UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

FORM 10-Q

QUARTERLY REPORT UNDER SECTION 13 or 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For Quarter Ended September 30, 2018
Commission File Number 1-1687

PPG INDUSTRIES, INC.

(Exact name of registrant as specified in its charter)

Pennsylvania	**25-0730780**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**
One PPG Place, Pittsburgh, Pennsylvania	**15272**
(Address of principal executive offices)	**(Zip Code)**

(412) 434-3131
(Registrant's telephone number, including area code)

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, 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 and posted 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. (Check one):

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

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

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

As of September 30, 2018 , 239,884,829 shares of the Registrant's common stock, par value $1.66 2/3 per share, were outstanding.

EXPLANATORY NOTE

As described in additional detail in the Explanatory Note to its amended Annual Report on Form 10-K/A for the year ended December 31, 2017 (the “2017 Form 10-K/A”), PPG Industries, Inc. (together with its subsidiaries, the "Company" or "PPG") restated its audited consolidated financial statements for the years ended December 31, 2017 and 2016 and certain unaudited quarterly results related to the quarters ended December 31, 2016, March 31, 2017, June 30, 2017, September 30, 2017 and December 31, 2017, including the nine months ended September 30, 2017, in its 2017 Form 10-K/A as a result of certain misstatements identified by the Company. The impact of the restatement on the Company's condensed consolidated financial statements included herein is further described in Note 2, " Restatement of Previously Reported Condensed Consolidated Quarterly Financial Statements ."

PPG INDUSTRIES, INC. AND SUBSIDIARIES

INDEX

		PAGE
Part I. Financial Information		
Item 1.	Financial Statements (Unaudited):	
	Condensed Consolidated Statement of Income	2
	Condensed Consolidated Statement of Comprehensive Income	3
	Condensed Consolidated Balance Sheet	4
	Condensed Consolidated Statement of Cash Flows	5
	Notes to Condensed Consolidated Financial Statements	6
Item 2.	Management's Discussion and Analysis of Financial Condition and Results of Operations	31
Item 3.	Quantitative and Qualitative Disclosures About Market Risk	46
Item 4.	Controls and Procedures	47
Part II. Other Information		
Item 1.	Legal Proceedings	49
Item 1A.	Risk Factors	49
Item 2.	Unregistered Sales of Equity Securities and Use of Proceeds	49
Item 6.	Exhibits	50
Signature		52

PART I. FINANCIAL INFORMATION

Item 1. Financial Statements

PPG INDUSTRIES, INC. AND SUBSIDIARIES

Condensed Consolidated Statement of Income (Unaudited)
($ in millions, except per share amounts)

	Three Months Ended September 30		Nine Months Ended September 30	
	2018	2017	2018	2017
		As Restated		*As Restated*
Net sales	$3,817	$3,776	$11,729	$11,066
Cost of sales, exclusive of depreciation and amortization	2,253	2,104	6,813	6,089
Selling, general and administrative	867	894	2,718	2,645
Depreciation	89	85	267	245
Amortization	33	32	103	95
Research and development, net	110	114	336	335
Interest expense	31	27	88	78
Interest income	(6)	(5)	(18)	(13)
Pension settlement charge	—	—	—	22
Business restructuring	(12)	—	71	—
Other charges	25	18	72	51
Other income	(24)	(16)	(72)	(109)
Income from continuing operations before income taxes	$451	$523	$1,351	$1,628
Income tax expense	79	124	270	391
Income from continuing operations	$372	$399	$1,081	$1,237
Income from discontinued operations, net of tax	10	217	16	222
Net income attributable to controlling and noncontrolling interests	$382	$616	$1,097	$1,459
Less: Net income attributable to noncontrolling interests	(4)	(6)	(14)	(16)
Net income (attributable to PPG)	$378	$610	$1,083	$1,443
Amounts attributable to PPG:				
Income from continuing operations, net of tax	$368	$393	$1,067	$1,221
Income from discontinued operations, net of tax	10	217	16	222
Net income (attributable to PPG)	$378	$610	$1,083	$1,443
Earnings per common share:				
Income from continuing operations, net of tax	$1.52	$1.53	$4.34	$4.75
Income from discontinued operations, net of tax	0.04	0.85	0.07	0.86
Net income (attributable to PPG)	$1.56	$2.38	$4.41	$5.61
Earnings per common share – assuming dilution:				
Income from continuing operations, net of tax	$1.51	$1.52	$4.32	$4.72
Income from discontinued operations, net of tax	0.04	0.84	0.06	0.86
Net income (attributable to PPG)	$1.55	$2.36	$4.38	$5.58
Dividends per common share	$0.48	$0.45	$1.38	$1.25

The accompanying notes to the condensed consolidated financial statements are an integral part of this condensed consolidated statement.

PPG INDUSTRIES, INC. AND SUBSIDIARIES

Condensed Consolidated Statement of Comprehensive Income (Unaudited)

($ in millions)

	Three Months Ended September 30		Nine Months Ended September 30	
	2018	2017	2018	2017
		As Restated		*As Restated*
Net income attributable to the controlling and noncontrolling interests	$382	$616	$1,097	$1,459
Other comprehensive (loss) income, net of tax:				
Defined benefit pension and other postretirement benefits	(12)	(29)	(64)	(63)
Unrealized foreign currency translation adjustments	89	26	(85)	387
Derivative financial instruments	(2)	1	(2)	(16)
Other comprehensive income (loss), net of tax	$75	($2)	($151)	$308
Total comprehensive income	$457	$614	$946	$1,767
Less: amounts attributable to noncontrolling interests:				
Net income	(4)	(6)	(14)	(16)
Unrealized foreign currency translation adjustments	3	(2)	11	(15)
Comprehensive income attributable to PPG	$456	$606	$943	$1,736

The accompanying notes to the condensed consolidated financial statements are an integral part of this condensed consolidated statement.

PPG INDUSTRIES, INC. AND SUBSIDIARIES

Condensed Consolidated Balance Sheet (Unaudited)
($ in millions)

	September 30, 2018	December 31, 2017
Assets		
Current assets:		
Cash and cash equivalents	$1,103	$1,436
Short-term investments	57	55
Receivables (less allowance for doubtful accounts of $25 in each period)	3,217	2,903
Inventories	1,962	1,730
Other	402	353
Total current assets	$6,741	$6,477
Property, plant and equipment (net of accumulated depreciation of $3,880 and $3,770)	2,738	2,824
Goodwill	3,939	3,942
Identifiable intangible assets, net	2,004	2,045
Deferred income taxes	306	305
Investments	266	268
Other assets	724	677
Total	$16,718	$16,538
Liabilities and Shareholders' Equity		
Current liabilities:		
Accounts payable and accrued liabilities	$3,806	$3,781
Restructuring reserves	112	102
Short-term debt and current portion of long-term debt	15	12
Total current liabilities	$3,933	$3,895
Long-term debt	5,023	4,134
Accrued pensions	626	729
Other postretirement benefits	685	699
Deferred income taxes	460	442
Other liabilities	913	967
Total liabilities	$11,640	$10,866
Commitments and contingent liabilities (Note 17)		
Shareholders' equity:		
Common stock	969	969
Additional paid-in capital	772	756
Retained earnings	17,987	17,140
Treasury stock, at cost	(12,551)	(11,251)
Accumulated other comprehensive loss	(2,197)	(2,057)
Total PPG shareholders' equity	$4,980	$5,557
Noncontrolling interests	98	115
Total shareholders' equity	$5,078	$5,672
Total	$16,718	$16,538

The accompanying notes to the condensed consolidated financial statements are an integral part of this condensed consolidated statement.

Table of Contents

PPG INDUSTRIES, INC. AND SUBSIDIARIES
Condensed Consolidated Statement of Cash Flows (Unaudited)

($ in millions)	Nine Months Ended September 30	
	2018	2017
		As Restated
Operating activities:		
Net income attributable to controlling and noncontrolling interests	$1,097	$1,459
Less: Income from discontinued operations	(16)	(222)
Income from continuing operations	$1,081	$1,237
Adjustments to reconcile net income to cash from operations:		
Depreciation and amortization	370	340
Pension expense	30	52
Pension settlement charge	—	22
Environmental remediation charges	34	—
Business restructuring charge	71	—
Impairment of a non-manufacturing asset	9	—
Stock-based compensation expense	21	26
Gain from the sale of a business	—	(25)
Equity affiliate loss, net of dividends	3	—
Deferred income tax benefit	(5)	(53)
Cash contributions to pension plans	(89)	(43)
Cash used for restructuring actions	(48)	(31)
Change in certain asset and liability accounts:		
Receivables	(419)	(350)
Inventories	(285)	(200)
Other current assets	(5)	(40)
Accounts payable and accrued liabilities	102	229
Taxes and interest payable	51	(115)
Noncurrent assets and liabilities, net	(144)	(102)
Other	(90)	71
Cash from operating activities - continuing operations	$687	$1,018
Cash (used for) from operating activities - discontinued operations	(20)	14
Cash from operating activities	$667	$1,032
Investing activities:		
Capital expenditures	(226)	(207)
Business acquisitions, net of cash balances acquired	(98)	(69)
Payments for acquisition of equity investment	—	(100)
Proceeds from the disposition of a business	—	593
Payments for the settlement of cross currency swap contracts	(23)	(34)
Proceeds from the settlement of cross currency swap	20	37
Other	16	—
Cash (used for) from investing activities - continuing operations	($311)	$220
Cash used for investing activities - discontinued operations	—	(4)
Cash (used for) from investing activities	($311)	$216
Financing activities:		
Net change in borrowing with maturities of three months or less	5	(6)
Net payments on commercial paper and short-term debt	(1)	(81)
Proceeds from the issuance of debt, net of discounts and fees	992	—
Repayment of long-term debt	(5)	(9)
Purchase of treasury stock	(1,313)	(413)
Issuance of treasury stock	14	45
Dividends paid	(338)	(321)

Payments related to tax withholding on stock-based compensation awards	(14)	(25)
Other	(10)	(41)
Cash used for financing activities	($670)	($851)
Effect of currency exchange rate changes on cash and cash equivalents	(19)	70
Net (decrease) increase in cash and cash equivalents	($333)	$467
Cash and cash equivalents, beginning of period	1,436	1,820
Cash and cash equivalents, end of period	$1,103	$2,287
Supplemental disclosures of cash flow information:		
Interest paid, net of amount capitalized	$68	$60
Taxes paid, net of refunds	$320	$481

The accompanying notes to the condensed consolidated financial statements are an integral part of this condensed consolidated statement.

PPG INDUSTRIES, INC. AND SUBSIDIARIES

Notes to Condensed Consolidated Financial Statements (Unaudited)

1 . Basis of Presentation

The condensed consolidated financial statements included herein are unaudited and have been prepared following the requirements of the Securities and Exchange Committee (the "SEC") and accounting principles generally accepted in the United States of America ("U.S. GAAP") for interim reporting. Under these rules, certain footnotes and other financial information that are normally required for annual financial statements can be condensed or omitted. These statements include all adjustments, consisting only of normal, recurring adjustments, necessary for a fair presentation of the financial position of PPG as of September 30, 2018 , and the results of its operations and cash flows for the three and nine months ended September 30, 2018 and 2017 . All intercompany balances and transactions have been eliminated. Material subsequent events are evaluated through the report issuance date and disclosed where applicable. These condensed consolidated financial statements should be read in conjunction with the consolidated financial statements and notes included in PPG's 2017 Form 10-K/A .

Net sales, expenses, assets and liabilities can vary during each quarter of the year. Accordingly, the results of operations for the three and nine months ended September 30, 2018 and the trends in these unaudited condensed consolidated financial statements may not necessarily be indicative of the results to be expected for the full year.

Certain prior period amounts have been reclassified to conform to the current period presentation and reflect the adoption of certain accounting standard updates, including the information presented for our reportable segments. These reclassifications had no impact on our previously reported net income, total assets, cash flows or shareholders' equity.

2 . Restatement of Previously Reported Condensed Consolidated Quarterly Financial Statements

As described in additional detail in the Explanatory Note to its 2017 Form 10-K/A, the Company restated its audited consolidated financial statements for the years ended December 31, 2017 and 2016 and certain unaudited quarterly results related to the quarters ended December 31, 2016, March 31, 2017, June 30, 2017, September 30, 2017 and December 31, 2017, including the nine months ended September 30, 2017.

On April 16, 2018, PPG received a report through the Company's internal reporting system alleging violations of the Company's accounting policies and procedures regarding the failure to accrue certain specified expenses in the first quarter of 2018. Based on the Company's initial review at that time, the Company identified approximately $1.4 million of expenses (including legal fees, property taxes and performance-based compensation) that should have been accrued in the first quarter of 2018 and that were then reflected in PPG's earnings for the quarter ended March 31, 2018, released on April 19, 2018. In addition, the report alleged that there may have been other unspecified expenses, potentially up to $5 million in the aggregate, that were improperly not accrued in the first quarter.

The Audit Committee of the Board of Directors (the "Audit Committee") oversaw an investigation of the matters set forth in the internal report, with the assistance of outside counsel and forensic accountants. The investigation identified the following items with respect to the quarter ended March 31, 2018, in addition to the approximately $1.4 million of expenses described above: (1) failure to record amortization expense in the amount of $1.4 million to correct for amortization of an intangible asset that was inadvertently not recorded over a three-year period and discovered in March 2018; (2) understatement of a health insurance accrued liability in the amount of $0.5 million ; and (3) failure to record an adjustment increasing the value of inventory in PPG's Europe, Middle East and Africa region in the amount of $2.2 million due to inflation of raw materials costs which, when corrected, had a positive effect on income in the first quarter of 2018. These three items resulted in a net increase to income from continuing operations before income taxes of approximately $0.3 million .

The investigation also identified certain inadvertent errors with respect to the quarter ended March 31, 2018. Correction of such inadvertent errors, together with the matters discussed in the immediately preceding paragraph, resulted in a net decrease in income from continuing operations before income taxes of $5.7 million for the quarter ended March 31, 2018.

The investigation identified the following items with respect to the year ended December 31, 2017: (1) improper reclassifications of gains from income from discontinued operations to income from continuing operations in total pre-tax amounts of $2.5 million in the quarter ended June 30, 2017 and $4.7 million in the quarter ended December 31, 2017; (2) improper shifting of pre-tax expenses between quarterly periods in 2017, including a total of $3.5 million in compensation expense recorded in the third and fourth quarters of 2017 that should have been recorded in the quarter ended June 30, 2017; an additional expense accrual for health care claims in the amount of $3.5 million recorded in

the third quarter of 2017 that should have been recorded in the quarter ended June 30, 2017; and additional expense for paid vacation in the amount of $2.2 million recorded in the quarter ended December 31, 2017 that should have been recorded in the second and third quarters of 2017.

The investigation also identified an improper reduction in the payout assumption for certain performance-based restricted stock units that had the impact of recognizing a $6.8 million reduction in stock based compensation expense in the fourth quarter of 2016. In the first quarter of 2017, the payout assumption for these same performance-based restricted stock units was increased, resulting in $6.8 million of stock-based compensation expense in the first quarter of 2017 that would not have been recorded if the payout assumption had not been reduced in the fourth quarter of 2016.

On May 10, 2018, management, in consultation with the Audit Committee and the Company's independent registered public accounting firm, PricewaterhouseCoopers LLP ("PwC"), concluded that the Company's consolidated financial statements for the year ended December 31, 2017 included in the Company's originally filed 2017 Annual Report on Form 10-K and the related report of PwC, and for the quarterly and year-to-date periods in 2017, should no longer be relied upon because of certain misstatements contained in those financial statements.

On June 27, 2018, the Audit Committee determined that its investigation was complete, and authorized the filing of our restated audited consolidated financial statements for the years ended December 31, 2017 and 2016 and certain quarterly periods within those fiscal years in order to correct our previously issued financial statements.

Impact of the Restatement

As a result of the restatement, reported net income from continuing operations and earnings per diluted share from continuing operations were adjusted for the interim period ended September 30, 2017 as follows:

- For the quarter ended September 30, 2017, net income from continuing operations increased $1 million , or zero cents per diluted share, and there was no impact to income from discontinued operations, net of tax.
- For the nine months ended September 30, 2017, net income from continuing operations decreased $3 million , or $0.01 per diluted share, and income from discontinued operations, net of tax, increased by $2 million , or $0.01 per diluted share.

The categories of misstatements and their impact on previously reported condensed consolidated financial statements are described below:

(a) Pension Expense

The Company did not properly recognize pension expense in the third and fourth quarters of 2017. The misstatements overstated previously reported Income before income taxes by $1.0 million for the three and nine months ended September 30, 2017.

(b) Employee Vacation Pay

The Company did not properly recognize expense associated with a change in the Company's vacation policy in the second and third quarters of 2017. Rather, the entire amount of expense associated with this change was recognized in the fourth quarter of 2017, resulting in a misstatement of expense in the second, third and fourth quarters of 2017. The misstatements overstated previously reported Income from continuing operations before income taxes by $1.3 million and $2.2 million for the three and nine months ended September 30, 2017, respectively.

(c) Compensation Expense

The Company did not properly record compensation expense related to a payment made to an employee upon his separation from the Company in the second quarter of 2017. Rather, the expense associated with this payment was recognized in the second, third and fourth quarters of 2017 resulting in a misstatement of expense in each of these periods. The misstatements understated previously reported Income from continuing operations before income taxes by $1.4 million for the three months ended September 30, 2017 and overstated previously reported Income from continuing operations before income taxes by $2.1 million for the nine months ended September 30, 2017.

(d) Health Care Claims

The Company did not properly recognize expense associated with the Company's liability for employee health care claims in the second quarter of 2017. Rather, this expense was recognized in the third quarter of 2017, resulting in a misstatement of expense in the second and third quarters of 2017. The misstatements understated previously reported Income from continuing operations before income taxes by $3.5 million for the three months

ended September 30, 2017. The misstatements had no impact on Income before taxes for the nine months ended September 30, 2017.

(e) Customer Rebates

The Company did not properly recognize expense associated with certain customer rebates, resulting in a misstatement of Net sales in the first and second quarters of 2017. The misstatements overstated previously reported Income from continuing operations before income taxes by $1.8 million for the nine months ended September 30, 2017.

(f) Stock-Based Compensation

In the fourth quarter of 2016, the Company improperly reduced the payout assumption for the 2015 grant of performance-based restricted stock units from 150% to 100% , which had the effect of reducing stock-based compensation expense in that period by $6.8 million . In the first quarter of 2017, the Company increased the payout assumption for these same restricted stock units from 100% back to 150% . These improper changes to the payout assumption for these restricted stock units resulted in a misstatement of stock-based compensation expense in the first quarter of 2017. The misstatements understated previously reported Income from continuing operations before income taxes by $6.8 million for the nine months ended September 30, 2017.

(g) Environmental Reserve

In the first quarter of 2017, the Company failed to appropriately update the discount rate used to calculate a long-term environmental remediation reserve, which had the effect of understating Other expense by $0.5 million in the quarter. The misstatement overstated previously reported Income from continuing operations before taxes by $0.5 million for the nine months ended September 30, 2017.

(h) Classification of Continuing Operations and Discontinued Operations

Certain items of income related to PPG's former Glass segment were inappropriately recorded in continuing operations rather than in discontinued operations. The misstatements overstated previously reported Income from continuing operations before income taxes by $2.5 million for the nine months ended September 30, 2017. The misstatements understated previously recorded Income from discontinued operations, net of tax, by $1.5 million for the nine months ended September 30, 2017.

(i) Income Taxes

Adjustments related to the income tax effects of other restatement adjustments noted above.

The financial statements included in this Form 10-Q have been restated to reflect the adjustments described above. The tables below summarizes the effects of the restatement on the Condensed Consolidated Statements of Income for the three and nine months ended September 30, 2017.

Condensed Consolidated Statement of Income (unaudited) - Summary of Restatement

	Three Months Ended September 30, 2017			
	As Previously Reported	Restatement Adjustment	Reference	As Restated
Cost of sales, exclusive of depreciation and amortization	2,100	1	(a)	2,101
Selling, general and administrative	905	(3)	(b),(c),(d)	902
Income from continuing operations before income taxes	$521	$2		$523
Income tax expense	123	1	(i)	124
Income from continuing operations	$398	$1		$399
Loss from discontinued operations, net of tax	217	—		217
Net income attributable to the controlling and noncontrolling interests	$615	$1		$616
Less: Net income attributable to noncontrolling interests	(6)	—		(6)
Net income (attributable to PPG)	$609	$1		$610
Amounts attributable to PPG:				
Income from continuing operations, net of tax	$392	$1		$393
Loss from discontinued operations, net of tax	217	—		217
Net income (attributable to PPG)	$609	$1		$610
Earnings per common share:				
Income from continuing operations, net of tax	$1.53	$—		$1.53
Loss from discontinued operations, net of tax	0.85	—		0.85
Net income (attributable to PPG)	$2.38	$—		$2.38
Earnings per common share – assuming dilution:				
Income from continuing operations, net of tax	$1.52	$—		$1.52
Loss from discontinued operations, net of tax	0.84	—		0.84
Net income (attributable to PPG)	$2.36	$—		$2.36
Dividends per common share	$0.45	$—		$0.45

	Nine Months Ended September 30, 2017			
	As Previously Reported	Restatement Adjustment	Reference	As Restated
Net sales	$11,068	($2)	(e)	$11,066
Cost of sales, exclusive of depreciation and amortization	6,087	1	(a)	6,088
Selling, general and administrative	2,658	(2)	(b),(c),(f)	2,656
Other charges	39	—	(g)	39
Other income	(112)	3	(h)	(109)
Income from continuing operations before income taxes	$1,632	($4)		$1,628
Income tax expense	392	(1)	(i)	391
Income from continuing operations	$1,240	($3)		$1,237
Income from discontinued operations, net of tax	220	2	(h)	222
Net income attributable to the controlling and noncontrolling interests	$1,460	($1)		$1,459
Less: Net income attributable to noncontrolling interests	(16)	—		(16)
Net income (attributable to PPG)	$1,444	($1)		$1,443
Amounts attributable to PPG:				
Income from continuing operations, net of tax	$1,224	($3)		$1,221
Income from discontinued operations, net of tax	220	2		222
Net income (attributable to PPG)	$1,444	($1)		$1,443
Earnings per common share:				
Income from continuing operations, net of tax	$4.76	($0.01)		$4.75
Income from discontinued operations, net of tax	0.86	—		0.86
Net income (attributable to PPG)	$5.62	($0.01)		$5.61
Earnings per common share – assuming dilution:				
Income from continuing operations, net of tax	$4.73	($0.01)		$4.72
Income from discontinued operations, net of tax	0.85	0.01		0.86
Net income (attributable to PPG)	$5.58	$—		$5.58
Dividends per common share	$1.25	$—		$1.25

Quarterly Condensed Consolidated Statement of Comprehensive Income (unaudited) - Summary of Restatement

In the condensed consolidated statement of comprehensive income for the three and nine months ended September 30, 2017, Net income attributable to the controlling and noncontrolling interests reflects the impact of the restatement adjustments. The restatement adjustments had no impact to the previously disclosed components of Other comprehensive income, net of tax.

Quarterly Condensed Consolidated Statement of Cash Flows (unaudited) - Summary of Restatement

There was no net impact of the restatement adjustments on net cash provided by operating activities, net cash provided by investing activities or net cash used in financing activities in the condensed consolidated statement of cash flows for the nine months ended September 30, 2017. The adjustments only had an impact on certain captions within cash from operating activities.

3 . New Accounting Standards

Accounting Standards Adopted in 2018

Effective January 1, 2018, PPG adopted Accounting Standard Updates (“ASU”) No. 2017-07, "Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost." This ASU requires the service cost component of these costs to be disaggregated from all other components and to be reported in the same line item or items as other compensation costs. The other components of these costs are required to be presented in the income statement separately from the service cost component. This ASU required retrospective adoption for all prior periods presented.

The effect of the retrospective adoption on the condensed consolidated statement of income related to the net periodic pension and other postretirement benefit costs was as follows:

	Three Months Ended September 30, 2017		
($ in millions)	As Previously Reported [1]	Reclassifications	As Revised
Cost of sales, exclusive of depreciation and amortization	$2,101	$3	$2,104
Selling, general and administrative	902	(8)	894
Research and development, net	114	—	114
Other charges	13	5	18
Income from continuing operations before income taxes	523	—	523

	Nine Months Ended September 30, 2017		
($ in millions)	As Previously Reported [1]	Reclassifications	As Revised
Cost of sales, exclusive of depreciation and amortization	$6,088	$1	$6,089
Selling, general and administrative	2,656	(11)	2,645
Research and development, net	337	(2)	335
Other charges	39	12	51
Income from continuing operations before income taxes	1,628	—	1,628

(1) Previously reported amounts reflect the impact of the restatement as described in Note 2, " Restatement of Previously Reported Condensed Consolidated Quarterly Financial Statements " and in the 2017 Form 10-K/A

In February 2018, the Financial Accounting Standards Board (“FASB”) issued ASU No. 2018-02, “Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income.” This ASU allows a reclassification from Accumulated other comprehensive income to Retained earnings for stranded tax effects resulting from the Tax Cuts and Jobs Act. PPG early adopted this standard in the first quarter of 2018 using the specific identification method and recorded a reclassification from other comprehensive income to retained earnings of $107 million .

Effective January 1, 2018, PPG adopted ASU No. 2014-09, “Revenue from Contracts with Customers: Topic 606.” See Note 4, “Revenue Recognition” for further details regarding the impact of adoption of this standard.

PPG’s adoption of the following ASU's in 2018 did not have a significant impact on PPG's consolidated financial position, results of operations or cash flows:

Accounting Standard Update	
2017-12	Derivatives and Hedging - Targeted Improvements to Accounting for Hedging Activities
2017-09	Stock Compensation - Scope of Modification Accounting
2016-16	Intra-Entity Transfers of Assets Other Than Inventory
2016-15	Classification of Certain Cash Receipts and Cash Payments
2016-01	Recognition and Measurement of Financial Assets and Liabilities

Accounting Standards to be Adopted in Future Years

In August 2018, the FASB issued ASU No. 2018-15, "Intangibles - Goodwill and Other - Internal-Use Software." This ASU requires capitalization of certain implementation costs incurred in a cloud computing arrangement that is a service contract. The amendments in this ASU are effective for fiscal years beginning after December 15, 2019 and for interim periods therein with early adoption permitted. PPG does not believe this ASU will have a material impact on its consolidated financial position, results of operations or cash flows.

In August 2018, the FASB issued ASU No. 2018-14, "Compensation - Retirement Benefits - Defined Benefit Plans - General." This ASU modifies the disclosure requirements for defined benefit and other postretirement plans. This ASU eliminates certain disclosures associated with accumulated other comprehensive income, plan assets, related parties, and the effects of interest rate basis point changes on assumed health care costs; while other disclosures have been added to address significant gains and losses related to changes in benefit obligations. This ASU also clarifies disclosure requirements for projected benefit and accumulated benefit obligations. The amendments in this ASU are effective for fiscal years ending after December 15, 2020 and for interim periods therein with early adoption permitted. Adoption on a retrospective basis for all periods presented is required. PPG does not believe this ASU will have a material impact on its consolidated financial position, results of operations or cash flows.

In June 2016, the FASB issued ASU No. 2016-13, “Financial Instruments - Credit Losses.” This ASU requires an organization to measure all expected credit losses for financial assets held at the reporting date based on historical experience, current conditions, and reasonable and supportable forecasts. Financial institutions and other organizations will now use forward-looking information to better inform their credit loss estimates. The amendments in this ASU are effective for fiscal years beginning after December 15, 2019 and for interim periods therein. Entities may choose to adopt the new ASU as of its fiscal year beginning after December 15, 2018. PPG does not believe this ASU will have a material impact on its consolidated financial position, results of operations or cash flows.

In February 2016, the FASB issued ASU No. 2016-02, “Leases.” This ASU requires all lessees to recognize on the balance sheet right to use assets and lease liabilities for the rights and obligations created by lease arrangements with terms greater than 12 months. The amendments in this ASU are effective for fiscal years beginning after December 15, 2018 and for interim periods therein. PPG is in the process of assessing the impact the adoption of this ASU will have on its consolidated financial position, results of operations and cash flows. At a minimum, total assets and total liabilities will increase in the period the ASU is adopted. Early adoption of this ASU is permitted. In July 2018, the FASB issued ASU No. 2018-11, "Targeted Improvements." This ASU provides an additional transition method to adopt the new leasing standard. Under this new transition method, an entity initially applies the new leasing standard using a cumulative-effect adjustment to the opening balance of retained earnings but will continue to report comparative periods under existing guidance in accordance with ASC 840, Leases. The amendments in ASU 2018-11 are effective for public companies for fiscal years beginning after December 15, 2018 and for interim periods within those years. PPG has elected to adopt ASU 2016-02 using this new transition method. At December 31, 2017, PPG’s undiscounted future minimum payments outstanding for lease obligations were approximately $840 million .

4 . Revenue Recognition

In May 2014, the FASB issued ASU No. 2014-09, “Revenue from Contracts with Customers: Topic 606.” This ASU replaces nearly all existing U.S. GAAP guidance on revenue recognition. The standard prescribes a five-step model for recognizing revenue, the application of which may require significant judgment. The new guidance requires PPG to evaluate the transfer of promised goods or services to customers and recognize revenue in an amount that reflects the consideration which the Company expects to be entitled to receive in exchange for those goods and services.

The Company recognizes revenue when control of the promised goods or services is transferred to the customer and in amounts that the Company expects to collect. The timing of revenue recognition takes into consideration the various shipping terms applicable to the Company’s sales. For most transactions, control passes in accordance with agreed upon delivery terms. This approach is consistent with the Company’s historical revenue recognition methodology.

The Company delivers products to company-owned stores, home centers and other regional or national consumer retail outlets, paint dealers, concessionaires and independent distributors, company-owned distribution networks, and directly to manufacturing companies and retail customers. Each product delivered to a third party customer is considered to satisfy a performance obligation. Performance obligations generally occur at a point in time and are satisfied when control of the goods passes to the customer. The Company is entitled to collection of the sales price under normal credit terms in the regions in which it operates.

The Company also provides services by applying coatings to customers' manufactured parts and assembled products and by providing technical support to certain customers. Performance obligations are satisfied over time as critical milestones are met and as services are provided. PPG is entitled to payment as the services are rendered. For the three and nine months ended September 30, 2018 and 2017 , service revenue constituted approximately 5% of total revenue, while the balance constituted standard ship and bill, retail or consignment arrangements. Accounts receivable are recognized when there is an unconditional right to consideration. Payment terms vary from customer to customer, depending on creditworthiness, prior payment history and other considerations.

Net sales by segment and region for the three and nine months ended September 30, 2018 and 2017 were as follows:

($ in millions)	Performance Coatings		Industrial Coatings		Total Net Sales	
	Three Months Ended September 30		Three Months Ended September 30		Three Months Ended September 30	
	2018	2017	2018	2017	2018	2017
United States and Canada	$1,028	$1,063	$606	$542	$1,634	$1,605
EMEA	741	735	397	398	1,138	1,133
Asia-Pacific	272	250	380	398	652	648
Latin America	248	242	145	148	393	390
Total	$2,289	$2,290	$1,528	$1,486	$3,817	$3,776

($ in millions)	Performance Coatings		Industrial Coatings		Total Net Sales	
	Nine Months Ended September 30		Nine Months Ended September 30		Nine Months Ended September 30	
	2018	2017	2018	2017	2018	2017
		As Restated				*As Restated*
United States and Canada	$3,175	$3,118	$1,836	$1,710	$5,011	$4,828
EMEA	2,259	2,104	1,338	1,205	3,597	3,309
Asia-Pacific	791	708	1,171	1,131	1,962	1,839
Latin America	722	676	437	414	1,159	1,090
Total	$6,947	$6,606	$4,782	$4,460	$11,729	$11,066

The Company adopted the ASU using the modified retrospective approach which required the financial statements to reflect the new standard as of January 1, 2018, and as a result, contracts that ended prior to January 1, 2018 were not included within the Company's assessment. Accordingly, the amounts in the comparative condensed consolidated statements of income and condensed consolidated balance sheet have not been recast. The ASU also provided additional clarity that resulted in reclassifications to or from Net sales, Cost of sales, exclusive of depreciation and amortization, Selling, general and administrative and Other income. Certain costs historically reported in Selling, general and administrative costs will now be recorded in Cost of sales, exclusive of depreciation and amortization in the condensed consolidated statement of income, as they represent costs incurred in satisfaction of performance obligations. In addition, the cost of certain customer incentives are now recorded as a reduction of Net sales rather than Cost of sales, exclusive of depreciation and amortization or Selling, general and administrative costs.

The following table summarizes the impact of the adoption of this ASU on the condensed consolidated statement of income for the three and nine months ended September 30, 2018 :

	Three Months Ended September 30, 2018		
($ in millions)	Without adoption	Adjustments	As Reported
Net sales	$3,825	($8)	$3,817
Cost of sales, exclusive of depreciation and amortization	2,233	20	2,253
Selling, general and administrative	897	(30)	867
Other income	(26)	2	(24)
Income from continuing operations before income taxes	451	—	451

	Nine Months Ended September 30, 2018		
($ in millions)	Without adoption	Adjustments	As Reported
Net sales	$11,748	($19)	$11,729
Cost of sales, exclusive of depreciation and amortization	6,753	60	6,813
Selling, general and administrative	2,804	(86)	2,718
Other income	(79)	7	(72)
Income from continuing operations before income taxes	1,351	—	1,351

5 . Acquisitions and Divestitures

Acquisitions

On October 18, 2018, PPG announced that it has reached a definitive agreement to acquire SEM Products, Inc., a U.S.-based manufacturer of specialized automotive refinish products. The transaction is expected to close in the fourth quarter 2018, subject to customary closing conditions.

In January 2018, PPG acquired ProCoatings, a leading architectural paint and coatings wholesaler located in The Netherlands. ProCoatings, established in 2001, distributes a large portfolio of well-known professional paint brands through its network of 23 multi-brand stores.

In January 2017, PPG completed the acquisition of DEUTEK S.A., a leading Romanian paint and architectural coatings manufacturer, from the Emerging Europe Accession Fund. DEUTEK, established in 1993, manufactures and markets a large portfolio of well-known professional and consumer paint brands, including OSKAR ® and DANKE! ® . The company's products are sold in more than 120 do-it-yourself stores and 3,500 independent retail outlets in Romania.

In January 2017, PPG also acquired certain assets of automotive refinish coatings company Futian Xinshi ("Futian"), an automotive refinish coatings company based in the Guangdong province of China. Futian distributes its products in China through a network of more than 200 distributors.

Taiwan Chlorine Industries

Taiwan Chlorine Industries ("TCI") was established in 1986 as a joint venture between PPG and China Petrochemical Development Corporation ("CPDC") to produce chlorine-based products in Taiwan, at which time PPG owned 60 percent of the venture. In conjunction with the 2013 separation of its commodity chemicals business, PPG conveyed to Axiall Corporation ("Axiall") its 60% ownership interest in TCI. Under PPG's agreement with CPDC, if certain post-closing conditions were not met following the three year anniversary of the separation, CPDC had the option to sell its 40% ownership interest in TCI to Axiall for $100 million . In turn, Axiall had a right to designate PPG as its designee to purchase the 40% ownership interest of CPDC. In April 2016, Axiall announced that CPDC had decided to sell its ownership interest in TCI to Axiall. In June 2016, Axiall formally designated PPG to purchase the 40% ownership interest in TCI. In August 2016, Westlake Chemical Corporation acquired Axiall, which became a wholly-owned subsidiary of Westlake. On April 11, 2017, PPG finalized its purchase of CPDC's 40% ownership interest in TCI. The difference between the acquisition date fair value and the purchase price of PPG's 40% ownership interest in TCI was recorded as a loss in discontinued operations during the second quarter 2017.

Divestitures

Glass Segment

The net sales and income from discontinued operations related to the former Glass reportable business segment for the three and nine months ended September 30, 2018 and 2017 were as follows:

($ in millions)	Three Months Ended September 30		Nine Months Ended September 30	
	2018	2017	2018	2017
				As Restated
Net sales	$—	$50	$—	$217
Income from operations	$13	$5	$21	$26
Net gain on divestiture of North American fiber glass business	—	343	—	343
Income tax expense	3	131	5	139
Income from discontinued operations, net of tax	$10	$217	$16	$230

During the third quarter of 2018, PPG released $13 million of previously recorded accruals and contingencies established in conjunction with the divestitures of businesses within the former Glass segment as a result of completed actions, new information and updated estimates. Also in the third quarter of 2018, PPG made a final payment of $20 million to Vitro S.A.B. de C.V related to the transfer of certain pension obligations upon the sale of the former flat glass business.

6 . Inventories

($ in millions)	September 30, 2018	December 31, 2017
Finished products	$1,221	$1,083
Work in process	205	177
Raw materials	502	437
Supplies	34	33
Total Inventories	$1,962	$1,730

Most U.S. inventories are valued using the last-in, first-out method. These inventories represented approximately 33% and 34% of total inventories at September 30, 2018 and December 31, 2017 , respectively. If the first-in, first-out method of inventory valuation had been used, inventories would have been $113 million and $103 million higher as of September 30, 2018 and December 31, 2017 , respectively.

7 . Goodwill and Other Identifiable Intangible Assets

The change in the carrying amount of goodwill attributable to each reportable segment for the nine months ended September 30, 2018 was as follows:

($ in millions)	Performance Coatings	Industrial Coatings	Total
January 1, 2018	$3,104	$838	$3,942
Acquisitions	54	(13)	41
Foreign currency impact	(30)	(14)	(44)
September 30, 2018	$3,128	$811	$3,939

A summary of the carrying value of the Company's identifiable intangible assets is as follows:

	September 30, 2018			December 31, 2017		
($ in millions)	Gross Carrying Amount	Accumulated Amortization	Net	Gross Carrying Amount	Accumulated Amortization	Net
Trademarks - indefinite lives	$1,186	N/A	$1,186	$1,158	N/A	$1,158
Customer-related intangibles	$1,416	($798)	$618	$1,437	($762)	$675
Acquired technology	630	(509)	121	613	(489)	124
Trade names	166	(94)	72	166	(87)	79
Other	43	(36)	7	44	(35)	9
Total	$3,441	($1,437)	$2,004	$3,418	($1,373)	$2,045

The Company’s identifiable intangible assets with finite lives are being amortized over their estimated useful lives.

	Three Months Ended September 30		Nine Months Ended September 30	
($ in millions)	2018	2017	2018	2017
Amortization expense related to identifiable intangible assets	$33	$32	$103	$95

As of September 30, 2018 , estimated future amortization expense of identifiable intangible assets is as follows:

($ in millions)	Future Amortization Expense
Remaining three months of 2018	$27
2019	120
2020	110
2021	105
2022	105
2023	95
Thereafter	256

8 . Business Restructuring

The Company records restructuring liabilities that represent charges incurred in connection with consolidations of certain operations, including operations from acquisitions, as well as headcount reduction programs. These charges consist primarily of severance costs and asset write-downs.

2018 Restructuring Program

On April 23, 2018, the Company approved a business restructuring plan which includes actions to reduce its global cost structure. The program is in response to the impacts of a customer assortment change in our U.S. architectural coatings business during the first quarter 2018 and sustained, elevated raw material inflation. The program aims to further right-size employee headcount and production capacity in certain businesses based on current product demand, as well as reductions in various global functional and administrative costs.

A pretax restructuring charge of $83 million was recorded in PPG's second quarter 2018 financial results, of which $80 million represents employee severance and other cash costs. The remainder of the charge represents the write-down of certain assets. In addition, other cash costs of approximately $25 million will be incurred, consisting of approximately $10 million of incremental restructuring-related cash costs for certain items that are required to be expensed on an as-incurred basis and approximately $15 million for items which are expected to be capitalized. The Company also expects approximately $20 million of incremental non-cash accelerated depreciation expense for certain assets due to their reduced expected asset life as a result of this program, $9 million of which was recognized in the nine months ending September 30, 2018. Substantially all actions from this business restructuring plan are expected to be complete by the end of the second quarter of 2019.

The 2018 restructuring charge and the reserve activity for the nine months ended September 30, 2018 were as follows:

($ in millions, except for employees impacted)	Severance and Other Costs	Asset Write-offs	Total Reserve	Employees Impacted
Performance Coatings	$49	$3	$52	1,032
Industrial Coatings	21	—	21	298
Corporate	10	—	10	348
Total second quarter 2018 restructuring charge	$80	$3	$83	1,678
2018 Activity	(6)	(3)	(9)	(435)
September 30, 2018	$74	$—	$74	1,243

2016 Restructuring Program

In December 2016, PPG’s Board of Directors approved a business restructuring program which includes actions necessary to reduce the Company's global cost structure. The program is focused on certain regions and end-use markets where business conditions are the weakest, as well as reductions in production capacity and various global functional and administrative costs. The restructuring actions will result in the net reduction of approximately 2,000 positions, with substantially all actions to be completed by the end of the second quarter of 2019.

The following table summarizes the reserve activity related to the 2016 restructuring charge for the nine months ended September 30, 2018 :

($ in millions, except for employees impacted)	Severance and Other Costs	Employees Impacted
December 31, 2017	$102	949
2018 Activity	(48)	(680)
Foreign currency impact	(3)	—
September 30, 2018	$51	269

In the first quarter of 2018, adjustments of approximately $17 million were recorded to reduce the remaining restructuring reserves established in 2016 to reflect the current estimate of the costs to complete these actions. Also in the first quarter of 2018, some additional restructuring actions were approved and charges of approximately $17 million were recorded. In the third quarter of 2018, previously recorded restructuring reserves were reduced by $12 million based on updated estimates to complete these programs. This amount was recorded as income in Business restructuring on the Condensed Consolidated Statement of Income.

9 . Borrowings

In February 2018, PPG completed a public offering of $300 million aggregate principal amount of 3.2% notes due 2023 and $700 million aggregate principal amount of 3.75% notes due 2028. These notes were issued pursuant to PPG's existing shelf registration statement and pursuant to an indenture between the Company and The Bank of New York Mellon Trust Company, N.A., as trustee, as supplemented. The Indenture governing these notes contains covenants that limit the Company's ability to, among other things, incur certain liens securing indebtedness, engage in certain sale-leaseback transactions, and enter into certain consolidations, mergers, conveyances, transfers or leases of all or substantially all the Company's assets. The terms of these notes also require the Company to make an offer to repurchase Notes upon a Change of Control Triggering Event (as defined in the Indenture) at a price equal to 101% of their principal amount plus accrued and unpaid interest. The Company may issue additional debt from time to time pursuant to the Indenture.

The aggregate cash proceeds from the notes, net of discounts and fees, was $992 million . A portion of the notes were converted from a fixed interest rate to a floating interest rate using interest rate swap contracts. For more information, refer to Note 15 , " Financial Instruments, Hedging Activities and Fair Value Measurements ."

10 . Earnings Per Share

The effect of dilutive securities on the weighted average common shares outstanding included in the calculation of earnings per diluted common share for the three and nine months ended September 30, 2018 and 2017 were as follows:

	Three Months Ended September 30		Nine Months Ended September 30	
(number of shares in millions)	2018	2017	2018	2017
Weighted average common shares outstanding	242.2	256.4	245.8	257.0
Effect of dilutive securities:				
Stock options	0.7	1.0	0.8	1.0
Other stock compensation awards	0.7	0.8	0.7	0.8
Potentially dilutive common shares	1.4	1.8	1.5	1.8
Adjusted weighted average common shares outstanding	243.6	258.2	247.3	258.8

Excluded from the computation of earnings per diluted share due to their antidilutive effect were 1.0 million outstanding stock options for the three and nine months ended September 30, 2018 and 0.5 million and 0.6 million outstanding stock options for the three and nine months ended September 30, 2017 , respectively.

11 . Income Taxes

	Nine Months Ended September 30	
	2018	2017
		As Restated
Effective tax rate on pre-tax income from continuing operations	20.0%	24.0%

The effective tax rate for the nine months ended September 30, 2018 was slightly lower than the U.S. federal statutory rate primarily due to certain discrete tax benefits recognized in 2018. These benefits included a $13 million decrease to the provisional amount for the tax owed on unrepatriated foreign earnings and certain reductions related to return-to-provision permanent and temporary adjustments.

The effective tax rate for the nine months ended September 30, 2017 of 24.0% was lower than the U.S. federal statutory rate in effect at that time primarily due to earnings in foreign jurisdictions which were taxed at rates lower than the U.S. statutory rate and the impact of certain U.S. tax incentives.

In December 2017, the U.S. enacted the Tax Cuts and Jobs Act (“the Act”) which, among other things, lowered the U.S. corporate statutory income tax rate from 35% to 21%, eliminated certain deductible items, added other deductible items for corporations, imposed a tax on unrepatriated foreign earnings, and eliminated U.S. taxes on most future foreign earnings. PPG recorded a provisional amount for the tax on unrepatriated foreign earnings as of December 31, 2017, which represented the Company’s best estimate as of February 1, 2018. Based on regulations released during the third quarter of 2018, the Company's provisional estimate was updated for its calendar year-end subsidiaries, and the Company believes the remeasurement of its 2017 provisional amount is complete. However, for the Company's non-calendar year-end subsidiaries, this remeasurement is not yet completed, and future regulatory guidance may have a significant impact on the amounts recorded for the Company's non-calendar year-end subsidiaries.

The Company is still evaluating, among other things, its position with respect to permanent reinvestment of foreign earnings overseas and related outside basis difference considerations.

The Company files federal, state and local income tax returns in numerous domestic and foreign jurisdictions. In most tax jurisdictions, returns are subject to examination by the relevant tax authorities for a number of years after the returns have been filed. The Company is no longer subject to examinations by tax authorities in any major tax jurisdiction for years before 2007. In addition, the Internal Revenue Service has completed its examination of the Company’s U.S. federal income tax returns filed for years through 2014. The examinations of the Company's U.S. federal income tax returns for 2015 and 2016 are currently underway.

12 . Pensions and Other Postretirement Benefits

Effective January 1, 2018, PPG adopted ASU No. 2017-07, "Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost." See Note 3, " New Accounting Standards " for more information.

Service cost for net periodic pension and other postretirement benefit costs is included in Cost of sales, exclusive of depreciation and amortization, Selling, general and administrative, and Research and development, net in the accompanying condensed consolidated statements of income. All other components of net periodic benefit cost are now recorded in Other charges, except for pension settlement charges, in the accompanying condensed consolidated statements of income.

The net periodic pension and other postretirement benefit costs for the three and nine months ended September 30, 2018 and 2017 were as follows:

	Pension			
	Three Months Ended September 30		Nine Months Ended September 30	
($ in millions)	2018	2017	2018	2017
Service cost	$8	$9	$24	$26
Interest cost	23	25	71	74
Expected return on plan assets	(37)	(35)	(113)	(105)
Amortization of actuarial losses	16	19	48	57
Pension settlement charge	—	—	—	22
Net periodic benefit cost	$10	$18	$30	$74

	Other Postretirement Benefits			
	Three Months Ended September 30		Nine Months Ended September 30	
($ in millions)	2018	2017	2018	2017
Service cost	$2	$1	$7	$6
Interest cost	6	6	18	18
Amortization of actuarial losses	5	3	14	9
Amortization of prior service credit	(15)	(14)	(45)	(44)
Net periodic benefit cost	($2)	($4)	($6)	($11)

PPG expects its 2018 net periodic pension and other postretirement benefit cost to be approximately $30 million , with pension expense representing approximately $40 million and other postretirement benefit cost representing a benefit of approximately $10 million .

Contributions to Defined Benefit Pension Plans

	Three Months Ended September 30		Nine Months Ended September 30	
($ in millions)	2018	2017	2018	2017
U.S. defined benefit pension contributions	$50	$—	$75	$29
Non-U.S. defined benefit pension mandatory contributions	$4	$6	$14	$14

PPG made voluntary contributions of $25 million and $50 million to its U.S. defined benefit pension plans in January 2018 and September 2018, respectively. PPG expects to make mandatory contributions to its non-U.S. pension plans in the range of $5 million to $15 million during the remaining 3 months of 2018 and may make additional voluntary contributions to its defined benefit pension plans in 2018 and beyond.

U.S. Non-qualified Pension

In the first quarter 2017, PPG made lump-sum payments to certain retirees who had participated in PPG's U.S. non-qualified pension plan (the "Nonqualified Plan") totaling approximately $40 million . As the lump-sum payments were in excess of the expected 2017 service and interest costs for the Nonqualified Plan, PPG remeasured the periodic benefit obligation of the Nonqualified Plan as of March 1, 2017 and recorded a settlement charge totaling $22 million million ($14 million after-tax).

13 . Shareholders' Equity

Changes to shareholders' equity for the nine months ended September 30, 2018 and 2017 were as follows:

($ in millions)	Total PPG Shareholders' Equity	Non-controlling Interests	Total
January 1, 2018	$5,557	$115	$5,672
Net income	1,083	14	1,097
Other comprehensive loss, net of tax	(140)	(11)	(151)
Reclassifications from other comprehensive income to retained earnings - Adoption ASU 2018-02 [(a)]	107	—	107
Cash dividends	(338)	(4)	(342)
Issuance of treasury stock	38	—	38
Stock repurchase program	(1,313)	—	(1,313)
Stock-based compensation activity	(10)	—	(10)
Other	(4)	(16)	(20)
September 30, 2018	$4,980	$98	$5,078

($ in millions)	Total PPG Shareholders' Equity	Non-controlling Interests	Total
January 1, 2017	$4,828	$87	$4,915
Net income (As Restated)	1,443	16	1,459
Other comprehensive income, net of tax	293	15	308
Cash dividends	(321)	—	(321)
Issuance of treasury stock	75	—	75
Stock repurchase program	(413)	—	(413)
Stock-based compensation activity (As Restated)	(8)	—	(8)
Dividends paid on subsidiary common stock to noncontrolling interests	—	(5)	(5)
Other	—	(5)	(5)
September 30, 2017 (As Restated)	$5,897	$108	$6,005

(a) See Note 3, " New Accounting Standards " for more information.

14 . Accumulated Other Comprehensive Loss

($ in millions)	Unrealized Foreign Currency Translation Adjustments	Pension and Other Postretirement Benefit Adjustments, net of tax	Unrealized Gain (Loss) on Derivatives, net of tax	Accumulated Other Comprehensive (Loss) Income
January 1, 2018	($1,567)	($493)	$3	($2,057)
Current year deferrals to AOCI	(172) [a]	—	—	(172)
Current year deferrals to AOCI, net of tax	121 [b]	6	(6) [d]	121
Reclassification from AOCI to Retained earnings - Adoption ASU 2018-02	(23)	(84)	—	(107)
Reclassifications from AOCI to net income	—	14 [c],[e]	4 [d],[e]	18
Net change	($74)	($64)	($2)	($140)
September 30, 2018	($1,641)	($557)	$1	($2,197)
January 1, 2017	($1,798)	($571)	$13	($2,356)
Current year deferrals to AOCI	634 [a]	—	—	634
Current year deferrals to AOCI, net of tax	(262) [b]	(93)	(13) [d]	(368)
Reclassifications from AOCI to net income	—	30 [c],[e]	(3) [d],[e]	27
Net change	$372	($63)	($16)	$293
September 30, 2017	($1,426)	($634)	($3)	($2,063)

(a) Unrealized foreign currency translation adjustments related to the translation of foreign denominated balance sheet account balances are not presented net of tax given that no deferred U.S. income taxes have been provided on the undistributed earnings of non-U.S. subsidiaries because they are deemed to be reinvested for an indefinite period of time.

(b) The tax cost (benefit) related to unrealized foreign currency translation adjustments on cross currency swaps and debt instruments for the nine months ended September 30, 2018 and 2017 was $29 million and ($157) million , respectively.

(c) The tax benefit related to the adjustment for pension and other postretirement benefits for the nine months ended September 30, 2018 and 2017 was ($3) million and ($27) million , respectively.

(d) The tax cost (benefit) related to the changes in the unrealized gain (loss) on derivatives for the nine months ended September 30, 2018 and 2017 was $2 million and ($7) million , respectively.

(e) Reclassifications from AOCI are included in the computation of net periodic pension and other post-retirement benefit costs (See Note 12 , "Pensions and Other Postretirement Benefits") and in the gain recognized on cash flow hedges (See Note 15 , "Financial Instruments, Hedging Activities and Fair Value Measurements").

15 . Financial Instruments, Hedging Activities and Fair Value Measurements

Financial instruments include cash and cash equivalents, short-term investments, cash held in escrow, marketable equity securities, accounts receivable, company-owned life insurance, accounts payable, short-term and long-term debt instruments, and derivatives. The fair values of these financial instruments approximated their carrying values at September 30, 2018 and December 31, 2017 , in the aggregate, except for long-term debt instruments.

Hedging Activities

The Company has exposure to market risk from changes in foreign currency exchange rates and interest rates. As a result, financial instruments, including derivatives, have been used to hedge these underlying economic exposures. Certain of these instruments qualify as cash flow, fair value and net investment hedges upon meeting the requisite criteria, including effectiveness of offsetting hedged or underlying exposures. In certain cases, PPG employs foreign currency contracts to economically hedge net foreign currency exposures, which do not qualify for hedge accounting. Accordingly, changes in the fair value of such derivatives are recognized in income from continuing operations in the period incurred.

PPG’s policies do not permit speculative use of derivative financial instruments. PPG enters into derivative financial instruments with high credit quality counterparties and diversifies its positions among such counterparties in order to reduce its exposure to credit losses. The Company did not realize a credit loss on derivatives during the three and nine month periods ended September 30, 2018 and 2017 .

All of PPG's outstanding derivative instruments are subject to accelerated settlement in the event of PPG’s failure to meet its debt or payment obligations under the terms of the instruments’ contractual provisions. In addition, should the

Company be acquired and its payment obligations under the derivative instruments' contractual arrangements not be assumed by the acquirer, or should PPG enter into bankruptcy, receivership or reorganization proceedings, the instruments would also be subject to accelerated settlement.

There were no derivative instruments de-designated or discontinued as hedging instruments during the three and nine month periods ended September 30, 2018 and 2017 and there were no gains or losses deferred in Accumulated other comprehensive loss that were reclassified to income from continuing operations during the nine month periods ended September 30, 2018 and 2017 related to hedges of anticipated transactions that were no longer expected to occur.

Cash Flow Hedges

PPG designates certain foreign currency forward contracts as cash flow hedges of the Company's exposure to variability in exchange rates on intercompany and third party transactions denominated in foreign currencies.

Fair Value Hedges

The Company manages its interest rate risk by balancing its exposure to fixed and variable rates while attempting to minimize its interest costs. PPG principally manages its fixed and variable interest rate risk by retiring and issuing long-term and short-term debt from time to time and occasionally through the use of interest rate swaps. In February of 2018, PPG entered into interest rate swaps which converted $525 million of fixed rate debt to variable rate debt. The swaps are designated as fair value hedges. As such, these swaps are carried at fair value. Changes in the fair value of these swaps and that of the related debt are recorded in Interest expense in the accompanying condensed consolidated statement of income.

Net Investment Hedges

PPG uses cross currency swaps and euro-denominated debt to hedge a portion of its net investment in its European operations.

In February 2018, PPG entered into U.S. dollar to euro cross currency swap contracts with a total notional amount of $575 million and designated these contracts as hedges of the Company's net investment in its European operations. During the term of these contracts, PPG will receive payments in U.S. dollars and make payments in euros to the counterparties. The Company also settled outstanding U.S. dollar to euro cross currency swap contracts with a total notional amount of $560 million in February 2018.

As of September 30, 2018 and December 31, 2017 , PPG had designated €2.3 billion of euro-denominated borrowings as hedges of a portion of its net investment in the Company's European operations. The carrying value of these instruments as of September 30, 2018 and December 31, 2017 was $2.7 billion .

Gains/Losses Deferred in Accumulated Other Comprehensive Loss

As of September 30, 2018 , the Company had accumulated pre-tax unrealized net foreign currency translation gains in Accumulated other comprehensive loss related to the euro-denominated borrowings, foreign currency forward contracts and cross currency swaps of $116 million . As of December 31, 2017, the Company had accumulated pre-tax unrealized net foreign currency translation gains of $16 million .

The following table summarizes the location within the condensed consolidated financial statements and amount of gains (losses) related to derivative financial instruments activity for the nine months ended September 30, 2018 and 2017 . All dollar amounts are shown on a pre-tax basis.

($ in millions)	September 30, 2018		September 30, 2017		Caption In Condensed Consolidated Statement of Income
	Gain (Loss) Deferred in OCI	Gain (Loss) Recognized	Loss Deferred in OCI	Gain Recognized	
Not Designated as Hedging Instruments:					
Foreign currency forward contracts [1]	$—	$37	$—	$—	Other charges
Fair Value					
Interest rate swaps	—	3	—	—	Interest expense
Cash Flow					
Foreign currency forward contracts	7	(5)	(20)	4	Other charges and Cost of sales
Total Cash Flow	$7	$35	($20)	$4	
Net Investment					
Foreign currency forward contracts	$—	$—	($2)		
Cross currency swaps	7	8	(54)		Interest expense
Foreign denominated debt	92	—	(363)		
Total Net Investment	$99	$8	($419)		

(1)For the period ended September 30, 2018 , the amounts excluded from effectiveness testing recognized in earnings based on an amortized approach was expense of $3 million , with a deferred loss balance of $1 million remaining in accumulated other comprehensive income as of September 30, 2018 .

Fair Value Measurements

The Company follows a fair value measurement hierarchy to measure its assets and liabilities. As of September 30, 2018 and December 31, 2017 , the assets and liabilities measured at fair value on a recurring basis were cash equivalents, equity securities and derivatives. In addition, the Company measures its pension plan assets at fair value (see Note 13, "Employee Benefit Plans" under Item 8 in the 2017 Form 10-K/A for further details). The Company's financial assets and liabilities are measured using inputs from the following three levels:

Level 1 inputs are quoted prices (unadjusted) in active markets for identical assets and liabilities that the Company has the ability to access at the measurement date. Level 1 inputs are considered to be the most reliable evidence of fair value as they are based on unadjusted quoted market prices from various financial information service providers and securities exchanges.

Level 2 inputs are directly or indirectly observable prices that are not quoted on active exchanges, which include quoted prices for similar assets and liabilities in active markets, quoted prices for identical or similar assets or liabilities in markets that are not active, inputs other than quoted prices that are observable for the asset or liability and inputs that are derived principally from or corroborated by observable market data by correlation or other means. The fair values of the derivative instruments reflect the instruments' contractual terms, including the period to maturity, and uses observable market-based inputs, including forward curves.

Level 3 inputs are unobservable inputs employed for measuring the fair value of assets or liabilities. The Company does not have any recurring financial assets or liabilities that are recorded in its consolidated balance sheets as of September 30, 2018 and December 31, 2017 that are classified as Level 3 inputs.

Assets and liabilities reported at fair value on a recurring basis:

($ in millions)	September 30, 2018			December 31, 2017		
	Level 1	Level 2	Level 3	Level 1	Level 2	Level 3
Assets:						
Other current assets:						
Marketable equity securities	$4	$—	$—	$4	$—	$—
Foreign currency forward contracts [a]	—	1	—	—	4	—
Foreign currency forward contracts [b]	—	66	—	—	2	—
Cross currency swaps	—	—	—	—	2	—
Investments:						
Marketable equity securities	83	—	—	79	—	—
Other assets						
Cross currency swaps [d]	—	22	—	—	—	—
Liabilities:						
Accounts payable and accrued liabilities:						
Foreign currency forward contracts [a]	—	1	—	—	1	—
Foreign currency forward contracts [b]	—	2	—	—	22	—
Other liabilities						
Interest rate swaps [c]	—	9	—	—	—	—

(a) Cash flow hedges

(b) Derivatives not designated as hedging instruments

(c) Fair value hedges

(d) Net investment hedges

Long-Term Debt

($ in millions)	September 30, 2018 [a]	December 31, 2017 [b]
Long-term debt - carrying value	$5,014	$4,123
Long-term debt - fair value	$5,149	$4,341

(a) Excluding capital lease obligations of $13 million and short term borrowings of $11 million as of September 30, 2018 .

(b) Excluding capital lease obligations of $15 million and short term borrowings of $8 million as of December 31, 2017 .

The fair values of the debt instruments were based on discounted cash flows and interest rates then currently available to the Company for instruments of the same remaining maturities and were measured using level 2 inputs.

16 . Stock-Based Compensation

The Company's stock-based compensation includes stock options, restricted stock units ("RSUs") and grants of contingent shares that are earned based on achieving targeted levels of total shareholder return. All current grants of stock options, RSUs and contingent shares are made under the PPG Industries, Inc. Amended and Restated Omnibus Incentive Plan (the "PPG Amended Omnibus Plan"), which was amended and restated effective April 21, 2016. Shares available for future grants under the PPG Amended Omnibus Plan were 7.3 million as of September 30, 2018 .

Stock-based compensation and the income tax benefit recognized during the three and nine months ended September 30, 2018 and 2017 were as follows:

($ in millions)	Three Months Ended September 30		Nine Months Ended September 30	
	2018	2017	2018	2017
				As Restated
Stock-based compensation	$3	$9	$21	$26
Income tax benefit recognized	$1	$4	$5	$9

Grants of stock-based compensation during the nine months ended September 30, 2018 and 2017 were as follows:

	Nine Months Ended September 30			
	2018		2017	
Grant Details	Shares	Fair Value	Shares	Fair Value
Stock options	532,705	$25.27	590,058	$21.15
Restricted stock units	249,062	$107.23	215,749	$96.69
Contingent shares (a)	52,450	$115.64	57,817	$103.67

(a) The number of contingent shares represents the target value of the award.

Stock options are generally exercisable 36 months after being granted and have a maximum term of 10 years. Compensation expense for stock options is recorded over the vesting period based on the fair value on the date of grant. The fair value of the stock option grants issued during the nine months ended September 30, 2018 was calculated with the following weighted average assumptions:

Weighted average exercise price	$115.98
Risk-free interest rate	2.9%
Expected life of option in years	6.5
Expected dividend yield	1.7%
Expected volatility	21.0%

The risk-free interest rate is determined by using the U.S. Treasury yield curve at the date of the grant and using a maturity equal to the expected life of the option. The expected life of options is calculated using the average of the vesting term and the maximum term, as prescribed by accounting guidance on the use of the simplified method for determining the expected term of an employee share option. The expected dividend yield and volatility are based on historical stock prices and dividend amounts over historical time periods equal in length to the expected life of the options.

Time-based RSUs generally vest over the three -year period following the date of grant, unless forfeited, and will be paid out in the form of stock, cash or a combination of both at the Company’s discretion at the end of the vesting period. Performance-based RSUs vest based on achieving specific annual performance targets for earnings per share growth and cash flow return on capital over the three calendar year-end periods following the date of grant. Unless forfeited, the performance-based RSUs will be paid out in the form of stock, cash or a combination of both at the Company’s discretion at the end of the three -year performance period if PPG meets the performance targets.

The amount paid upon vesting of performance-based RSUs may range from 0% to 180% of the original grant, based upon the frequency with which the annual earnings per share growth and cash flow return on capital performance targets are met over the three calendar year periods comprising the vesting period. For the purposes of expense recognition, PPG updated certain vesting assumptions and recognized a benefit of $6 million during the third quarter 2018 to reflect these changes.

Contingent share grants (referred to as “TSR awards”) are made annually and are paid out at the end of each three -year period following the date of grant based on PPG's performance. Performance is measured by determining the percentile rank of the total shareholder return of PPG common stock in relation to the total shareholder return of the S&P 500 as it existed at the beginning of the three -year performance period excluding any companies that have been removed from the index because they ceased to be publicly traded during the performance period. Any payments made at the end of the award period may be in the form of stock, cash or a combination of both at the Company's discretion. The TSR awards qualify as liability awards, and compensation expense is recognized over the three -year award period based on the fair value of the awards (giving consideration to the Company’s percentile rank of total shareholder return) remeasured in each reporting period until settlement of the awards.

17 . Commitments and Contingent Liabilities

PPG is involved in a number of lawsuits and claims, both actual and potential, including some that it has asserted against others, in which substantial monetary damages are sought. These lawsuits and claims may relate to contract, patent, environmental, product liability, asbestos exposure, antitrust, employment, securities and other matters arising out of the conduct of PPG's current and past business activities. To the extent that these lawsuits and claims involve personal injury and property damage, PPG believes it has adequate insurance; however, certain of PPG's insurers are contesting coverage with respect to some of these claims, and other insurers, as they had prior to the asbestos settlement described below, may contest coverage in the future. PPG's lawsuits and claims against others include claims against insurers and other third parties with respect to actual and contingent losses related to environmental, asbestos and other matters.

The results of any current or future litigation and claims are inherently unpredictable. However, management believes that, in the aggregate, the outcome of all lawsuits and claims involving PPG, including asbestos-related claims, will not have a material effect on PPG's consolidated financial position or liquidity; however, such outcome may be material to the results of operations of any particular period in which costs, if any, are recognized.

Asbestos Matters

Prior to 2000, the Company had been named as a defendant in numerous claims alleging bodily injury from (i) exposure to asbestos-containing products allegedly manufactured, sold or distributed by the Company, its subsidiaries, or for which they are otherwise alleged to be liable; (ii) exposure to asbestos allegedly present at a facility owned or leased by the Company; or (iii) exposure to asbestos-containing products of Pittsburgh Corning Corporation ("PC") for which the Company was alleged to be liable under a variety of legal theories (the Company and Corning Incorporated were each 50% shareholders in PC).

Pittsburgh Corning Corporation asbestos bankruptcy

In 2000, PC filed for Chapter 11 in the U.S. Bankruptcy Court for the Western District of Pennsylvania in an effort to permanently and comprehensively resolve all of its pending and future asbestos-related liability claims. At the time of the bankruptcy filing, the Company had been named as one of many defendants in approximately 114,000 open claims. The Bankruptcy Court subsequently entered a series of orders preliminarily enjoining the prosecution of asbestos litigation against PPG until after the effective date of a confirmed PC plan of reorganization. During the pendency of this preliminary injunction staying asbestos litigation against PPG, PPG and certain of its historical liability insurers negotiated a settlement with representatives of present and future asbestos claimants. That settlement was incorporated into a PC plan of reorganization that was confirmed by the Bankruptcy Court on May 24, 2013 and ultimately became effective on April 27, 2016. With the effectiveness of the plan, the preliminary injunction staying the prosecution of asbestos litigation against PPG expired by its own terms on May 27, 2016. In accordance with the settlement, the Bankruptcy Court issued a permanent channeling injunction under Section 524(g) of the Bankruptcy Code that prohibits present and future claimants from asserting claims against PPG that arise, in whole or in part, out of exposure to asbestos or asbestos-containing products manufactured, sold and/or distributed by PC or asbestos on or emanating from any PC premises. The channeling injunction, by its terms, also prohibits codefendants in cases that are subject to the channeling injunction from asserting claims against PPG for contribution, indemnification or other recovery. The channeling injunction also precludes the prosecution of claims against PPG arising from alleged exposure to asbestos or asbestos-containing products to the extent that a claimant is alleging or seeking to impose liability, directly or indirectly, for the conduct of, claims against, or demands on PC by reason of PPG's: (i) ownership of a financial interest in PC; (ii) involvement in the management of PC, or service as an officer, director or employee of PC or a related party; (iii) provision of insurance to PC or a related party; or (iv) involvement in a financial transaction affecting the financial condition of PC or a related party. The foregoing PC related claims are referred to as "PC Relationship Claims."

The channeling injunction channels the Company's liability for PC Relationship Claims to a trust funded in part by PPG and its participating insurers for the benefit of current and future PC asbestos claimants (the "Trust"). The Trust is the sole recourse for holders of PC Relationship Claims. PPG and its affiliates have no further liability or responsibility for, and will be permanently protected from, pending and future PC Relationship Claims. The channeling injunction does not extend to present and future claims against PPG that arise out of alleged exposure to asbestos or asbestos-containing products historically manufactured, sold and/or distributed by PPG or its subsidiaries or for which they are alleged to be liable that are not PC Relationship Claims, and does not extend to claims against PPG alleging personal injury allegedly caused by asbestos on premises presently or formerly owned, leased or occupied by PPG. These claims are referred to as non-PC Relationship Claims.

In accordance with the PC plan of reorganization, PPG's equity interest in PC was canceled. PPG satisfied its funding obligations to the Trust on June 9, 2016, when it conveyed to the Trust the stock it owned in Pittsburgh Corning Europe and 2,777,778 shares of PPG's common stock and made a cash payment to the Trust in the amount of $764 million . PPG's historical insurance carriers participating in the PC plan of reorganization are required to make cash payments to the Trust of approximately $1.7 billion , subject to a right of prepayment at a 5.5% discount rate.

On October 13, 2016, the Bankruptcy Court issued an order entering a final decree and closing the Chapter 11 case. That order provided that the Bankruptcy Court retained jurisdiction to enforce any order issued in the case and any agreements approved by the court, enforce the terms and conditions of the modified third amended Plan, and consider any requests to reopen the case.

Non-PC relationship asbestos claims

At the time PC filed for bankruptcy, PPG had been named as one of many defendants in one or more of the categories of asbestos-related claims identified above. Over the course of the 16 years during which the PC bankruptcy proceedings, and corresponding preliminary injunction staying the prosecution of asbestos-related claims against PPG, were pending, certain plaintiffs alleging premises claims filed motions seeking to lift the stay with respect to more than 1,000 individually-identified premises claims. The Bankruptcy Court granted motions to lift the stay in respect to certain of these premises claims and directed PPG to engage in a process to address any additional premises claims that were the subject of pending or anticipated lift-stay motions. As a result of the overall process as directed by the Bankruptcy Court involving more than 1,000 premises claims between 2006 and May 27, 2016, hundreds of these claims were withdrawn or dismissed without payment and approximately 650 premises claims were dismissed upon agreements by PPG and its insurers to resolve such claims in exchange for monetary payments.

With respect to the remaining claims still reportable within the inventory of 114,000 asbestos-related claims at the time PC filed for bankruptcy, the Company considers such claims to fall within one or more of the following categories: (1) claims that have been closed or dismissed as a result of processes undertaken during the bankruptcy; (2) claims that may have been previously filed on the dockets of state and federal courts in various jurisdictions, but are inactive as to the Company; and (3) claims that are subject, in whole or in part, to the channeling injunction and thus will be resolved, in whole or in part, in accordance with the Trust procedures established under the PC bankruptcy reorganization plan. As a result of the foregoing, the Company does not consider these three categories of claims to be open or active litigation against it, although the Company cannot now determine whether, or the extent to which, any of these claims may in the future be reinstituted, reinstated, or revived such that they may become open and active asbestos-related claims against it.

Current open and active claims post-Pittsburgh Corning bankruptcy

As of September 30, 2018 , the Company was aware of approximately 440 open and active asbestos-related claims pending against the Company and certain of its subsidiaries. These claims consist primarily of non-PC Relationship Claims and claims against a subsidiary of PPG. The Company is defending the remaining open and active claims vigorously.

Since April 1, 2013, a subsidiary of PPG has been implicated in claims alleging death or injury caused by asbestos-containing products manufactured, distributed or sold by a North American architectural coatings business or its predecessors which was acquired by PPG. All such claims have been either served upon or tendered to the seller for defense and indemnity pursuant to obligations undertaken by the seller in connection with the Company's purchase of the North American architectural coatings business. The seller has accepted the defense of these claims subject to the terms of various agreements between the Company and the seller. The seller's defense and indemnity obligations in connection with newly filed claims ceased with respect to claims filed after April 1, 2018.

PPG has established reserves totaling approximately $180 million for asbestos-related claims that would not be channeled to the Trust which, based on presently available information, we believe will be sufficient to encompass all of PPG's current and potential future asbestos liabilities. These reserves include a $162 million reserve established in 2009 in connection with an amendment to the PC plan of reorganization. These reserves, which are included within "Other liabilities" on the accompanying condensed consolidated balance sheets, represent PPG's best estimate of its liability for these claims. PPG does not have sufficient current claim information or settlement history on which to base a better estimate of this liability in light of the fact that the Bankruptcy Court's injunction staying most asbestos claims against the Company was in effect from April 2000 through May 2016. PPG will monitor the activity associated with its remaining asbestos claims and evaluate, on a periodic basis, its estimated liability for such claims, its insurance assets then available, and all underlying assumptions to determine whether any adjustment to the reserves for these claims is required.

The amount reserved for asbestos-related claims by its nature is subject to many uncertainties that may change over time, including (i) the ultimate number of claims filed; (ii) the amounts required to resolve both currently known and future unknown claims; (iii) the amount of insurance, if any, available to cover such claims; (iv) the unpredictable aspects of the litigation process, including a changing trial docket and the jurisdictions in which trials are scheduled; (v) the outcome of any trials, including potential judgments or jury verdicts; (vi) the lack of specific information in many cases concerning exposure for which PPG is allegedly responsible, and the claimants' alleged diseases resulting from such exposure; and (vii) potential changes in applicable federal and/or state tort liability law. All of these factors may have a material effect upon future asbestos-related liability estimates. As a potential offset to any future asbestos financial exposure, under the PC plan of reorganization PPG retained, for its own account, the right to pursue insurance coverage from certain of its historical insurers that did not participate in the PC plan of reorganization. While the ultimate outcome of PPG's asbestos litigation cannot be predicted with certainty, PPG believes that any financial exposure resulting from its asbestos-related claims will not have a material adverse effect on PPG's consolidated financial position, liquidity or results of operations.

Environmental Matters

It is PPG's policy to accrue expenses for environmental contingencies when it is probable that a liability has been incurred and the amount of loss can be reasonably estimated. Reserves for environmental contingencies are exclusive of claims against third parties and are generally not discounted. In management's opinion, the Company operates in an environmentally sound manner and the outcome of the Company's environmental contingencies will not have a material effect on PPG's financial position or liquidity; however, any such outcome may be material to the results of operations of any particular period in which costs, if any, are recognized. Management anticipates that the resolution of the Company's environmental contingencies will occur over an extended period of time. See Note 14, "Commitments and Contingent Liabilities," under Item 8 of the 2017 Form 10-K/A for additional descriptions of the following environmental matters.

As of September 30, 2018 and December 31, 2017 , PPG had reserves for environmental contingencies associated with PPG's former chromium manufacturing plant in Jersey City, N.J. and associated sites ("New Jersey Chrome") and for other environmental contingencies, including National Priority List sites and legacy glass and chemical manufacturing sites. These reserves are included in Accounts payable and accrued liabilities and Other liabilities in the accompanying condensed consolidated balance sheet.

Environmental Reserves

($ in millions)	September 30, 2018	December 31, 2017
New Jersey Chrome	$130	$136
Legacy glass and chemical	70	71
Other	49	51
Total	$249	$258
Current portion	*$67*	*$73*

Pre-tax charges against income for environmental remediation costs are included in Other charges in the accompanying condensed consolidated statement of income. The pre-tax charges and cash outlays related to such environmental remediation for the three and nine months ended September 30, 2018 and 2017 were as follows:

	Three Months Ended September 30		Nine Months Ended September 30	
($ in millions)	2018	2017	2018	2017
Environmental remediation pre-tax charges	$4	$3	$39	$5
Cash outlays for environmental remediation activities	$14	$14	$45	$36

Environmental remediation of the NJ Chrome sites and our legacy glass and chemical sites is ongoing. In the first quarter 2018, charges were taken to increase the existing reserves for the NJ Chrome and legacy glass and chemical sites by $26 million and $8 million , respectively.

Remediation: New Jersey Chrome

In June 2009, PPG entered into a settlement agreement with the New Jersey Department of Environmental Protection ("NJDEP") and Jersey City, New Jersey (which had asserted claims against PPG for lost tax revenue) which was in the form of a Judicial Consent Order (the "JCO"). Under the JCO, PPG accepted sole responsibility for the remediation

activities at its former chromium manufacturing location in Jersey City and 19 additional sites. The principal contaminant of concern is hexavalent chromium. The JCO also provided for the appointment of a court-approved Site Administrator who is responsible for establishing a master schedule for the remediation of the 20 PPG sites which existed at that time. One site was subsequently removed from the JCO process during 2014 and will be remediated separately at a future date. A total of 19 sites remain subject to the JCO process.

The most significant assumptions underlying the estimate of remediation costs for all New Jersey Chrome sites are those related to the extent and concentration of chromium impacts in the soil, as these determine the quantity of soil that must be treated in place, the quantity that will have to be excavated and transported for offsite disposal, and the nature of disposal required. The reserve for the estimated costs to remediate all New Jersey Chrome sites are exclusive of any third party indemnification, as the recovery of any such amounts is uncertain.

Groundwater remediation at PPG's former chromium manufacturing site in Jersey City and five adjacent sites is expected to occur over several years after NJDEP's approval of a work plan. Ongoing groundwater monitoring will be utilized to develop a final groundwater remedial action work plan which is currently expected to be submitted to NJDEP in 2021.

PPG's financial reserve for remediation of all New Jersey Chrome sites is $130 million at September 30, 2018 . The major cost components of this liability continue to be related to excavation, transportation and disposal of impacted soil, as well as construction services. These components each account for approximately 21% , 21% and 30% of the accrued amount, respectively.

There are multiple, future events yet to occur, including further remedy selection and design, remedy implementation and execution and applicable governmental agency or community organization approvals. Considerable uncertainty exists regarding the timing of these future events for the New Jersey Chrome sites. Final resolution of these events is expected to occur over the next several years. As these events occur and to the extent that the cost estimates of the environmental remediation remedies change, the existing reserve for this environmental remediation matter will continue to be adjusted.

Remediation: Other Legacy Sites

Among other sites at which PPG is managing environmental liabilities, remedial actions are occurring at a legacy chemical manufacturing site in Barberton, Ohio, where PPG has completed a Facility Investigation and Corrective Measure Study under the USEPA's Resource Conservation and Recovery Act ("RCRA") Corrective Action Program. PPG has also been addressing the impacts from a legacy plate glass manufacturing site in Kokomo, Indiana under the Voluntary Remediation Program of the Indiana Department of Environmental Management. PPG is currently performing additional investigation activities at this location.

With respect to certain other waste sites, the financial condition of other potentially responsible parties also contributes to the uncertainty of estimating PPG's final costs. Although contributors of waste to sites involving other potentially responsible parties may face governmental agency assertions of joint and several liability, in general, final allocations of costs are made based on the relative contributions of wastes to such sites. PPG is generally not a major contributor to such sites.

Remediation: Reasonably Possible Matters

In addition to the amounts currently reserved for environmental remediation, the Company may be subject to loss contingencies related to environmental matters estimated to be as much as $100 million to $200 million . Such unreserved losses are reasonably possible but are not currently considered to be probable of occurrence. These reasonably possible unreserved losses relate to environmental matters at a number of sites, none of which are individually significant. The loss contingencies related to these sites include significant unresolved issues such as the nature and extent of contamination at these sites and the methods that may have to be employed to remediate them.

The impact of evolving programs, such as natural resource damage claims, industrial site re-use initiatives and domestic and international remediation programs, also adds to the present uncertainties with regard to the ultimate resolution of this unreserved exposure to future loss. The Company's assessment of the potential impact of these environmental contingencies is subject to considerable uncertainty due to the complex, ongoing and evolving process of investigation and remediation, if necessary, of such environmental contingencies, and the potential for technological and regulatory developments.

Other Matters

The Company had outstanding letters of credit and surety bonds of $159 million and guarantees of $14 million as of September 30, 2018 . The Company does not believe any loss related to such guarantees is likely.

18 . Reportable Business Segment Information

PPG is a multinational manufacturer with 9 operating segments that are organized based on the Company's major product lines. These operating segments are also the Company's reporting units for purposes of testing goodwill for impairment. The operating segments have been aggregated based on economic similarities, the nature of their products, production processes, end-use markets and methods of distribution into two reportable business segments.

Effective January 1, 2018, the coatings services operating segment was merged into the industrial coatings operating segment to achieve operational efficiencies and to realign management teams and operations to better deliver the Company's total value proposition and provide optimal solutions to its customers.

The Performance Coatings reportable segment is comprised of the automotive refinish, aerospace, architectural coatings – Americas and Asia-Pacific, architectural coatings - EMEA, and protective and marine coatings operating segments. This reportable segment primarily supplies a variety of protective and decorative coatings, sealants and finishes along with paint strippers, stains and related chemicals, as well as transparencies and transparent armor.

The Industrial Coatings reportable segment is comprised of the automotive original equipment manufacturer ("OEM") coatings, industrial coatings, packaging coatings, and the specialty coatings and materials operating segments. This reportable segment primarily supplies a variety of protective and decorative coatings and finishes along with adhesives, sealants, metal pretreatment products, optical monomers and coatings, precipitated silicas, *Teslin*® and other specialty materials, and coatings services.

Reportable segment net sales and segment income for the three and nine months ended September 30, 2018 and 2017 were as follows:

($ in millions)	Three Months Ended September 30		Nine Months Ended September 30	
	2018	2017	2018	2017
		As Restated		*As Restated*
Net sales:				
Performance Coatings	$2,289	$2,290	$6,947	$6,606
Industrial Coatings	1,528	1,486	4,782	4,460
Total	$3,817	$3,776	$11,729	$11,066
Segment income: [(a)]				
Performance Coatings	$331	$365	$1,039	$1,054
Industrial Coatings	169	225	631	765
Total	$500	$590	$1,670	$1,819
Corporate [(a)]	(26)	(46)	(92)	(134)
Interest expense, net of interest income	(25)	(22)	(70)	(65)
Legacy items [(a),(b)]	—	1	5	(4)
Business restructuring	12	—	(71)	—
Accelerated depreciation related to restructuring actions	(4)	—	(9)	—
Legacy legal settlements	—	—	(10)	18
Accounting investigation costs	(2)	—	(11)	—
Impairment of a non-manufacturing asset	—	—	(9)	—
Costs related to customer assortment change	(4)	—	(18)	—
Environmental remediation charges	—	—	(34)	—
Gain from sale of a business	—	—	—	25
Transaction-related costs [(c)]	—	—	—	(9)
Pension settlement charge	—	—	—	(22)
Income from continuing operations before income taxes	$451	$523	$1,351	$1,628

(a) During the first quarter 2018, PPG recast 2017 segment income, legacy items and corporate to present the non-service cost components of pension and other post-retirement benefit costs as corporate costs. Segment income only includes the service cost component of pension and other post-retirement benefit costs for all periods presented. See Note 3, " New Accounting Standards " for more information.

(b) Legacy items include current costs related to former operations of the Company, including pension and other postretirement benefit costs, certain charges for legal matters and environmental remediation costs, and certain other charges which are not associated with PPG's current business portfolio.

(c) Transaction-related costs include advisory, legal, accounting, valuation and other professional or consulting fees incurred to effect significant acquisitions, as well as similar fees and other costs to effect disposals not classified as discontinued operations. These costs may also include the flow-through cost of sales for the step up to fair value of inventories acquired in acquisitions.

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

The following discussion and analysis of our financial condition and results of operations should be read in conjunction with our unaudited financial statements and the notes thereto included in the condensed consolidated financial statements in Part I, Item 1, "Financial Statements," of this report and in conjunction with the 2017 Form 10-K/A. As described in Note 2, "Restatement of Previously Reported Consolidated Annual and Condensed Consolidated Quarterly (unaudited) Financial Statements," we restated our audited consolidated financial statements for the years ended December 31, 2017 and 2016. We have also restated certain unaudited quarterly results related to the three months ended December 31, 2016, March 31, 2017, June 30, 2017 (and six months ended), September 30, 2017 (and nine months ended) and December 31, 2017. The impact of the restatement is reflected below in Management's Discussion and Analysis of Financial Condition and Results of Operations.

Executive Overview

Below are our key financial results for the three months ended September 30, 2018 :

- Net sales were approximately $3.8 billion , up 1.1% compared to the prior year.
- Cost of sales, exclusive of depreciation and amortization ("Cost of sales") was $2.3 billion , up 7.1% versus prior year. As a percentage of sales, Cost of sales increased 3.3% .
- Selling, general and administrative ("SG&A") expense was $867 million , down 3.0% year-over-year. As a percentage of sales, SG&A expense decreased 1.0% .
- Income before income taxes was $451 million .
- The effective tax rate was 17.5% .
- Income from continuing operations, net of tax (attributable to PPG) was $368 million .
- Earnings per diluted share from continuing operations was $1.51 .
- During the third quarter 2018, PPG increased its normal quarterly dividend by 7%, or $0.03 per share, to $0.48 per share

For the nine months ended September 30, 2018:

- Cash flows from operating activities - continuing operations was $687 million , a decrease of $331 million year-over-year.
- Capital expenditures, including acquisitions (net of cash acquired), was $324 million .
- The Company paid $338 million in dividends and repurchased $1,313 million of its outstanding common stock.

Performance in the third quarter of 2018 compared to the third quarter of 2017

Performance Overview

Net Sales

($ in millions, except percentages)	Three Months Ended September 30 2018	2017	Percent Change 2018 vs. 2017
United States and Canada	$1,634	$1,605	1.8%
Europe, Middle East and Africa (EMEA)	1,138	1,133	0.4%
Asia-Pacific	652	648	0.6%
Latin America	393	390	0.8%
Total	$3,817	$3,776	1.1%

2018 vs. 2017

Net sales increased $41 million due to the following:

- *Higher selling prices (+2%)*
- *Net sales from acquired businesses (+1%)*

Partially offset by:

- *Unfavorable foreign currency translation (-2%)*

In the United States and Canada region, sales volumes were lower by a low-single-digit percentage. Aerospace coatings, automotive original equipment manufacturer (OEM) coatings and packaging coatings had above-market sales volume performance driven by customers' continuing adoption of PPG's technology advantaged products. Architectural company-owned stores same store sales increased by a high-single-digit percentage, more than offset by lower volumes in the do-it-yourself (DIY) and independent dealer channel and the automotive refinish coatings business. The automotive OEM coatings, general industrial coatings and protective and marine coatings businesses had modest sales volume growth during the quarter.

In the Europe, Middle East and Africa (EMEA) region, sales volumes were flat. Strong sales volume growth in general industrial coatings, aerospace and marine coatings was offset by lower sales volumes in the automotive refinish, architectural, protective, packaging and automotive OEM businesses.

In the Asia-Pacific region, sales volumes grew a low-single-digit percentage with above market growth in aerospace coatings and protective and marine coatings partially offset by lower sales volumes in automotive OEM coatings.

In the Latin America region, sales volumes expanded by a mid-single-digit percentage versus the prior year led by automotive OEM coatings, general industrial coatings, packaging coatings and automotive refinish coatings. The architectural coatings business in Mexico grew organic sales by a high-single-digit percentage.

Net sales from acquired businesses, net of dispositions added approximately $40 million, primarily from The Crown Group.

Foreign currency translation decreased net sales approximately $80 million as the U.S. dollar strengthened against several foreign currencies versus the prior year, most notably the euro, Chinese yuan, and U.K. pound.

Cost of Sales, exclusive of depreciation and amortization

($ in millions, except percentages)	Three Months Ended September 30		Percent Change
	2018	2017	2018 vs. 2017
		As Restated	
Cost of sales, exclusive of depreciation and amortization	$2,253	$2,104	7.1%
Cost of sales as a percentage of net sales	59.0%	55.7%	3.3%

2018 vs. 2017

Cost of sales, exclusive of depreciation and amortization, increased $149 million primarily due to the following:

- *Higher raw material costs*
- *Higher sales volumes*
- *Cost of sales attributable to acquired businesses*
- *Cost reclassifications associated with the adoption of the new revenue recognition standard. Refer to Note 4, "Revenue Recognition" within Part 1 of this 10-Q.*

Partially offset by:

- *Foreign currency translation*
- *Restructuring cost savings*

Selling, general and administrative expenses

($ in millions, except percentages)	Three Months Ended September 30		Percent Change
	2018	2017	2018 vs. 2017
		As Restated	
Selling, general and administrative expenses (SG&A)	$867	$894	(3.0)%
Selling, general and administrative expenses as a percentage of net sales	22.7%	23.7%	(1.0)%

2018 vs. 2017

SG&A expense decreased $27 million primarily due to the following:

- *Cost reclassifications associated with the adoption of the new revenue recognition standard. Refer to Note 4, "Revenue Recognition" within Part 1 of this 10-Q.*
- *Lower selling and advertising expense*
- *Foreign currency translation*
- *Restructuring cost savings*

Partially offset by:

- *Wage and other cost inflation*
- *SG&A expenses attributable to acquired businesses*

Other costs and income

($ in millions, except percentages)	Three Months Ended September 30		Percent Change
	2018	2017	2018 vs. 2017
		As Restated	
Interest expense, net of Interest income	$25	$22	13.6%
Other charges	$25	$18	38.9%
Other income	($24)	($16)	50.0%

Effective tax rate and earnings per diluted share

($ in millions, except percentages)	Three Months Ended September 30		Percent Change
	2018	2017	2018 vs. 2017
		As Restated	
Income tax expense	$79	$124	(36.3)%
Effective tax rate	17.5%	23.7%	(6.2)%
Adjusted effective tax rate, continuing operations*	20.5%	23.7%	(3.2)%
Earnings per diluted share, continuing operations	$1.51	$1.52	(0.7)%
Adjusted earnings per diluted share*	$1.45	$1.52	(4.6)%

*See Regulation G Reconciliation below

The effective tax rate for the three months ending September 30, 2018 reflects the benefit of U.S. tax legislation enacted in December 2017 as well as the impact of certain discrete tax items. The Company expects that its full year 2018 adjusted effective tax rate will be between 23.0% and 24.0%.

Earnings per diluted share from continuing operations for the three months ended September 30, 2018 decreased year-over-year due to items described further in the Regulation G reconciliation. The Company benefited from the 11.8 million shares repurchased in the first nine months of 2018 and 3.5 million shares repurchased in the fourth quarter of 2017.

Regulation G Reconciliation - Results from Operations

PPG believes investors' understanding of the Company's operating performance is enhanced by the disclosure of net income, earnings per diluted share and the effective tax rate adjusted for certain charges. PPG's management considers this information useful in providing insight into the Company's ongoing operating performance because it excludes the impact of items that cannot reasonably be expected to recur on a quarterly basis or that are not attributable to our primary operations. Net income, earnings per diluted share and the effective tax rate adjusted for these items are not recognized financial measures determined in accordance with U.S. generally accepted accounting principles (U.S. GAAP) and should not be considered a substitute for net income, earnings per diluted share, the effective tax rate or other financial measures as computed in accordance with U.S. GAAP. In addition, adjusted net income, earnings per diluted share and the effective tax rate may not be comparable to similarly titled measures as reported by other companies.

Income before income taxes from continuing operations is reconciled to adjusted income before income taxes from continuing operations, the effective tax rate from continuing operations is reconciled to the adjusted effective tax rate from continuing operations and net income from continuing operations (attributable to PPG) and earnings per share – assuming dilution (attributable to PPG) are reconciled to adjusted net income from continuing operations (attributable to PPG) and adjusted earnings per share – assuming dilution below:

	Three Months Ended September 30, 2018				
($ in millions, except percentages and per share amounts)	Income Before Income Taxes	Tax Expense	Effective Tax Rate	Net income from continuing operations (attributable to PPG)	Earnings per diluted share
As reported, continuing operations	$451	$79	17.5%	$368	$1.51
Adjusted for:					
Costs related to customer assortment change	4	1	24.3%	3	0.01
Release of business restructuring reserves	(12)	(2)	16.9%	(10)	(0.04)
Accelerated depreciation from restructuring actions	4	1	23.3%	3	0.01
Accounting investigation costs	2	—	24.3%	2	0.01
Tax benefit related to U.S. Tax Cuts and Jobs Act	—	13	N/A	(13)	(0.05)
Adjusted, continuing operations, excluding certain items	$449	$92	20.5%	$353	$1.45

As Restated	Three Months Ended September 30, 2017				
($ in millions, except percentages and per share amounts)	Income Before Income Taxes	Tax Expense	Effective Tax Rate	Net income from continuing operations (attributable to PPG)	Earnings per share
As reported, continuing operations	$523	$124	23.7%	$393	$1.52

Performance of Reportable Business Segments

Performance Coatings

($ in millions, except per share amounts)	Three Months Ended September 30		$ Change	% Change
	2018	2017	2018 vs. 2017	2018 vs. 2017
		As Restated		
Net sales	$2,289	$2,290	($1)	— %
Segment income	$331	$365	($34)	(9.3) %

2018 vs. 2017

Performance Coatings net sales decreased $1 million due to the following:

- *Unfavorable foreign currency translation (-2%)*
- *Lower sales volumes (-1%)*

Partially offset by:

- *Higher selling prices (+3%)*

Architectural coatings Americas and Asia-Pacific sales volumes were lower by a mid-single-digit percentage versus the prior year. Sales volumes were positive year-over-year in the U.S. and Canada company-owned store network, as well as in Mexico, Central America and China. The architectural coatings business in Mexico grew organic sales by a high-single-digit percentage as positive demand trends continued. Organic sales volumes increased by a high-single-digit percentage in the U.S. and Canada company-owned stores. This increase was more than offset by lower sales in the national retail channel, including the unfavorable impact from previously communicated customer assortment changes.

Architectural coatings - EMEA organic sales volumes increased by a low-single-digit percentage year-over-year. Modest sales volumes declines were more than offset by higher selling prices.

Automotive refinish coatings organic sales decreased by a low-single-digit percentage year-over-year. Sales volumes were impacted by lower sales in the U.S. and Europe stemming from a change in customer order patterns, as several customers have high inventory levels due to lower end-use demand. Collision claims in the U.S. were down in the third quarter of 2018 by one percent. Organic sales volumes in emerging regions continued to be solid.

Aerospace coatings sales volumes grew by a low-teen-percentage, including above-market volume growth in the U.S. and Asia-Pacific, supported by technology advantaged products. Aerospace sales grew across all major platforms.

Protective and marine coatings sales volumes increased by a mid-single-digit percentage driven by strong protective coatings sales volumes in China. Marine coatings sales volumes were higher year-over-year.

Segment income decreased $34 million year-over-year primarily due to lower sales volumes, raw material and logistics cost inflation and unfavorable foreign currency translation, partially offset by higher selling prices and benefits from prior business restructuring actions.

Looking Ahead

In the fourth quarter of 2018, we expect modestly lower sequential sales due to seasonal patterns, most notably in the U.S., Canada, and European architectural coatings businesses. We expect no material benefit from acquisition-related sales in the segment and, based on current exchange rates, foreign currency translation is expected to have an unfavorable year-over-year impact on segment sales and income in the fourth quarter. In addition, we anticipate that raw material costs will remain elevated but at lower inflationary levels in the fourth-quarter 2018, and that logistics cost inflation will remain elevated. We are planning additional year-over-year growth-related spending of up to $5 million in the fourth quarter compared to the prior year.

Overall net sales are expected to be lower sequentially due to normal seasonal patterns. From a business perspective, we anticipate lower sales volumes in the architectural coatings DIY channel due to the previously communicated customer assortment change within the Architectural coatings Americas and Asia Pacific business. In Architectural coatings - EMEA, we expect overall demand patterns to be consistent with those experienced in the first three quarters of the year, although the potential for lower industry demand in the U.K. due to subdued consumer spending as apprehension surrounding the “BREXIT” process still exists. In automotive refinish coatings, we expect recent sales volume trends in the U.S. and Europe to continue into the fourth quarter. In aerospace coatings, we anticipate continued strong performance in the fourth quarter with more moderate growth rates as year-over-year comparisons become more challenging due to strong growth in the prior year. Marine coatings sales volumes are expected to be modestly positive in the fourth quarter.

Industrial Coatings

($ in millions, except per share amounts)	Three Months Ended September 30 2018	2017	$ Change 2018 vs. 2017	% Change 2018 vs. 2017
Net sales	$1,528	$1,486	$42	2.8 %
Segment income	$169	$225	($56)	(24.9)%

2018 vs. 2017

Industrial Coatings segment net sales increased $42 million due to the following:

- *Acquisition-related sales (+2%)*
- *Higher sales volumes (+2%)*
- *Higher selling prices (+1%)*

Partially offset by:

- *Unfavorable foreign currency translation (-3%)*

Sales volumes were flat in the automotive OEM coatings business versus the prior year period, which is slightly better than the overall global industry build rate. PPG's sales volume growth was strongest in Latin America. Sales in the Asia-Pacific region were lower compared to the prior year primarily due to lower sales in Korea and the exiting of all remaining automotive OEM production in Australia which was completed late last year.

Aggregate industrial coatings and specialty coatings and materials sales volumes increased by a mid-single-digit percentage year-over-year. Sales volume growth was the strongest in Europe and Latin America driven by strong end-market demand for coil and heavy-duty equipment. Selling prices continued to improve. Acquisition-related sales from The Crown Group, acquired in October 2017, added approximately $30 million in sales below segment margins and in-line with the Company's expectations.

Packaging coatings sales volumes were up a mid-single-digit percentage versus the prior year due to ongoing adoption of PPG's new can coating technologies in the U.S. and Latin America. Asia-Pacific region volumes were flat.

Segment income decreased $56 million year-over-year. Segment income benefited from improving selling prices and from prior business restructuring actions, which were more than offset by elevated raw material costs and logistics costs. Unfavorable foreign currency translation decreased segment income by $5 million, primarily related to the Chinese yuan, the euro and several emerging region currencies.

Looking ahead

In the fourth quarter of 2018, we expect to see greater volatility in global industrial demand, primarily in emerging regions. We anticipate that the year-over-year rate of raw material inflation will moderate due to the spike in inflation in the prior year quarter, and logistics cost inflation is expected to remain elevated. The company will continue to prioritize selling price increases and operating margin recovery, both of which are expected to improve in the fourth quarter. Based on current exchange rates, foreign currency translation is expected to have a negative impact on segment sales and income in the fourth quarter 2018.

From a business perspective, global automotive industry growth in the fourth quarter is expected to be similar to the third quarter for most regions with greater volatility expected in China. We anticipate continued favorable general industrial demand growth trends in aggregate. In packaging coatings, we expect sales volume growth will begin to moderate until more countries mandate BPA non-intent. The company is working on new initiatives and technologies that we believe will help maintain growth in this business .

Performance in the first nine months of 2018 compared to the first nine months of 2017

Performance Overview

Net Sales

($ in millions, except percentages)	Nine Months Ended September 30		Percent Change
	2018	2017	2018 vs. 2017
		As Restated	
United States and Canada	$5,011	$4,828	3.8%
Europe, Middle East and Africa (EMEA)	3,597	3,309	8.7%
Asia-Pacific	1,962	1,839	6.7%
Latin America	1,159	1,090	6.3%
Total	$11,729	$11,066	6.0%

2018 vs. 2017

Net sales increased $663 million due to the following:

- *Favorable foreign currency translation (+2%)*
- *Higher selling prices (+2%)*
- *Higher sales volumes (+1%)*
- *Net sales from acquired businesses (+1%)*

U.S. and Canada sales volumes increased modestly versus the prior year. Aerospace coatings and packaging coatings had above market sales volume growth reflecting continued adoption of PPG's technology advanced products. Organic sales in the automotive refinish coatings business grew year-over-year, despite slightly lower industry collision claims. Sales volumes in the industrial coatings business were slightly lower year-over-year. Our architectural coatings company-owned stores continued to perform well, as sales volumes were positive versus the prior year. These increases were more than offset by sales volumes declines in the architectural national retail DIY channel and independent dealer networks, including the unfavorable impact from the customer assortment change in the DIY channel.

In February 2018, PPG announced that Lowe’s will discontinue the sale of OLYMPIC® brand paints and stains in its U.S. retail stores, effective mid-2018. During the second quarter 2018, the Company launched its OLYMPIC® stain products at THE HOME DEPOT® U.S. retail stores, expanding our existing partnership arrangement; however, these incremental sales will not offset expected declines in the overall DIY and independent dealer network. PPG will continue to supply certain specialty building materials to Lowe’s stores.

Europe, Middle East and Africa (EMEA) sales volumes were flat versus the prior year. Strong sales volume growth in general industrial coatings, automotive refinish coatings, automotive OEM coatings and packaging coatings was offset by a low-single-digit percentage decrease in architectural coatings. Sales volumes in the protective and marine coatings business were lower due to customer project delays.

Asia-Pacific sales volumes were up a low-single-digit percentage from the comparable nine-month period, with growth in general industrial coatings, aerospace coatings, automotive refinish coatings and protective coatings offset by lower sales volumes in marine coatings, automotive OEM coatings and packaging coatings.

Latin American sales volumes grew by a high-single-digit percentage versus the prior year, led by our architectural coatings, industrial coatings and automotive OEM coatings businesses. PPG automotive OEM coatings continued to perform at above market levels, driven by new business secured in 2017.

Net sales from acquired businesses, net of dispositions added approximately $105 million, primarily from The Crown Group.

Foreign currency translation increased net sales by approximately $215 million as the U.S. dollar weakened against several foreign currencies versus the prior year, most notably the Mexican peso and the euro.

Cost of Sales, exclusive of depreciation and amortization

($ in millions, except percentages)	Nine Months Ended September 30		Percent Change
	2018	2017	2018 vs. 2017
		As Restated	
Cost of sales, exclusive of depreciation and amortization	$6,813	$6,089	11.9%
Cost of sales as a percentage of net sales	58.1%	55.0%	3.1%

2018 vs. 2017

Cost of sales, exclusive of depreciation and amortization, increased $724 million primarily due to the following:

- *Higher raw material costs*
- *Higher sales volumes*
- *Foreign currency translation*
- *Cost of sales attributable to acquired businesses*
- *Cost reclassifications associated with the adoption of the new revenue recognition standard. Refer to Note 4, "Revenue Recognition" within Part 1 of this Form 10-Q.*

Partially offset by:

- *Lower manufacturing costs, including restructuring cost savings*

Selling, general and administrative expenses

($ in millions, except percentages)	Nine Months Ended September 30		Percent Change
	2018	2017	2018 vs. 2017
		As Restated	
Selling, general and administrative expenses (SG&A)	$2,718	$2,645	2.8 %
Selling, general and administrative expenses as a percentage of net sales	23.2%	23.9%	(0.7)%

2018 vs. 2017

SG&A expense increased $73 million primarily due to the following:

- *Foreign currency translation*
- *Wage and other cost inflation*
- *SG&A expenses attributable to acquired businesses*

Partially offset by:

- *Cost reclassifications associated with the adoption of the new revenue recognition standard. Refer to Note 4, "Revenue Recognition" within Part 1 of this Form 10-Q.*
- *Restructuring cost savings*

Other costs and income

($ in millions, except percentages)	Nine Months Ended September 30		Percent Change
	2018	2017	2018 vs. 2017
		As Restated	
Interest expense, net of Interest income	$70	$65	7.7 %
Pension settlement charge	—	$22	(100.0)%
Other charges	$72	$51	41.2 %
Other income	($72)	($109)	(33.9)%

Pension settlement charge

During the first quarter of 2017, PPG made lump-sum payments to certain retirees who had participated in PPG's U.S. non-qualified pension plan (the "Nonqualified Plan") totaling approximately $40 million. As the lump-sum payments were in excess of the expected annual service and interest costs for the Nonqualified Plan, PPG remeasured the periodic benefit obligation of the Nonqualified Plan as of March 1, 2017 and recorded a corresponding settlement charge totaling $22 million.

Other charges

Other charges were higher in the nine months ended September 30, 2018 compared to the comparable prior year period due to environmental remediation charges of $34 million. Offsetting this increase, the non-service components of net periodic pension and post-retirement benefit costs were lower by $16 million compared to prior year due to higher expected return on assets and lower amortization of actuarial losses. We expect this trend to continue in the fourth quarter of 2018.

Other income

Other income was lower in the nine months ended September 30, 2018 due to the absence of a gain on the sale of a business of $25 million and income from a legacy legal settlement of $18 million recorded in 2017.

Effective tax rate and earnings per diluted share

($ in millions, except percentages)	Nine Months Ended September 30		Percent Change
	2018	2017	2018 vs. 2017
		As Restated	
Income tax expense	$270	$391	(30.9)%
Effective tax rate	20.0%	24.0%	(4.0)%
Adjusted effective tax rate, continuing operations*	21.2%	24.4%	(3.2)%
Earnings per diluted share, continuing operations	$4.32	$4.72	(8.5)%
Adjusted earnings per diluted share*	$4.75	$4.66	1.9 %

*See Regulation G Reconciliation below

The effective tax rate for the nine months ending September 30, 2018 reflects the benefit of U.S. tax legislation enacted in December 2017 as well as the impact of certain discrete tax items. The Company expects its full year 2018 adjusted effective tax rate will be between 23.0% and 24.0%.

Earnings per diluted share from continuing operations for the nine months ended September 30, 2018 decreased year-over-year due to the net business restructuring charge, as well as other items described further in the Regulation G reconciliation. The Company benefited from the 11.8 million shares repurchased in the first nine of 2018 and 3.5 million shares repurchased in the fourth quarter of 2017.

Regulation G Reconciliation - Results from Operations

PPG believes investors' understanding of the Company's operating performance is enhanced by the disclosure of net income, earnings per diluted share and the effective tax rate adjusted for certain charges. PPG's management considers this information useful in providing insight into the Company's ongoing operating performance because it excludes the impact of items that cannot reasonably be expected to recur on a quarterly basis or that are not attributable to our primary operations. Net income, earnings per diluted share and the effective tax rate adjusted for these items are not

recognized financial measures determined in accordance with U.S. generally accepted accounting principles (U.S. GAAP) and should not be considered a substitute for net income, earnings per diluted share, the effective tax rate or other financial measures as computed in accordance with U.S. GAAP. In addition, adjusted net income, earnings per diluted share and the effective tax rate may not be comparable to similarly titled measures as reported by other companies.

Income before income taxes from continuing operations is reconciled to adjusted income before income taxes from continuing operations, the effective tax rate from continuing operations is reconciled to the adjusted effective tax rate from continuing operations and net income from continuing operations (attributable to PPG) and earnings per share – assuming dilution (attributable to PPG) are reconciled to adjusted net income from continuing operations (attributable to PPG) and adjusted earnings per share – assuming dilution below:

	Nine Months Ended September 30, 2018				
($ in millions, except percentages and per share amounts)	Income Before Income Taxes	Tax Expense	Effective Tax Rate	Net income from continuing operations (attributable to PPG)	Earnings per diluted share
As reported, continuing operations	$1,351	$270	20.0%	$1,067	$4.32
Adjusted for:					
Costs related to customer assortment change	18	4	24.3%	14	0.05
Environmental remediation charges	34	8	25.1%	26	0.10
Business restructuring, net	71	18	25.4%	53	0.21
Accelerated depreciation from restructuring actions	9	2	24.0%	7	0.02
Legacy legal settlement	10	2	24.3%	8	0.03
Accounting investigation costs	11	2	24.3%	9	0.04
Impairment of non-manufacturing asset	9	2	24.3%	7	0.03
Tax benefit related to U.S. Tax Cuts and Jobs Act	—	13	N/A	(13)	(0.05)
Adjusted, continuing operations, excluding certain items	$1,513	$321	21.2%	$1,178	$4.75

For the three months ended March 31, 2018, PPG determined that a portion of the Company's reserve for unrecognized tax benefits should be released discretely in the first quarter, rather than be included in the effective tax rate to be applied over the course of the full year, reducing income tax expense for the first quarter by $15 million. In the first quarter Form 10-Q, this was shown as an adjustment to net income from continuing operations, excluding non-recurring items. In the second and third quarters of 2018, there have been additional tax items that have been treated as discrete items rather than be included in the annual effective tax rate. PPG has determined that such tax items are likely to be incurred on a regular basis and will be part of PPG's on-going tax expense and should not be treated as adjustments to net income from continuing operations. As such, PPG will not include the $15 million reserve release or similar recurring tax items going forward as an adjustment to net income from continuing operations.

As Restated	Nine Months Ended September 30, 2017				
($ in millions, except percentages and per share amounts)	Income Before Income Taxes	Tax Expense	Effective Tax Rate	Net income from continuing operations (attributable to PPG)	Earnings per share
As reported, continuing operations	$1,628	$391	24.0%	$1,221	$4.72
Adjusted for:					
Transaction-related costs [(1)]	9	3	37.9%	6	0.02
Pension settlement charge	22	8	37.9%	14	0.05
Gain on sale of Plaka business	(25)	(1)	3.2%	(24)	(0.09)
Legacy legal settlement	(18)	(7)	37.9%	(11)	(0.04)
Adjusted, continuing operations, excluding certain items	$1,616	$394	24.4%	$1,206	$4.66

(1) Transaction-related costs include advisory, legal, accounting, valuation and other professional or consulting fees incurred to effect significant acquisitions, as well as similar fees and other costs to effect disposals not classified as discontinued operations.

Performance of Reportable Business Segments

Performance Coatings

($ in millions, except per share amounts)	Nine Months Ended September 30 2018	2017	$ Change 2018 vs. 2017	% Change 2018 vs. 2017
		As Restated		
Net sales	$6,947	$6,606	$341	5.2 %
Segment income	$1,039	$1,054	($15)	(1.4) %

2018 vs. 2017

Performance Coatings net sales increased $341 million due to the following:

- *Higher selling prices (+2%)*
- *Favorable foreign currency translation (+2%)*
- *Higher sales volumes (+1%)*

Architectural coatings - Americas and Asia-Pacific sales volumes declined by a low-single-digit percentage versus the prior year. Sales volumes were positive year-over-year in the U.S. and Canada company-owned store network as well as in Mexico, Central America, Australia and Brazil. The increase was more than offset by lower DIY and independent dealer network channel declines, including the unfavorable impact from a previously communicated customer assortment change in the U.S. architectural DIY channel.

Architectural coatings - EMEA sales volumes decreased by a low-single-digit percentage year-over-year consistent with the market. Sales volumes were impacted by harsh weather in the first quarter and soft consumer demand in the retail channel in the second and third quarters.

Automotive refinish coatings organic sales grew by a low-single-digit percentage year-over-year, despite weakening demand in the U.S. Organic sales increased in all other geographic regions as customers adopted PPG's industry leading technologies.

Aerospace coatings sales volumes grew by low-teen-digit percentage versus the prior year, including above-market volume growth in the U.S. and Asia. Strong growth was supported by positive industry demand fundamentals and market outperformance in the U.S. from technology advantaged products.

Protective and marine coatings sales volumes increased by a low-single-digit percentage year-over-year. Protective coatings sales volumes were up, driven by growth in China, and marine coatings sales volumes were slightly higher than prior year.

Segment income decreased $15 million year-over-year driven by increasing raw material costs and wage and other cost inflation. These cost increases were partially offset by higher selling prices, lower manufacturing costs and further benefits from the Company's 2016 restructuring program. Favorable foreign currency translation increased segment income by approximately $20 million, primarily related to the strengthening of the Mexican peso and the euro.

Industrial Coatings

($ in millions, except per share amounts)	Nine Months Ended September 30 2018	2017	$ Change 2018 vs. 2017	% Change 2018 vs. 2017
Net sales	$4,782	$4,460	$322	7.2 %
Segment income	$631	$765	($134)	(17.5)%

2018 vs. 2017

Industrial Coatings segment net sales increased $322 million due to the following:

- *Higher sales volumes (+2%)*
- *Favorable foreign currency translation (+2%)*
- *Acquisition-related sales (+2%)*
- *Higher selling prices (+1%)*

Automotive OEM coatings sales volumes were slightly higher versus the prior year, consistent with the global automotive industry growth rate. Automotive OEM coatings sales volume growth was strongest in Latin America.

Industrial coatings and specialty coatings and materials sales volumes, in aggregate, continued to grow driven by strong end-market demand for coil, heavy-duty equipment and electronics materials. From a geographic perspective, sales volume growth was led by EMEA, Latin America and Asia-Pacific. Acquisition-related sales from The Crown Group added approximately $100 million in sales during the first nine months of 2018.

Packaging coatings sales volumes were up a mid-single-digit percentage year-over-year driven by ongoing customer adoption of PPG's new can coating technologies. From a geographic perspective, sales volumes in the developed regions grew a mid-to-high-single-digit percentage, led by the U.S. and Canada and Europe. In the Asia-Pacific region, sales volumes decreased by a low-single-digit percentage.

Segment income decreased $134 million year-over-year primarily due to continuing significant raw material and logistics cost inflation, higher overhead costs and wage inflation, partially offset by higher selling prices and lower manufacturing costs, including benefits from business restructuring actions. Favorable foreign currency translation added $12 million to segment income.

Liquidity and Capital Resources

PPG had cash and short-term investments totaling $1.2 billion and $1.5 billion at September 30, 2018 and December 31, 2017 , respectively.

Cash from operating activities - continuing operations for the nine months ended September 30, 2018 was $687 million . Cash from operating activities - continuing operations was $1,018 million for the nine months ended September 30, 2017 . Operating cash flow decreased primarily due to higher working capital.

Other uses of cash during the nine months ended September 30, 2018 included:

- Capital expenditures, excluding acquisitions, of $226 million .
- Business acquisition cash spending of $98 million .
- Contributions to pension plans of $89 million .
- Cash dividends paid of $338 million .
- Share repurchases of $1,313 million .

In February 2018, PPG completed a public debt offering of $300 million aggregate principal amount of 3.2% notes due 2023 and $700 million aggregate principal amount of 3.75% notes due 2028 and received aggregate net proceeds of $992 million.

Total capital spending in 2018 is expected to be up to 3.0% of full year sales. PPG made voluntary contributions of $25 million and $50 million to its U.S. defined benefit pension plans in January 2018 and September 2018, respectively. PPG expects to make mandatory contributions to its non-U.S. pension plans in the range of $5 million to $15 million during the remaining three months of 2018 and may make voluntary contributions to its defined benefit pension plans in 2018 and beyond.

We intend to deploy our cash in a timely, disciplined manner with a continued emphasis on incremental earnings accretive initiatives, including additional acquisitions and share repurchases. The Company expects cash deployment for acquisitions and share repurchases of at least $2.4 billion for 2018.

PPG's total debt to equity ratio (total debt, including capital leases, to total debt and PPG shareholders' equity) was 50% at September 30, 2018 and 43% at December 31, 2017 .

Operating Working Capital is a subset of total working capital and represents (1) trade receivables – net of the allowance for doubtful accounts, (2) FIFO inventories and (3) trade liabilities. We believe Operating Working Capital represents the key components of working capital under the operating control of our businesses. A key metric we use to measure improvement in our working capital management is Operating Working Capital as a percentage of sales (current quarter sales annualized).

($ in millions, except percentages)	**September 30, 2018**	**December 31, 2017**	**September 30, 2017**
			As Restated
Trade Receivables, Net	$2,864	$2,559	$2,760
Inventories, FIFO	2,075	1,833	1,909
Trade Creditors' Liabilities	2,346	2,321	2,255
Operating Working Capital	$2,593	$2,071	$2,414
Operating Working Capital as a % of Sales	17.0%	14.1%	16.0%
Days sales outstanding	61	57	59
Days payable outstanding	97	96	95

Other Liquidity Information

The Company continues to believe that cash on hand and short term investments, cash from operations and the Company's access to capital markets will continue to be sufficient to fund our operating activities, capital spending, acquisitions, dividend payments, debt service, share repurchases, contributions to pension plans and PPG's contractual obligations.

Environmental

($ in millions)	Three Months Ended September 30 2018	2017	Nine Months Ended September 30 2018	2017
Cash outlays for environmental remediation activities	$14	$14	$45	$36

($ in millions)	Remainder of 2018	Annually 2019 - 2022
Projected future cash outlays for environmental remediation activities	$18	$25 - $75

Restructuring

The 2016 restructuring actions have anticipated annual savings of approximately $130 million once fully implemented. The company expects to achieve at least $60 million in savings in 2018.

A pretax restructuring charge of $83 million was recorded in PPG's second quarter 2018 financial results, of which $80 million represents employee severance and other cash costs. The remainder of the charge represents the write-down of certain assets. In addition, other cash costs of approximately $25 million will be incurred, consisting of approximately $10 million of incremental restructuring-related cash costs for certain items that are required to be expensed on an as-incurred basis and approximately $15 million for items which are expected to be capitalized. The Company also expects approximately $20 million of incremental non-cash accelerated depreciation expense for certain assets due to their reduced expected asset life as a result of this program, $5 million of which was recognized in the second quarter of 2018. Substantially all actions from this business restructuring plan are expected to be complete by the end of the second quarter of 2019. The company expects this program to achieve annual savings of $85 million upon full implementation.

In addition, the Company continues to review its cost structure to identify additional cost savings opportunities.

See Note 8 , " Business Restructuring ," to the accompanying condensed consolidated financial statements for further details on the Company's business restructuring programs.

Currency

Comparing exchange rates as of December 31, 2017 to September 30, 2018 , the U.S. dollar weakened against numerous currencies in which PPG operates, most notably the U.K. pound and several other emerging region currencies. As a result, consolidated net assets at September 30, 2018 decreased by $74 million compared to December 31, 2017 .

Comparing exchange rates during the first nine months of 2018 to those of the first nine months of 2017 , the U.S. dollar weakened against the currencies of most countries in which PPG operates, most notably the euro, U.K. pound, Chinese yuan and several other emerging region currencies in the third quarter. This had a favorable impact on income from continuing operations before income taxes for the nine months ended September 30, 2018 of $32 million from the translation of these foreign earnings into U.S. dollars.

New Accounting Standards

See Note 3 , " New Accounting Standards ," to the accompanying condensed consolidated financial statements for further details on recently issued accounting guidance.

Commitments and Contingent Liabilities, including Environmental Matters

PPG is involved in a number of lawsuits and claims, both actual and potential, including some that it has asserted against others, in which substantial monetary damages are sought. See Part II, Item 1, "Legal Proceedings" of this Form 10-Q and Note 17 , " Commitments and Contingent Liabilities ," to the accompanying condensed consolidated financial statements for a description of certain of these lawsuits.

As discussed in Part II, Item 1 and Note 17 , although the result of any future litigation of such lawsuits and claims is inherently unpredictable, management believes that, in the aggregate, the outcome of all lawsuits and claims involving PPG, including asbestos-related claims, will not have a material effect on PPG's consolidated financial position or liquidity; however, any such outcome may be material to the results of operations of any particular period in which costs, if any, are recognized.

As also discussed in Note 17 , PPG has significant reserves for environmental contingencies. Please refer to the Environmental Matters section of Note 17 for details of these reserves. A significant portion of our reserves for

environmental contingencies relate to ongoing remediation at PPG's former chromium manufacturing plant in Jersey City, N.J. and associated sites ("New Jersey Chrome"). The Company continues to analyze, assess and remediate the environmental issues associated with New Jersey Chrome. Information will continue to be generated from the ongoing groundwater remedial investigation activities related to New Jersey Chrome and will be incorporated into a final draft remedial action work plan for groundwater expected to be submitted to the New Jersey Department of Environmental Protection no later than 2020.

It is possible that technological, regulatory and enforcement developments, the results of environmental studies and other factors could alter the Company's expectations with respect to future charges against income and future cash outlays. Specifically, the level of expected future remediation costs and cash outlays is highly dependent upon activity related to New Jersey Chrome.

Forward-Looking Statements

The Private Securities Litigation Reform Act of 1995 provides a safe harbor for forward-looking statements made by or on behalf of the Company. Management's Discussion and Analysis and other sections of this Quarterly Report contain forward-looking statements that reflect the Company's current views with respect to future events and financial performance. You can identify forward-looking statements by the fact that they do not relate strictly to current or historic facts. Forward-looking statements are identified by the use of the words "aim," "believe," "expect," "anticipate," "intend," "estimate," "project," "outlook," "forecast" and other expressions that indicate future events and trends. Any forward-looking statement speaks only as of the date on which such statement is made, and the Company undertakes no obligation to update any forward looking statement, whether as a result of new information, future events or otherwise. You are advised, however, to consult any further disclosures we make on related subjects in our reports to the Securities and Exchange Commission. Also, note the following cautionary statements.

Many factors could cause actual results to differ materially from the Company's forward-looking statements. Such factors include global economic conditions, increasing price and product competition by foreign and domestic competitors, fluctuations in cost and availability of raw materials, the ability to achieve selling price increases, the ability to recover margins, customer inventory levels, the ability to maintain favorable supplier relationships and arrangements, the timing of and the realization of anticipated cost savings from restructuring initiatives, the ability to identify additional cost savings opportunities, difficulties in integrating acquired businesses and achieving expected synergies therefrom, economic and political conditions in international markets, the ability to penetrate existing, developing and emerging foreign and domestic markets, foreign exchange rates and fluctuations in such rates, fluctuations in tax rates, the impact of future legislation, the impact of environmental regulations, unexpected business disruptions, our ability to successfully remediate the material weakness in our internal control over financial reporting disclosed in this report within the time periods and in the manner currently anticipated, the effectiveness of our internal control over financial reporting, including the identification of additional control deficiencies, further expenditures related to our restatement, the results of governmental actions relating to pending investigations, the results of shareholder actions relating to the restatement of our financial statements and the unpredictability of existing and possible future litigation.

Consequently, while the list of factors presented here and in the 2017 Form 10-K/A under the caption "Item 1A Risk Factors" are considered representative, no such list should be considered to be a complete statement of all potential risks and uncertainties. Unlisted factors may present significant additional obstacles to the realization of forward-looking statements.

Consequences of material differences in the results compared with those anticipated in the forward-looking statements could include, among other things, lower sales or earnings, business disruption, operational problems, financial loss, legal liability to third parties, other factors set forth in "Item 1A. Risk Factors" of the 2017 Form 10-K/A and similar risks, any of which could have a material adverse effect on the Company's consolidated financial condition, results of operations or liquidity.

Item 3. Quantitative and Qualitative Disclosures About Market Risk

Foreign Currency Risk

As of September 30, 2018 and December 31, 2017, PPG had non-U.S. dollar denominated borrowings outstanding of $2.7 billion and $2.8 billion, respectively. A weakening of the U.S. dollar by 10% against European currencies and by 20% against Asian and South American currencies would have resulted in unrealized translation losses on these borrowings of $303 million as of September 30, 2018 and $314 million as of December 31, 2017.

The fair value of foreign currency forward contracts outstanding as of September 30, 2018 and 2017 was an asset of $64 million and a liability of $11 million, respectively. The potential reduction in PPG's income from continuing operations resulting from the impact of adverse changes in exchange rates on the fair value of its outstanding foreign currency

hedge contracts of 10% for European and Canadian currencies and 20% for Asian and Latin American currencies for the nine months ended September 30, 2018 and 2017 was $219 million and $122 million, respectively.

In February 2018, PPG entered into U.S. dollar to euro cross currency swap contracts with a total notional amount of $575 million outstanding, resulting in an asset with a fair value of $22 million as of September 30, 2018 . As of December 31, 2017 , PPG had U.S. dollar to euro cross currency swap contracts with a total notional amount of $560 million outstanding, resulting in an asset with a fair value of $2 million. A 10% increase in the value of the euro to the U.S. dollar would have had an unfavorable effect on the fair value of these swap contracts by reducing the value of these instruments by $58 million at September 30, 2018 and December 31, 2017.

Interest Rate Risk

In March of 2018, PPG entered into interest rate swaps which converted $525 million of fixed rate debt to variable rate debt. The fair value of these contracts was a liability of $8 million as of September 30, 2018 . An increase in variable interest rates of 10% would lower the fair value of these swaps and increase interest expense by $11 million over the term of the instruments.

There were no other material changes in the Company's exposure to market risk from December 31, 2017 to September 30, 2018 . See Note 15 , " Financial Instruments, Hedging Activities and Fair Value Measurements " for a description of our instruments subject to market risk.

Item 4. Controls and Procedures

a. Evaluation of disclosure controls and procedures. The Company's management is responsible for establishing and maintaining adequate disclosure controls and procedures as defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended (the "Exchange Act"). Disclosure controls and procedures means controls and other procedures of the Company that are designed to ensure that information required to be disclosed by the Company in the reports that it files or submits under the Exchange Act, is recorded, processed, summarized, and reported, within the time periods specified in the SEC's rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by the Company in the reports that it files or submits under the Exchange Act is accumulated and communicated to the Company's management, including its principal executive and principal financial officers, as appropriate to allow timely decisions regarding required disclosure.

The Company's principal executive officer and principal financial officer have evaluated the effectiveness of the Company's disclosure controls and procedures as of September 30, 2018 and, due to the existence of the material weakness in internal control over financial reporting described below, the Company's principal executive and principal financial officers have determined that such disclosure controls and procedures were not effective as of such date. In light of the material weakness, the Company performed additional analysis and other post-closing procedures to ensure the Company's condensed consolidated financial statements are prepared in accordance with accounting principles generally accepted in the United States. Accordingly, the Company's management, including its principal executive and principal financial officers, has concluded that the condensed consolidated financial statements included in this Form 10-Q present fairly, in all material respects, the Company's financial position, results of operations and cash flows for the periods presented in conformity with accounting principles generally accepted in the United States.

Material Weakness

A material weakness is a deficiency, or a combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of the Company's annual or interim financial statements will not be prevented or detected on a timely basis.

As described in additional detail in the 2017 Form 10-K/A, the Company did not maintain effective controls within its financial close process. Until this material weakness is remediated, it could result in material misstatements of the Company's financial statements that would not be prevented or detected. As of September 30, 2018, the remedial measures identified below are in place and will be tested for operational effectiveness throughout the fourth quarter.

Remediation of Material Weakness

In connection with the investigation described in Note 2, " Restatement of Previously Reported Condensed Consolidated Quarterly Financial Statements ," the Company identified and implemented actions to improve the effectiveness of its internal control over financial reporting and disclosure controls and procedures, including enhancing the Company's resources and training with respect to financial reporting and disclosure responsibilities. Management reviewed and will continue to review such actions with the Audit Committee. To date, the following steps have been taken towards the remediation of the Company's material weakness:

- The Company has terminated the employment of the former Vice President and Controller.
- Two employees who acted under the direction of the former Vice President and Controller have been re-assigned to different positions within the Company where they do not have a Financial Reporting Oversight Role or a role in the design or operation of internal control over financial reporting, disclosure controls or accounting policy.
- The Company appointed its former Director of Corporate Audit Services and former Assistant Controller, Financial Reporting as Acting Controller and on July 19, 2018 appointed him the Company's permanent Vice President and Controller.
- The Company's Chairman and Chief Executive Officer has emphasized to all employees, and to the Company's finance employees specifically, the importance of acting ethically and adhering to the Company's Global Code of Ethics.

The Company is committed to maintaining a strong internal control environment and to ensuring that a proper, consistent tone is communicated throughout the organization, including the expectation that previously existing deficiencies will be remediated through the implementation of processes and controls to ensure strict compliance with generally accepted accounting principles. In addition to the steps set forth above, the Company has also taken other remedial measures as described below:

- The Company re-emphasized (1) its commitment to ethical standards, (2) the requirements of the Company's Code of Ethics, (3) reporting obligations and (4) non-retaliation policy for complaints;
- The Company enhanced its corporate finance department by adding personnel with responsibility for areas identified in the investigation and enhanced segregation of duties in the finance department;
- The Company enhanced policies and procedures relating to the preparation, approval and entry of journal entries;
- The Company enhanced its process to evaluate and adjust certain significant expense accruals;
- The Company enhanced its policies and procedures relating to inventory standard cost revaluations;
- The Company enhanced its policies and procedures concerning accounting entries related to discontinued operations;
- The Company now requires additional annual/onboarding education for finance staff;
- The Company will conduct additional periodic risk assessments and targeted internal audit reviews; and
- The Company separated the financial forecasting process from financial accounting.

As the Company continues to evaluate and work to improve internal control over financial reporting, the Company may determine to take additional measures to strengthen its internal control environment or modify the remediation efforts described above. Until the remediation efforts discussed above, including any additional remediation efforts that the Company identifies as necessary, are fully implemented, tested and deemed to be operating effectively, the material weakness described above will continue to exist.

b. Changes in internal control. Other than the changes noted above under the heading "Remediation of Material Weakness," there were no changes in the Company's internal control over financial reporting that occurred during the Company's quarter ended September 30, 2018 that have materially affected, or are reasonably likely to materially affect, the Company's internal control over financial reporting.

PART II. OTHER INFORMATION

Item 1. Legal Proceedings

PPG is involved in a number of lawsuits and claims, both actual and potential, including some that it has asserted against others, in which substantial monetary damages are sought. These lawsuits and claims may relate to contract, patent, environmental, product liability, asbestos exposure, antitrust, employment, securities and other matters arising out of the conduct of PPG's current and past business activities. To the extent that these lawsuits and claims involve personal injury and property damage, PPG believes it has adequate insurance; however, certain of PPG's insurers are contesting coverage with respect to some of these claims, and other insurers may contest coverage. PPG's lawsuits and claims against others include claims against insurers and other third parties with respect to actual and contingent losses related to environmental, asbestos and other matters.

The Company has self-reported to the SEC information concerning the internal investigation of accounting matters described in Note 2, " Restatement of Previously Reported Condensed Consolidated Quarterly Financial Statements " under Item 1 of this Form 10-Q. The Company's cooperation with the SEC's investigation is continuing.

On May 20, 2018, a putative securities class action lawsuit was filed in the U.S. District Court for the Central District of California against the Company and certain of its current or former officers. On September 21, 2018, an Amended Class Action Complaint was filed in the action. The Amended Complaint, captioned *Trevor Mild v. PPG Industries, Inc., Michael H. McGarry, Vincent J. Morales, and Mark C. Kelly* , asserts securities fraud claims under Sections 10(b) and 20(a) of the Securities Exchange Act of 1934 on behalf of putative classes of persons who purchased or otherwise acquired stock of the Company during various time periods between January 19, 2017 and May 10, 2018. The allegations relate to, among other things, allegedly false and misleading statements and/or failures to disclose information about the Company's business, operations and prospects. This action remains pending. The Company believes this action is without merit and intends to defend itself vigorously.

For many years, PPG has been a defendant in lawsuits involving claims alleging personal injury from exposure to asbestos. For a description of asbestos litigation affecting the Company, see Note 17 , " Commitments and Contingent Liabilities " to the accompanying condensed consolidated financial statements under Part I, Item 1 of this Form 10-Q.

In the past, the Company and others have been named as defendants in several cases in various jurisdictions claiming damages related to exposure to lead and remediation of lead-based coatings applications. PPG has been dismissed as a defendant from most of these lawsuits and has never been found liable in any of these cases.

Item 1A. Risk Factors

There were no material changes in the Company's risk factors from the risks disclosed in the 2017 Form 10-K/A.

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

Issuer Purchases of Equity Securities

The following table summarizes the Company's stock repurchase activity for the three months ended September 30, 2018 :

Month	Total Number of Shares Purchased	Average Price Paid per Share	Total Number of Shares Purchased as Part of Publicly Announced Programs (1)	Maximum Number of Shares That May Yet Be Purchased Under the Programs (1)
July 2018				
Repurchase program	—	$—	—	22,534,973
August 2018				
Repurchase program	282,382	$110.76	282,382	22,276,485
September 2018				
Repurchase program	1,949,018	$112.17	1,949,018	20,560,992
Total quarter ended September 30, 2018				
Repurchase program	2,231,400	$111.99	2,231,400	20,560,992

(1) In December 2017, PPG's board of directors approved a $2.5 billion share repurchase program. This program is in addition to the company's share repurchase authorization, which was approved in October 2016. The remaining shares yet to be

purchased under the programs have been calculated using PPG's closing stock price on the last business day of the respective month. These repurchase programs have no expiration date.

Item 6. Exhibits

See the Index to Exhibits on Page 51.

PPG INDUSTRIES, INC. AND SUBSIDIARIES

Index to Exhibits

The following exhibits are filed as part of, or incorporated by reference into, this Form 10-Q.

†*10.1	Letter Agreement with Rebecca B. Liebert
†*10.2	Letter Agreement with Amy R. Ericson
†12	Computation of Ratio of Earnings to Fixed Charges for the Nine Months Ended September 30, 2018 and for the Five Years Ended December 31, 2017.
†31.1	Certification of Principal Executive Officer Pursuant to Rule 13a-14(a) or 15d-14(a) of the Exchange Act, as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
†31.2	Certification of Principal Financial Officer Pursuant to Rule 13a-14(a) or 15d-14(a) of the Exchange Act, as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
††32.1	Certification of Chief Executive Officer Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
††32.2	Certification of Chief Financial Officer Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
101.INS**	XBRL Instance Document
101.SCH**	XBRL Taxonomy Extension Schema Document
101.CAL**	XBRL Taxonomy Extension Calculation Linkbase Document
101.DEF**	XBRL Taxonomy Extension Definition Linkbase Document
101.LAB**	XBRL Taxonomy Extension Label Linkbase Document
101.PRE**	XBRL Taxonomy Extension Presentation Linkbase Document

† Filed herewith.
†† Furnished herewith.
*Management contract, compensatory plan or arrangement required to be filed as an exhibit hereto pursuant to Item 601 of Regulation S-K.
**Attached as Exhibit 101 to this report are the following documents formatted in XBRL (Extensible Business Reporting Language): (i) the Condensed Consolidated Statement of Income for the nine months ended September 30, 2018 and 2017 , (ii) the Condensed Consolidated Balance Sheet at September 30, 2018 and December 31, 2017 , (iii) the Condensed Consolidated Statement of Cash Flows for the nine months ended September 30, 2018 and 2017 , and (iv) Notes to Condensed Consolidated Financial Statements for the nine months ended September 30, 2018 .

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.

PPG INDUSTRIES, INC.
(Registrant)

Date: October 19, 2018

By: /s/ Vincent J. Morales
Vincent J. Morales
Senior Vice President and Chief Financial Officer
(Principal Financial Officer and Duly Authorized Officer)

By: /s/ William E. Schaupp
William E. Schaupp
Vice President and Controller
(Principal Accounting Officer and Duly Authorized Officer)

Exhibit 10.1



PPG Industries Inc.
One PPG Place
Pittsburgh, PA 15272

Hervé Tiberghien
Vice President, Human Resources

May 9, 2018

Dear Rebecca,

PPG's success depends on hiring the very best people. We believe, with PPG, you will find meaning in your work every day and engage in opportunities that will shape you personally and professionally. We are very pleased to offer you the position of Senior Vice President, Global Automotive OEM reporting to Michael McGarry. Additionally, you will have oversight responsibility for the PPG Latin America region.

Your starting base salary will be $625,000 annually.

You will participate in our annual Incentive Compensation Plan. Your 2018 incentive award target will be 70% of your base salary, which will be prorated in 2018 (based upon your starting date) and will be paid in February 2019 based on the level of achievement of performance goals under the Incentive Compensation Plan.

In addition, you will participate in our long-term incentive (LTI) program, which includes annual grants of stock options, performance-based restricted stock units (RSUs) and a total shareholder return (TSR) grant. Provided your employment begins on or before December 31, your initial LTI grants will be made in February 2019. The target value of your LTI award is approximately $1,000,000, and will be scheduled to vest on the third anniversary of the grant date. All LTI grants made to you will be subject to the LTI program.

To offset your unvested equity, the following grants will be made in your first month of employment:

- A grant of $1,000,000 comprised of 1/3 stock options, 1/3 performance based RSUs and 1/3 TSRs. The RSUs and TSRs will vest in February 2021, while the stock options will vest in June 2021; and
- A time-based RSU grant of $3,145,000 with a vesting schedule of: $1,075,000 in December 2019, $1,500,000 in December 2020, $420,000 in December 2022, and $150,000 in December 2023.

All LTI grants made to you will be subject to the LTI program.

You will receive a signing bonus of $1,200,000, less applicable taxes, in the paycheck following your first month of employment. Additionally, you will receive a cash bonus of $140,000, less applicable taxes, in February 2019 to help offset the loss of the 2018 bonus from January through May 2018. Should you resign within two years of the payment of either of these bonuses, you will repay PPG the full amount, less applicable taxes.

In addition, we appreciate the risk that you absorb in joining PPG. Therefore, in the event that you are not selected by the Board of Directors as the next CEO of PPG, as part of the Board’s normal succession planning process, and decide to resign as a result, you will be entitled to a severance payment under the following conditions:

1. You remain employed and perform at a successful or above level for the 12 month period following the effective date of the appointment;
2. Your resignation is effective immediately following the expiration of the 12 month period; and
3. You sign PPG's standard separation agreement.

The severance payment will be equal to two times your annual base salary, less applicable taxes and withholdings.

In your leadership role, you will be subject to meeting a stock ownership requirement equal to three times your base salary within five years.

PPG will provide you with the reimbursement of relocation costs to Troy. Such relocation benefits will be applicable until the one-year anniversary of your start date. The details of the relocation program are found in our standard relocation policy which is attached.

You will be eligible for a broad array of PPG employee benefits, including health care coverage, life insurance and retirement plan which includes a 401(k) savings plan with a company matching contribution as well as a Company-provided contribution to the plan. You will be provided five weeks of vacation, prorated in 2018, based upon the commencement of your employment. A summary of benefits is attached for your review.

All PPG compensation and benefits described in this letter will be provided under the terms of applicable PPG plans, which plans PPG may amend in accordance with their terms.

This offer is contingent upon the successful completion of PPG's pre-employment processes, which will be initiated after you have accepted our offer. The pre-employment contingencies include:

- **Background Check:** After you have electronically accepted our offer of employment, you will receive instructions to initiate your background check and drug screen. Please initiate this process as soon as possible as the link expires after 48 hours.
- **Medical History Review:** The information you provide on the PPG Medical History Questionnaire is used to determine whether there are any medical conditions that might restrict you from safely performing the essential functions of the position; and if so, whether accommodations to those restrictions can be made.
- **Employment Agreement:** Based on your position, you are required to complete an Employment Agreement. Execution of this agreement must be completed prior to your first day of employment. We encourage you to review the employee agreement by clicking on the employee agreement task prior to accepting this offer of employment. The Employment Agreement will supersede the terms of this letter, if at all inconsistent.
- **Employment Eligibility:** On your first day of employment you will be expected to provide proof of citizenship or other authorization to work in the United States.

Should you have any questions regarding our employment offer, please contact me or Annie Livingston.

Rebecca, we believe that you have the desire and ability to make a significant contribution to PPG, and to drive the growth of our business. Joining PPG means you are connecting your career and your learning and development to a growing global leader dedicated to support your aspirations. We look forward to welcoming you to PPG.

Sincerely,

/s/ Hervé Tiberghien

Hervé Tiberghien
Vice President, Human Resources

cc: Annie Livingston
Karen Rathburn

Enclosures:

- Employment Agreement
- PPG Benefits Information
- Relocation Package Information

Exhibit 10.2



PPG Industries Inc.
One PPG Place
Pittsburgh, PA 15272

Hervé Tiberghien
Vice President, Human Resources

May 17, 2018

Dear Amy:

PPG's success depends on hiring the very best people. We believe, with PPG, you will find meaning in your work every day and engage in opportunities that will shape you personally and professionally. We are very pleased to offer you the position of Senior Vice President, Packaging, Specialty Coatings & Materials, and Corporate Strategy, reporting to Michael McGarry.

Your starting base salary will be $480,000 annually.

You will participate in our annual Incentive Compensation Plan. Your 2018 incentive award target will be 65% of your base salary, which will be prorated in 2018 (based upon your starting date) and will be paid in February 2019 based on the level of achievement of performance goals under the Incentive Compensation Plan.

In addition, you will participate in our long-term incentive (LTI) program, which includes annual grants of stock options, performance-based restricted stock units (RSUs) and a total shareholder return (TSR) grant. Provided your employment begins on or before December 31, your initial LTI grants will be made in February 2019. The target value of your LTI award is approximately $750,000, and will be scheduled to vest on the third anniversary of the grant date. All LTI grants made to you will be subject to the LTI program.

You will receive a signing bonus of $300,000, less applicable taxes, in October 2018 to off-set the loss of your retention bonus with your current company. Additionally, you will receive a cash bonus of $100,000, less applicable taxes, in February 2019 to partially offset the loss of your 2018 bonus from your current company. Should you voluntarily resign within one year of the payment of either of these bonuses, you will repay PPG the full amount, less applicable taxes.

You will also receive a one-time grant of time-based RSUs with a total target grant value of $1,200,000 to partially off-set the loss of your unvested equity. These RSUs will be granted shortly after your start date and will vest on January 29, 2021.

In your leadership role, you will be subject to meeting a stock ownership requirement equal to two times your base salary within five years.

Should PPG terminate your employment for reasons other than cause within your first ten years of employment, you will be eligible for a severance of 100% of your annual base salary and a pro-rated target bonus award.

PPG will provide you with the reimbursement of relocation costs to Pittsburgh, as shown in the attached document. Such relocation benefits will be applicable until the one-year anniversary of your start date.

You will be eligible for a broad array of PPG employee benefits, including health care coverage, life insurance and retirement plan which includes a 401(k) savings plan with a company matching contribution as well as a company-provided contribution to the plan. You will be provided five weeks
of vacation, prorated in 2018, based upon the commencement of your employment. A summary of benefits is attached for your review.

All PPG compensation and benefits described in this letter will be provided under the terms of applicable PPG plans, which plans PPG may amend in accordance with their terms.

This offer is contingent upon the successful completion of PPG's pre-employment processes, which will be initiated after you have accepted our offer. The pre-employment contingencies include:

- **Background Check:** After you have electronically accepted our offer of employment, you will receive instructions to initiate your background check and drug screen. Please initiate this process as soon as possible as the link expires after 48 hours.
- **Medical History Review:** The information you provide on the PPG Medical History Questionnaire is used to determine whether there are any medical conditions that might restrict you from safely performing the essential functions of the position; and if so, whether accommodations to those restrictions can be made.
- **Employment Agreement:** Based on your position, you are required to complete an Employment Agreement. Execution of this agreement must be completed prior to your first day of employment. We encourage you to review the employee agreement by clicking on the employee agreement task prior to accepting this offer of employment. The Employment Agreement will supersede the terms of this letter, if at all inconsistent.
- **Employment Eligibility:** On your first day of employment you will be expected to provide proof of citizenship or other authorization to work in the United States.

Should you have any questions regarding our employment offer, please contact me or Annie Livingston.

Amy, we believe that you have the desire and ability to make a significant contribution to PPG, and to drive the growth of our business. Joining PPG means you are connecting your career and your learning and development to a growing global leader dedicated to support your aspirations. We look forward to welcoming you to PPG.

Sincerely,

/s/ Hervé Tiberghien

Hervé Tiberghien
Vice President, Human Resources

cc: Annie Livingston

Enclosures:
- Employment Agreement
- PPG Benefits Information
- Relocation Package

Exhibit 12

PPG INDUSTRIES, INC. AND CONSOLIDATED SUBSIDIARIES
Computation of Ratio of Earnings to Fixed Charges
(Dollars in millions)

	Nine Months Ended September 30	Year Ended December 31				
	2018	2017	2016	2015	2014	2013
		As Restated	*As Restated*			
Earnings:						
Earnings before income taxes and net earnings in equity affiliates	$ 1,337	$ 1,988	$ 767	$ 1,735	$ 1,216	$ 1,177
Plus:						
Fixed charges exclusive of capitalized interest	157	200	215	210	278	280
Amortization of capitalized interest	5	6	5	5	5	4
Adjustments for equity affiliates	15	8	7	73	5	1
Total	**$ 1,514**	**$ 2,202**	**$ 994**	**$ 2,023**	**$ 1,504**	**$ 1,462**
Fixed Charges:						
Interest expense including amortization of debt discount/premium and debt expense	$ 88	$ 105	$ 125	$ 125	$ 187	$ 196
Rentals - portion representative of interest	69	95	90	85	91	84
Fixed charges exclusive of capitalized interest	157	200	215	210	278	280
Capitalized interest	3	7	8	9	16	10
Total	**$ 160**	**$ 207**	**$ 223**	**$ 219**	**$ 294**	**$ 290**
Ratio of earnings to fixed charges	**9.5**	**10.6**	**4.5**	**9.2**	**5.1**	**5.0**

Note: The financial information of all prior periods has been reclassified to reflect discontinued operations.

Exhibit 31.1

PRINCIPAL EXECUTIVE OFFICER CERTIFICATION

I, Michael H. McGarry, certify that:

1. I have reviewed this quarterly report on Form 10-Q of PPG Industries, Inc.;

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

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

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

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

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

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

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

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

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

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

Date: October 19, 2018

/s/ Michael H. McGarry

Michael H. McGarry
Chairman and Chief Executive Officer

Exhibit 31.2

PRINCIPAL FINANCIAL OFFICER CERTIFICATION

I, Vincent J. Morales, certify that:

1. I have reviewed this quarterly report on Form 10-Q of PPG Industries, Inc.;

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

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

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

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

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

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

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

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

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

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

Date: October 19, 2018

/s/ Vincent J. Morales

Vincent J. Morales
Senior Vice President and Chief Financial Officer
(Principal Financial Officer)

Exhibit 32.1

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

In connection with the Quarterly Report on Form 10-Q of PPG Industries, Inc. for the period ended September 30, 2018 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Michael H. McGarry, Chairman and Chief Executive Officer of PPG Industries, Inc., certify to the best of my knowledge, pursuant to 18 U.S.C. §1350, as adopted pursuant to §906 of the Sarbanes-Oxley Act of 2002, that:

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

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

/s/ Michael H. McGarry

Michael H. McGarry
Chairman and Chief Executive Officer

October 19, 2018

A signed original of this written statement required by Section 906 has been provided to PPG Industries, Inc. and will be retained by PPG Industries, Inc. and furnished to the Securities and Exchange Commission or its staff upon request.

Exhibit 32.2

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

In connection with the Quarterly Report on Form 10-Q of PPG Industries, Inc. for the period ended September 30, 2018 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Vincent J. Morales, Senior Vice President and Chief Financial Officer of PPG Industries, Inc., certify to the best of my knowledge, pursuant to 18 U.S.C. §1350, as adopted pursuant to §906 of the Sarbanes-Oxley Act of 2002, that:

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

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

/s/ Vincent J. Morales

Vincent J. Morales
Senior Vice President and Chief Financial Officer
(Principal Financial Officer)

October 19, 2018

A signed original of this written statement required by Section 906 has been provided to PPG Industries, Inc. and will be retained by PPG Industries, Inc. and furnished to the Securities and Exchange Commission or its staff upon request.