TENNECO INC
Form 10-K
March 18, 2019
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UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549
FORM 10-K
(Mark One)
þ ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended December 31, 2018
OR
¨ TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
Commission file number 1-12387
TENNECO INC.
(Exact name of registrant as specified in its charter)

Delaware	76-0515284
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)
500 North Field Drive Lake Forest, IL (Address of principal executive offices)	60045 (Zip Code)

Registrant's telephone number, including area code: (847) 482-5000
Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Name of each Exchange on which registered
Class A Voting Common Stock, par value $.01 per share	New York Stock Exchange

Securities registered pursuant to Section 12(g) of the Act: None
Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes þ No ¨
Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes ¨ No þ
Note — Checking the box above will not relieve any registrant required to file reports pursuant to Section 13 or 15(d) of the Exchange Act from their obligations under those Sections.
Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes þ No ¨
Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes þ No ¨
Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. þ

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

Large accelerated filer	þ	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 þ

The aggregate market value of the voting and non-voting common equity held by non-affiliates of the registrant as of June 30, 2018, computed by reference to the price at which the registrant's common stock was last sold on the New York Stock Exchange on June 30, 2018, was approximately $2.2 billion.

The number of shares of Class A Voting Common Stock, par value $0.01 per share: 57,126,127 shares outstanding as of March 11, 2019. The number of shares of Class B Non-Voting Common Stock, par value $0.01 per share: 23,793,669 shares outstanding as of March 11, 2019.

Documents Incorporated by Reference:

Document	Part of the Form 10-K into which incorporated
Portions of Tenneco Inc.’s Definitive Proxy Statement for the Annual Meeting of Stockholders to be held May 15, 2019	Part III

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CAUTIONARY STATEMENT FOR PURPOSES OF THE "SAFE HARBOR" PROVISIONS OF THE PRIVATE SECURITIES LITIGATION REFORM ACT OF 1995

This report contains forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995 concerning, among other things, our prospects and business strategies. These forward-looking statements are included in various sections of this report. The words "may," "will," "believe," "should," "could," "plan," "expect," "anticipate" "estimate," and similar expressions (and variations thereof), identify these forward-looking statements. Although we believe that the expectations reflected in these forward-looking statements are based on reasonable assumptions, these expectations may not prove to be correct. Because these forward-looking statements are also subject to risks and uncertainties, actual results may differ materially from the expectations expressed in the forward-looking statements. Important factors that could cause actual results to differ materially from the expectations reflected in the forward-looking statements include:

- general economic, business and market conditions;
- our ability to source and procure needed materials, components and other products and services in accordance with customer demand and at competitive prices;
- the cost and outcome of existing and any future claims, legal proceedings or investigations, including, but not limited to, any of the foregoing arising in connection with the ongoing global antitrust investigation, product performance, product safety or intellectual property rights;
- changes in consumer demand, prices and our ability to have our products included on top selling vehicles, including any shifts in consumer preferences away from historically higher margin products for our customers and us, to other lower margin vehicles, for which we may or may not have supply arrangements, and the cyclical nature of the global vehicle industry, including the performance of the global aftermarket sector and the impact of vehicle parts' longer product lives;
- changes in consumer demand for our OE or aftermarket products, or changes in automotive and commercial vehicle manufacturers' production rates and their actual and forecasted requirements for our products, due to difficult economic conditions and/or regulatory or legal changes affecting internal combustion engines and/or aftermarket products;
- our dependence on certain large customers, including the loss of any of our large original equipment manufacturer ("OE") customers (on whom we depend for a substantial portion of our revenues), or the loss of market shares by these customers if we are unable to achieve increased sales to other OE customers or any change in customer demand due to delays in the adoption or enforcement of worldwide emissions regulations;
- new technologies that reduce the demand for certain of our products or otherwise render them obsolete;
- our ability to introduce new products and technologies that satisfy customers' needs in a timely fashion;
- the overall highly competitive nature of the automotive and commercial vehicle parts industries, and any resultant inability to realize the sales represented by our awarded book of business (which is based on anticipated pricing and volumes over the life of the applicable program);
- changes in capital availability or costs, including increases in our cost of borrowing (i.e., interest rate increases), the amount of our debt, our ability to access capital markets at favorable rates, and the credit ratings of our debt;
- our ability to comply with the covenants contained in our debt instruments;
- our working capital requirements;
- our ability to successfully execute cash management and other cost reduction plans, and to realize the anticipated benefits from these plans;
- risks inherent in operating a multi-national company, including economic conditions, such as currency exchange and inflation rates, and political conditions in the countries where we operate or sell our products, adverse changes in trade agreements, tariffs, immigration policies, political stability, and tax and other laws, and potential disruptions of production and supply;
- increasing competition from lower cost, private-label products;
- damage to the reputation of one or more of our leading brands;

- the impact of improvements in automotive parts on aftermarket demand for some of our products;
- industrywide strikes, labor disruptions at our facilities or any labor or other economic disruptions at any of our significant customers or suppliers or any of our customers' other suppliers;
- developments relating to our intellectual property, including our ability to changes in technology;
- costs related to product warranties and other customer satisfaction actions;
- the failure or breach of our information technology systems, including the consequences of any misappropriation, exposure or corruption of sensitive information stored on such systems and the interruption to our business that such failure or breach may cause;

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- the impact of consolidation among vehicle parts suppliers and customers on our ability to compete in the highly competitive automotive and commercial vehicle supplier industry;
- changes in distribution channels or competitive conditions in the markets and countries where we operate;
- the evolution towards autonomous vehicles and car and ride sharing;
- customer acceptance of new products;
- our ability to successfully integrate, and benefit from, any acquisitions that we complete;
- our ability to effectively manage our joint ventures and other third-party relationships;
- the potential impairment in the carrying value of our long-lived assets, goodwill, other intangible assets or our deferred tax assets;
- the negative impact of fuel price volatility on transportation and logistics costs, raw material costs, discretionary purchases of vehicles or aftermarket products and demand for off-highway equipment;
- increases in the costs of raw materials or components, including our ability to successfully reduce the impact of any such cost increases through materials substitutions, cost reduction initiatives, customer recovery and other methods;
- changes by the Financial Accounting Standards Board or the Securities and Exchange Commission of authoritative generally accepted accounting principles or policies;
- changes in accounting estimates and assumptions, including changes based on additional information;
- any changes by the International Organization for Standardization (ISO) or other such committees in their certification protocols for processes and products, which may have the effect of delaying or hindering our ability to bring new products to market;
- the impact of the extensive, increasing and changing laws and regulations to which we are subject, including environmental laws and regulations, which may result in our incurrence of environmental liabilities in excess of the amount reserved or increased costs or loss of revenues relating to products subject to changing regulation;
- potential volatility in our effective tax rate;
- disasters, such as fires, earthquakes and flooding, and any resultant disruptions in the supply or production of goods or services to us or by us, in demand by our customers or in the operation of our system, disaster recovery capabilities or business continuity capabilities;
- acts of war and/or terrorism, as well as actions taken or to be taken by the United States and other governments as a result of further acts or threats of terrorism, and the impact of these acts on economic, financial and social conditions in the countries where we operate;
- pension obligations and other postretirement benefits;
- our hedging activities to address commodity price fluctuations; and
- the timing and occurrence (or non-occurrence) of other transactions, events and circumstances which may be beyond our control.

In addition, important factors related to the acquisition of Federal-Mogul LLC ("Federal-Mogul") and the planned separation of our company into a powertrain technology company and an aftermarket and ride performance company that could cause actual results to differ materially from the expectations reflected in the forward-looking statements, including:

- the risk that the benefits of the acquisition of Federal-Mogul, including synergies, may not be fully realized or may take longer to realize than expected;
- the risk that the acquisition of Federal-Mogul may not advance our business strategy;
- the risk that we may experience difficulty integrating or separating employees or operations;
- the risk that the transaction may have an adverse impact on existing arrangements with us, including those related to transition, manufacturing and supply services and tax matters, our ability to retain and hire key personnel or our ability to maintain relationships with customers, suppliers or other business partners;
- the risk that the company may not complete a separation of its powertrain technology business and its aftermarket and ride performance business (or achieve some or all of the anticipated benefits of such a separation);

- the risk that the combined company and each separate company following the spin-off will underperform relative to our expectations;
- the ongoing transaction costs and risk that we may incur greater costs following the spin-off; and
- the risk that the spin-off is determined to be a taxable transaction.

The risks included here are not exhaustive. Refer to “Part I, Item 1A — Risk Factors” of this report for further discussion regarding our exposure to risks. Additionally, new risk factors emerge from time to time and it is not possible for us to predict all such risk

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factors, nor to assess the impact such risk factors might have on our business or the extent to which any factor or combination of factors may cause actual results to differ materially from those contained in any forward-looking statements. Given these risks and uncertainties, investors should not place undue reliance on forward-looking statements as a prediction of actual results. Unless otherwise indicated in this report, the forward-looking statements in this report are made as of the date of this report, and, except as required by law, the Company does not undertake any obligation, and disclaims any obligation, to publicly disclose revisions or updates to any forward-looking statements.

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PART I

ITEM 1.BUSINESS.

TENNECO INC.

General

Our company, Tenneco Inc., designs, manufactures and sells innovative products and services for light vehicle, commercial truck, off-highway, industrial and aftermarket customers. We serve both original equipment manufacturers (“OEM”) and replacement markets worldwide. We are one of the world’s leading manufacturers of clean air, powertrain and ride performance products and systems for light vehicle, commercial truck, off-highway, industrial and aftermarket customers. As used herein, the term “Tenneco,” “we,” “us,” “our,” or the “Company” refers to Tenneco Inc. ar its consolidated subsidiaries.

We were incorporated in Delaware in 1996. In 2005, we changed our name from Tenneco Automotive Inc. to Tenneco Inc. The name Tenneco better represents the expanding number of markets we serve through our commercial truck and off-highway businesses. Our Class A Voting Common Stock is traded on the New York Stock Exchange (“NYSE”) under the symbol “TEN.”

On October 1, 2018, we completed the acquisition of Federal-Mogul LLC ("Federal-Mogul"), a global supplier of technology and innovation in vehicle and industrial products for fuel economy, emissions reductions, and safety systems. Federal-Mogul serves the world’s foremost OEM and servicers (“OES”, and together with OEM, “OE”) of automotive, light, medium and heavy-duty commercial vehicles, off road, agricultural, marine, rail, aerospace, power generation and industrial equipment, as well as the worldwide aftermarket. We expect to separate our businesses to form two new independent, publicly traded companies, an Aftermarket and Ride Performance company and a new Powertrain Technology company, in the second half of 2019. See Note 3—Acquisitions and Divestitures to our consolidated financial statements in Item 8 — “Financial Statements and Supplementary Data" for additional information.

As a result of the Acquisition, the number of our reportable segments increased from three to five segments, consisting of the following: our historical Clean Air, Ride Performance and Aftermarket segments and the newly acquired Powertrain and Motorparts segments.

On January 10, 2019, we closed on our acquisition of Öhlins Racing A.B. (“Öhlins”), a Sweden-based company. Öhlins offers suspension systems and components to automotive, and motorsport industries.

Our Internet address is http://www.tenneco.com. We make our proxy statements, annual report on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K and amendments to those reports, as filed with or furnished to the Securities and Exchange Commission (SEC), available free of charge on our Internet website as soon as reasonably practicable after submission to the SEC. Securities ownership reports on Forms 3, 4 and 5 are also available free of charge on our website as soon as reasonably practicable after submission to the SEC. The contents of our website are not, however, a part of this report.

Available Information

Our Audit Committee, Compensation Committee and Nominating and Governance Committee Charters, Corporate Governance Principles, Stock Ownership Guidelines, Audit Committee policy regarding accounting complaints, Code of Ethical Conduct for Financial Managers, Code of Conduct, Policy and Procedures for Transactions with Related Persons, Equity Award Policy, Clawback Policy, Insider Trading Policy, policy for communicating with the Board of Directors, and Audit Committee policy regarding the pre-approval of audit, non-audit, tax and other services are available free of charge on our website at www.tenneco.com. In addition, we will make a copy of any of these documents available to any person, without charge, upon written request to Tenneco Inc., 500 North Field Drive, Lake

Forest, Illinois 60045, Attn: General Counsel. We intend to satisfy the disclosure requirements under Item 5.05 of Form 8-K and applicable NYSE rules regarding amendments to, or waivers of, our Code of Ethical Conduct for Financial Managers and Code of Conduct by posting this information on our website at www.tenneco.com.

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DESCRIPTION OF OUR BUSINESS

We design, manufacture and sell innovative products and services for light vehicle, commercial truck, off-highway, industrial and aftermarket customers, and generated revenues of $11.8 billion in 2018. We serve both original equipment (OE) manufacturers and replacement markets worldwide. Our portfolio of the industry's most well-respected enduring brands include Monroe®, Champion®, Öhlins®, MOOG®, Walker®, Fel-Pro®, Wagner®, Ferodo®, Rancho®, Thrush®, National®, and Sealed Power®, among others. We seek to leverage our OE product engineering and development capability, manufacturing know-how, and expertise in managing a broad and deep range of replacement parts to service the aftermarket. We effectively manage the life cycle of a broad range of products to a diverse customer base.

As a parts supplier, we produce individual component parts for vehicles as well as groups of components that are combined as modules or systems within vehicles. These parts, modules, and systems are sold globally to the world's leading light vehicle and commercial truck manufacturers as well as aftermarket customers, including independent warehouse distributors, distributors, engine rebuilders, retail parts stores, mass merchants, and service chains.

On October 1, 2018, we closed the acquisition of Federal-Mogul, (the "Acquisition") pursuant to the Membership Interest Purchase Agreement, dated as of April 10, 2018, by and among us, Federal-Mogul, American Entertainment Properties Corp. ("AEP") and Icahn Enterprises L.P. ("IEP"). We agreed to use our reasonable best efforts to pursue the separation of the combined company's aftermarket and ride performance business and its powertrain technology business into two new independent, publicly traded companies in a spin-off transaction that is expected to be treated as a tax-free reorganization for U.S. federal income tax purposes. We expect the spin-off to be completed in the second half of 2019.

As a result of the Acquisition, the number of our reportable segments increased from three to five segments, consisting of the following: our historical Clean Air, Ride Performance and Aftermarket segments and the newly acquired Powertrain and Motorparts segments.

Our Industry

The parts industry for vehicles and engines is generally separated into two categories, both of which we operate within:(1) "original equipment" or "OE" parts that are sold in large quantities directly for use by manufacturers of light vehicles and commercial vehicles and (2) "aftermarket" or replacement parts that are sold in varying quantities to wholesalers, retailers and installers. Light vehicles are comprised of passenger cars and light trucks, which include sport-utility vehicles (SUVs), crossover vehicles (CUVs), pick-up trucks, vans and multi-purpose passenger vehicles. Commercial vehicles include commercial trucks and off-highway equipment.

Global OE Industry

Products for the global OE industry are sold directly to OE manufacturers that use these parts, which include components, systems, subsystems, and modules, in the manufacture of new light and commercial vehicles. Demand for component parts in the OE market is generally a function of the number of new vehicles/engines produced, which is driven by macroeconomic conditions and other factors such as fuel prices, consumer confidence, employment trends, regulatory requirements, and trade agreements. Although OE demand is tied to planned vehicle production, parts suppliers also have the opportunity to grow revenues by increasing their product content per vehicle. Companies, like us, with a global presence, leading technology and innovation, and advanced product, engineering, manufacturing, and customer support capabilities are best positioned to take advantage of these opportunities.

Key Industry Trends Affecting the Global OE Industry

Global Light Vehicle Production

Global light vehicle production is expected to grow by approximately 2% annually from 2018 to 2025, reaching nearly 109 million units by 2025, according to leading forecasting company IHS Markit. In 2018, global light vehicle production declined 1% versus the previous year, including a 1% decline in North America, 1% decline in Europe and 4% decline in China, with increases of 3% in South America and 6% in India. Global light vehicle production increased 2% in 2017 and 5% in 2016.

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Intelligent Suspension, Autonomous Driving and Mobility

There are a number of trends that are driving "Auto 2.0," defined as the transformation of cars into hybrid systems, electric and fully autonomous vehicles, the business model shift from individual car ownership to ride-sharing, and multi-model forms of mobility. For instance, higher levels of autonomy will drive increased passenger expectations for a comfortable ride, which, in turn, will create additional content opportunities per vehicle and heighten demand for advanced suspension products, including full-corner/around-the-wheel intelligent suspension systems.

Advanced suspension technology is expected to grow with adoption led by global OE manufacturers. Increased connectivity also presents additional prospects for active suspension systems, predictive vehicle diagnostics, and system-based integration within the vehicle as well as broader vehicle to everything ("V2X") communications. The addition of Öhlins to the portfolio is expected to accelerate the development of advanced OE intelligent suspension solutions, while also fast-tracking time to market. This acquisition is yet another example of our strategy to leverage key technologies that will better position us to take advantage of secular trends. It will also enhance our portfolio in broader mobility markets through the addition of Öhlins' range of premium OE and aftermarket automotive and motorsports performance products.

Maturing powertrain technology, including the increased adoption of hybrid and fully electric powertrains, will create further opportunities for increased ride performance and noise, vibration and harshness ("NVH") capabilities, as consumers look for smoother, quieter and more efficient rides. Our capability in both the suspension and NVH performance materials categories provide the opportunity to maximize driving comfort and ride performance for motorists worldwide.

Shared mobility describes a range of transportation options that involve the shared use of a vehicle, motorcycle, scooter, bicycle or other travel mode; it provides users with short-term access to a transportation mode on an as-needed basis. Shared mobility may reduce vehicle volumes in established markets, but it also provides an opportunity for us to develop higher-mileage, durable solutions to meet the needs of new mobility fleets. Additionally, ride comfort and durability will become increasingly important differentiators as consumers increasingly take advantage of the sharing economy.

Focus on Fuel Economy, Reduced Emissions and Alternative Energy Sources

Increased fuel economy and decreased vehicle emissions are of great importance to OE suppliers, as customers, consumers and legislators continue to demand more efficient and cleaner operating vehicles. Increasingly stringent fuel economy standards and environmental regulations are driving OE customers to focus on new technologies including downsized, higher-output and turbocharged gasoline and diesel engines, and hybrid electric and pure electric powertrains, such as fuel cell and battery powered cars. We continue to expand our investment around the world, in regions such as North America, Europe, China, India, and Japan to capitalize on the growing demand for environmentally friendly solutions for light vehicle, commercial truck and off-highway applications driven by environmental regulations in these regions.

The products that our clean air segment provides reduce the tailpipe emissions of criteria pollutants. In addition, regulations have been adopted to regulate greenhouse gas emissions of carbon dioxide. Reducing CO2 emissions requires improving fuel economy; as a result improved combustion efficiency and reduction of vehicle mass have become priorities. As a leading supplier of clean air systems with strong technical capabilities, we believe we are well positioned to benefit from the more rigorous environmental standards being adopted around the world.

The demand for smaller but more powerful engines requires more technology per engine to withstand the higher output requirements, which we estimate will result in an increase in content per engine for our powertrain business. With a global manufacturing presence, we believe we are well-positioned to meet expectations of our global customers. For the foreseeable future, it is expected that gasoline and diesel engines will remain the dominant powertrain for cars (including hybrids), heavy-duty, and industrial applications. We are equally capable of providing components for both gasoline and diesel engines.

Increasing Technologically Sophisticated Content

As end users and consumers continue to demand vehicles with improved performance, safety and functionality at competitive prices, the components and systems in these vehicles are becoming technologically more advanced and sophisticated. Mechanical functions are being replaced with electronics; and mechanical and electronic devices are being integrated into single systems. More stringent emission and other regulatory standards are increasing the complexity of the systems as well.

To remain competitive as a parts and systems supplier, we invest in engineering, research and development. We also fund and sponsor university and other independent research to advance development efforts. By investing in technology, we have been able to expand our product offerings and penetrate new markets.

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Enhanced Vehicle Safety and Handling

To serve the needs of their customers and meet government mandates, OE manufacturers are seeking parts suppliers that invest in new technologies, capabilities and products that advance vehicle safety and handling, such as roll-over protection systems, intelligent suspension, and safer, more durable materials. Those suppliers, such as us, that are able to offer such innovative products and technologies have a distinct competitive advantage. We offer adjustable and adaptive damping as well as semi-active suspension systems designed to improve vehicle stability, handling and control.

We also are a global leader in the development of leading friction formulas that improve vehicle stopping distances and performance. As the commercial truck customers migrate to air disc brake systems, we remain at the forefront of providing the brake friction necessary for these new systems.

Many of our aftermarket products directly affect vehicle performance. Product quality, reliability, and consistency are paramount to our end-customers, the majority of whom are professional service technicians. Our engineering prowess and product capabilities from chassis to braking allow us to provide a complete around-the-wheel offering. Additionally, we have a number of braking products including disc pads for passenger cars, motorcycles and commercial vehicles; drum brake shoes and CV drum brake lining; and brake accessories including rotors, drums, hydraulics, hardware and brake fluid.

Sourcing by OE Manufacturers

As OE manufacturers expand their reach, many are looking for suppliers with a global footprint and the capability to supply them with full system integration and solutions, rather than individual standalone products.

Because of these trends, OE manufacturers are increasingly seeking suppliers capable of supporting vehicle platforms on a global basis. They want suppliers like us with design, production, engineering and logistics capabilities that can be accessed not just in North America and Europe but also in emerging markets such as India and China. OE manufacturers have standardized on global platforms, designing basic mechanical structures suitable for a number of similar vehicle models and are able to accommodate different features across regions. This standardization will drive growth in production of light vehicles designed on global platforms. Accordingly, global platforms, identified as platforms produced in more than one region, are expected to grow.

As OE manufacturers look to simplify and streamline design, they are also increasingly selecting suppliers like us that provide fully-engineered, integrated systems and solutions. OE manufacturers have steadily outsourced more of the design and manufacturing of vehicle parts and systems to simplify the assembly process, lower costs and reduce development times. Furthermore, they have demanded from their parts suppliers fully integrated, functional modules and systems made possible with the development of advanced electronics in addition to innovative, individual vehicle components and parts that may not readily interface together.

Global Aftermarket Industry

Products for the global aftermarket are sold directly to a wide range of distributors, retail parts stores, and mass merchants that distribute these products to professional service providers, “do-it-yourself” consumers, and in some cases, directly to service chains. Demand for aftermarket products historically has been driven by four primary factors: (i) the number of vehicles in operation (“VIO”); (ii) the average age of VIO; (iii) vehicle usage trends; and (iv) component failure and wear rates. These factors, while applicable in all regions, vary depending on the composition of VIO and other factors.

Key trends affecting the Global Aftermarket Industry

Growth in the Number of VIO in both Mature and Emerging Markets

The global number of VIO is expected to grow, with the number of VIO in emerging markets such as China expected to increase substantially. The number of VIO in mature markets, such as North America and Europe, is also expected to grow, though at a lesser pace than the emerging markets. We have strong aftermarket positions in North America, Europe and South America and a growing aftermarket position in Asia. We expect there to be aftermarket growth opportunities in emerging markets such as China and India where the VIO are expected to increase and are investing to position ourselves as a leading aftermarket supplier in these regions. We are leveraging our market-leading

capabilities from mature markets and investing to develop the right distributor base, drive brand recognition, increase product coverage, build the supply chain and promote our experience as an OE-quality supplier.

Increase in the Average Age of Vehicles in Operation

The average age of VIO in North America and Europe has increased significantly this century, and is expected to increase further. Increases in the average age of VIO will drive the need for maintenance and repair work, thereby increasing the overall demand for aftermarket replacement parts in North America and Europe. The average age of VIO in China is expected to increase, which we believe will lead to continuing significant growth in the China aftermarket.

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Extended Product Life of Automotive Parts

The average useful life of automotive parts, both OE and replacement, has steadily increased in recent years due to technological innovations including longer-lasting materials. As a result, there are more vehicles on the road than ever before. Aftermarket suppliers are focused on reducing costs and providing product differentiation through advanced technology and recognized brand names. With our long history of technological innovation, iconic brands and operational efficiency, we believe we are well-positioned to leverage our products and technology.

Managing Complexity

We operate in a highly fragmented and dynamic industry and are among the few large aftermarket-focused suppliers globally. The increasing global vehicle population, brand and vehicle complexity, and need for rapid new part introduction, as well as new distribution channels (including online) continue to drive significant SKU proliferation and business complexity. Our recent investments in our supply chain and information technology capabilities are designed to manage this complexity, which we believe will be an important competitive differentiator.

Channel Consolidation

In the more mature markets of North America and Europe, there has been increasing consolidation in the aftermarket distribution channel with larger aftermarket distributors and retailers gaining market share. These distributors generally require larger, more capable suppliers that have the ability to provide world-class product expertise, category management capabilities, brand management and supply chain support, as well as a competitive manufacturing and sourcing network. We have undertaken many initiatives to support the value of our branded products to end-market consumers and diversify our revenue base.

Growth of Online Capabilities

Reaching consumers directly through online capabilities, including e-commerce, is expected to have an increasing effect on the global aftermarket industry and how aftermarket products are marketed and sold. The establishment of a robust online presence will be critical for suppliers regardless of whether they intend to participate directly in e-commerce. We invested heavily in online initiatives to improve our capabilities and connectivity to our end-customers, including a new online order management system, customer relationship management tools, global brand websites, and data analytics capabilities. We will continue to invest in these competencies. Additionally, consumers increasingly are utilizing online research prior to making buying or repair decisions. We will continue to expand our online presence in order to connect with our customers and more effectively communicate the value of our premium aftermarket brands.

Increase in Lower Cost, Private Label Brands

In many of our markets, there has been an increase in private label or store brands sold by retailers and distributors at a lower price point than premium brands of the same products. However, in many cases, retailers or wholesale distributors creating private label brands still rely on established suppliers, like us, to design and manufacture their private label products and, in some cases, utilize co-branding to support their private label offerings.

We have some of the strongest and most recognized brands in the automotive aftermarket. In addition, we expect to continue to invest in product innovation, marketing and brand support that differentiate our premium branded products for their quality while also supporting lower priced, mid- grade offerings. Additionally, we expect to continue to drive productivity and cost reduction efforts and enhance our already strong global sourcing capabilities to remain competitive in each product tier.

Resilience during Economic Downturn

Aftermarket products are largely stable, non-discretionary and less susceptible to cyclicality as customers often have no choice but to replace automotive parts that are worn. During the 2008 economic downturn, the number of consumers with the ability to purchase new vehicles declined and led to increased demand for aftermarket parts in order to keep older vehicles road-worthy. The resilience of the automotive aftermarket industry is exhibited by the fact that the U.S. light vehicle aftermarket has grown every year for the last 20 years, except for 2009 when industry sales declined by approximately 1.4% according to Automotive Aftermarket Suppliers Association (AASA).

Customers

We strive to develop long-standing business relationships with our customers around the world. We work collaboratively with our OE customers in all stages of production, including design, development, component sourcing, quality assurance, manufacturing and delivery. For both OE and aftermarket customers, we provide timely delivery of quality products at competitive prices and deliver customer service. With our diverse product mix and numerous facilities in major markets worldwide, we believe we are well positioned to meet customer needs.

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Our OE customers consist of automotive and commercial manufacturers as well as agricultural, off-highway, marine, railroad, aerospace, high performance, and power generation and industrial application manufacturers. We have well-established relationships with substantially all major American, European, and Asian automotive OE manufacturers.

The following customers accounted for 10% or more of our net sales in any of the last three years.

Customer	2018	2017	2016
General Motors Company	12%	14%	17%
Ford Motor Company	12%	13%	13%

Our aftermarket customers include independent warehouse distributors that redistribute products to local parts suppliers, distributors, engine rebuilders, retail parts stores, mass merchants and service chains. The breadth of our product lines, the strength of our leading marketing expertise, a sizable sales force, and supply chain and logistics capabilities are central to our success in the aftermarket. We have a large and diverse aftermarket customer base.

Competition

We operate in highly competitive markets. Customer loyalty is a key element of competition in these markets and is developed through long-standing relationships, customer service, high quality value-added products and timely delivery. Product pricing and services provided are other important competitive factors.

As a supplier of OE and aftermarket parts, we compete with the vehicle manufacturers, some of which are also customers of ours, and numerous independent suppliers. We believe we are meeting these competitive challenges by developing leading technologies, efficiently integrating and expanding our manufacturing and distribution operations, widening our product coverage within our core businesses, restructuring our operations and transferring production to best cost countries, and utilizing our worldwide technical centers to develop and provide value-added solutions to our customers.

Seasonality

Our businesses are somewhat seasonal. OE production is historically higher in the first half of the year compared to the second half. It typically decreases in the third quarter due to OE plant shutdowns for model changeovers and European holidays, and softens further in the fourth quarter due to reduced production during the end-of-year holiday season in North America and Europe. Shut-down periods in the rest of the world generally vary by country. Our aftermarket operations experience relatively higher demand during the spring as vehicle owners prepare for the summer driving season. While seasonality does impact our business, actual results may vary from the above trends due to global and local economic dynamics as well as industry-specific platform launches and other production-related events. Aftermarket sales tend not to be as adversely affected during periods of economic downturn, as consumers forgo new vehicle purchases and keep their vehicles longer, thereby increasing demand for repair and maintenance services.

The aftermarket is affected by changes in economic conditions, volatility in fuel prices, and expanding focus on environmental and energy conservation.

Order Fulfillment

For OE customers, we generally receive long-term production contracts for specific products supplied for particular vehicles. These supply relationships typically extend over the life of the related vehicle, subject to interim design and technical specification revisions, and do not require the customer to purchase a minimum quantity. In addition to customary commercial terms and conditions, long-term production contracts generally provide for annual price reductions based upon expected productivity improvements and other factors. Customers typically retain the right to terminate long-term production contracts, but we generally cannot terminate long-term production contracts. OE order fulfillment is typically manufactured in response to customer purchase order releases, and we ship directly from a manufacturing location to the customer for use in vehicle production and assembly. Accordingly, our manufacturing locations turn finished goods inventory relatively quickly, producing from on-hand raw materials and work-in-process inventory within relatively short manufacturing cycles. Significant risks to us include a change in vehicle or engine production, lower than expected vehicle or engine production by one or more of our OE customers, or termination of

the business based upon perceived or actual shortfalls in delivery, quality or value.

For our global aftermarket customers, we generally establish product line arrangements that encompass substantially all parts offered within a particular product line. In some cases, we will enter into agreements with terms ranging from one to three years that cover one or more product lines with fixed prices. Pricing is market responsive and subject to adjustment based upon competitive pressures, material costs, and other commercial factors. Global aftermarket order fulfillment is largely performed from finished goods inventory stocked in our worldwide distribution network. Inventory stocking levels in our distribution centers are established based upon historical and anticipated future customer demand.

Although customer programs typically extend to future periods, and although there is an expectation we will supply certain levels of OE production over such periods, we believe outstanding purchase orders and product line arrangements do not constitute firm

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orders. Firm orders are limited to specific and authorized customer purchase order releases placed with our manufacturing and distribution centers for actual production and order fulfillment. Firm orders are typically fulfilled as promptly as possible from the conversion of available raw materials and work-in-process inventory for OE orders, and from current on-hand finished goods inventory for aftermarket orders.

Clean Air Segment

We operate 64 clean air manufacturing facilities worldwide, of which 17 facilities are located in North and South America, 20 in Europe and 27 in Asia Pacific. We operate 16 of the manufacturing facilities in Asia Pacific through joint ventures in which we hold a controlling interest. We operate five clean air engineering and technical facilities worldwide and share three other such facilities with our ride performance operations. Of the five clean air engineering and technical facilities, one is located in North America, two in Europe, and two in Asia Pacific. In addition, one joint venture in which we hold a noncontrolling interest operates one manufacturing facility in Europe.

Through the recent acquisition of Federal-Mogul Powertrain, combined with our Clean Air emissions expertise, we are focused on delivering an optimized trade-off between fuel economy and emission control from the cylinder to the tailpipe. Specifically, Clean Air products and systems are designed to help global OE manufacturers in light vehicle, commercial truck and off-highway markets to meet global emissions regulations anywhere in the world. With significant investment in core sciences and technical capabilities, including combustion and thermal management, materials science and thermoelectrical energy, we are able to provide advance emissions solutions that solve unique technical challenges.

Our technologies are broken into four key product areas:

- Emissions Control Products — includes Dosing Systems, Advanced Mixers, Selective Catalytic Reduction, Gasoline and Diesel Particulate Filters and Catalytic Converters;
- Lightweighting and Thermal Management — includes Rankine Cycle Power Pack, Thermo-electric Generators, Thermoacoustic Converters, Heat Exchangers, Lightweight Aftertreatment Systems and Fabricated Manifolds;
- Acoustic Products — includes Muffler and Resonator Tuning Devices. Active Noise Cancellation, Signature Sound, Smart Sound and Electronic and Passive Valves; and
- Noise, Vibration and Harshness — includes Exhaust System Isolators, Lightweight Hanger Solutions and Modular Exhaust Dampers.

Our engineering capabilities include advanced predictive design tools, advanced prototyping processes and state-of-the-art testing equipment. These technological capabilities make us a “full system” integrator and supplier to the OE manufacturers, supplying optimized emission control systems from the manifold to the tailpipe, while delivering emission regulatory compliance and acoustic noise control. Our technology includes the use of urea injectors, electronic controls and software for use in selective catalytic reduction (SCR) and other exhaust after-treatment systems. We also offer a complete suite of alternative full system NOx aftertreatment technologies, including the Hydrocarbon Lean NOx Catalyst (HC-LNC) technology.

Vehicle emission control products and systems play a critical role in safely conveying noxious exhaust gases away from the passenger compartment and reducing the level of pollutants and engine exhaust noise emitted to acceptable levels. Precise engineering of the exhaust system - which extends from the manifold that connects an engine’s exhaust ports to an exhaust pipe, to the catalytic converter that eliminates pollutants from the exhaust, and to the muffler that modulates noise emissions - leads to a pleasantly tuned engine sound, reduced pollutants and optimized engine performance.

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We design, manufacture and distribute a variety of clean air products and systems. The following table sets forth a description of the largest product lines sold by our Clean Air segment:

Product	Description
Catalytic converters and diesel oxidation catalysts	Devices consisting of a substrate coated with precious metals enclosed in a steel casing used to reduce harmful gaseous emissions such as carbon monoxide.
Diesel particulate filters (DPFs)	Devices to capture and regenerate particulate matter emitted from diesel engines.
Burner systems	Devices which actively combust fuel and air inside the exhaust system to create extra heat for DPF regeneration, or to improve the efficiency of SCR systems.
Lean NOx traps	Devices which reduce nitrogen oxide (NOx) emissions from diesel powertrains using capture and store technology.
Hydrocarbon vaporizers and injectors	Devices to add fuel to a diesel exhaust system in order to regenerate particulate filters or Lean NOx traps.
SCR systems	Devices which reduce NOx emissions from diesel powertrains using urea mixers and injected reductants such as Verband der Automobil industrie e.V.'s AdBlue® or Diesel Exhaust Fluid (DEF).
SCR-coated diesel particulate filters (SDPF) systems	Lightweight and compact devices combining the SCR catalyst and the particulate filter onto the same substrate for reducing NOx and particulate matter emissions.
Urea dosing systems	Systems comprised of a urea injector, pump, and control unit, among other parts, that dose liquid urea onto SCR catalysts.
Four-way catalysts	Devices that combine a three-way catalyst and a particulate filter onto a single device by having the catalyst coating of a converter directly applied onto a particulate filter.
Alternative NOx reduction technologies	Devices which reduce NOx emissions from diesel powertrains, by using, for example, alternative reductants such as diesel fuel, E85 (85% ethanol, 15% gasoline), or solid forms of ammonia.
Mufflers and resonators	Devices to provide noise elimination and acoustic tuning.
Fabricated exhaust manifolds	Components that collect gases from individual cylinders of a vehicle’s engine and direct them into a single exhaust pipe. Fabricated manifolds can form the core of an emissions module that includes an integrated catalytic converter (maniverter) and/or turbocharger.
Pipes	Utilized to connect various parts of both the hot and cold ends of an exhaust system.
Hydroformed assemblies	Forms in various geometric shapes, such as Y-pipes or T-pipes, which provide optimization in both design and installation as compared to conventional pipes.
Elastomeric hangers and isolators	Used for system installation and elimination of noise and vibration, and for the improvement of useful life.
Aftertreatment control units	Computerized electronic devices that utilize embedded software to regulate the performance of active aftertreatment systems, including the control of sensors, injectors, vaporizers, pumps, heaters, valves, actuators, wiring harnesses, relays and other mechatronic components.

For the catalytic converters, SCR systems and other substrate-based devices we sell, we need to procure substrates coated with precious metals or in the case of catalytic converter systems only, purchase the complete systems. We obtain these components and systems from third parties, often at the OE manufacturer's direction, or directly from OE vehicle and engine manufacturers. See Item 7. “Management’s Discussion and Analysis of Financial Condition and Results of Operations” for more information on our sales of these products.

Powertrain Segment

We operate 85 manufacturing sites in 19 countries, serving a large number of major automotive, heavy-duty, marine and industrial customer worldwide. Powertrain has also invested globally in nonconsolidated affiliates that have

multiple manufacturing sites, mainly in Turkey and China.

Powertrain offers its customers a diverse array of market-leading products for OE applications, including pistons, piston rings, piston pins, cylinder liners, valvetrain products, valve seats and guides, ignition products, dynamic seals, bonded piston seals, combustion and exhaust gaskets, static gaskets and seals, rigid heat shields, engine bearings, industrial bearings, bushings and washers, systems protection sleeves, acoustic shielding and flexible heat shields.

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We design, manufacture and distribute a variety of powertrain products and systems. The following table sets forth a description of the largest product lines sold by our Powertrain segment:

Product	Description
Pistons	Pistons convert the energy created by the combustion event into mechanical energy to drive a car; Pistons can be made from aluminum or steel, both casted and forged; Highly efficient engines impose high demands on pistons in terms of rigidity and temperature resistance.
Piston rings	Piston rings are mounted on the piston to seal the combustion chamber while the piston is moving up and down; Modern rings need to resist high temperature and very abrasive environments without significant wear; Rings are critical for low oil consumptions.
Cylinder liners	Cylinder liners, or sleeves, are specially engineered where surfaces formed within the engine block, working in tandem with the piston and ring, as the chamber in which the thermal energy of the combustion process is converted into mechanical energy.
Valve seats and guides	Valve seats and guides are produced from powdered metal based on sophisticated metal-ceramic structures to meet extreme requirements for hardness.
Bearings	Bearings provide the low-friction environment for rotating components like crankshafts and camshafts; Modern bearings are able to deal with very low viscosity oil even in highly repetitive motions like in stop/start-conditions.
Spark plugs	Modern spark plugs for engines fueled by gasoline or natural gas have to ignite fuel even at very high combustion pressure and with very clean fuel-air mixture - combined with extended life expectation well over 100,000 miles for turbo-charged engines.
Valvetrain products	Valvetrain products include mainly engine valves but also retainers, rotators, cotters, and tappets for use in both diesel and gas engines; the most demanding applications require sodium-filled hollow valves for fast heat dissipation.
System protection	System protection products include protection sleeves for wire harness and for oil and water tubes as well as acoustic and EMI/RFI shielding, heat and abrasion protection, and safety/ crash protection for cables and tubes for engines and cars.
Seals and gaskets	Cylinder-head gaskets and other hot and cold gaskets are sealing engines and engine components; dynamic and static seals protecting rotating engine and transmission components against oil and gas leakages. Such seals and gaskets are made from high-alloyed steel as well as from sophisticated rubber and polymers.

Ride Performance Segment

We operate 25 ride performance manufacturing facilities worldwide, of which 10 facilities are located in North and South America, seven in Europe and South Africa, and eight in Asia Pacific. We operate two of the facilities through joint ventures in which we hold a controlling interest, one in Europe and another one in Asia. We operate seven engineering and technical facilities worldwide and share three other such facilities with our clean air operations. Of the seven ride performance engineering and technical facilities, two are located in North America, three in Europe and South America, and two in Asia Pacific.

Within each of our ride performance manufacturing facilities, operations are organized by product (e.g., shocks, struts and vibration control products) and include computer numerically controlled and conventional machine centers; tube milling and drawn-over-mandrel manufacturing equipment; metal inert gas and resistance welding; powdered metal pressing and sintering; chrome plating; stamping; and assembly/test capabilities. Our manufacturing systems incorporate cell-based designs, allowing work-in-process to move through the operation with greater speed and flexibility.

In designing our shock absorbers and struts, we use advanced engineering and test capabilities to provide product reliability, endurance and performance. Our engineering capabilities feature advanced computer-aided design equipment and testing facilities. Our dedication to innovative solutions has led to such technological advances as:

- Adaptive damping systems — adapt to the vehicle's motion to better control undesirable vehicle motions;
- Electronically adjustable suspensions — change suspension performance based on a variety of inputs such as steering, braking, vehicle height, and velocity; and
- Air leveling systems — manually or automatically adjust the height of the vehicle.

Superior ride control is governed by a vehicle's suspension system, including shock absorbers and struts. Shock absorbers and struts maintain the vertical loads placed on vehicle tires, helping keep the tires in contact with the road. Vehicle steering, braking, acceleration and safety depend on maintaining contact between the tires and the road. Worn shocks and struts can allow excessive transfer of the vehicle's weight - from side to side, known as "roll;" from front to rear, called "pitch;" or up and down, "bounce." Because shock absorbers and struts are designed to control the vertical loads placed on tires, they provide resistance to excessive roll, pitch and bounce.

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We design, manufacture and distribute a variety of ride performance products and systems. The following table sets forth a description of the largest product lines sold by our Ride Performance segment:

Product	Description
Shock absorbers and struts	A broad range of mechanical shock absorbers and related components for light- and heavy-duty vehicles, including twin-tube and monotube shock absorbers and a complete line of struts and strut assemblies for light vehicles. Shock absorbers and struts maintain the vertical loads placed on vehicle tires, helping keep tires in contact with the road.
Monroe® intelligent suspension portfolio	An extensive product portfolio of advanced electronically controlled ride performance technology, which improve ride quality and vehicle handling: Kinetic ® suspension technology - A suite of roll-control and nearly equal wheel-loading systems ranging from simple mechanical systems to complex hydraulic systems featuring proprietary and patented technology. We have won the PACE Award for our Kinetic ® suspension technology; Dual-mode suspension - An adaptive suspension solution used for small- and medium-sized vehicles that provides drivers a choice of two suspension modes such as comfort and sport; DRiV— A digital electronic adaptive suspension system that adapts to road surfaces and vehicle control data through sensors, valves and intelligence located within the damper. CVSAe Continuously Variable 1 valve semi active suspension systems — Shock absorbers and suspension systems that electronically adjust a vehicle's performance based on certain inputs such as steering, braking and other chassis control data CVSA2/Kinetic — Continuously Variable 2 valve semi active damping systems with hydraulic roll control (Kinetic H2) or hydraulic roll and pitch control (Kinetic X2).
NVH performance materials	Highly-engineered elastomer performance materials designed to reduce noise, vibration and harshness. Generally, rubber-to-metal bushings and mountings to reduce vibration between metal parts of a vehicle. Offerings include a broad range of suspension arms, rods and links for light- and heavy-duty vehicles.

On January 10, 2019, we closed on our acquisition of Öhlins Racing A.B. ("Öhlins"), a Sweden-based company. Öhlins offers suspension systems and components to automotive and motorsport industries.

Aftermarket Segment

We operate five Aftermarket production facilities worldwide, two in North America, one in Europe, and two in Asia Pacific. We share engineering testing facilities with our clean air and ride performance operations. In addition, we operate 22 distribution centers worldwide, four in North America, one in South America, 14 in Europe, and three in Asia Pacific. Eight of these are third party logistics providers.

The following table sets forth a description of the largest product categories sold by our Aftermarket segment:

Product	Description	Select Brands
Ride control	Ride Control parts include a broad range of mechanical shock absorbers and related components as well as struts and strut assemblies. Shock absorbers and struts maintain the vertical loads placed on vehicle tires, helping keep the tires in contact with the road.	Monroe®, Monroe® Reflex® Monroe® Adventure,™ Rancho®, Quick-Strut®, Gas-Matic®, Sensa-Trac®, Quick-Strut® and Gas-Magnum®
NVH performance	Highly-engineered elastomer performance materials designed to reduce noise, vibration and harshness. Generally,	Clevite® Elastomers and Axios™

materials	rubber-to-metal bushings and mountings to reduce vibration between metal parts of a vehicle. Offerings include a broad range of suspension arms, rods and links for light- and heavy-duty vehicles.	
Emission control	Mufflers provide noise elimination and acoustic tuning. Pipes that connect various parts of the hot and cold exhaust system and catalytic converters. In addition, specialty exhaust products for heavy-duty and high performance vehicle applications.	Walker®, Walker® Perfection, Quiet-Flow®, Tru-Fit®, Thush®, Fonos ™ Mega-Flow® and DynoMax®

Motorparts Segment
We operate 31 manufacturing sites in 14 countries, 36 distribution centers and warehouses in 10 countries, 11 engineering and technical centers in 6 countries, and 11 technical service centers in two countries.

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We engineer, manufacture, source, and distribute a broad portfolio of products in the global vehicle aftermarket while also servicing the OE/OES markets with products including braking, wipers, and a limited range of chassis components. Motorparts' products are designed to enhance safety, durability, and vehicle performance, while providing ease of installation. Motorparts' products are utilized in vehicle braking systems and also include a wide variety of chassis, engine, sealing, wiper, filter, lighting, and other general maintenance applications. Motorparts uses market analytics, supply chain expertise, brand and product line management, innovative technology, manufacturing, sourcing, and distribution capabilities to satisfy its customers' requirements. On March 1, 2019, we completed the sale of substantially all of the global OE and aftermarket wipers business.

The following table sets forth a description of the largest product categories sold by our Motorparts segment:

Product	Description	Select Brands
Chassis	Chassis parts include ball joints, tie rod ends, sway bar links, hub assemblies, anti-friction bearings and universal joints, strut assemblies, idler arms, pitman arms, and control arms. These components affect vehicle steering and vehicle ride quality.	MOOG®, QuickSteer® and National®
Braking	Braking products include disc pads for passenger cars, motorcycles and commercial vehicles; drum brake shoes and CV drum brake lining; and brake accessories including rotors, drums, hydraulics, hardware and brake fluid. These products provide stopping ability, a safety feature on all vehicles.	Wagner®, Ferodo®, Jurid®, Beck Arnley® and Abex®
Sealing and Engine	Gaskets and seals create a barrier between two surfaces to contain fluids, pressure, and gases while keeping out dust and other contaminants. There are numerous areas of application including engine covers, oil pans, intake manifolds, shaft seals, transmission covers, and differential covers.	Fel-Pro®, Payen®, Goetze® and National®
Maintenance and Other	Filtration - Filtration parts include oil, air, cabin, fuel, and other filters for both light and commercial vehicles. These components prevent harmful contaminants contained in liquids and gases from passing through vehicle components and potentially leading to premature wear or failure. Lighting - Lighting products include forward lighting capsules, miniature light bulbs, LED lighting and sealed beams for virtually every application on cars, trucks, commercial vehicles and other off-road vehicles. Lighting improves driver visibility and safety. Ignition - Ignition products include spark plugs, glow plugs, ignition coils, wires, harnesses, and accessories for automotive, commercial, lawn and garden, marine, and industrial applications.	Interfil®, Champion® and Beru®

Sales, Marketing and Distribution

We have separate and distinct sales and marketing efforts for our OE and aftermarket customers.

For OE sales, our sales and marketing team is an integrated group of sales professionals, including skilled engineers and program managers, who are organized globally by customer business unit and product type (e.g., Ride Performance, Clean Air, and Powertrain). Our sales and marketing teams are focused on meeting and exceeding our customer's needs by delivering engineered products and services on time; maximizing profit for our investors while financing continued growth and product development; and developing a common system approach to create a superior customer experience. Our teams provide the appropriate mix of operational and technical expertise needed to interface successfully with the OE manufacturers. Our business capture process involves targeting select programs and working closely with the OE manufacturer platform engineering and purchasing teams. Bidding on OE automotive platforms typically encompasses many months of engineering and business development activity. Throughout the process, our sales team, program managers and product engineers assist the OE customer in defining the project’s technical and

business requirements. A normal part of the process includes our engineering and sales personnel working on customers' integrated product teams, creating a statement of requirements, and assisting our customers with full system or component design and development concepts that deliver expectations and create value for OE manufacturer customers. Given that the Clean Air, Ride Performance and Powertrain operations typically involve long-term production contracts awarded on a platform-by-platform basis, our strategy is to leverage our engineering expertise and strong customer relationships to target and win new business and increase operating margins.

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For aftermarket sales and marketing, our sales force is generally organized by region and customer and covers multiple product lines. We sell aftermarket products through five primary channels of distribution: (1) traditional three-step distribution system of full-line warehouse distributors, jobbers and service providers; (2) two-step distribution system of warehouse distributors that distribute directly to the service providers; (3) direct sales to retailers; (4) direct sales to service provider chains and (5) direct sales through online channels. Our aftermarket sales and marketing representatives cover all levels of the distribution channel, stimulating interest in our products and helping our products move through the distribution system. Also, to generate demand for our products, we run print, online and outdoor advertisements and training conducted by our field sales force along with E-training courses. In addition, we maintain detailed web sites for certain of our brands.

Business Strategy

We are a leading diversified, global supplier of innovative products and services to light vehicle, commercial truck, off-highway, industrial and aftermarket customers. Our strategy focuses on addressing the evolving needs of our OE and aftermarket customers around the world to drive growth.

The key components of our business strategy are described below:

Continue to optimize our operations by aggressively pursuing cost competitiveness in all business segments and continuing to drive productivity in existing operations

As we continue to expand our distribution and service capabilities globally, we seek to continue optimizing our performance through enhanced efficiencies in order to meet the world-class delivery performance our customers increasingly require. We have made investments in our global distribution network, through our new multi-product distribution centers, and through the implementation of automated picking technology and a more efficient replenishment system with the objective of improving inventory visibility and availability and lowering costs.

We will continue to focus on operational excellence by optimizing our manufacturing footprint, further developing our engineering capabilities, managing the complexities of our global supply chain to realize purchasing economies of scale while satisfying diverse and global requirements, and supporting our businesses with robust information technology systems. We will make investments in our operations and infrastructure as required to achieve our strategic goals.

From a design perspective, we will bring a lean mindset to our portfolio to ensure standardization, remove redundancies, reduce transit costs, leverage economies of scale, and optimize manufacturing productivity. We will also continually look for ways to innovate and leverage cross- and up-sell opportunities to the market through a customer-centric product development process. From a manufacturing perspective, we will maintain a continuous improvement philosophy by streamlining plant operations and our network, and executing projects to improve efficiency.

Serving our customers also requires that we compete effectively at the unit cost level, in particular with OE customers. We are making concerted and systematic efforts to continuously improve our position on the cost curve for each of our component part categories. In doing so, we will continue to be a preferred supplier to our customers.

We will be mindful of the changing market conditions that might necessitate adjustments to our resources and manufacturing capacity around the world. We will also remain committed to protecting the environment as well as the health and safety of our employees.

Further execute on attaining synergies from the acquisition of Federal-Mogul

We completed the acquisition of Federal-Mogul on October 1, 2018. While we have undertaken significant integration subsequent to closing the Federal-Mogul acquisition, we continue to seek to optimize the combined operations. This optimization should present additional opportunities for cost reduction, increased profitability and cash flow.

Assess focused acquisition and investment opportunities that provide product line expansion, technological advancements, geographic positioning, penetration of emerging markets and market share growth

Throughout our history, we have successfully identified and capitalized on acquisitions, alliances and divestitures to achieve strategic growth and alignment. Through these transactions, we have (1) expanded our product portfolio with complementary technologies; (2) realized incremental business from existing customers; (3) gained access to new customers; (4) achieved leadership positions in geographic regions outside North America; and (5) re-focused on areas that will contribute to our profitable growth.

We intend to continue to explore strategic alliances, joint ventures, acquisitions and other transactions that complement, expand or enhance our existing products, technology, systems development efforts, customer base and/or global presence. We will align with companies that have proven products, proprietary technology, advanced research capabilities, broad geographic reach, and/or strong market positions to further strengthen our product leadership, technology position, global reach and customer relationships.

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Adapt cost structure to economic realities

We aggressively respond to difficult economic environments, aligning our operations to any resulting reductions in production levels and replacement demand and executing comprehensive restructuring and cost-reduction initiatives. Suppliers must continually identify and implement product innovation and cost reduction activities to fund customer annual price concession expectations in order to retain current business as well as to be competitively positioned for future new business opportunities.

Original Equipment Specific Strategies

The converging forces of connectivity, autonomy, electrification and shared mobility are spawning a new age of automotive autonomy and a unique opportunity to position our business for significant growth and profitability. We strive to strengthen our global position by designing, manufacturing, delivering and marketing technologically innovative products and systems for OE manufacturers.

The key components of our OE strategy are described below:

Maintain technological leadership to drive further growth from secular market trends

In order to maintain our strong market positions, we are focused on meeting changing performance requirements and keeping up with new OE trends such as mobility, electrification and autonomous driving. Aligning product lines and technical capabilities creates an ideal foundation to meet changing performance requirements for comfort and safety and again ultimately reinventing the ride of the future. In addition, our suite of solutions represents an opportunity to drive greater partnership with OE manufacturers, capturing growth with higher value content per vehicle.

OE manufacturers are responding to changing end customer trends and preferences alongside their own challenging cost structures by reducing design and production complexities and investing in advanced technologies that enable vehicle electrification and autonomy. We anticipate that OE suppliers with high technology capabilities in vehicle system integration will be able to enable a more seamless transition to next-generation electric vehicles and become preferred suppliers to OE manufacturers.

Penetrate adjacent market segments

We seek to penetrate a variety of adjacent sales opportunities and achieve growth in higher-margin businesses by applying our design, engineering and manufacturing capabilities. For example, we aggressively leverage our technology and engineering leadership in powertrain, clean air, ride performance and aftermarket into adjacent sales opportunities for heavy-duty trucks, buses, agricultural equipment, construction machinery and other vehicles in other regions around the world.

We design and launch clean air products for commercial vehicle customers such as Caterpillar, for whom we are their global diesel clean air system integrator, John Deere, Navistar, Deutz, Daimler Trucks, Scania, Weichai Power, FAW Group and Kubota. We also engineer and build modular NOx-reduction systems for large engines that meet standards of the International Maritime Organization, among others.

Our revenues generated by commercial truck, off-highway and industrial customers were 16% of our total revenues in 2018 and 12% in 2017.

Aftermarket Specific Strategies

We expect the demand for replacement parts to increase steadily as a result of the anticipated significant increase in VIO through 2040, the increase in the average age of VIO and the increase in the average miles driven per year. The characteristics of aftermarket sales and distribution are defined regionally, which require regionally focused strategies to address the key success factors of our customers.

The key components of our aftermarket strategy are described below:

Leverage the strength of our global aftermarket leading brands positions, product portfolio and range, marketing and selling expertise, and distribution and logistics capabilities

Our aftermarket business houses multiple leading brands with strong product offerings. We will build upon our brand strengths and grow our global aftermarket business by leveraging our broad product coverage and extensive distribution network. We intend to capitalize on aftermarket trends and expand in established markets (North America, Europe, Australia) as well as high-growth regions (China, South America, India, Southeast and Northeast Asia). Important focus areas are enhancing our presence in high-growth markets; leveraging our portfolio and strong presence in suspension to expand our business globally; and diversifying outside of chassis with our sealing, electronic and underhood products, as well as other components.

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Continue to strengthen our aftermarket capabilities and product offerings in mature markets, including North America and Europe

The scale of our aftermarket business allows for strong distribution channels that significantly enhance our go-to-market capabilities across mature markets in North America and Europe. We continually rationalize our already strong distribution networks with the goal of improved customer service at a lower cost. This is achieved by constantly sharing information across channels on best practices in go-to-market, manufacturing and distribution capabilities.

The North America and Europe go-to-market capabilities will be defined by positioning our distribution and installer partners for success. We believe this will require maintaining a vast catalog of products to provide the ability to address customer requirements quickly and easily. Managing vast and complex catalog of products requires an understanding of the composition of the car parc within the regions including wear patterns, typical replacement rates based on weather, road quality, and average miles driven annually. These compositions differ significantly by region, which will impact the range and frequency of replacement part requirements. The understanding of these regional dynamics will help us provide the right parts when they are needed and achieve the industry's best "Order to Delivery" times. We will continue to innovate product solutions that will be cost competitive, reliable, reduce install time, reduce the number of unique parts that installers need to inventory on-site, reduce the number of unique installer tools and equipment required, and improve installer safety.

In addition to having a comprehensive product catalog, we also strive to maintain very close relationships with our customers and help position them for success. We have launched a series of 'Tech First' initiatives to provide online, on demand, and onsite technical training and support to vehicle repair technicians who use and install our products in North America, Europe and China and plan to expand into South America. This initiative included Garage Gurus™, a network of technical support centers that provide some of the most comprehensive training programs in the industry that educate our partners and customers with emerging vehicle technologies and vehicle repair operational skills. We believe it is key to our strategy to provide aftermarket parts that are simple to install and to make sure our customers have the resources to know how to install these parts properly. In having the right products and resources for our customers, we believe we will continue to be a preferred aftermarket supplier and continue to drive growth in the Americas and emerging economic areas.

Increase aftermarket position in high-growth regions, notably in Asia Pacific

The Asia Pacific region, particularly the high-growth markets of China and India, presents a significant opportunity for us to expand our business. We have made investments in distribution and in our sales force in both China and the rest of Asia to help drive growth in this increasingly important region. We must take into account the different operational requirements in Asia Pacific in order to drive aftermarket growth in this region.

The Asia Pacific light vehicle and commercial vehicle aftermarket industry is fragmented with a large number of small distributors and installers that require different strategies and solutions than more mature consolidated markets. Distribution in smaller volumes will require us to have a hub and spoke warehousing approach to compete on the basis of optimal "Order to Delivery" timeliness while maintaining a broad range of products.

Additionally, buying online is the preferred purchase method for many smaller distribution and installer partners. The sophistication of the existing online marketplaces in Asia Pacific will require us to develop adaptive and flexible omnichannel tools in order to compete effectively. We believe that developing a competitive online platform for our Asia Pacific customers will be the foundation for us to build a digital platform that will improve our competitiveness globally.

Environmental Matters

For additional information regarding environmental matters, see Item 3, "Legal Proceedings," Item 7, "Management's Discussion and Analysis of Financial Condition and Results of Operations — Environmental Matters" and Note 15—Commitments and Contingencies of the consolidated financial statements included in Item 8, "Financial Statements and Supplementary Data."

Employees

As of December 31, 2018, we had approximately 81,000 employees of whom approximately 48% were covered by collective bargaining agreements. With the exception of two facilities in the U.S., most of our unionized manufacturing facilities have their own contracts with their own expiration dates and, as a result, no contract expiration date affects more than one facility.

Other

We purchase various raw materials and component parts for use in our manufacturing processes, including ferrous and non-ferrous metals, non-metallic raw materials, stampings, castings and forgings. We also purchase parts manufactured by other manufacturers for sale in the aftermarket. The principal raw material that we use is steel. We obtain steel from a number of sources pursuant to various contractual and other arrangements. We believe that an adequate supply of steel can presently be obtained from a number of different domestic and foreign suppliers. We address price increases by evaluating alternative materials and processes, reviewing material substitution opportunities, increasing component sourcing and parts assembly in best

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cost countries, strategically pursuing regional and global purchasing strategies for specific commodities, and aggressively negotiating with our customers to allow us to recover these higher costs from them.

We hold a number of domestic and foreign patents and trademarks relating to our products and businesses. Through our acquisition of Federal-Mogul, we acquired in excess of 6,900 patents and more than 6,700 active trademark registrations and applications worldwide. We manufacture and distribute our aftermarket products under a number of brand names that are well-recognized in the marketplace and some of are registered trademarks. We also market certain of our clean air products to OE manufacturers under the names Solid SCR™ and XNOx®. The patents, trademarks and other intellectual property owned by or licensed to us are important in the manufacturing, marketing and distribution of our products. However, we do not materially rely on any single patent, nor will the expiration of any single patent materially affect our business. Our current patents expire over various periods into the year 2040. We are actively introducing and patenting new technology to replace formerly patented technology before the expiration of the existing patents. In the aggregate, our worldwide patent portfolio is materially important to our business because it enables us to achieve technological differentiation from our competitors.

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ITEM 1A.RISK FACTORS.

Future deterioration or prolonged difficulty in economic conditions could have a material adverse impact on our business, financial position and liquidity.

We are a global company and, as such, our businesses are affected by economic conditions in the various geographic regions in which we do business. Economic difficulties generally lead to tightening of credit and liquidity. These conditions often lead to low consumer confidence, which in turn results in delayed and reduced purchases of durable goods such as automobiles and other vehicles. As a result, during difficult economic times our OE customers can significantly reduce their production schedules. For example, light vehicle production declined significantly during the economic crisis in 2008 and 2009 in North America and Europe. More recently, light vehicle and commercial vehicle production has declined significantly in South America in 2015 and 2016 and persistent challenges in the Chinese economy in 2018 and continuing into 2019 may result in lower-than-anticipated growth in both light and commercial vehicles in the region. Additionally, production of off-highway equipment with our content on them have been weak in certain product applications, such as agricultural and construction equipment in North America and Europe. Any deterioration or prolonged difficulty in economic conditions in any region in which we do business could have a material adverse effect on our business, financial position and liquidity.

In addition, economic difficulties often lead to disruptions in the financial markets, which may adversely impact the availability and cost of credit which could materially and negatively affect our company. Future disruptions in the capital and credit markets could adversely affect our customers' and our ability to access the liquidity that is necessary to fund operations on terms that are acceptable to us or at all.

In addition, financial or other difficulties at any of our major customers could have a material adverse impact on us, including as a result of lost revenues, significant write downs of accounts receivable, significant impairment charges or additional restructuring beyond our current global plans. Severe financial or other difficulties at any of our major suppliers could have a material adverse effect on us if we are unable to obtain on a timely basis on similar economic terms the quantity and quality of components we require to produce our products.

Moreover, severe financial or operating difficulties at any light vehicle or commercial vehicle manufacturer or other supplier could have a significant disruptive effect on the entire industry, leading to supply chain disruptions and labor unrest, among other things. These disruptions could force original equipment manufacturers and, in turn, other suppliers, including us, to shut down production at plants. While the issues that our customers and suppliers face during economic difficulties may be primarily financial in nature, other difficulties, such as an inability to meet increased demand as conditions recover, could also result in supply chain and other disruptions.

Factors that reduce demand for our products or reduce prices could materially and adversely impact our financial condition and results of operations.

Demand for and pricing of our products are subject to economic conditions and other factors present in the various domestic and international markets where our products are sold. Demand for our OE products is subject to the level of consumer demand for new vehicles that are equipped with our parts. The level of new light vehicle, commercial truck and off-highway vehicle purchases is cyclical, affected by such factors as general economic conditions, interest rates and availability of credit, consumer confidence, patterns of consumer spending, industrial construction levels, fuel costs, government incentives and vehicle replacement cycles. Consumer preferences and government regulations also impact the demand for new light vehicle purchases equipped with our products. For example, if consumers increasingly prefer electric vehicles, demand for the vehicles equipped with our clean air products would decrease. Demand for our aftermarket, or replacement, products varies based upon such factors as general economic conditions; the level of new vehicle purchases, which initially displaces demand for aftermarket products; the severity of winter weather, which increases the demand for certain aftermarket products; the number of vehicles in operation; and other factors, including the average useful life of parts and number of miles driven.

The highly cyclical nature of the automotive and commercial vehicle industry presents a risk that is outside our control and that cannot be accurately predicted. Decreases in demand for automobiles and commercial vehicles and vehicle parts generally, or in the demand for our products in particular, could materially and adversely impact our

financial condition and results of operations.

In addition, we believe that increasingly stringent environmental standards for emissions have presented and will continue to present an important opportunity for us to grow our clean air product line. We cannot assure you, however, that environmental standards for emissions will continue to become more stringent or that the adoption of any new standards will not be delayed beyond our expectations.

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We are dependent on certain large customers for future revenue. The loss of all or a substantial portion of our revenues from any of these customers or the loss of market share by these customers could have a material adverse impact on us.

We depend on major vehicle manufacturers for a substantial portion of our revenues. For example, during the fiscal year ended December 31, 2018, General Motors and Ford accounted for 12% and 12% of our net sales, respectively. Following the Federal-Mogul acquisition, we are increasingly dependent on certain major aftermarket customers for our revenues. The loss of all or a substantial portion of our revenues from any of our large-volume customers could have a material adverse effect on our financial condition and results of operations by reducing cash flows and our ability to spread costs over a larger revenue base. We may experience decreased revenues from these customers for a variety of reasons, including but not limited to: (i) in the case of our OE customers, loss of awarded platforms, reduced demand for our customers' products, and work stoppages or other disruptions impacting OE production, and (ii) in the case of our aftermarket customers, reduced or delayed consumer requirements and competition from other brands or lower-cost alternatives. Further, our aftermarket customers are generally able to change suppliers more quickly than OE customers, which exacerbates these risks with respect to our aftermarket business. For all of our customers, we face the risk of their failure to pay us for a variety of reasons, including their respective financial conditions.

In addition, our customers compete intensively against each other. The loss of market share by any of our major customers could have a material adverse effect on our business unless we are able to achieve increased sales to other major customers.

We are subject to, and could be further subject to, government investigations or actions by other third parties.

We are subject to a variety of laws and regulations that govern our business both in the United States and internationally, including antitrust laws, violations of which can involve civil or criminal sanctions. Responding to governmental investigations or other actions may be both time-consuming and disruptive to our operations and could divert the attention of our management and key personnel from our business operations.

For example, antitrust authorities in various jurisdictions are investigating possible violations of antitrust laws by multiple automotive parts suppliers, including Tenneco. In addition, Tenneco and certain of its competitors are currently subject to civil putative class action lawsuits in the United States, which allege anti-competitive conduct related to the activities subject to these investigations. More related lawsuits may be filed, including in other jurisdictions.

While we have established a reserve that we believe is adequate to resolve Tenneco's antitrust matters globally, we cannot, however, assure you that the reserve will not change materially from time to time or that the costs, charges and liabilities associated with these matters will not exceed any amounts reserved for them in our consolidated financial statements.

We may be unable to realize sales represented by our awarded business, which could materially and adversely impact our financial condition and results of operations.

The realization of future sales from awarded business is inherently subject to a number of important risks and uncertainties, including the number of vehicles that our OE customers will actually produce, the timing of that production and the mix of options that our OE customers and consumers may choose. For example, light vehicle production declined significantly during the economic crisis in 2008 and 2009 in North America and Europe. More recently, light vehicle and commercial truck production has declined significantly in South America in 2015 and 2016 and persistent challenges in the Chinese economy in 2018 and going into 2019 may result in lower-than-anticipated growth in both light and commercial vehicles in the region. In addition to the risks inherent in the cyclicality of vehicle production, our customers generally have the right to replace us with another supplier at any time for a variety of reasons and have demanded price decreases over the life of awarded business. Accordingly, we cannot assure you that we will in fact realize any or all of the future sales represented by our awarded business. Any failure to realize these sales could have a material adverse effect on our financial condition, results of operations, and liquidity.

In many cases, we must commit substantial resources in preparation for production under awarded OE business well in advance of the customer's production start date. In certain instances, the terms of our OE customer arrangements permit us to recover these pre-production costs if the customer cancels the business through no fault of our company. Although we have been successful in recovering these costs under appropriate circumstances in the past, we can give no assurance that our results of operations will not be materially impacted in the future if we are unable to recover these types of pre-production costs in the event of an OE customer's cancellation of awarded business.

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Our level of debt, which increased in amount and percentage of floating rate debt as a result of the Acquisition, makes us more sensitive to the effects of economic downturns; and provisions in our debt agreements could constrain our ability to react to changes in the economy or our industry.

Our leverage increased as a result of the Acquisition. As of December 31, 2018, we had approximately $3.3 billion of indebtedness outstanding under our new senior credit facility, $2.0 billion of outstanding notes and approximately $100 million of other debt. In addition, as a result of the Acquisition we have increased exposure to interest rate fluctuations because our percentage of floating rate debt increased.

Our level of debt makes us more vulnerable to changes in our results of operations because a significant portion of our cash flow from operations is dedicated to servicing our debt and is not available for other purposes and our level of debt could impair our ability to raise additional capital if necessary. Further increases in interest rates will increase the amount of cash required for debt service. Under the terms of our existing senior secured credit facility, the indentures governing our notes and the agreements governing our other indebtedness, we are able to incur significant additional indebtedness in the future. The more we become leveraged, the more we, and in turn our security holders, become exposed to many of the risks described herein.

Our ability to make payments on our indebtedness depends on our ability to generate cash in the future. If we do not generate sufficient cash flow to meet our debt service, capital investment and working capital requirements, we may need to reduce or cease our repurchase of shares or payments of dividends, seek additional financing or sell assets. If we require such financing and are unable to obtain it, we could be forced to sell assets under unfavorable circumstances and we may not be able to sell assets quickly enough or for sufficient amounts to enable us to meet our obligations.

In addition, our senior credit facility and our other debt agreements contain covenants that limit our flexibility in planning for or reacting to changes in our business and our industry, including limitations on our ability to:

- declare dividends or redeem or repurchase capital stock;
- prepay, redeem or purchase other debt;
- incur liens;
- make loans, guarantees, acquisitions and investments;
- incur additional indebtedness;
- amend or otherwise alter debt and other material agreements;
- engage in mergers, acquisitions or asset sales; and
- engage in transactions with affiliates.

Our failure to comply with the covenants contained in our debt instruments, including as a result of events beyond our control, could result in an event of default, which could materially and adversely affect our operating results and our financial condition.

Our senior credit facility and other agreements governing financings we enter into from time to time require us to maintain certain financial ratios. Our senior credit facility and our other financing instruments require us to comply with various operational and other covenants. If there were an event of default under any of our financing instruments that was not cured or waived, the holders of the defaulted financing could cause all amounts outstanding with respect to that financing to be due and payable immediately (which, in turn, could also result in an event of default under one or more of our other financing arrangements). If such event occurs, the lenders under our senior credit facility could elect to terminate their commitments, cease making further loans and institute foreclosure proceedings against our assets and we could lose access to our factoring and supply chain financing programs. We cannot assure you that our assets or cash flow would be sufficient to fully repay borrowings under our outstanding financing instruments, either upon maturity or if accelerated, upon an event of default, or that we would be able to refinance or restructure the payments on those financing instruments. This would have a material adverse impact on our liquidity, financial position and results of operations, and on our ability to effect our share repurchase and dividend programs. For example, as a result of the economic downturn in 2008 and 2009, we needed to amend our senior credit agreement to revise the financial ratios we were required to maintain. Even though we were able to obtain that amendment, we

cannot assure you that we would be able to obtain an amendment on commercially reasonable terms, or at all, if required in the future.

Our working capital requirements may negatively affect our liquidity and capital resources.

Our working capital requirements can vary significantly, depending in part on the level, variability and timing of our customers' worldwide vehicle production and the payment terms with our customers and suppliers. If our working capital needs exceed our cash flows from operations, we would look to our cash balances and availability for borrowings under our borrowing