition in interim periods.

The impact of adopting the new revenue standard on our Consolidated Statements of Income and Consolidated Balance Sheets is as follows:

Consolidated Statements of Income	Three Months Ended March 30, 2019		
	As Reported	Balances without Adoption of ASC 606	Effect of Change
Revenue	$ 233,046	$ 224,665	$ 8,381
Cost of sales	145,696	140,312	5,384
Gross profit	87,350	84,353	2,997
Selling and marketing	33,395	33,239	156
Income tax provision (benefit)	2,916	2,422	494
Net income	14,160	11,813	2,347

	Six Months Ended March 30, 2019		
	As Reported	Balances without Adoption of ASC 606	Effect of Change
Revenue	$ 436,227	$ 423,103	$ 13,124
Cost of sales	270,572	260,732	9,840
Gross profit	165,655	162,371	3,284
Selling and marketing	65,484	65,491	(7)
Income tax provision (benefit)	3,612	3,037	575
Net income	24,661	21,945	2,716

Consolidated Balance Sheets	March 30, 2019		
	As Reported	Balances without Adoption of ASC 606	Effect of Change
Assets			
Accounts receivable, net	$ 117,349	$ 121,678	$ (4,329)
Unbilled accounts receivable, net	71,175	79,819	(8,644)
Inventories, net	179,071	160,914	18,157
Prepaid expenses and other current assets	32,307	28,216	4,091
Other long-term assets	3,900	2,794	1,106
Deferred income taxes	4,058	3,417	641
Liabilities and Shareholders' Equity			
Advance payments from customers	102,033	100,589	1,444
Accrued income taxes	5,709	5,861	(152)
Other accrued liabilities	34,494	20,855	13,639
Deferred income taxes	50,659	51,886	(1,227)
Other long-term liabilities	12,508	11,748	760
Accumulated other comprehensive income (loss)	(4,618)	(4,687)	69
Retained earnings	308,279	311,790	(3,511)

The cumulative effect of the changes made to our September 29, 2018 Consolidated Balance Sheet from the modified retrospective adoption of the new revenue standard is as follows:

Consolidated Balance Sheets

	Balance at September 29, 2018	Adjustments due to ASC 606 Adoption	Balance at September 30, 2018
Assets			
Accounts receivable, net	$ 122,243	$ (4,481)	$ 117,762
Unbilled accounts receivable, net	70,474	(8,002)	62,472
Inventories, net	139,109	16,727	155,836
Prepaid expenses and other current assets	24,572	4,651	29,223
Other long-term assets	2,263	1,060	3,323
Deferred income taxes	3,249	643	3,892
Liabilities and Shareholders' Equity			
Advance payments from customers	80,131	13,568	93,699
Other accrued liabilities	19,146	(2,504)	16,642
Deferred income taxes	46,482	(1,228)	45,254
Other long-term liabilities	4,894	6,989	11,883
Retained earnings	300,585	(6,227)	294,358

Revenue Recognition

Revenue is recognized when control of the promised goods or services is transferred to our customers in an amount that reflects the consideration we expect to be entitled to in exchange for transferring those goods or providing those services. We account for a contract when it has approval and commitment from both parties, the rights of the parties are identified, payment terms are known, the contract has commercial substance and collectability of consideration is probable.

A performance obligation is a promise in a contract to transfer a distinct good or service to the customer and is the unit of account under the new revenue standard. A contract's transaction price is allocated to each distinct performance obligation and recognized as revenue when, or as, the performance obligation is satisfied. Many of our contracts have a single performance obligation as the promise to transfer the individual goods or services is not separately identifiable from other promises in the contracts and, therefore, not distinct. In situations when our contract includes distinct goods or services that are substantially the same and have the same pattern of transfer to the customer over time, they are recognized as a series of distinct goods or services. For contracts with multiple performance obligations, we allocate the contract's transaction price to each performance obligation using our best estimate of the standalone selling price of each distinct good or service in the contract.

We do not adjust the promised amount of consideration for the effects of a significant financing component if we expect, at contract inception, that the period between when we transfer a promised good or service to a customer and when the customer pays for that good or service will be one year or less.

Revenue is recorded net of taxes collected from customers, and taxes collected are recorded as current liabilities until remitted to the relevant government authority. Shipping and handling costs associated with outbound freight after control of a product has transferred are accounted for as a fulfillment cost and are included in cost of sales in the Consolidated Statements of Income.

The following is a description of the product offerings, end markets, typical revenue transactions and payment terms for each of our two reportable segments. See Note 16 for further information on reportable segments.

Test & Simulation

Test & Simulation manufactures and sells equipment and related software and services which are used by customers to characterize a product's mechanical properties or performance. Our solutions simulate forces and motions that customers expect their products to encounter in use or are necessary to properly characterize the product's performance. Primary Test & Simulation markets include transportation, infrastructure, energy, aerospace, materials science, medical, flight training and amusement parks. A typical system is a comprehensive solution which includes a reaction frame to hold the prototype specimen; a hydraulic or electro-mechanical power source; actuators to create the force or motion; and a computer controller with specialized software to coordinate the actuator movement and to measure, record and manipulate results. Our portfolio of Test & Simulation solutions includes standard, configurable testing products; engineered products which combine standard product configurations with a moderate degree of customization per customer specifications; and highly customized, highly engineered testing solutions built to address the customer's unique business need, which can include development of first-of-a-kind technology. To complement our Test & Simulation products, we provide our customers with a spectrum of services to maximize product performance including installation, product life cycle management, professional training, calibration and metrology, technical consulting and onsite and factory repair and maintenance. In addition, we sell a variety of accessories and spare parts. The manufacturing cycle for a typical system ranges from weeks to 12 months, depending on the complexity of the system and the availability of components, and can be up to three years for larger, more complex systems. For certain contracts, the order to revenue cycle may extend beyond the manufacturing cycle, such as when the manufacturing start date is driven by the customer's project timeline or when the contract terms require equipment installation and commissioning and customer acceptance prior to point-in-time revenue recognition.

Test & Simulation contracts often have multiple performance obligations, most commonly due to the contract covering multiple phases of the product life cycle (i.e., equipment design and production, installation and commissioning, extended warranty and software maintenance). The primary method used to estimate standalone selling price is the expected cost plus a margin approach under which we forecast our expected costs of satisfying a performance obligation and then add an appropriate margin for that distinct good or service.

Test & Simulation revenue is recognized either over time as work progresses or point-in-time, depending on contract-specific terms and the pattern of transfer of control of the product or service to the customer. Revenue from services is recognized in the period the service is performed or ratably over the period of the related service contract. Equipment revenue is recognized over time when: (i) control is transferred to the customer over time as work progresses; or (ii) contract terms evidence customer control of the work in process or an enforceable right to payment with no alternative use. Equipment revenue is recognized over time using costs incurred to date relative to total estimated costs at completion to measure progress toward satisfying the performance obligation. Incurred cost represents work performed, which corresponds with, and thereby best depicts, the transfer of control to the customer. Equipment contract costs include materials, component parts, labor and overhead costs.

Equipment revenue is recognized point-in-time when either: (i) control is transferred to the customer at a point-in-time when obligations under the terms of the contract are satisfied; or (ii) contract terms do not evidence customer control of the work in process or an enforceable right to payment with no alternative use, and consequently revenue is deferred as work progresses. Satisfaction of performance obligations under the terms of the contract occurs either upon product shipment (as evidenced by delivery or shipment terms), completion of equipment installation and commissioning, or customer acceptance.

For our Test & Simulation contracts with customers, payment terms vary and are subject to negotiation. Typical payment terms include progress payments based on specified events or milestones. For some contracts, we are entitled to receive an advance payment.

Sensors

Our Sensors segment (Sensors) manufactures and sells high-performance sensors which provide measurements of vibration, pressure, position, force and sound in a variety of applications. Our Sensors products are used to enable automation, enhance precision and safety, and lower our customers' production costs by improving performance and reducing downtime. Primary Sensors markets include automotive, aerospace and defense, industrial, and research and development. Our Sensors products are sold as configurable, standard units; utilize piezoelectric or magnetostriction technology; and are ideal for use in harsh operating environments to provide accurate and reliable sensor information. To complement our Sensors products, we also provide spare parts and services. The cycle from contract inception to shipment of equipment is typically one to three months, with the exception of certain high-volume contracts which are fulfilled in a series of shipments over an extended period.

Our Sensors contracts generally have a single performance obligation which is satisfied at a point in time. The performance obligation is a stand-alone sensor product, accessory, service or software license. Sensors contracts are generally fixed-price purchase order fulfillment contracts, and the transaction price is equal to the observable consideration in the contract. Revenue is recognized when obligations under the terms of the contract with our customer are satisfied; generally this occurs with the transfer of control upon product shipment (as evidenced by shipment or delivery terms) or with the performance of the service.

For our Sensors contracts with customers, payment terms are generally within 90 days. The timing of satisfying our Sensors performance obligations does not vary significantly from the typical timing of payment. For certain high-volume contracts, we are entitled to receive an advance payment.

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Disaggregation of Revenue
We disaggregate our revenue by reportable segment, sales type (product or service), the timing of recognition of revenue for transfer of goods or services to customers (point-in-time or over time), and geographic market based on the billing location of the customer. See Note 16 for further information on our reportable segments and intersegment revenue.

	Three Months Ended March 30, 2019			
	Test & Simulation	Sensors	Intersegment	Total
Sales type				
Product	$ 126,511	$ 80,540	$ (361)	$ 206,690
Service	24,521	1,835	—	26,356
Total revenue	$ 151,032	$ 82,375	$ (361)	$ 233,046
Timing of recognition				
Point-in-time	$ 98,360	$ 82,375	$ (361)	$ 180,374
Over time	52,672	—	—	52,672
Total revenue	$ 151,032	$ 82,375	$ (361)	$ 233,046
Geographic market				
Americas	$ 51,399	$ 38,975	$ (361)	$ 90,013
Europe	29,536	27,653	—	57,189
Asia	70,097	15,747	—	85,844
Total revenue	$ 151,032	$ 82,375	$ (361)	$ 233,046

	Six Months Ended March 30, 2019			
	Test & Simulation	Sensors	Intersegment	Total
Sales type				
Product	$ 225,419	$ 157,040	$ (690)	$ 381,769
Service	51,173	3,285	—	54,458
Total revenue	$ 276,592	$ 160,325	$ (690)	$ 436,227
Timing of recognition				
Point-in-time	$ 177,979	$ 160,325	$ (690)	$ 337,614
Over time	98,613	—	—	98,613
Total revenue	$ 276,592	$ 160,325	$ (690)	$ 436,227
Geographic market				
Americas	$ 90,888	$ 76,704	$ (690)	$ 166,902
Europe	58,163	53,001	—	111,164
Asia	127,541	30,620	—	158,161
Total revenue	$ 276,592	$ 160,325	$ (690)	$ 436,227

Contract Assets and Liabilities
Contract assets and contract liabilities are as follows:

	March 30, 2019	September 29, 2018
Contract assets	$ 71,175	$ 70,474
Contract liabilities	109,763	80,131

The timing of revenue recognition, billings and cash collections results in billed accounts receivable, unbilled accounts receivable (contract assets) and advance payments from customers (contract liabilities). Contract balances are classified as assets or liabilities on a contract-by-contract basis at the end of each reporting period. Contract liabilities represent payments received from customers at contract inception and at milestones per contract provisions. These payments are recorded in advance payments from customers and other long-term liabilities in our Consolidated Balance Sheets (current and non-current portions, respectively) and are liquidated as revenue is recognized. Conversely, when billing occurs subsequent to revenue recognition for contracts recognized over time, balances are recorded in unbilled accounts receivable, net in our Consolidated Balance Sheets. As customers are billed, unbilled accounts receivable balances are transferred to accounts receivable, net in the Consolidated Balance Sheets.

Significant changes in contract assets and contract liabilities are as follows:

		Contract Assets
Balance, September 29, 2018	$	70,474
Cumulative transition adjustment upon adoption		(8,002)
Changes in estimated stage of completion		69,857
Transfers to accounts receivable, net		(62,265)
Acquisitions[1]		1,518
Other		(407)
Balance, March 30, 2019	$	71,175

		Contract Liabilities
Balance, September 29, 2018	$	80,131
Cumulative transition adjustment upon adoption		20,557
Revenue recognized included in balance at beginning of period		(58,947)
Increases due to payments received, excluding amounts recognized as revenue during period		64,121
Acquisitions[1]		4,777
Other		(876)
Balance, March 30, 2019	$	109,763

[1] See Note 18 for additional information regarding acquisitions.

Remaining Performance Obligations
As of March 30, 2019, we had approximately $224,000 of remaining performance obligations on contracts with an original expected duration of one year or more which are primarily related to Test & Simulation. As of March 30, 2019, we expect to recognize approximately 74% of these remaining performance obligations as revenue within one year, an additional 24% within two years and the balance thereafter. We do not disclose the value of remaining performance obligations for contracts with an original expected duration of one year or less.

Contract Estimates
For contracts recognized over time, we estimate the profit on a contract as the difference between the total estimated revenue and expected costs to complete a contract and recognize that profit over the life of the contract. Contract estimates are based on various assumptions to project the outcome of future events that may span several years. These assumptions include labor productivity and availability, the complexity of the work to be performed, the cost and availability of materials, and internal and subcontractor performance.

Pricing is established at or prior to the time of sale with our customers, and we record sales at the agreed-upon selling price. The terms of a contract or the historical business practice can give rise to variable consideration due to but not limited to volume discounts, penalties and early payment discounts. We estimate variable consideration at the most likely amount we will receive from customers. We include estimated amounts in the transaction price to the extent it is probable that a significant reversal of cumulative revenue recognized for such transaction will not occur, or when the uncertainty associated with the variable consideration is resolved. In general, variable consideration in our contracts relates to the entire contract. As a result, the variable consideration is allocated proportionately to all performance obligations. Our estimates of variable consideration and determination of whether to include estimated amounts in the transaction price are based largely on an assessment of our anticipated performance and all information (historical, current and forecasted) that is reasonably available to us at contract inception. There are no significant instances where variable consideration is constrained and not recorded at the initial time of sale.

As a significant change in one or more of these estimates could affect the profitability of our contracts, we review and update our contract-related estimates regularly. We recognize adjustments in estimated profit on contracts under the cumulative catch-up method. Under this method, the impact of the adjustment on profit recorded to date is recognized in the period the adjustment is identified. Revenue and profit in future periods of contract performance is recognized using the adjusted estimate. If at any time the estimate of contract profitability indicates an anticipated loss on the contract, we recognize the total loss in the period it is identified. Our review of contract-related estimates has not resulted in adjustments that are significant to our results of operations.

Contract Modifications
When contracts are modified to account for changes in contract specifications and requirements, we consider whether the modification either creates new, or changes existing, enforceable rights and obligations. Contract modifications that are for goods or services that are not distinct from the existing contract, due to the significant integration with the original product or service provided, are accounted for as if they were part of that existing contract. The effect of a contract modification on the transaction price, and our measure of progress for the performance obligation to which it relates, is recognized as an adjustment to revenue (either as an increase in or a reduction of revenue) on a cumulative catch-up basis. When the modifications include additional performance obligations that are distinct and at a relative stand-alone selling price, they are accounted for as a new contract and performance obligation and recognized prospectively.

Warranties and Returns
For both Test & Simulation and Sensors, we provide a manufacturer's warranty on our products and systems which is included in customer contracts. At the time a sale is recognized, we record estimated future warranty costs. See Note 5 for further discussion of our product warranty liabilities. We also offer separately-priced extended warranties or service-type contracts on certain products for which revenue is recognized over the contractual period or as services are rendered.

Our sales terms generally do not allow for a right of return except for situations where the product fails. When the right of return exists, we recognize revenue for the transferred products at the expected amount of consideration for which we will be entitled.

Pre-contract Costs
We recognize an asset for the incremental costs of obtaining a contract with a customer (i.e., pre-contract costs) when costs are considered recoverable. Capitalized pre-contract costs, consisting primarily of Test & Simulation sales commissions, are amortized as the related revenue is recognized. We recognized total capitalized pre-contract costs of $5,936 in prepaid expenses and other current assets and other long-term assets in the Consolidated Balance Sheets as of March 30, 2019 and related expense of $1,249 and $3,869 in the Consolidated Statements of Income during the three and six months ended March 30, 2019, respectively.

NOTE 4 INVENTORIES

Inventories consist of material, labor and overhead costs and are stated at the lower of cost or net realizable value determined under the first-in, first-out accounting method. Certain inventories are measured using the weighted average cost method. Inventories, net are as follows:

	March 30, 2019	September 29, 2018
Components, assemblies and parts	$ 105,669	$ 93,020
Customer projects in various stages of completion	62,922	35,675
Finished goods	10,480	10,414
Total inventories, net	$ 179,071	$ 139,109

We adopted the new revenue standard effective September 30, 2018 under the modified retrospective transition method which impacted inventories, net. See Note 3 for the impact of this adoption on our Consolidated Balance Sheets.

NOTE 5 WARRANTY OBLIGATIONS

Sales of our products and systems are subject to limited warranty obligations that are included in customer contracts. For sales that include installation services, warranty obligations generally extend for a period of 12 to 24 months from the date of either shipment or acceptance based on the contract terms. Product obligations generally extend for a period of 12 to 24 months from the date of purchase. Certain products offered in our Sensors segment include a lifetime warranty.

Under the terms of these warranties, we are obligated to repair or replace any components or assemblies deemed defective due to workmanship or materials. We reserve the right to reject warranty claims where it is determined that failure is due to normal wear, customer modifications, improper maintenance or misuse. We record general warranty provisions based on an estimated warranty expense percentage applied to current period revenue. The percentage applied reflects our historical warranty claims experience over the preceding 12-month period. Both the experience percentage and the warranty liability are evaluated on an ongoing basis for adequacy. Warranty provisions are also recognized for certain unanticipated product claims that are individually significant.

Changes to accrued warranty costs are as follows:

	Three Months Ended		Six Months Ended	
	March 30, 2019	March 31, 2018	March 30, 2019	March 31, 2018
Beginning accrued warranty costs	$ 5,229	$ 5,832	$ 5,418	$ 6,018
Warranty claims	(1,167)	(1,410)	(2,446)	(2,585)
Warranty provisions	697	1,742	1,791	2,727
Adjustments to preexisting warranties	(15)	14	(15)	14
Currency translation	(3)	13	(7)	17
Ending accrued warranty costs	$ 4,741	$ 6,191	$ 4,741	$ 6,191

NOTE 6 CAPITAL ASSETS

Property and Equipment

Property and equipment, net are as follows:

	March 30, 2019	September 29, 2018
Land and improvements	$ 2,881	$ 2,881
Buildings and improvements	58,692	58,880
Machinery and equipment	210,065	203,647
Assets held under capital leases	2,796	2,815
Total property and equipment	274,434	268,223
Less: Accumulated depreciation	(186,308)	(177,954)
Total property and equipment, net	$ 88,126	$ 90,269

Goodwill

Changes to the carrying amount of goodwill are as follows:

	Test & Simulation	Sensors	Total
Balance, September 29, 2018	$ 24,631	$ 344,644	$ 369,275
Acquisitions [1]	34,387	—	34,387
Currency translation	(208)	(29)	(237)
Balance, March 30, 2019	$ 58,810	$ 344,615	$ 403,425

[1] See Note 18 for additional information regarding acquisitions.

Intangible Assets

Intangible assets are as follows:

	March 30, 2019			
	Gross Carrying Amount	Accumulated Amortization	Net Carrying Value	Weighted Average Useful Life (in Years)
Software development costs [2]	$ 35,297	$ (15,859)	$ 19,438	6.3
Technology and patents	59,055	(14,110)	44,945	14.9
Trademarks and trade names	12,697	(3,442)	9,255	20.7
Customer lists	179,919	(28,831)	151,088	15.7
Land-use rights	2,360	(858)	1,502	26.2
Other	3,705	(332)	3,373	4.0
Trade names	57,500	—	57,500	Indefinite
Total intangible assets	$ 350,533	$ (63,432)	$ 287,101	14.5

	September 29, 2018			
	Gross Carrying Amount	Accumulated Amortization	Net Carrying Value	Weighted Average Useful Life (in Years)
Software development costs [2]	$ 31,251	$ (15,860)	$ 15,391	6.5
Technology and patents	46,405	(12,188)	34,217	14.9
Trademarks and trade names	6,754	(2,987)	3,767	25.4
Customer lists	156,971	(23,314)	133,657	15.8
Land-use rights	2,336	(730)	1,606	26.0
Trade names	57,500	—	57,500	Indefinite
Total intangible assets	$ 301,217	$ (55,079)	$ 246,138	14.8

[2] The gross carrying amount of software development costs as of March 30, 2019 and September 29, 2018 includes $19,438 and $15,391, respectively, of intangible assets not yet placed in service.

Amortization expense recognized related to finite-lived intangible assets is as follows:

	Three Months Ended		Six Months Ended	
	March 30, 2019	March 31, 2018	March 30, 2019	March 31, 2018
Amortization expense	$ 4,403	$ 3,456	$ 8,219	$ 6,935

Estimated future amortization expense related to finite-lived intangible assets is as follows:

	Amortization Expense
Remainder of 2019	$ 8,695
2020	17,108
2021	18,164
2022	19,036
2023	18,139
2024	17,770
Thereafter	130,689

Future amortization amounts presented above are estimates. Actual future amortization expense may be different due to fluctuations in foreign currency exchange rates, future acquisitions, impairments, changes in amortization periods or other factors.

NOTE 7 FAIR VALUE MEASUREMENTS

In determining the fair value of financial assets and liabilities, we currently utilize market data or other assumptions that we believe market participants would use in pricing the asset or liability in the principal or most advantageous market and adjust for non-performance and/or other risk associated with the Company as well as counterparties, as appropriate. When considering market participant assumptions in fair value measurements, the following fair value hierarchy distinguishes between observable and unobservable inputs, which are categorized in one of the following levels:

- **Level 1:** Unadjusted quoted prices that are available in active markets for identical assets or liabilities accessible to us at the measurement date.
- **Level 2:** Inputs other than quoted prices included in Level 1 inputs that are observable for the asset or liability, either directly or indirectly, for substantially the full term of the asset or liability.
- **Level 3:** Unobservable inputs for the asset or liability used to measure fair value to the extent that observable inputs are not available, thereby allowing for situations in which there is little, if any, market activity for the asset or liability at the measurement date.

The hierarchy gives the highest priority to Level 1, as this level provides the most reliable measure of fair value, while giving the lowest priority to Level 3.

Assets and Liabilities Measured at Fair Value on a Recurring Basis
Financial assets and liabilities subject to fair value measurements on a recurring basis are as follows:

	March 30, 2019			
	Level 1	Level 2	Level 3	Total
Assets				
Currency contracts [1]	$ —	$ 411	$ —	$ 411
Interest rate swaps [2]	—	3,684	—	3,684
Total assets	—	4,095	—	4,095
Liabilities				
Currency contracts [1]	—	78	—	78
Total liabilities	$ —	$ 78	$ —	$ 78

	September 29, 2018			
	Level 1	Level 2	Level 3	Total
Assets				
Currency contracts [1]	$ —	$ 1,080	$ —	$ 1,080
Interest rate swaps [2]	—	7,411	—	7,411
Total assets	—	8,491	—	8,491
Liabilities				
Currency contracts [1]	—	173	—	173
Total liabilities	$ —	$ 173	$ —	$ 173

[1] Based on observable market transactions of spot currency rates and forward currency rates on equivalently-termed instruments. Carrying amounts of the financial assets and liabilities are equal to the fair value. See Note 8 for additional information on derivative financial instruments.

[2] Based on London Interbank Offered Rate (LIBOR) and spot rates. Carrying amount of the financial asset is equal to the fair value. See Note 8 for additional information on derivative financial instruments.

Assets and Liabilities Measured at Fair Value on a Nonrecurring Basis
We measure certain financial instruments at fair value on a nonrecurring basis. These assets primarily include goodwill, intangible assets and other long-lived assets acquired either as part of a business acquisition, individually or with a group of other assets, as well as property and equipment. These assets were initially measured and recognized at amounts equal to the fair value determined as of the date of acquisition or purchase subject to changes in value only for foreign currency translation.

Periodically, these assets are tested for impairment by comparing their respective carrying values to the estimated fair value of the reporting unit or asset group in which they reside. In the event any of these assets were to become impaired, we would recognize an impairment loss equal to the amount by which the carrying value of the reporting unit, impaired asset or asset group exceeds its estimated fair value. Fair value measurements of reporting units are estimated using an income approach involving discounted or undiscounted cash flow models that contain certain Level 3 inputs requiring management judgment, including projections of economic conditions and customer demand, revenue and margins, changes in competition, operating costs, working capital requirements and new product introductions. Fair value measurements of the reporting units associated with our goodwill balances and our indefinite-lived intangible assets are estimated at least annually in the fourth quarter of each fiscal year for purposes of impairment testing if a quantitative analysis is performed. Fair value measurements associated with our intangible assets, other long-lived assets and property and equipment are estimated when events or changes in circumstances such as market value, asset utilization, physical change, legal factors or other matters indicate that the carrying value may not be recoverable. See Note 6 for additional information on goodwill, indefinite-lived intangible assets, other long-lived assets and property and equipment.

Assets and Liabilities Not Measured at Fair Value
Certain financial instruments are not measured at fair value but are recorded at carrying amounts approximating fair value based on their short-term nature or variable interest rate. These financial instruments include cash and cash equivalents, accounts receivable, unbilled accounts receivable, accounts payable and short-term borrowings.

Other Financial Instruments
Other financial instruments subject to fair value measurements include debt, which is recorded at carrying value in the Consolidated Balance Sheets. The carrying amount and estimated fair values of our debt are as follows:

	March 30, 2019				
	Carrying Value	Fair Value	Level 1	Level 2	Level 3
Debt component of tangible equity units [1]	$ 2,472	$ 2,939	$ —	$ 2,939	$ —
Tranche B term loan [2]	390,266	390,266	—	390,266	—
Total debt	$ 392,738	$ 393,205	$ —	$ 393,205	$ —

	September 29, 2018				
	Carrying Value	Fair Value	Level 1	Level 2	Level 3
Debt component of tangible equity units [1]	$ 7,290	$ 8,626	$ —	$ 8,626	$ —
Tranche B term loan [2]	391,416	395,330	—	395,330	—
Total debt	$ 398,706	$ 403,956	$ —	$ 403,956	$ —

[1] The fair value of the 8.75% tangible equity units (TEUs) is based on the most recently quoted price for the outstanding securities, adjusted for any known significant deviations in value. The estimated fair value of these long-term obligations is not necessarily indicative of the amount that would be realized in a current market exchange. See Note 13 for additional information on the TEUs.

[2] The fair value of the tranche B term loan is based on the most recently quoted market price for the outstanding debt instrument, adjusted for any known significant deviations in value. The estimated fair value of the debt obligation is not necessarily indicative of the amount that would be realized in a current market exchange. See Note 9 for additional information on debt instruments.

NOTE 8 DERIVATIVE INSTRUMENTS AND HEDGING ACTIVITIES

Our currency exchange contracts and interest rate swaps are designated as cash flow hedges and qualify as hedging instruments. We also have derivatives that are not designated as cash flow hedges and, therefore, are accounted for and reported under foreign currency guidance. Regardless of designation for accounting purposes, we believe all of our derivative instruments are hedges of transactional risk exposures. The fair value of our outstanding designated and undesignated derivative assets and liabilities are reported in the Consolidated Balance Sheets as follows:

	March 30, 2019	
	Prepaid Expenses and Other Current Assets	Other Accrued Liabilities
Designated hedge derivatives		
Cash flow derivatives	$ 314	$ 78
Interest rate swaps	3,684	—
Total designated hedge derivatives	3,998	78
Undesignated hedge derivatives		
Balance sheet derivatives	97	—
Total hedge derivatives	$ 4,095	$ 78

	September 29, 2018	
	Prepaid Expenses and Other Current Assets	Other Accrued Liabilities
Designated hedge derivatives		
Cash flow derivatives	$ 989	$ 173
Interest rate swaps	7,411	—
Total designated hedge derivatives	8,400	173
Undesignated hedge derivatives		
Balance sheet derivatives	91	—
Total hedge derivatives	$ 8,491	$ 173

A reconciliation of the net fair value of designated hedge derivatives subject to master netting arrangements that are recorded in the Consolidated Balance Sheets to the net fair value that could have been reported in the Consolidated Balance Sheets are as follows:

	Gross Recognized Amount	Gross Offset Amount	Net Amount Presented	Derivatives Subject to Offset	Cash Collateral Received	Net Amount
March 30, 2019						
Assets	$ 3,998	$ —	$ 3,998	$ (78)	$ —	$ 3,920
Liabilities	78	—	78	(78)	—	—
September 29, 2018						
Assets	$ 8,400	$ —	$ 8,400	$ (173)	$ —	$ 8,227
Liabilities	173	—	173	(173)	—	—

Cash Flow Hedging – Currency Risks

Currency exchange contracts utilized to maintain the functional currency value of expected financial transactions denominated in foreign currencies are designated as cash flow hedges. Gains and losses related to changes in the market value of these contracts are reported as a component of accumulated other comprehensive income (AOCI) within shareholders' equity in the Consolidated Balance Sheets and reclassified to earnings in the same line item in the Consolidated Statements of Income and in the same period as the recognition of the underlying hedged transaction. We periodically assess whether our currency exchange contracts are effective and, when a contract is determined to be no longer effective as a hedge, we discontinue hedge accounting prospectively.

As of March 30, 2019 and September 29, 2018, we had outstanding cash flow hedge currency exchange contracts with gross notional U.S. dollar equivalent amounts of $26,576 and $39,856, respectively. Upon netting offsetting contracts to sell foreign currencies against contracts to purchase foreign currencies, irrespective of contract maturity dates, the net notional U.S. dollar equivalent amount of contracts outstanding was $24,840 and $29,315 as of March 30, 2019 and September 29, 2018, respectively. As of March 30, 2019, the net market value of the foreign currency exchange contracts was a net asset of $236, consisting of $314 in assets and $78 in liabilities. As of September 29, 2018, the net market value of the foreign currency exchange contracts was a net asset of $816, consisting of $989 in assets and $173 in liabilities.

The pretax amounts recognized in AOCI on currency exchange contracts, including (gains) losses reclassified into earnings in the Consolidated Statements of Income and gains (losses) recognized in other comprehensive income (loss) (OCI), are as follows:

	Three Months Ended		Six Months Ended	
	March 30, 2019	March 31, 2018	March 30, 2019	March 31, 2018
Beginning unrealized net gain (loss) in AOCI	$ 214	$ (444)	$ 672	$ (443)
Net (gain) loss reclassified into revenue	(16)	1,146	(601)	1,304
Net gain (loss) recognized in OCI	(6)	(1,794)	121	(1,953)
Ending unrealized net gain (loss) in AOCI	$ 192	$ (1,092)	$ 192	$ (1,092)

As of March 30, 2019, the amount projected to be reclassified from AOCI into earnings in the next 12 months was a net gain of $193. The maximum remaining maturity of any forward or optional contract as of March 30, 2019 was 1.6 years.

Interest Rate Swaps

On October 20, 2016, we entered into a floating to fixed interest rate swap agreement to mitigate our exposure to interest rate increases related to a portion of our tranche B term loan facility. The total notional amount of the interest rate swap was $225,000 as of March 30, 2019. The swap agreement expires April 3, 2021. As a result of this agreement, every month we pay fixed interest at 1.256% in exchange for interest received at one month U.S. LIBOR. The market value of the interest rate swap as of March 30, 2019 was an asset of $3,684. The interest rate swap has been designated as a cash flow hedge. As a result, changes in the fair value of the interest rate swap are recorded in AOCI within shareholders' equity in the Consolidated Balance Sheets.

The pretax amounts recognized in AOCI on interest rate swaps, including (gains) losses reclassified into earnings in the Consolidated Statements of Income and gains (losses) recognized in OCI, are as follows:

	Three Months Ended		Six Months Ended	
	March 30, 2019	March 31, 2018	March 30, 2019	March 31, 2018
Beginning unrealized net gain (loss) in AOCI	$ 4,889	$ 5,027	$ 7,411	$ 3,499
Net (gain) loss reclassified into interest expense	(709)	(220)	(1,293)	(239)
Net gain (loss) recognized in OCI	(496)	2,118	(2,434)	3,665
Ending unrealized net gain (loss) in AOCI	$ 3,684	$ 6,925	$ 3,684	$ 6,925

As of March 30, 2019, the amount projected to be reclassified from AOCI into earnings in the next 12 months was a net gain of $2,378.

Foreign Currency Balance Sheet Derivatives

We also use foreign currency derivative contracts to maintain the functional currency value of monetary assets and liabilities denominated in non-functional foreign currencies. The gains and losses related to the changes in the market value of these derivative contracts are included in other income (expense), net in the Consolidated Statements of Income.

As of March 30, 2019 and September 29, 2018, we had outstanding foreign currency balance sheet derivative contracts with gross notional U.S. dollar equivalent amounts of $108,957 and $90,816, respectively. Upon netting offsetting contracts by counterparty banks to sell foreign currencies against contracts to purchase foreign currencies, irrespective of contract maturity dates, the net notional U.S. dollar equivalent amount of contracts outstanding as of March 30, 2019 and September 29, 2018 was $34,789 and $28,271, respectively. As of March 30, 2019 and September 29, 2018, the net market value of the foreign exchange balance sheet derivative contracts was a net asset of $97 and $91, respectively.

The net gain (loss) recognized in the Consolidated Statements of Income on foreign exchange balance sheet derivative contracts is as follows:

	Three Months Ended		Six Months Ended	
	March 30, 2019	March 31, 2018	March 30, 2019	March 31, 2018
Net gain (loss) recognized in other income (expense), net	$ (395)	$ (848)	$ (388)	$ (1,027)

NOTE 9 FINANCING

Long-term debt consists of the following:

	March 30, 2019	September 29, 2018
Long-term debt		
Tranche B term loan, 1.00% amortizing per year, maturing July 5, 2023	$ 390,266	$ 391,416
Revolving credit facility, non-current portion, expiring July 5, 2022	80,391	—
Tangible equity units, 8.75% coupon, maturing July 1, 2019 [1]	2,472	7,290
Capital lease obligations	1,709	2,000
Total long-term debt	474,838	400,706
Less: Unamortized underwriting discounts, commissions and other expenses	(6,862)	(8,623)
Less: Current maturities of tranche B term loan debt [2, 3]	(28,600)	(28,600)
Less: Current maturities of TEU debt [2]	(2,472)	(7,290)
Less: Current maturities of capital lease obligations [2]	(560)	(553)
Total long-term debt, less current maturities, net	$ 436,344	$ 355,640

1 See Note 13 for additional information on our TEUs issued in the third quarter of fiscal year 2016.

2 In addition to the current maturities above, current maturities of long-term debt, net in the Consolidated Balance Sheets includes the current portion of unamortized underwriting discounts, commissions and other expenses of $3,556 and $3,705 as of March 30, 2019 and September 29, 2018, respectively.

3 As of March 30, 2019 and September 29, 2018, current maturities of tranche B term loan consist of the 1% annual payment and the calculated or estimated required annual Excess Cash Flow payment as defined below, as well as planned prepayments.

Tranche B Term Loan and Revolving Credit Facility

We have a credit agreement with U.S. Bank National Association and HSBC Bank USA, National Association as Co-Documentation Agents, Wells Fargo Bank, National Association as Syndication Agent, JPMorgan Chase Bank, N.A. as Administrative Agent and JP Morgan Chase Bank, N.A. and Wells Fargo Securities, LLC as Joint Bookrunners and Joint Lead Arrangers (the Credit Agreement). The Credit Agreement as amended provides for senior secured credit facilities consisting of a $150,000 revolving credit facility (the Revolving Credit Facility), which expires on July 5, 2022, and a $460,000 tranche B term loan facility (the Term Facility) which expires on July 5, 2023. The proceeds of the Revolving Credit Facility can be drawn upon to refinance existing indebtedness, for working capital and for other general corporate purposes, up to a maximum of $150,000. The Term Facility amortizes in equal quarterly installments equal to 1% of the original principal amount. The proceeds of the Term Facility were used for financing the acquisition of PCB Group, Inc. (PCB) in fiscal year 2016. Borrowings on the Revolving Credit Facility were used for financing the acquisition of E2M Technologies B.V. (E2M) in the first quarter of fiscal year 2019.

In the first quarter of fiscal year 2019, in conjunction with the E2M acquisition, we entered into a third amendment to the Credit Agreement to increase the borrowing capacity on the Revolving Credit Facility from $120,000 to $150,000 and extend the expiration date of the Revolving Credit Facility from July 5, 2021 to July 5, 2022. Additionally, the required performance levels under certain financial covenants were modified. During the six months ended March 30, 2019, we incurred debt financing costs of $541 as a result of this amendment which were capitalized in current maturities of long-term debt, net and long-term debt, less current maturities, net in the Consolidated Balance Sheets.

The primary categories of borrowing include Alternate Base Rate (ABR) Borrowings (ABR Term Loans and ABR Revolving Loans), Swingline Loans and Eurocurrency Borrowings (Eurocurrency Term Loans and Eurocurrency Revolving Loans), each as defined in the Credit Agreement. ABR Borrowings and Swingline Loans made in U.S. dollars under the Credit Agreement bear interest at a rate per annum equal to the ABR plus the Applicable Rate (as defined in the Credit Agreement). The ABR is defined as the greater of (a) the Prime Rate (as defined in the Credit Agreement) in effect on such day, (b) the New York Federal Reserve Bank (NYFRB) rate (as defined in the Credit Agreement) in effect on such day plus ½ of 1.00%, or (c) the Adjusted LIBOR (as defined in the Credit Agreement) for a one-month interest period in dollars on such day plus 1.00%. The ABR for ABR Term Loans shall not be less than 1.75% per annum. The Applicable Rate for any ABR Revolving Loans will be based upon the leverage ratio applicable on such date. As of March 30, 2019, the Applicable Rate for ABR Term Loans was 2.25% per annum.

Eurocurrency Borrowings made under the Credit Agreement bear interest at a rate per annum equal to the Adjusted LIBOR Rate plus the Applicable Rate. The Adjusted LIBOR Rate is defined as an interest rate per annum equal to (a) the LIBOR Rate for such interest period multiplied by (b) the Statutory Reserve Rate (as defined in the Credit Agreement). The Applicable Rate for any Eurocurrency Revolving Loan is based upon the leverage ratio applicable on such date. The Adjusted LIBOR Rate for Eurocurrency Term Loans shall not be less than 0.75% per annum. Based on our leverage ratio as of March 30, 2019, the Applicable Rate for Eurocurrency Revolving Loans was 3.00%. As of March 30, 2019, the Applicable Rate for Eurocurrency Term Loans was 3.25% per annum, plus the applicable Adjusted LIBOR Rate of 2.49%. The weighted average interest rate on Term Facility debt during the six months ended March 30, 2019 was 5.65%.

As of March 30, 2019, there was $80,391 of outstanding borrowings under the Revolving Credit Facility which is included in long-term debt, less current maturities, net in the Consolidated Balance Sheets. As of September 29, 2018, there were no outstanding borrowings under the Revolving Credit Facility. We had outstanding letters of credit drawn from the Revolving Credit Facility totaling $19,976 and $20,448 as of March 30, 2019 and September 29, 2018, respectively, leaving approximately $49,633 and $99,552, respectively, of unused borrowing capacity. Commitment fees are payable on the unused portion of the Revolving Credit Facility at rates between 0.25% and 0.40% based on our leverage ratio. During the three and six months ended March 30, 2019, commitment fees incurred totaled $52 and $124, respectively. During the three and six months ended March 31, 2018, commitment fees incurred totaled $77 and $156, respectively.

The Credit Agreement governing the Term Facility requires us to prepay outstanding term loans, subject to certain exceptions, depending on the leverage ratio with (a) up to 50% of the our annual Excess Cash Flow (as defined in the Credit Agreement) and (b) 100% of the net cash proceeds of (i) certain asset sales and casualty and condemnation events, subject to reinvestment rights and certain other exceptions; and (ii) any incurrence or issuance of certain debt, other than debt permitted under the Credit Agreement. We may voluntarily prepay outstanding loans under the Term Facility at any time without premium or penalty. All obligations under the Credit Agreement are unconditionally guaranteed by certain of our existing wholly-owned domestic subsidiaries, and are secured, subject to certain exceptions, by substantially all of our assets and the assets of our subsidiary guarantors.

Under the Credit Agreement, we are subject to customary affirmative and negative covenants, including, among others, restrictions on our ability to incur debt, create liens, dispose of assets, make investments, loans, advances, guarantees, and acquisitions, enter into transactions with affiliates, and enter into any restrictive agreements and customary events of default (including payment defaults, covenant defaults, change of control defaults and bankruptcy defaults). The Credit Agreement also contains financial covenants, including the ratio of consolidated total indebtedness to adjusted consolidated earnings before income, taxes, depreciation and amortization (Adjusted EBITDA), as defined in the Credit Agreement, as well as the ratio of Adjusted EBITDA to consolidated interest expense. These covenants restrict our ability to purchase outstanding shares of our common stock. As of March 30, 2019 and September 29, 2018, we were in compliance with these financial covenants.

See Note 7 for additional information on the fair value of the tranche B term loan and the TEU debt.

Interest Rate Swaps
On October 20, 2016, in order to mitigate our exposure to interest rate increases on our variable rate debt, we entered into a variable to fixed amortizing interest rate swap. See Note 8 for additional information on derivative financial instruments.

The interest rate swap will be reduced to the following notional amounts over the next three years:

	Notional Amount
October 3, 2019	$ 180,000
October 3, 2020	125,000
April 3, 2021	—

NOTE 10 STOCK-BASED COMPENSATION

We compensate our officers, directors and employees with stock-based compensation under the 2017 Stock Incentive Plan (the 2017 Plan) approved by our shareholders and administered under the supervision of our Board of Directors. As of March 30, 2019, a total of 958 shares were available for issuance under the 2017 Plan.

We make an annual stock grant under the 2017 Plan of stock options, restricted stock units and performance restricted stock units, as well as stock grants throughout the fiscal year. For fiscal years 2019, 2018 and 2017, the annual stock grant occurred in December 2018, April 2018 and April 2017, respectively.

Stock Options
During the six months ended March 30, 2019, 231 stock options were granted at a weighted average fair value of $9.91. During the six months ended March 30, 2018, no stock options were granted.

Restricted Stock Units and Performance Restricted Stock Units
We award restricted stock units to directors and key employees and performance restricted stock units to key employees. During the six months ended March 30, 2019, we granted 124 restricted stock units and 40 performance restricted stock units to directors, officers and employees. During the six months ended March 30, 2018, we granted 24 restricted stock units and no performance restricted stock units. The fair value of the restricted stock units and performance restricted stock units granted during the six months ended March 30, 2019 and March 31, 2018 was $46.45 and $48.61, respectively, representing the market value of our shares as of the date of grant less the present value of estimated foregone dividends over the vesting period.

Employee Stock Purchase Plan
Our U.S. employees are eligible to participate in the 2012 Employee Stock Purchase Plan (2012 ESPP) approved by our shareholders. As of March 30, 2019, 599 shares were available for issuance under the 2012 ESPP. During the six months ended March 30, 2019 and March 31, 2018, we issued 16 and 12 shares, respectively, under the 2012 ESPP at a weighted average price per share of $34.11 and $44.03, respectively.

NOTE 11 EMPLOYEE BENEFIT PLANS

We sponsor a non-contributory, defined benefit pension plan for eligible employees of one of our German subsidiaries. Net periodic benefit cost for our defined benefit pension plan includes the following components:

	Three Months Ended		Six Months Ended	
	March 30, 2019	March 31, 2018	March 30, 2019	March 31, 2018
Service cost	$ 321	$ 331	$ 643	$ 649
Interest cost	155	165	310	324
Expected return on plan assets	(321)	(328)	(643)	(643)
Net amortization and deferral	137	137	274	267
Net periodic benefit cost	$ 292	$ 305	$ 584	$ 597

The weighted average expected long-term rate of return on plan assets used to determine the net periodic benefit cost for each of the three and six months ended March 30, 2019 and March 31, 2018 was 5.5%.

NOTE 12 INCOME TAXES

The Tax Cuts and Jobs Act (the Tax Act) was enacted into law on December 22, 2017 and made significant changes to U.S. federal corporate tax law. Effective January 1, 2018, the Tax Act lowered the U.S. corporate tax rate from 35% to 21% and prompted various other changes to U.S. federal corporate tax law, including the establishment of a territorial-style system for taxing foreign-source income of domestic multinational corporations and a one-time deemed repatriation tax on untaxed foreign earnings. The Tax Act resulted in a U.S. federal blended statutory rate of 24.5% for fiscal year 2018 and a rate of 21.0% for fiscal year 2019.

Generally, the impacts of new tax legislation would be required to be recorded in the period of enactment, which was our first quarter of fiscal year 2018. However, in March 2018, the FASB issued ASU No. 2018-05, *Income Taxes (Topic 740): Amendments to SEC Paragraphs Pursuant to SEC Staff Accounting Bulletin No. 118*, which incorporates various SEC paragraphs from Staff Accounting Bulletin No. 118 into income tax accounting guidance effective immediately, allowing registrants to record provisional amounts during a one-year measurement period.

As of December 29, 2018, we completed our accounting for the tax effects of the Tax Act at the conclusion of the one-year measurement period. As a result, the income tax provision for the six months ended March 30, 2019 includes certain discrete benefits of $1,293 for Tax Act measurement period adjustments. The discrete benefits relate to $1,297 of additional dividends received deduction for certain foreign tax credits included in the mandatory deemed repatriation tax calculation, partially offset by $4 of expense for other Tax Act measurement period adjustments. The additional dividends received deduction is based on our assessment of the treatment under the applicable provisions of the Tax Act as currently written and enacted. If, in the future, Congress or the Department of the Treasury provides legislative or regulatory updates, this could change our assessment of the benefit associated with the dividends received deduction, and we may be required to recognize additional tax expense up to the full amount of the $1,297 in the period such updates are issued.

Excluding the impact of certain discrete benefits in the current and prior year, the effective tax rate for the six months ended March 30, 2019 and March 31, 2018 was essentially flat compared to the same prior year period. Factors that affected the effective tax rate for the six months ended March 30, 2019 included impacts of the Tax Act, such as elimination of the domestic manufacturing deduction and the implementation of the global intangible low-taxed income (GILTI) provision. These increases were offset by favorable aspects of the Tax Act, such as the decrease in the U.S. income tax rate and provisions for incentivizing foreign-derived intangible income (FDII). In the first quarter of fiscal year 2019, we made an accounting policy election to treat the future tax impacts of the GILTI provisions of the Tax Act as a period cost to the extent applicable.

The income tax benefit for the six months ended March 31, 2018 included certain discrete benefits of $25,378 for the estimated impact of the Tax Act. The discrete benefits related to $32,264 of estimated benefit from the remeasurement of our estimated net deferred tax liabilities, partially offset by $6,886 of estimated expense associated with the mandatory deemed repatriation tax. The income tax benefit for fiscal year 2018 included certain discrete benefits of $25,008 for the estimated impact of the Tax Act. The discrete benefits primarily related to $31,647 of estimated benefit from the remeasurement of our estimated net deferred tax liabilities, partially offset by $6,639 of estimated expense associated with the mandatory deemed repatriation tax.

As of March 30, 2019, the liability for unrecognized tax benefits was $6,985, of which $4,510 would favorably affect our effective tax rate, if recognized. As of September 29, 2018, the liability for unrecognized tax benefits was $6,158, of which $3,740 would favorably affect our effective tax rate, if recognized. As of March 30, 2019, we do not expect significant changes in the amount of unrecognized tax benefits during the next twelve months.

NOTE 13 SHAREHOLDERS' EQUITY

Tangible Equity Units

During the third quarter of fiscal year 2016, we issued 1,150 TEUs in a registered public offering primarily to finance the acquisition of PCB, to repay amounts outstanding under our existing revolving credit facility and to pay related costs, fees and expenses. Total proceeds, net of underwriting discounts, commissions and other expenses were $110,926. Each TEU has a stated amount of $100 per TEU and is comprised of a prepaid stock purchase contract and a senior amortizing note having a final installment payment date of July 1, 2019. We allocated the proceeds from the issuance of the TEUs between equity and debt based on the relative fair values of the respective components of each TEU. The fair value of the prepaid stock purchase contracts, net of underwriting discounts, commissions and other expenses, was recorded in additional paid-in capital in the Consolidated Balance Sheets. The fair value of the senior amortizing note, net of underwriting discounts, commissions and other expenses, was split between current maturities of long-term debt, net and long-term debt, less current maturities, net in the Consolidated Balance Sheets. Underwriting discounts, commissions and other costs directly associated with the TEU-related debt will be amortized using the effective interest rate method over the three-year term of the instrument.

The aggregate values assigned upon issuance to each component of the TEUs, based on the relative fair value of the respective components, were as follows:

	Equity Component	Debt Component	Total
Fair value price per TEU [1]	$ 76.19	$ 23.81	$ 100.00
Gross proceeds	$ 87,614	$ 27,386	$ 115,000
Less: Underwriting discounts and commissions	(2,628)	(822)	(3,450)
Less: Other expenses [2]	(475)	(149)	(624)
Issuance of TEUs, net	$ 84,511	$ 26,415	$ 110,926

[1] The fair value price allocation between equity and debt for each TEU was determined using a discounted cash flow model.

[2] Other expenses include direct and incremental costs related to the issuance of the TEUs.

Equity Component
Unless converted earlier at the option of the holder, each prepaid stock purchase contract will automatically settle on July 1, 2019. If converted prior to the automatic settlement date at the option of the holder, the minimum of 1.9841 shares of our common stock are delivered to the holder of each prepaid stock purchase contract. On the automatic settlement date, a minimum of 1.9841 shares and a maximum of 2.3810 shares of our common stock, subject to adjustment based upon the applicable market value discussed below, will be delivered to the holder of each prepaid stock purchase contract at the settlement date.

The number of shares of our common stock issuable upon settlement of each purchase contract on July 1, 2019 will be determined as follows:

- if the applicable market value is equal to or greater than the threshold appreciation price of $50.40 per share, holders will receive 1.9841 shares of common stock per purchase contract, or the minimum settlement rate;
- if the applicable market value is greater than the reference price of $42.00 per share, but less than the threshold appreciation price of $50.40 per share, holders will receive a number of shares of common stock equal to $100 per TEU divided by the applicable market value; or
- if the applicable market value is less than or equal to the reference price of $42.00 per share, holders will receive 2.3810 shares of common stock per purchase contract, or the maximum settlement rate.

The "applicable market value" is defined as the average of the daily volume-weighted average price of the common stock on each of the 20 consecutive trading days beginning on, and including, the 23rd scheduled trading day immediately preceding July 1, 2019.

During the fourth quarter of fiscal year 2017, certain holders of our TEUs elected to early convert the equity component on 473 of our outstanding TEUs at the minimum conversion rate of 1.9841 which resulted in the issuance of 939 shares of our common stock. During fiscal years 2019 and 2018, no holders of our TEUs elected to early convert the equity component of our outstanding TEUs. There were 677 units of the equity component of TEUs outstanding as of both March 30, 2019 and September 29, 2018.

Debt Component
The amortizing senior note was issued with an initial principal amount of $27,386, or $23.8136 per TEU. Equal quarterly cash installments of $2.1875 per amortizing note are paid, which in the aggregate are equivalent to a 8.75% cash distribution per year with respect to each $100 stated amount per TEU. Each installment constitutes a payment of interest and partial repayment of principal. The final installment will be paid in the fourth quarter of fiscal year 2019.

Earnings Per Common Share
The TEUs have a dilutive effect on our earnings per share. The 1.9841 minimum shares to be issued are included in the calculation of basic weighted average shares outstanding. The 0.3969 difference between the minimum shares and the 2.3810 maximum shares are potentially dilutive, and accordingly, are included in our diluted earnings per share on a pro rata basis to the extent the applicable market value is higher than the reference price but less than the threshold appreciation price. See Note 14 for additional information regarding the calculation of earnings per share.

Capped Calls
In connection with the pricing of the TEUs sold in our public offering in fiscal year 2016, we purchased capped calls from third party banking institutions (Capped Calls) for $7,935. The initial Capped Calls were for 2,282 equivalent shares of our common stock with a strike price of $50.40, a cap price of $58.80 and an expiration date of July 1, 2019. The value of the Capped Calls is settled with shares of our common stock, based on the approximate market value of our common stock at such time, and could be settled as the TEUs were early converted or settled upon expiration on July 1, 2019 (Capped Call Expiration). During the fourth quarter of fiscal year 2017, we settled approximately 10% of the Capped Calls, which resulted in us receiving and retiring 12 shares of our common stock. No Capped Calls were settled during fiscal years 2019 and 2018.

On June 13, 2018, we amended the agreements with third party banking institutions for the outstanding Capped Calls (Capped Call Agreements) to modify the timing of settlement to be only upon expiration for all outstanding Capped Calls. Per the Capped Call Agreements, the outstanding Capped Calls are for 2,054 equivalent shares of our common stock with a strike price of $50.40 and a cap price of $57.97. The Capped Calls will be automatically settled upon Capped Call Expiration with shares of our common stock based on the average market value of our common stock as defined in the Capped Call Agreements.

As of March 30, 2019, the range of shares of our common stock to be received for the outstanding Capped Calls was a minimum of 0 shares to a maximum of 268 shares, which will be realized if the average market value of our common stock as defined in the Capped Call Agreements is at or below $50.40 or at $57.97, respectively, upon Capped Call Expiration.

NOTE 14 EARNINGS PER SHARE

Basic earnings per share is computed by dividing net income by the daily weighted average number of common shares outstanding during the applicable period. The TEUs are assumed to be settled at the minimum settlement amount of 1.9841 shares per TEU when calculating weighted-average common shares outstanding for purposes of basic earnings per share.

Using the treasury stock method, diluted earnings per share includes the potentially dilutive effect of common shares issued in connection with outstanding stock-based compensation options and grants. The potentially dilutive effect of common shares issued in connection with outstanding stock options is determined based on the average market price for the period. For diluted earnings per share, the TEUs are assumed to be settled at a conversion factor based on our daily volume-weighted average price per share of our common stock for the 20 consecutive trading days preceding the end of the current fiscal quarter not to exceed 2.3810 shares of common stock per TEU.

Under the treasury stock method, shares associated with certain stock options have been excluded from the diluted weighted average shares outstanding calculation because the exercise of those options would lead to a net reduction in common shares outstanding or anti-dilution. As a result, stock options to acquire 865 and 482 weighted common shares have been excluded from the diluted weighted average common shares outstanding calculation for the three months ended March 30, 2019 and March 31, 2018, respectively. Stock options to acquire 791 and 489 weighted common shares have been excluded from the diluted weighted average common shares outstanding calculation for the six months ended March 30, 2019 and March 31, 2018, respectively.

In connection with the pricing of the TEUs, we purchased capped calls. The capped calls will not be reflected in the calculation of diluted earnings per share until settled as they will lead to a net reduction in common shares outstanding or anti-dilution. See Note 13 for additional information on our equity instruments.

Basic and diluted earnings per share are calculated as follows:

	Three Months Ended		Six Months Ended	
	March 30, 2019	March 31, 2018	March 30, 2019	March 31, 2018
Net income	$ 14,160	$ 8,438	$ 24,661	$ 41,589
Weighted average common shares outstanding	19,251	19,150	19,234	19,137
Effect of dilutive securities				
Stock-based compensation	190	123	159	121
Weighted average dilutive common shares outstanding	19,441	19,273	19,393	19,258
Earnings per share				
Basic	$ 0.74	$ 0.44	$ 1.28	$ 2.17
Diluted	0.73	0.44	1.27	2.16

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NOTE 15 OTHER COMPREHENSIVE INCOME (LOSS)

Other comprehensive income (loss), a component of shareholders' equity, consists of foreign currency translation adjustments, gains or losses on derivative instruments and defined benefit pension plan adjustments.

Income tax expense or benefit allocated to each component of other comprehensive income (loss) is as follows:

	Three Months Ended			Six Months Ended		
	March 30, 2019					
	Pre-tax	Tax	Net	Pretax	Tax	Net
Foreign currency translation gain (loss) adjustments	$ (1,168)	$ —	$ (1,168)	$ (2,671)	$ —	$ (2,671)
Derivative instruments						
Unrealized net gain (loss)	(502)	110	(392)	(2,313)	505	(1,808)
Net (gain) loss reclassified to earnings	(725)	158	(567)	(1,894)	413	(1,481)
Defined benefit pension plan						
Unrealized net gain (loss)	1,374	(415)	959	(839)	253	(586)
Net (gain) loss reclassified to earnings	137	(42)	95	274	(83)	191
Currency exchange rate gain (loss)	146	—	146	261	—	261
Other comprehensive income (loss)	$ (738)	$ (189)	$ (927)	$ (7,182)	$ 1,088	$ (6,094)

	Three Months Ended			Six Months Ended		
	March 31, 2018					
	Pre-tax	Tax	Net	Pretax	Tax	Net
Foreign currency translation gain (loss) adjustments	$ 5,172	$ —	$ 5,172	$ 7,671	$ —	$ 7,671
Derivative instruments						
Unrealized net gain (loss)	324	(84)	240	1,713	(443)	1,270
Net (gain) loss reclassified to earnings	926	(239)	687	1,065	(275)	790
Defined benefit pension plan						
Unrealized net gain (loss)	(918)	277	(641)	(388)	117	(271)
Net (gain) loss reclassified to earnings	137	(42)	95	267	(81)	186
Currency exchange rate gain (loss)	(181)	—	(181)	(268)	—	(268)
Other comprehensive income (loss)	$ 5,460	$ (88)	$ 5,372	$ 10,060	$ (682)	$ 9,378

The changes in the net-of-tax balances of each component of AOCI are as follows:

	Three Months Ended				Six Months Ended			
	March 30, 2019							
	Adjustments				Adjustments			
	Foreign Currency Translation	Unrealized Derivative Instrument	Defined Benefit Pension Plan	Total	Foreign Currency Translation	Unrealized Derivative Instrument	Defined Benefit Pension Plan	Total
Beginning balance	$ 269	$ 3,990	$ (7,950)	$ (3,691)	$ 1,772	$ 6,320	$ (6,616)	$ 1,476
Other comprehensive net gain (loss) reclassifications	(1,168)	(392)	1,105	(455)	(2,671)	(1,808)	(325)	(4,804)
Net (gain) loss reclassified to earnings	—	(567)	95	(472)	—	(1,481)	191	(1,290)
Other comprehensive income (loss)	(1,168)	(959)	1,200	(927)	(2,671)	(3,289)	(134)	(6,094)
Ending balance	$ (899)	$ 3,031	$ (6,750)	$ (4,618)	$ (899)	$ 3,031	$ (6,750)	$ (4,618)

	Three Months Ended				Six Months Ended			
	March 31, 2018							
	Adjustments				Adjustments			
	Foreign Currency Translation	Unrealized Derivative Instrument	Defined Benefit Pension Plan	Total	Foreign Currency Translation	Unrealized Derivative Instrument	Defined Benefit Pension Plan	Total
Beginning balance	$ 6,445	$ 3,086	$ (6,078)	$ 3,453	$ 3,946	$ 1,953	$ (6,452)	$ (553)
Other comprehensive net gain (loss) reclassifications	5,172	240	(822)	4,590	7,671	1,270	(539)	8,402
Net (gain) loss reclassified to earnings	—	687	95	782	—	790	186	976
Other comprehensive income (loss)	5,172	927	(727)	5,372	7,671	2,060	(353)	9,378
Ending balance	$ 11,617	$ 4,013	$ (6,805)	$ 8,825	$ 11,617	$ 4,013	$ (6,805)	$ 8,825

The effect on certain line items in the Consolidated Statements of Income of amounts reclassified out of AOCI are as follows:

	Three Months Ended		Six Months Ended		Affected Line Item in the Consolidated Statements of Income
	March 30, 2019	March 31, 2018	March 30, 2019	March 31, 2018	
Derivative instruments					
Currency exchange contracts gain (loss)	$ 16	$ (1,146)	$ 601	$ (1,304)	Revenue
Interest rate swap contracts gain (loss)	709	220	1,293	239	Interest expense, net
Income tax benefit (expense)	(158)	239	(413)	275	Income tax provision (benefit)
Total net gain (loss) on derivative instruments	567	(687)	1,481	(790)	Net income
Defined benefit pension plan [1]					
Actuarial loss	—	(75)	—	(146)	Cost of sales
Actuarial loss	—	(38)	—	(75)	Selling and marketing
Actuarial loss	—	(24)	—	(46)	General and administrative
Actuarial loss	(137)	—	(274)	—	Other income (expense), net
Total actuarial loss	(137)	(137)	(274)	(267)	Income before income taxes
Income tax benefit	42	42	83	81	Income tax provision (benefit)
Total net loss on pension plan	(95)	(95)	(191)	(186)	Net income
Total net of tax reclassifications out of AOCI included in net income	$ 472	$ (782)	$ 1,290	$ (976)	

[1] Change in classification of actuarial loss on defined benefit pension plan related to the adoption of ASU No. 2017-07 in fiscal year 2019. See Note 2 for additional information on the impact of adoption.

NOTE 16 BUSINESS SEGMENT INFORMATION

Our Chief Executive Officer (the Chief Operating Decision Maker) regularly reviews financial information for our two reportable segments, Test & Simulation and Sensors. Test & Simulation manufactures and sells equipment and related software and services which are used by customers to characterize a product's mechanical properties or performance. Sensors manufactures and sells high-performance sensors which provide measurements of vibration, pressure, position, force and sound in a variety of applications.

In evaluating each segment's performance, our Chief Executive Officer focuses on income from operations. This measure excludes interest income and expense, income taxes and other non-operating items. Corporate expenses, including costs associated with various support functions such as human resources, information technology, legal, finance and accounting, and general and administrative costs are allocated to the reportable segments on the basis of revenue. The accounting policies of the reportable segments are the same as those described in Note 1 to the Consolidated Financial Statements found in our Annual Report on Form 10-K for the fiscal year ended September 29, 2018 and in Note 3 of this Quarterly Report on Form 10-Q.

Intersegment revenue is based on standard costs with reasonable mark-ups established between the reportable segments. All significant intersegment amounts are eliminated to arrive at consolidated financial results.

Financial information by reportable segment is as follows:

	Three Months Ended		Six Months Ended	
	March 30, 2019	March 31, 2018	March 30, 2019	March 31, 2018
Revenue				
Test & Simulation	$ 151,032	$ 110,238	$ 276,592	$ 228,441
Sensors	82,375	81,542	160,325	157,501
Intersegment eliminations	(361)	(457)	(690)	(457)
Total revenue	$ 233,046	$ 191,323	$ 436,227	$ 385,485
Income from operations				
Test & Simulation	$ 12,684	$ 3,295	$ 20,015	$ 8,904
Sensors	11,504	13,337	22,138	24,225
Intersegment eliminations	(14)	(22)	(13)	(22)
Total income from operations	$ 24,174	$ 16,610	$ 42,140	$ 33,107

NOTE 17 RESTRUCTURING AND RELATED COSTS

Fiscal Year 2018 Restructuring

During the fourth quarter of fiscal year 2018, we initiated a Test & Simulation workforce reduction intended to simplify the organization and reduce the overall cost structure. No restructuring expenses were recognized in the three or six months ended March 30, 2019 or March 31, 2018 related to this restructuring action. As of March 30, 2019, we have incurred a total of $880 of pre-tax severance and related expense.

Fiscal Year 2017 Restructuring

During the fourth quarter of fiscal year 2017, we initiated a series of Test & Simulation workforce reductions and facility closures intended to increase organizational effectiveness, gain manufacturing efficiencies and provide cost savings that can be reinvested in our growth initiatives. These actions include the transfer of certain production operations in China to a contract manufacturing partner throughout fiscal years 2018 and 2019. As a result, during the three and six months ended March 30, 2019, we recorded $0 and $130 of pre-tax severance and related expense, respectively. During the three and six months ended March 31, 2018, we recorded $321 and $414 of pre-tax severance and related expense, respectively, and $25 and $187 of pre-tax facility closure costs, respectively. As of March 30, 2019, we have incurred a total of $4,871 of pre-tax expense, including $4,579 and $292 of pre-tax expense related to severance and facility closure costs, respectively.

Restructuring expenses included in our Consolidated Statements of Income for the above restructuring actions are as follows:

	Three Months Ended		Six Months Ended	
	March 30, 2019	March 31, 2018	March 30, 2019	March 31, 2018
	Test & Simulation	Test & Simulation	Test & Simulation	Test & Simulation
Cost of sales	$ —	$ 304	$ 117	$ 424
Selling and marketing	—	—	—	—
General and administrative	—	42	13	177
Total restructuring expense	$ —	$ 346	$ 130	$ 601

Restructuring expense accruals included in payroll and related costs in the Consolidated Balance Sheets for the above restructuring actions are as follows:

	2018	2017
	Test & Simulation	Test & Simulation
Balance, September 29, 2018	$ 1,051	$ 2,933
Restructuring expense	—	130
Payments	(1,012)	(3,058)
Other adjustments	(39)	(5)
Currency translation	—	—
Balance, March 30, 2019	$ —	$ —

NOTE 18 BUSINESS ACQUISITIONS

On November 21, 2018, we acquired all ownership interests of E2M for a cash purchase price of $80,287. Based in Amsterdam, Netherlands, E2M is a leading manufacturer of high force, electrically driven actuation systems, serving primarily the human-rated entertainment and training simulation markets. The acquisition of E2M expands our technology and product offerings for human-rated simulation systems and brings key regulatory approvals and customers in the flight simulation and entertainment markets. The transaction was accounted for under the acquisition method of accounting. The acquired assets, liabilities and operating results have been included in our financial statements within Test & Simulation from the date of acquisition. During the three and six months ended March 30, 2019, we included $10,138 and $13,659, respectively, of revenue from E2M in our Consolidated Statements of Income. We funded the acquisition of E2M primarily with borrowings on our Revolving Credit Facility. Costs of $1,035 associated with the acquisition of E2M were expensed as incurred. Pro forma information related to the acquisition of E2M has not been included as the impact on our consolidated results of operations was not considered material.

The following table summarizes the preliminary fair value measurement of the assets acquired and liabilities assumed, net of cash acquired, as of the date of acquisition:

		Fair Value	Finite-Lived Intangible Asset Lives (Years)
Asset (Liability)			
Accounts receivable	$	4,651	
Unbilled accounts receivable		1,518	
Inventories		11,063	
Prepaid expenses and other current assets		123	
Property and equipment		672	
Intangible assets			
Customer lists		21,595	15
Trademarks and trade names		5,926	15
Technology		12,650	15
Other intangible assets		3,761	4
Other long-term assets		60	
Purchased goodwill		32,523	
Accounts payable		(3,657)	
Accrued payroll and related costs		(1,328)	
Advance payments from customers		(4,315)	
Accrued income taxes		(290)	
Other accrued liabilities		(127)	
Deferred income taxes		(6,278)	
Net assets acquired	$	78,547	
Supplemental information			
Consideration paid at closing	$	79,772	
Post-closing purchase price adjustment		515	
Less: Cash acquired		(1,740)	
Purchase price, net of cash acquired	$	78,547	

The allocation of purchase price consideration is considered preliminary as of March 30, 2019 with provisional amounts primarily related to inventory, intangible assets, advanced payments to customers and certain tax related items included as our allocation process has not been finalized. We expect to finalize the allocation of purchase price as soon as possible, but no later than one year from the acquisition date.

Goodwill was calculated as the difference between the acquisition date fair value of the total purchase price consideration and the fair value of the net assets acquired and represents the future economic benefits that we expect to achieve as a result of the acquisition. This resulted in a purchase price in excess of the fair value of identifiable net assets acquired. The purchase price also included the fair value of other assets that were not identifiable, not separately recognizable under accounting rules (e.g., assembled workforce) or of immaterial value. All of the goodwill was assigned to Test & Simulation. None of the goodwill is deductible for income tax purposes.

The preliminary fair value of the acquired intangible assets was $43,932. The acquired intangible assets are being amortized on a straight-line basis over the useful lives identified in the table above.

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

Management's Discussion and Analysis of Financial Condition and Results of Operations (MD&A) is designed to provide a reader of our financial statements with a narrative from the perspective of management on our financial condition, results of operations, liquidity and certain other factors that may affect our future results. Our MD&A is presented in nine sections:

- Overview
- Financial Results
- Cash Flow Comparison
- Liquidity and Capital Resources
- Off-balance Sheet Arrangements
- Critical Accounting Policies
- Recently Issued Accounting Pronouncements
- Other Matters
- Forward-looking Statements

Our MD&A should be read in conjunction with the Consolidated Financial Statements and related Notes included in Item 1 of Part I of this Quarterly Report on Form 10-Q. All dollar and share amounts are in thousands, unless otherwise noted.

Overview

MTS Systems Corporation's testing and simulation hardware, software and service solutions help customers accelerate and improve their design, development and manufacturing processes and are used for determining the mechanical behavior of materials, products and structures. Our high-performance sensors provide measurements of vibration, pressure, position, force and sound in a variety of applications. As of September 29, 2018, we had 3,400 employees and revenue of $778,032 for fiscal year 2018.

Further globalization and expansion of many industries along with growth in emerging markets, such as China and India, provide a strong and vibrant market base from which we can grow revenue. We have aligned our organizational structure to be more flexible to the demands of globalized and volatile markets by adjusting our structure to be more cost effective and nimble in responding to our customers' needs. We are looking ahead to delivering distinctive business performance through our commitment to sustain the differentiated competitive advantage that comes from offering an innovative portfolio of Test & Simulation and Sensors solutions that create value for customers and are delivered with total customer satisfaction.

Acquisition

On November 21, 2018, we acquired E2M Technologies B.V. (E2M) for a cash purchase price of $80,287. We funded the acquisition of E2M through borrowings on our Revolving Credit Facility. See Note 18 to the Consolidated Financial Statements included in Item 1 of Part I of this Quarterly Report on Form 10-Q for further discussion of the acquisition of E2M.

Financing

On November 21, 2018, we amended the Credit Agreement to increase the size of our Revolving Credit Facility from $120,000 to $150,000 and to extend the expiration date to July 5, 2022. The size of the Revolving Credit Facility was increased to finance the purchase of E2M. See Note 9 to the Consolidated Financial Statements included in Item 1 of Part I of this Quarterly Report on Form 10-Q for further discussion of the amendment to the Credit Agreement.

Foreign Currency

Approximately 70% of our revenue has historically been derived from customers outside of the U.S. Our financial results are principally exposed to changes in exchange rates between the U.S. dollar and the Euro, the Japanese yen and the Chinese yuan. A change in foreign exchange rates could positively or negatively affect our reported financial results. The discussion below quantifies the impact of foreign currency translation on our financial results for the periods discussed.

Adoption of New Revenue Recognition Standard

In fiscal year 2019, we adopted Accounting Standards Update (ASU) No. 2014-09, *Revenue from Contracts with Customers (Topic 606),* followed by related amendments (collectively, "the new revenue standard" or "ASC 606"). See Note 2 and Note 3 to the Consolidated Financial Statements included in Item 1 of Part I of this Quarterly Report on Form 10-Q for the impact of this adoption on our Consolidated Income Statements and Consolidated Balance Sheets.

Terms

The terms "MTS," "we," "us," "the Company" or "our" in this Quarterly Report on Form 10-Q, unless the context otherwise requires, refer to MTS Systems Corporation and its wholly owned subsidiaries.

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Financial Results

Total Company

Results of Operations

The following tables compare results of operations, separately identifying the estimated impact of currency translation, the acquisition of E2M in the first quarter of fiscal year 2019 and restructuring costs incurred in the first quarter of fiscal year 2019.

	Three Months Ended[1]				
		Estimated			
	March 30, 2019	Business Change	Acquisition[2]	Currency Translation	March 31, 2018
Revenue	$ 233,046	$ 37,302	$ 10,138	$ (5,717)	$ 191,323
Cost of sales	145,696	25,891	7,260	(3,953)	116,498
Gross profit	87,350	11,411	2,878	(1,764)	74,825
Gross margin	*37.5%*				*39.1%*
Operating expenses					
Selling and marketing	33,395	3,229	319	(750)	30,597
General and administrative	22,105	1,535	1,875	(297)	18,992
Research and development	7,676	(1,229)	348	(69)	8,626
Total operating expenses	63,176	3,535	2,542	(1,116)	58,215
Income from operations	$ 24,174	$ 7,876	$ 336	$ (648)	$ 16,610

	Six Months Ended[1]				
		Estimated			
	March 30, 2019	Business Change	Acquisition / Restructuring[3]	Currency Translation	March 31, 2018
Revenue	$ 436,227	$ 45,243	$ 13,659	$ (8,160)	$ 385,485
Cost of sales	270,572	33,553	10,193	(5,906)	232,732
Gross profit	165,655	11,690	3,466	(2,254)	152,753
Gross margin	*38.0%*				*39.6%*
Operating expenses					
Selling and marketing	65,484	3,453	410	(1,004)	62,625
General and administrative	43,183	972	3,208	(551)	39,554
Research and development	14,848	(3,085)	558	(92)	17,467
Total operating expenses	123,515	1,340	4,176	(1,647)	119,646
Income from operations	$ 42,140	$ 10,350	$ (710)	$ (607)	$ 33,107

[1] Financial results for fiscal year 2019 are presented in accordance with the new revenue standard adopted in the first quarter of fiscal year 2019. Prior period results have not been restated to reflect this change. The three and six months ended March 30, 2019 include a favorable impact on income from operations related to the ASC 606 adoption of $2,841 and $3,291, respectively. While we do not expect the adoption of the new revenue standard to have a significant impact on annual operating results, we do expect that it will have an impact on the timing of revenue recognition in interim periods.

[2] The Acquisition column includes revenues and costs from the acquisition of E2M and costs incurred as part of the acquisition of E2M.

[3] The Acquisition / Restructuring column includes revenues and costs from the acquisition of E2M, costs incurred as part of the acquisition of E2M and restructuring costs.

See Notes 3, 17 and 18 to the Consolidated Financial Statements included in Item 1 of Part I of this Quarterly Report on Form 10-Q for additional information on the new revenue standard, restructuring and related costs, and the E2M acquisition, respectively.

Revenue

	Three Months Ended		Increased / (Decreased)		Six Months Ended		Increased / (Decreased)	
	March 30, 2019	March 31, 2018	$	%	March 30, 2019	March 31, 2018	$	%
Revenue	$ 233,046	$ 191,323	$ 41,723	21.8%	$ 436,227	$ 385,485	$ 50,742	13.2%

Revenue for the three and six months ended March 30, 2019 increased 21.8% and 13.2%, respectively, primarily driven by growth in both the Test & Simulation and Sensors businesses, partially offset by the unfavorable impact of currency translation. Test & Simulation revenue for the three and six months ended March 30, 2019 increased $40,794 and $48,151, respectively, primarily driven by growth in equipment volume from conversion of robust beginning-of-year backlog across all sectors and strong current-year order volume and the acquisition of E2M in the first quarter of fiscal year 2019. The increase was partially offset by the unfavorable impact of currency translation. Sensors revenue for the three and six months ended March 30, 2019 increased $833 and $2,824, respectively, primarily driven by continued growth in the Sensors position sector from ongoing strength in industrial and mobile hydraulics markets and growth in the Sensors test sector from a multi-year contract with the U.S. Department of Defense, partially offset by the unfavorable impact of currency translation. Excluding the impact of currency translation and the E2M acquisition, revenue increased 19.5% and 11.7%, respectively.

Gross Profit

	Three Months Ended		Increased / (Decreased)		Six Months Ended		Increased / (Decreased)	
	March 30, 2019	March 31, 2018	$	%	March 30, 2019	March 31, 2018	$	%
Gross profit	$ 87,350	$ 74,825	$ 12,525	16.7%	$ 165,655	$ 152,753	$ 12,902	8.4%
Gross margin	*37.5%*	*39.1%*	*(1.6)* ppts		*38.0%*	*39.6%*	*(1.6)* ppts	

Gross profit for the three and six months ended March 30, 2019 increased 16.7% and 8.4%, respectively, primarily driven by revenue growth in Test & Simulation and the gross profit contribution from the E2M acquisition. This increase was partially offset by increased compensation expense, revenue mix between Test & Simulation and Sensors, the E2M inventory acquisition adjustment of $539 and $984, respectively, and the unfavorable impact of currency translation. Gross margin rate declined 1.6 percentage points in both periods primarily due to increased compensation expense, revenue mix between Test & Simulation and Sensors, and the E2M inventory acquisition adjustment. This decrease was partially offset by favorable leverage on higher revenue volume and strong project execution. Excluding the impact of currency translation, the E2M acquisition, and restructuring costs incurred in both fiscal years, gross profit increased 14.8% and 7.4% and the gross margin rate declined 1.6 and 1.5 percentage points, respectively.

Selling and Marketing Expense

	Three Months Ended		Increased / (Decreased)		Six Months Ended		Increased / (Decreased)	
	March 30, 2019	March 31, 2018	$	%	March 30, 2019	March 31, 2018	$	%
Selling and marketing	$ 33,395	$ 30,597	$ 2,798	9.1%	$ 65,484	$ 62,625	$ 2,859	4.6%
% of revenue	*14.3%*	*16.0%*			*15.0%*	*16.2%*		

Selling and marketing expense for the three and six months ended March 30, 2019 increased 9.1% and 4.6%, respectively, primarily due to increased compensation and commissions expense to support sales growth and the addition of E2M expenses, partially offset by the favorable impact of currency translation. Excluding the impact of currency translation and E2M expenses, selling and marketing expense increased 10.6% and 5.5%, respectively.

General and Administrative Expense

	Three Months Ended		Increased / (Decreased)		Six Months Ended		Increased / (Decreased)	
	March 30, 2019	March 31, 2018	$	%	March 30, 2019	March 31, 2018	$	%
General and administrative	$ 22,105	$ 18,992	$ 3,113	16.4%	$ 43,183	$ 39,554	$ 3,629	9.2%
% of revenue	*9.5%*	*9.9%*			*9.9%*	*10.3%*		

General and administrative expense for the three and six months ended March 30, 2019 increased 16.4% and 9.2%, respectively, primarily due to the addition of E2M expenses, acquisition-related expenses, higher compensation expense in Sensors and increased professional fees, partially offset by lower compensation expense in Test & Simulation. Excluding the impact of currency translation, E2M expenses, and restructuring costs incurred in both fiscal years, general and administrative expense increased 8.3% and 2.9%, respectively.

Research and Development Expense

	Three Months Ended		Increased / (Decreased)		Six Months Ended		Increased / (Decreased)	
	March 30, 2019	March 31, 2018	$	%	March 30, 2019	March 31, 2018	$	%
Research and development	$ 7,676	$ 8,626	$ (950)	(11.0)%	$ 14,848	$ 17,467	$ (2,619)	(15.0)%
% of revenue	*3.3%*	*4.5%*			*3.4%*	*4.5%*		

Research and development (R&D) expense for the three months ended March 30, 2019 declined 11.0% primarily due to lower compensation expense in Test & Simulation, partially offset by the addition of E2M expenses. Excluding the impact of currency translation and E2M expenses, R&D expense decreased 14.2%.

R&D expense for the six months ended March 30, 2019 declined 15.0% primarily due to lower compensation expense in Test & Simulation due in part to the shift of internal resources to capital projects, partially offset by the addition of E2M expenses and continued investment in new product development in Sensors. Excluding the impact of currency translation and E2M expenses, R&D expense decreased 17.7%.

Income from Operations

	Three Months Ended		Increased / (Decreased)		Six Months Ended		Increased / (Decreased)	
	March 30, 2019	March 31, 2018	$	%	March 30, 2019	March 31, 2018	$	%
Income from operations	$ 24,174	$ 16,610	$ 7,564	45.5%	$ 42,140	$ 33,107	$ 9,033	27.3%
% of revenue	*10.4%*	*8.7%*			*9.7%*	*8.6%*		

Income from operations for the three and six months ended March 30, 2019 increased 45.5% and 27.3%, respectively, primarily due to increased gross profit on higher revenue volume and the impact of the E2M acquisition, partially offset by higher compensation expense and acquisition-related expenses. Excluding the impact of currency translation, the E2M acquisition, and restructuring costs incurred in both fiscal years, income from operations increased 44.4% and 28.9%, respectively.

Interest Expense, Net

	Three Months Ended		Increased / (Decreased)		Six Months Ended		Increased / (Decreased)	
	March 30, 2019	March 31, 2018	$	%	March 30, 2019	March 31, 2018	$	%
Interest expense, net	$ 7,368	$ 6,708	$ 660	9.8%	$ 14,186	$ 13,512	$ 674	5.0%

Interest expense, net for the three and six months ended March 30, 2019 increased primarily due to an increase in interest expense on the revolving credit facility, which was partially offset by a reduction in interest expense related to lower balances on the tranche B term loan, as well as current year gains on interest rate swaps.

Other Income (Expense), Net

	Three Months Ended		Increased / (Decreased)		Six Months Ended		Increased / (Decreased)	
	March 30, 2019	March 31, 2018	$	%	March 30, 2019	March 31, 2018	$	%
Other income (expense), net	$ 270	$ 274	$ (4)	(1.5)%	$ 319	$ 51	$ 268	525.5%

Other income (expense), net remained flat for the three months ended March 30, 2019.

The increase in other income (expense), net for the six months ended March 30, 2019 was primarily driven by a relative decrease in losses on foreign currency transactions.

Income Tax Provision (Benefit)

	Three Months Ended		Increased / (Decreased)		Six Months Ended		Increased / (Decreased)	
	March 30, 2019	March 31, 2018	$	%	March 30, 2019	March 31, 2018	$	%
Income tax provision (benefit)	$ 2,916	$ 1,738	$ 1,178	67.8%	$ 3,612	$ (21,943)	$ 25,555	116.5%
Effective tax rate	*17.1%*	*17.1%*			*12.8%*	*(111.7)%*		

The effective tax rate for the three months ended March 30, 2019 was flat.

The effective tax rate for the six months ended March 30, 2019 increased primarily due to certain discrete benefits of $25,378 in the prior year for the estimated impact of the Tax Cuts and Jobs Act (the Tax Act). The current year also includes a certain discrete tax benefit of $1,293 related to the Tax Act. Excluding the impact of these discrete benefits, the effective tax rate for the six months ended March 30, 2019 and March 31, 2018 would have been 17.3% and 17.5%, respectively.

Net Income

	Three Months Ended		Increased / (Decreased)		Six Months Ended		Increased / (Decreased)	
	March 30, 2019	March 31, 2018	$	%	March 30, 2019	March 31, 2018	$	%
Net income	$ 14,160	$ 8,438	$ 5,722	67.8%	$ 24,661	$ 41,589	$ (16,928)	(40.7)%
Diluted earnings per share	$ 0.73	$ 0.44	$ 0.29	65.9%	$ 1.27	$ 2.16	$ (0.89)	(41.2)%

Net income and diluted earnings per share for the three months ended March 30, 2019 increased primarily due to higher income from operations.

Net income and diluted earnings per share for the six months ended March 30, 2019 decreased primarily due to an increase in the effective tax rate, partially offset by higher income from operations.

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Segment Results

Test & Simulation Segment

Results of Operations
The following tables compare results of operations for Test & Simulation, separately identifying the estimated impact of currency translation, the acquisition of E2M in the first quarter of fiscal year 2019 and restructuring costs incurred in the first quarter of fiscal year 2019. See Note 16 to the Consolidated Financial Statements included in Item 1 of Part I of this Quarterly Report on Form 10-Q for additional information on our reportable segments.

	Three Months Ended[1]				
		Estimated			
	March 30, 2019	Business Change	Acquisition[2]	Currency Translation	March 31, 2018
Revenue	$ 151,032	$ 34,007	$ 10,138	$ (3,351)	$ 110,238
Cost of sales	103,742	23,110	7,260	(2,639)	76,011
Gross profit	47,290	10,897	2,878	(712)	34,227
Gross margin	*31.3%*				*31.0%*
Operating expenses					
Selling and marketing	18,515	2,626	319	(389)	15,959
General and administrative	12,816	410	1,875	(211)	10,742
Research and development	3,275	(1,299)	348	(5)	4,231
Total operating expenses	34,606	1,737	2,542	(605)	30,932
Income from operations	$ 12,684	$ 9,160	$ 336	$ (107)	$ 3,295

	Six Months Ended[1]				
		Estimated			
	March 30, 2019	Business Change	Acquisition / Restructuring[3]	Currency Translation	March 31, 2018
Revenue	$ 276,592	$ 39,352	$ 13,659	$ (4,860)	$ 228,441
Cost of sales	189,757	28,528	10,193	(4,039)	155,075
Gross profit	86,835	10,824	3,466	(821)	73,366
Gross margin	*31.4%*				*32.1%*
Operating expenses					
Selling and marketing	35,863	2,227	410	(495)	33,721
General and administrative	24,887	274	3,208	(428)	21,833
Research and development	6,070	(3,390)	558	(6)	8,908
Total operating expenses	66,820	(889)	4,176	(929)	64,462
Income from operations	$ 20,015	$ 11,713	$ (710)	$ 108	$ 8,904

[1] Financial results for fiscal year 2019 are presented in accordance with the new revenue standard adopted in the first quarter of fiscal year 2019. Prior period results have not been restated to reflect this change. The three and six months ended March 30, 2019 include a favorable impact on income from operations related to the ASC 606 adoption of $2,841 and $3,291, respectively. While we do not expect the adoption of the new revenue standard to have a significant impact on annual operating results, we do expect that it will have an impact on the timing of revenue recognition in interim periods.

[2] The Acquisition column includes revenues and costs from the acquisition of E2M and costs incurred as part of the acquisition of E2M.

[3] The Acquisition / Restructuring column includes revenues and costs from the acquisition of E2M, costs incurred as part of the acquisition of E2M and restructuring costs.

See Notes 3, 17 and 18 to the Consolidated Financial Statements included in Item 1 of Part I of this Quarterly Report on Form 10-Q for additional information on the new revenue standard, restructuring and related costs, and the E2M acquisition, respectively.

Revenue

	Three Months Ended		Increased / (Decreased)		Six Months Ended		Increased / (Decreased)	
	March 30, 2019	March 31, 2018	$	%	March 30, 2019	March 31, 2018	$	%
Revenue	$ 151,032	$ 110,238	$ 40,794	37.0%	$ 276,592	$ 228,441	$ 48,151	21.1%

Revenue for the three and six months ended March 30, 2019 increased 37.0% and 21.1%, respectively, primarily driven by growth in equipment volume across all sectors from conversion of robust beginning-of-year backlog and strong current-year order volume and the acquisition of E2M in the first quarter of fiscal year 2019. The increase was partially offset by the unfavorable impact of currency translation. Excluding the impact of currency translation and the E2M acquisition, revenue increased 30.8% and 17.2%, respectively.

Gross Profit

	Three Months Ended		Increased / (Decreased)		Six Months Ended		Increased / (Decreased)	
	March 30, 2019	March 31, 2018	$	%	March 30, 2019	March 31, 2018	$	%
Gross profit	$ 47,290	$ 34,227	$ 13,063	38.2%	$ 86,835	$ 73,366	$ 13,469	18.4%
Gross margin	*31.3%*	*31.0%*	*0.3* ppts		*31.4%*	*32.1%*	*(0.7)* ppts	

Gross profit for the three months ended March 30, 2019 increased 38.2% primarily due to higher revenue volume and the gross profit contribution from the E2M acquisition, partially offset by increased compensation expense. Gross margin rate increased 0.3 percentage points primarily driven by higher revenue volume, strong project execution and the favorable impact of currency translation, partially offset by increased compensation expense and the $539 E2M acquisition inventory adjustment. Excluding the impact of currency translation, the E2M acquisition, and prior year restructuring costs, gross profit increased 30.7% and gross margin rate remained flat.

Gross profit for the six months ended March 30, 2019 increased 18.4% primarily due to higher revenue volume and the gross profit contribution from the E2M acquisition, partially offset by increased compensation expense. Gross margin rate declined 0.7 percentage points primarily driven by increased compensation expense and the $984 E2M acquisition inventory adjustment, partially offset by higher revenue volume, strong project execution and the favorable impact of currency translation. Excluding the impact of currency translation, the E2M acquisition, and restructuring costs incurred in both fiscal years, gross profit increased 14.1% and gross margin rate declined 0.9 percentage points.

Selling and Marketing Expense

	Three Months Ended		Increased / (Decreased)		Six Months Ended		Increased / (Decreased)	
	March 30, 2019	March 31, 2018	$	%	March 30, 2019	March 31, 2018	$	%
Selling and marketing	$ 18,515	$ 15,959	$ 2,556	16.0%	$ 35,863	$ 33,721	$ 2,142	6.4%
% of revenue	*12.3%*	*14.5%*			*13.0%*	*14.8%*		

Selling and marketing expense for the three and six months ended March 30, 2019 increased 16.0% and 6.4%, respectively, primarily due higher commissions and compensation expense, as well as the addition of E2M expenses, partially offset by the favorable impact of currency translation. Excluding the impact of currency translation and E2M expenses, selling and marketing expense increased 16.5% and 6.6%, respectively.

General and Administrative Expense

	Three Months Ended		Increased / (Decreased)		Six Months Ended		Increased / (Decreased)	
	March 30, 2019	March 31, 2018	$	%	March 30, 2019	March 31, 2018	$	%
General and administrative	$ 12,816	$ 10,742	$ 2,074	19.3%	$ 24,887	$ 21,833	$ 3,054	14.0%
% of revenue	*8.5%*	*9.7%*			*9.0%*	*9.6%*		

General and administrative expense for the three and six months ended March 30, 2019 increased 19.3% and 14.0%, respectively, primarily driven by the addition of E2M expenses and acquisition-related expenses, partially offset by lower compensation expense. Excluding the impact of currency translation, E2M expenses, and restructuring costs incurred in both fiscal years, general and administrative expense increased 4.2% and 2.1%, respectively.

Research and Development Expense

	Three Months Ended		Increased / (Decreased)		Six Months Ended		Increased / (Decreased)	
	March 30, 2019	March 31, 2018	$	%	March 30, 2019	March 31, 2018	$	%
Research and development	$ 3,275	$ 4,231	$ (956)	(22.6)%	$ 6,070	$ 8,908	$ (2,838)	(31.9)%
% of revenue	*2.2%*	*3.8%*			*2.2%*	*3.9%*		

R&D expense for the three months ended March 30, 2019 declined 22.6% primarily due to lower compensation expense, partially offset by the addition of E2M expenses. Excluding the impact of currency translation and E2M expenses, R&D expense decreased 30.7%.

R&D expense for the six months ended March 30, 2019 declined 31.9% primarily due to the shift of internal resources to capital projects and lower compensation expense, partially offset by the addition of E2M expenses. Excluding the impact of currency translation and E2M expenses, R&D expense decreased 38.1%.

Income from Operations

	Three Months Ended		Increased / (Decreased)		Six Months Ended		Increased / (Decreased)	
	March 30, 2019	March 31, 2018	$	%	March 30, 2019	March 31, 2018	$	%
Income from operations	$ 12,684	$ 3,295	$ 9,389	284.9%	$ 20,015	$ 8,904	$ 11,111	124.8%
% of revenue	*8.4%*	*3.0%*			*7.2%*	*3.9%*		

Income from operations for the three and six months ended March 30, 2019 increased 284.9% and 124.8%, respectively, primarily due to increased gross profit on higher revenue volume and operational productivity, partially offset by higher compensation expense. Excluding the impact of currency translation, the E2M acquisition, and restructuring costs incurred in both fiscal years, income from operations increased 242.1% and 116.9%, respectively.

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Sensors Segment

Results of Operations

The following tables compare results of operations for Sensors, separately identifying the estimated impact of currency translation. See Note 16 to the Consolidated Financial Statements included in Item 1 of Part I of this Quarterly Report on Form 10-Q for additional information on our reportable segments.

	Three Months Ended			
		Estimated		
	March 30, 2019	Business Change	Currency Translation	March 31, 2018
Revenue	$ 82,375	$ 3,199	$ (2,366)	$ 81,542
Cost of sales	42,301	2,693	(1,314)	40,922
Gross profit	40,074	506	(1,052)	40,620
Gross margin	*48.6%*			*49.8%*
Operating expenses				
Selling and marketing	14,880	603	(361)	14,638
General and administrative	9,289	1,125	(86)	8,250
Research and development	4,401	70	(64)	4,395
Total operating expenses	28,570	1,798	(511)	27,283
Income (loss) from operations	$ 11,504	$ (1,292)	$ (541)	$ 13,337

	Six Months Ended			
		Estimated		
	March 30, 2019	Business Change	Currency Translation	March 31, 2018
Revenue	$ 160,325	$ 6,124	$ (3,300)	$ 157,501
Cost of sales	81,492	5,267	(1,867)	78,092
Gross profit	78,833	857	(1,433)	79,409
Gross margin	*49.2%*			*50.4%*
Operating expenses				
Selling and marketing	29,621	1,226	(509)	28,904
General and administrative	18,296	698	(123)	17,721
Research and development	8,778	305	(86)	8,559
Total operating expenses	56,695	2,229	(718)	55,184
Income (loss) from operations	$ 22,138	$ (1,372)	$ (715)	$ 24,225

Revenue

	Three Months Ended		Increased /(Decreased)		Six Months Ended		Increased / (Decreased)	
	March 30, 2019	March 31, 2018	$	%	March 30, 2019	March 31, 2018	$	%
Revenue	$ 82,375	$ 81,542	$ 833	1.0%	$ 160,325	$ 157,501	$ 2,824	1.8%

Revenue for the three and six months ended March 30, 2019 increased 1.0% and 1.8%, respectively, primarily driven by continued growth in the Sensors position sector from continued strength in industrial and mobile hydraulics markets and growth in the Sensors test sector from a multi-year contract with the U.S. Department of Defense, partially offset by the unfavorable impact of currency translation. Excluding the impact of currency translation, revenue increased 3.9% in both periods.

Gross Profit

	Three Months Ended		Increased / (Decreased)		Six Months Ended		Increased / (Decreased)	
	March 30, 2019	March 31, 2018	$	%	March 30, 2019	March 31, 2018	$	%
Gross profit	$ 40,074	$ 40,620	$ (546)	(1.3)%	$ 78,833	$ 79,409	$ (576)	(0.7)%
Gross margin	*48.6%*	*49.8%*	*(1.2)* ppts		*49.2%*	*50.4%*	*(1.2)* ppts	

Gross profit for the three and six months ended March 30, 2019 declined 1.3% and 0.7%, respectively, primarily due to the unfavorable impact of currency translation and increased compensation expense, partially offset by increased revenue volume. Gross margin rate declined 1.2 percentage points in both periods primarily driven by increased compensation expense during the ramp-up of manufacturing capacity to support both new products and growth in order volume in a tight labor market. Excluding the impact of currency translation, gross profit increased 1.2% and 1.1%, respectively, and the gross margin rate declined 1.3 percentage points in both periods.

Selling and Marketing Expense

	Three Months Ended		Increased / (Decreased)		Six Months Ended		Increased / (Decreased)	
	March 30, 2019	March 31, 2018	$	%	March 30, 2019	March 31, 2018	$	%
Selling and marketing	$ 14,880	$ 14,638	$ 242	1.7%	$ 29,621	$ 28,904	$ 717	2.5%
% of revenue	*18.1%*	*18.0%*			*18.5%*	*18.4%*		

Selling and marketing expense for the three and six months ended March 30, 2019 increased 1.7% and 2.5%, respectively, primarily driven by increased compensation from headcount additions to support sales growth, partially offset by the favorable impact of currency translation. Excluding the impact of currency translation, selling and marketing expense increased 4.1% and 4.2%, respectively.

General and Administrative Expense

	Three Months Ended		Increased / (Decreased)		Six Months Ended		Increased / (Decreased)	
	March 30, 2019	March 31, 2018	$	%	March 30, 2019	March 31, 2018	$	%
General and administrative	$ 9,289	$ 8,250	$ 1,039	12.6%	$ 18,296	$ 17,721	$ 575	3.2%
% of revenue	*11.3%*	*10.1%*			*11.4%*	*11.3%*		

General and administrative expense for the three months ended March 30, 2019 increased 12.6% primarily driven by higher compensation expense. Excluding the impact of currency translation, general and administrative expense increased 13.6%.

General and administrative expense for the six months ended March 30, 2019 increased 3.2% primarily driven by higher professional fees and compensation expense. Excluding the impact of currency translation, general and administrative expense increased 3.9%.

Research and Development Expense

	Three Months Ended		Increased / (Decreased)		Six Months Ended		Increased / (Decreased)	
	March 30, 2019	March 31, 2018	$	%	March 30, 2019	March 31, 2018	$	%
Research and development	$ 4,401	$ 4,395	$ 6	0.1%	$ 8,778	$ 8,559	$ 219	2.6%
% of revenue	*5.3%*	*5.4%*			*5.5%*	*5.4%*		

R&D expense for the three months ended March 30, 2019 was flat. R&D expense for the six months ended March 30, 2019 increased 2.6% primarily driven by continued investment in new product development. Excluding the impact of currency translation, R&D expense increased 1.6% and 3.6%, respectively.

Income from Operations

	Three Months Ended		Increased / (Decreased)		Six Months Ended		Increased / (Decreased)	
	March 30, 2019	March 31, 2018	$	%	March 30, 2019	March 31, 2018	$	%
Income from operations	$ 11,504	$ 13,337	$ (1,833)	(13.7)%	$ 22,138	$ 24,225	$ (2,087)	(8.6)%
% of revenue	*14.0%*	*16.4%*			*13.8%*	*15.4%*		

Income from operations for the three and six months ended March 30, 2019 declined 13.7% and 8.6%, respectively, primarily due to increased compensation expense and the unfavorable impact of currency translation. Excluding the impact of currency translation, income from operations decreased 9.7% and 5.7%, respectively.

Cash Flow Comparison

The following table summarizes our cash flows from total operations:

	Six Months Ended	
	March 30, 2019	March 31, 2018
Total cash provided by (used in):		
Operating activities	$ 30,669	$ 37,258
Investing activities	(91,450)	(4,476)
Financing activities	63,187	(61,126)
Effect of exchange rate changes on cash	(88)	3,989
Increase (decrease) during the period	2,318	(24,355)
Cash and cash equivalents balance, beginning of period	71,804	108,733
Cash and cash equivalents balance, end of period	$ 74,122	$ 84,378

Operating Activities

The decrease in cash provided by operating activities was primarily due to an increase in cash used by working capital associated with timing fluctuations from accounts receivable payments received and unbilled accounts receivable accruals, accounts payable payments, inventory purchases, and advanced payments received from customers, as well as a decrease in net income due to the remeasurement of our estimated deferred tax liabilities as a result of the Tax Act in fiscal year 2018. This decrease was partially offset by a decrease in cash used by deferred income taxes, an increase in cash provided by other assets and liabilities related to accrued project costs, and a decrease in cash used by payroll-related accruals.

Investing Activities

The increase in cash used in investing activities was primarily due to the acquisition of E2M in the first quarter of fiscal year 2019.

Financing Activities

The increase in cash provided by financing activities was primarily due to borrowings under the Revolving Credit Facility used to fund the acquisition of E2M and a decrease in cash used for long-term debt payments.

Liquidity and Capital Resources

We had cash and cash equivalents of $74,122 as of March 30, 2019. Of this amount, $10,597 was located in North America, $28,847 in Europe and $34,678 in Asia. Repatriation of certain foreign earnings is restricted by local law. The North American cash balance was primarily invested in bank deposits. The cash balances in Europe and Asia were primarily invested in money market funds and bank deposits. In accordance with our investment policy, we place cash equivalent investments with issuers who have high-quality investment credit ratings. In addition, we limit the amount of investment exposure we have with any particular issuer. Our investment objectives are to preserve principal, maintain liquidity and achieve the best available return consistent with our primary objectives of safety and liquidity. As of March 30, 2019, we held no short-term investments.

As a result of the transition tax related to the enactment of the Tax Act, we are able to repatriate cash held in our foreign subsidiaries without such funds being subject to additional federal income tax liability. We plan to continue to repatriate certain amounts of our existing offshore cash and future earnings back to the U.S.

As of March 30, 2019, our capital structure was comprised of $31,632 in short-term debt, $443,206 in long-term debt and $485,054 in shareholders' equity. Long-term debt included $80,391 on our Revolving Credit Facility used to finance the acquisition of E2M. The Consolidated Balance Sheets also included $10,418 of unamortized debt issuance costs as of

March 30, 2019. Total interest-bearing debt as of March 30, 2019 was $474,838. We have a credit agreement with a consortium of financial institutions (the Credit Agreement) that provides for senior secured credit facilities consisting of a Revolving Credit Facility and a Term Facility. The maturity date of the Revolving Credit Facility is July 5, 2022 and the maturity date of the loans under the Term Facility is July 5, 2023, unless a term loan lender agrees to extend the maturity date pursuant to a loan modification agreement made in accordance with the terms of the Credit Agreement. The Credit Agreement also requires mandatory prepayments on our Term Facility in certain circumstances, including the potential for an annual required prepayment of a certain percentage of our excess cash flow.

Under the Credit Agreement, we are subject to customary affirmative and negative covenants, including, among others, restrictions on our ability to incur debt, create liens, dispose of assets, make investments, loans, advances, guarantees and acquisitions, enter into transactions with affiliates and enter into any restrictive agreements and customary events of default (including payment defaults, covenant defaults, change of control defaults and bankruptcy defaults). The Credit Agreement also contains financial covenants, including the ratio of consolidated total indebtedness to adjusted consolidated earnings before interest, taxes, depreciation and amortization (Adjusted EBITDA), as defined in the Credit Agreement, as well as the ratio of Adjusted EBITDA to consolidated interest expense. These covenants restrict our ability to pay dividends and purchase outstanding shares of common stock. As of March 30, 2019, we were in compliance with these financial covenants. See Note 9 to the Consolidated Financial Statements included in Item I of Part I of this Quarterly Report on Form 10-Q for additional information on our financing arrangements.

Shareholders' equity increased by $7,122 during the six months ended March 30, 2019 primarily due to $24,661 net income and $5,219 stock-based compensation. The increase was partially offset by $10,740 dividends declared and $6,094 other comprehensive loss. Also contributing to the decrease was a cumulative effect of accounting change reduction to our opening retained earnings balance of $6,227 related to the adoption of the new revenue recognition standard, ASU No. 2014-09, *Revenue from Contracts with Customers (Topic 606).*

As of March 30, 2019, we believe our current capital resources will be sufficient to fund working capital requirements, capital expenditures and operations for the foreseeable future, including at least the next twelve months.

Off-balance Sheet Arrangements

As of March 30, 2019, we did not have any off-balance sheet arrangements that have, or are reasonably likely to have, a current or future material effect on our financial condition, changes in financial condition, revenues or expenses, results of operations, liquidity, capital expenditures or capital resources that are material to investors.

Critical Accounting Policies

The Consolidated Financial Statements have been prepared in accordance with GAAP, which requires us to make estimates and assumptions in certain circumstances that affect amounts reported, giving due consideration to materiality, that affect the reported amounts of assets and liabilities, revenues and expenses and related disclosures of any contingent assets and liabilities at the date of the financial statements. We regularly review our estimates and assumptions, which are based on historical experience and on various other factors that are believed to be reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions or conditions. For further information, see "Summary of Significant Accounting Policies" under Note 1 to the Consolidated Financial Statements included in Item 8 of our Annual Report on Form 10-K for the fiscal year ended September 29, 2018. For a discussion of our critical accounting policies, see "Management’s Discussion and Analysis of Financial Condition and Results of Operations" in Item 7 of Part II of our Annual Report on Form 10-K for the fiscal year ended September 29, 2018.

The following critical accounting policy has been updated since our Annual Report on Form 10-K for the fiscal year ended September 29, 2018.

Revenue Recognition (Over Time)

Revenue is recognized either over time as work progresses or at a point-in-time, dependent upon contract-specific terms and the pattern of transfer of control of the product or service to the customer. Contracts with equipment revenue recognized over time use costs incurred to date relative to total estimated costs at completion to measure progress toward satisfying the performance obligation. Incurred cost represents work performed, which corresponds with, and thereby best depicts, the transfer of control to the customer. Equipment contract costs include materials, component parts, labor and overhead costs. For contracts recognized over time, we estimate the profit on a contract as the difference between the total estimated revenue and expected costs to complete a contract and recognize that profit over the life of the contract. Contract estimates are based on various assumptions to determine the outcome of future events that may span several years. These assumptions include labor productivity and availability, the complexity of the work to be performed, the cost and availability of materials, and internal and subcontractor performance.

As a significant change in one or more of these estimates could affect the profitability of our contracts, we review and update our contract-related estimates regularly. We recognize adjustments in estimated profit on contracts under the cumulative catch-up method. Under this method, the impact of the adjustment on profit recorded to date is recognized in the period the adjustment is identified. Revenue and profit in future periods of contract performance is recognized using the adjusted estimate. If at any time the estimate of contract profitability indicates an anticipated loss on the contract, we recognize the total loss in the period it is identified. Our review of contract-related estimates has not resulted in adjustments that are significant to our results of operations.

Recently Issued Accounting Pronouncements
Information regarding new accounting pronouncements is included in Note 2 and Note 3 to the Consolidated Financial Statements included in Item 1 of Part I of this Quarterly Report on Form 10-Q.

Other Matters

Dividends
Our dividend policy is to maintain a payout ratio that allows dividends to increase in conjunction with the long-term growth of earnings per share, while sustaining dividends through economic cycles. Our dividend practice is to target, over time, a payout ratio of approximately 25% of net earnings per share. We have historically paid dividends to holders of our common stock on a quarterly basis. The declaration and payment of future dividends will depend on many factors, including, but not limited to, our earnings, financial condition, debt repayment obligations, business development needs and regulatory considerations and are at the discretion of our Board of Directors.

Forward-looking Statements
Statements contained in this Quarterly Report on Form 10-Q including, but not limited to, the discussion under Item 2, Management's Discussion and Analysis of Financial Condition and Results of Operations, that are not statements of historical fact are forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995 (the Act). In addition, certain statements in our future filings with the SEC, in press releases, and in oral and written statements made by us or with our approval that are not statements of historical fact constitute forward-looking statements within the meaning of the Act. Examples of forward-looking statements include, but are not limited to: (i) projections of revenue, ROIC, Adjusted EBITDA, net income or loss, earnings or loss per share, the payment or nonpayment of dividends, our capital structure, the adequacy of our liquidity and reserves, the anticipated level of expenditures required and other statements concerning future financial performance; (ii) statements of our plans and objectives by our management or Board of Directors, including those relating to products or services, our restructuring initiatives, merger or acquisition activity and the potential impact of newly acquired businesses; (iii) statements of assumptions underlying such statements; (iv) statements regarding business relationships with vendors, customers or collaborators or statements relating to our order cancellation history, our ability to convert our backlog of undelivered orders into revenue, the timing of purchases, competitive advantages and growth in end markets; and (v) statements regarding our products and their characteristics, fluctuations in the costs of raw materials for products, our geographic footprint, performance, sales potential or effect in the hands of customers. Words such as "believes," "anticipates," "expects," "intends," "targeted," "should," "potential," "goals," "strategy," and similar expressions are intended to identify forward-looking statements, but are not the exclusive means of identifying such statements.

Forward-looking statements involve risks and uncertainties that may cause actual results to differ materially from those in such statements. Factors that could cause actual results to differ from those discussed in the forward-looking statements include, but are not limited to, those described in Item 1A of Part I of our Annual Report on Form 10-K for the fiscal year ended September 29, 2018 and in Item 1A of Part II of this Quarterly Report on Form 10-Q. The performance of our business and our securities may be adversely affected by these factors and by other factors common to other businesses and investments, or to the general economy. Forward-looking statements are qualified by some or all of these risk factors. Therefore, you should consider these forward-looking statements with caution and form your own critical and independent conclusions about the likely effect of these risk factors on our future performance. Forward-looking statements speak only as of the date on which such statements are made, and we undertake no obligation to update any forward-looking statement to reflect events or circumstances after the date on which such statement is made to reflect the occurrence of unanticipated events or circumstances. You should carefully review the disclosures and the risk factors described in our Annual Report on Form 10-K for the fiscal year ended September 29, 2018 and in other documents we file from time to time with the SEC, including our Quarterly Reports on Form 10-Q and Current Reports on Form 8-K.

Item 3. Quantitative and Qualitative Disclosures About Market Risk

Foreign Currency Exchange Risk

Approximately 70% of our revenue has historically been derived from customers outside of the U.S. Our international subsidiaries have functional currencies other than our U.S. dollar reporting currency and, occasionally, transact business in currencies other than their functional currencies. These non-functional currency transactions expose us to market risk on assets, liabilities and cash flows recognized on these transactions.

The strengthening of the U.S. dollar relative to foreign currencies decreases the value of foreign currency-denominated revenue and earnings when translated into U.S. dollars resulting in an unfavorable currency translation impact on revenue and earnings. Conversely, a weakening of the U.S. dollar increases the value of foreign currency-denominated revenue and earnings resulting in a favorable currency translation impact on revenue and earnings.

A hypothetical 10% appreciation or depreciation in foreign currencies against the U.S. dollar, assuming all other variables are held constant, would result in an increase or decrease in revenue of approximately $16,581 for the six months ended March 30, 2019.

We have operational procedures to mitigate these non-functional currency exposures. We also utilize foreign currency exchange contracts to exchange currencies at set exchange rates on future dates to offset expected gains or losses on specifically identified exposures.

Mark-to-market gains and losses on derivatives designated as cash flow hedges in our currency hedging program are recorded within accumulated other comprehensive income (loss) (AOCI) in the Consolidated Balance Sheets. Mark-to-market gains and losses are reclassified from AOCI to earnings in the same line item in the Consolidated Statements of Income and in the same period as the recognition of the underlying hedged transaction. Net gains and losses on foreign currency transactions included in the accompanying Consolidated Statements of Income were net losses of $309 and $642 during the six months ended March 30, 2019 and March 31, 2018, respectively. See Note 8 to the Consolidated Financial Statements included in Item 1 of Part I of this Quarterly Report on Form 10-Q for additional information on our cash flow hedge currency exchange contracts.

Interest Rates

We are directly exposed to changes in market interest rates on cash, cash equivalents, short-term investments and long-term debt, and are indirectly exposed to the impact of market interest rates on overall business activity.

On floating-rate investments, increases or decreases in market interest rates will increase or decrease future interest income, respectively. On floating-rate debt, increases or decreases in market interest rates will increase or decrease future interest expense, respectively. On fixed-rate investments, increases or decreases in market interest rates do not impact future interest income but may decrease or increase the fair market value of the investments, respectively. On fixed-rate debt, increases or decreases in market interest rates do not impact future interest expense but may decrease or increase the fair market value of the debt, respectively.

As of March 30, 2019, we had cash and cash equivalents of $74,122, some of which was invested in interest-bearing bank deposits or money market funds. The interest-bearing bank deposits and money market funds have interest rates that reset every 1 to 89 days and generate interest income that will vary based on changes in short-term interest rates. A hypothetical decrease of 100 basis points in market interest rates, assuming all other variables were held constant, would decrease interest income by approximately $59 for the six months ended March 30, 2019.

Secured floating rate credit facilities require interest payments to be calculated at a floating rate and are therefore impacted by increases or decreases in market interest rates. We have swapped a portion of our floating-rate debt to a fixed-rate such that the interest expense on this debt will not vary with changes in short-term interest rates. See Note 9 to the Consolidated Financial Statements included in Item 1 of Part I of this Quarterly Report on Form 10-Q for additional information on our interest rate swaps. A hypothetical increase of 100 basis points in floating interest rates, assuming all other variables were held constant, would result in an approximately $2,426 increase in future annual interest expense.

Item 4. Controls and Procedures

Our management, including our Chief Executive Officer and Chief Financial Officer, has conducted an evaluation of the effectiveness of the design and operation of our disclosure controls and procedures (as defined in Rule 13a-15(e) under the Securities Exchange Act of 1934, as amended (the Exchange Act)), as of March 30, 2019. Based on that evaluation, our Chief Executive Officer and Chief Financial Officer concluded that, as of March 30, 2019, our disclosure controls and procedures were effective.

There were no changes in our internal control over financial reporting during the second quarter of fiscal year 2019 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

PART II – OTHER INFORMATION

Item 1. Legal Proceedings

We are subject to various claims, legal actions and complaints arising in the ordinary course of business. We are not presently a party to any litigation the outcome of which we believe, if determined adversely to us, would individually or taken together have a material adverse effect on our business, operating results, cash flows or financial condition.

Item 1A. Risk Factors

A discussion of our risk factors can be found in Item 1A of Part I of our Annual Report on Form 10-K for the fiscal year ended September 29, 2018. The risks described in our Annual Report on Form 10-K are not the only risks we face. Additional risks not currently known to us, or that we currently deem to be immaterial, may also adversely affect our business, financial condition or results of operations in future periods.

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

The following table presents repurchases of our equity securities we made during the fiscal quarter ended March 30, 2019:

	Total Number of Shares Purchased	Average Price Paid per Share	Total Number of Shares Purchased As Part of Publicly Announced Plans or Programs	Maximum Number of Shares that May Yet be Purchased As Part of Publicly Announced Plans or Programs
December 30, 2018 – February 2, 2019	—	$ —	—	438
February 3, 2019 – March 2, 2019	—	$ —	—	438
March 3, 2019 – March 30, 2019	—	$ —	—	438

We purchase common stock from time to time to mitigate dilution related to new shares issued as equity for employee compensation such as stock options, restricted stock units, performance restricted stock units and employee stock purchase plan activity, as well as to return to shareholders capital not immediately required to fund ongoing operations.

Share Purchase Plan
Our Board of Directors approved, and on February 11, 2011 announced, a purchase authorization of 2,000 shares. Authority over pricing and timing under the authorization has been delegated to management. The share purchase authorization has no expiration date. We made no share purchases during the second quarter of fiscal year 2019. As of March 30, 2019, there were 438 shares available for purchase under the existing authorization.

Capped Calls
In connection with the pricing of the tangible equity units (TEUs) sold in our public offering in fiscal year 2016, we purchased capped calls from third party banking institutions (Capped Calls) for $7,935. On June 13, 2018, we amended the agreements with third party banking institutions for the outstanding Capped Calls (Capped Call Agreements) to modify the timing of settlement to be only upon expiration for all outstanding Capped Calls. Per the Capped Call Agreements, the outstanding Capped Calls will automatically settle upon expiration on July 1, 2019. As of March 30, 2019 the range of shares of our common stock to be received for the outstanding Capped Calls was a minimum of 0 shares to a maximum of 268 shares, subject to market conditions. See Note 13 to the Consolidated Financial Statements included in Part I of this Quarterly Report on Form 10-Q for additional information on our equity instruments.

Item 6. Exhibits

Exhibit Number	Description
31.1	Certification of the Chief Executive Officer Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002 (filed herewith).
31.2	Certification of the Chief Financial Officer Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002 (filed herewith).
32.1	Certification of the Chief Executive Officer Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002 (furnished herewith).
32.2	Certification of the Chief Financial Officer Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002 (furnished herewith).
101.INS	XBRL Instance Document (filed herewith).
101.SCH	XBRL Taxonomy Extension Schema Document (filed herewith).
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document (filed herewith).
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document (filed herewith).
101.LAB	XBRL Taxonomy Extension Label Linkbase Document (filed herewith).
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document (filed herewith).

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.

		MTS SYSTEMS CORPORATION
Date:	May 6, 2019	/s/ JEFFREY A. GRAVES
		Jeffrey A. Graves President and Chief Executive Officer (Principal Executive Officer)
Date:	May 6, 2019	/s/ BRIAN T. ROSS
		Brian T. Ross Senior Vice President and Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer)

Exhibit 31.1

SARBANES-OXLEY SECTION 302 CERTIFICATION

I, Jeffrey A. Graves, certify that:

1. I have reviewed this quarterly report on Form 10-Q of MTS Systems Corporation;

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: May 6, 2019

/s/ JEFFREY A. GRAVES

Jeffrey A. Graves
President and Chief Executive Officer

Exhibit 31.2

SARBANES-OXLEY SECTION 302 CERTIFICATION

I, Brian T. Ross, certify that:

1. I have reviewed this quarterly report on Form 10-Q of MTS Systems Corporation;

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: May 6, 2019

/s/ BRIAN T. ROSS

Brian T. Ross
Senior Vice President and Chief Financial Officer

Exhibit 32.1

MTS SYSTEMS CORPORATION
CERTIFICATION OF CHIEF EXECUTIVE OFFICER
PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002 (18 U.S.C. 1350)

The undersigned, Jeffrey A. Graves, the Chief Executive Officer of MTS Systems Corporation (the "Company"), has executed this Certification in connection with the filing with the Securities and Exchange Commission of the Company's Quarterly Report on Form 10-Q for the fiscal quarter ended March 30, 2019 (the "Report").

The undersigned hereby certifies that:

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

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

Date:	May 6, 2019	/s/ JEFFREY A. GRAVES
		Jeffrey A. Graves
		President and Chief Executive Officer

This certification accompanies the Report pursuant to Section 906 of the Sarbanes-Oxley Act of 2002 and shall not be deemed "filed" by the Company for purposes of Section 18 of the Securities and Exchange Act of 1934, as amended.

Exhibit 32.2

MTS SYSTEMS CORPORATION
CERTIFICATION OF CHIEF FINANCIAL OFFICER
PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002 (18 U.S.C. 1350)

The undersigned, Brian T. Ross, the Chief Financial Officer of MTS Systems Corporation (the "Company"), has executed this Certification in connection with the filing with the Securities and Exchange Commission of the Company's Quarterly Report on Form 10-Q for the fiscal quarter ended March 30, 2019 (the "Report").

The undersigned hereby certifies that:

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

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

Date:	May 6, 2019	/s/ BRIAN T. ROSS
		Brian T. Ross
		Senior Vice President and Chief Financial Officer

This certification accompanies the Report pursuant to Section 906 of the Sarbanes-Oxley Act of 2002 and shall not be deemed "filed" by the Company for purposes of Section 18 of the Securities and Exchange Act of 1934, as amended.