

UNITED STATES SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 10-K

(Mark One)

[X] Annual report pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934

For the fiscal year ended December 31, 2019

OR

[] Transition report pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934

For the transition period from _____ to _____

Commission file number 1-12001

ALLEGHENY TECHNOLOGIES INCORPORATED

(Exact name of registrant as specified in its charter)

Delaware
(State or other jurisdiction of incorporation or organization)
1000 Six PPG Place
Pittsburgh, Pennsylvania
(Address of principal executive offices)

25-1792394
(I.R.S. Employer Identification Number)
15222-5479
(Zip Code)

Registrant's telephone number, including area code: (412) 394-2800

Securities registered pursuant to Section 12(b) of the Act:

Table with 3 columns: Title of each class, Trading Symbol, Name of each exchange on which registered. Row: Common stock, par value \$0.10, ATI, New York Stock Exchange

Securities registered pursuant to Section 12(g) of the Act: None

Indicate by check mark whether the Registrant is well known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes [X] 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 [X]

Indicate by check mark whether the Registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months, and (2) has been subject to such filing requirements for the past 90 days. Yes [X] No []

Indicate by check mark whether the Registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes [X] No []

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

- Large accelerated filer [X] Accelerated filer []
Non-accelerated filer [] (Do not check if a smaller reporting company) 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 [X]

On February 7, 2020, the Registrant had outstanding 126,085,348 shares of its Common Stock.

The aggregate market value of the Registrant's voting stock held by non-affiliates at June 30, 2019 was approximately \$3.2 billion, based on the closing price per share of Common Stock on June 28, 2019 of \$25.20 as reported on the New York Stock Exchange. Shares of Common Stock known by the Registrant to be beneficially owned by directors and officers of the Registrant subject to the reporting and other requirements of Section 16 of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), are not included in the computation. The Registrant, however, has made no determination that such persons are "affiliates" within the meaning of Rule 12b-2 under the Exchange Act.

Documents Incorporated By Reference

Selected portions of the Proxy Statement for the Annual Meeting of Stockholders to be held on May 8, 2020 are incorporated by reference into Part III of this Report.

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PART I

Item 1. Business

The Company

Allegheny Technologies Incorporated is a Delaware corporation with its principal executive offices located at 1000 Six PPG Place, Pittsburgh, Pennsylvania 15222-5479, telephone number (412) 394-2800, Internet website address www.atimetals.com. Our Internet website and the content contained therein or connected thereto are not intended to be incorporated into this Annual Report on Form 10-K. References to “Allegheny Technologies,” “ATI,” the “Company,” the “Registrant,” “we,” “our” and “us” and similar terms mean Allegheny Technologies Incorporated and its subsidiaries, unless the context otherwise requires.

Our Business

ATI’s strategic vision is to be an aligned and integrated specialty materials and components company, solving the world’s challenges through materials science. Our strategies target the products and global growth markets that require and value ATI’s technical and manufacturing capabilities. Our largest markets are aerospace & defense, representing approximately 50% of total sales, led by products for jet engines. Additionally, we have a strong presence in the oil & gas and electrical energy markets. In aggregate, these markets represent about 70% of our revenue. ATI is a market leader in manufacturing differentiated products that require our materials science capabilities and unique process technologies, including our new product development competence.

We operate in two business segments: High Performance Materials & Components (HPMC), and Flat Rolled Products (FRP). Over 75% of 2019 HPMC business segment sales were to the aerospace & defense markets, and nearly half of HPMC’s total sales are products for commercial jet engines. Increasing demand for commercial aerospace products has been the main source of sales and segment operating profit growth for HPMC over the last few years, and is expected to continue to drive HPMC and overall ATI results for the next several years due to the ongoing expansion in production of next generation jet engines and airplanes. Other major HPMC end markets include medical and electrical energy. HPMC produces a wide range of high performance materials and components, including advanced metallic powder alloys, made from titanium and titanium-based alloys, nickel-based alloys and superalloys, and a variety of other specialty materials. Capabilities range from cast/wrought and powder alloy development to final production of highly engineered finished components, including those used for next-generation jet engine forgings and 3D-printed aerospace products.

The FRP segment serves a diverse group of end markets, with sales to the oil & gas market and aerospace & defense markets collectively representing over 40% of 2019 sales. Other important end markets for FRP include automotive, food processing equipment and appliances, consumer electronics, and construction & mining. FRP produces nickel-based alloys, specialty alloys, and titanium and titanium-based alloys, and stainless steel products in a variety of forms including plate, sheet, engineered strip, and Precision Rolled Strip products.

Strategic end use markets for our products include:

Aerospace & Defense. We are a world leader in the production of specialty materials and components for both commercial and military jet engines and airframes supporting customer needs for initial build requirements and for spare parts. Through alloy development, internal growth efforts, and long-term supply agreements on current and next-generation jet engines and airframes, we are well positioned with a fully qualified asset base to meet the expected multi-year demand growth from the commercial aerospace market. In 2019, we extended and expanded our long-term agreements (LTAs) with significant customers in the aero-engine supply chain, including LTAs with GE Aviation and Rolls-Royce. We have LTAs in place with most major aerospace market OEMs.

Typical aerospace applications for nickel-based alloys and superalloys and advanced metallic powders include jet engine shafts, discs, blades, vanes, rings and casings. Nickel-based alloys and superalloys remain extremely strong at high temperatures and resist degradation under extreme conditions. The next generation jet engines use advanced nickel-based superalloys and metallic powder alloys due to increased fuel efficiency requirements that require hotter-burning engines. Our specialty materials are also used in the manufacture of aircraft landing gear and structural components.

We are a global industry leader in isothermal and hot-die forging technologies for advanced aerospace components. Capital investments for our fourth iso-thermal press and heat-treating capacity expansion at our Iso-Thermal Forging Center of Excellence in Cudahy, WI, which began in 2018, continued through 2019. We produce highly sophisticated components that have differing mechanical properties across a single product unit and are highly-resistant to fatigue and temperature effects. Our precision forgings are used for jet engine components, structural components for aircraft, helicopters, launch vehicles, and other demanding applications. ATI provides a full range of post-production inspection and machining with the certified quality needed to meet demanding application requirements.

Products and components made from titanium and titanium-based alloys, such as jet engine components including blades, vanes, discs, and casings, and airframe components such as structural members, landing gears, hydraulic systems, and fasteners, are critical in aerospace applications. These materials and components possess an extraordinary combination of properties that help to increase jet engine fuel efficiency and product longevity, including superior strength-to-weight ratio, elevated temperature resistance, low coefficient of thermal expansion, and extreme corrosion resistance.

Our specialty materials and components for government aerospace & defense applications include naval nuclear products, military jet engines, fixed wing and rotorcraft products, and armor applications. We expect to increase our sales in government defense applications in future years, and in 2019, we announced the expansion and 6.5 year extension of our LTA with BWX Technologies to supply materials for the manufacture of naval nuclear components.

We continuously seek to develop and manufacture innovative new alloys to better serve the needs of the aerospace & defense markets. For example, ATI 718Plus® nickel-based superalloy, Rene 65 near-powder superalloy, and our powder alloys have won significant share in the current and next-generation jet engines. ATI's metallic powder technology delivers alloy compositions and refined microstructures that offer increased performance and longer useful lives in high-temperature aerospace environments as well as improving the efficiency of jet engines. Our metallic powder products deliver the most uniform grain structure achievable in near-net shapes. We continue to increase our production capacity for advanced metallic powders for use in next-generation aerospace products, including additive manufacturing applications. In 2018, we acquired the assets of Addaero Manufacturing, a metal alloy-based additive manufacturer, to expand ATI's capabilities to provide comprehensive customer solutions ranging from the design of parts for additive manufacturing to the production of ready-to-install components. We recently expanded our nickel-based and titanium-based powder manufacturing capabilities in North Carolina.

Oil & Gas. The environments in which oil & gas can be found in commercial quantities have become more challenging, involving deep offshore wells, high pressure and high temperature conditions in sour wells and unconventional sources, such as shale oil & gas, and oil sands. These challenging offshore environments are located further off the continental shelf, including locations in arctic and tropical waters where drilling is more difficult than previously-sourced locations. They are often more than one mile below the water's surface, and up to two miles below the ocean floor. We enable our customer's success in these applications by developing and producing specialty materials for equipment that can operate for up to 30 years in these harsh environments.

Both of our business segments produce specialty materials that are critical to the oil & gas industry. Our specialty materials, including nickel-based alloys, stainless and duplex alloys, and other specialty alloys, have the strength and corrosion-resistant properties necessary to meet these challenging operating conditions. Several of our strip, plate and cast products meet NORSOK qualification standards, which are developed by the Norwegian petroleum industry and are intended to identify materials used in oil and gas applications that are safe and cost-effective.

Energy. Our specialty materials are widely used in the global electrical power generation and distribution industries. We believe energy needs, environmental policies and the electrification of developing countries will continue to drive demand for our specialty materials and products for use in this industry over the long term.

For electrical power generation, our specialty materials, including corrosion-resistant alloys (CRAs), are used in coal, nuclear, and natural gas applications. In coal-fired plants, our CRAs are used for pipe, tube, and heat exchanger applications in water systems and in pollution control scrubbers. Our CRAs are also used in water systems, fuel cladding components, and process equipment for nuclear power plants. For nuclear power plants, we are an industry pioneer in producing nuclear reactor fuel cladding and structural components utilizing zirconium and hafnium alloys. We are a technology leader for large diameter components used in natural gas land-based turbines for power generation. Our alloys are also used for alternative energy generation, in solar, fuel cell and geothermal applications.

Medical. ATI's advanced specialty materials are used in medical device products that enhance the quality of people's lives around the world.

Our specialty alloys are used for replacement knees, hips and other prosthetic devices. The use of our alloys in these replacement devices offer the potential of longer product lifespans versus previous implant generations.

Our biocompatible nickel-titanium shape memory alloy is used for stents to support collapsed or clogged blood vessels. Reduced in diameter for insertion, these stents expand post-implant to the original tube-like shape due to the metal's superelasticity. In addition, our ultra fine diameter (0.002 inch/0.051 mm) titanium wire is used for screens to prevent blood clots from entering critical areas of the body.

Manufacturers of magnetic resonance imaging (MRI) devices rely on our niobium superconducting wire to help produce electromagnetic fields that allow physicians to safely scan the body's soft tissue. We have a joint technology development agreement with Bruker Energy & Supercon Technologies to advance state-of-the-art niobium-based superconductors, including those used in MRI magnets for the medical industry, and preclinical MRI magnets used in the life-science tools industry.

Business Segments

Our two business segments accounted for the following percentages of total revenues of \$4.12 billion, \$4.05 billion, and \$3.53 billion for the years ended December 31, 2019, 2018, and 2017, respectively.

	2019	2018	2017
High Performance Materials & Components	58%	58%	59%
Flat Rolled Products	42%	42%	41%

Information with respect to our business segments is presented below and in Note 18 of the notes to the consolidated financial statements.

High Performance Materials & Components Segment

Our HPMC segment produces a wide range of high performance specialty materials, parts and components for several major end markets, including aerospace & defense, medical, and energy. 78% of the HPMC segment's 2019 revenues were derived from the aerospace & defense markets. Demand for our products is driven primarily by the commercial aerospace cycle. Large aircraft and jet engines are manufactured by a small number of companies, such as The Boeing Company, Airbus S.A.S. (an Airbus Group company) including the former operations of Bombardier Aerospace, and Embraer (Empresa Brasileira de Aeronáutica S.A.) for airframes, and GE Aviation (a division of General Electric Company), Rolls-Royce plc, Pratt & Whitney (a division of United Technologies Corporation), Snecma (SAFRAN Group), and various joint ventures that manufacture jet engines. These companies, and their suppliers, form a substantial part of our customer base in this business segment. The loss of one or more of our customers in the aerospace & defense markets could have a material adverse effect on ATI's results of operations and financial condition (see Item 1A. Risk Factors).

In 2019, we extended supply agreements with GE Aviation that are expected to generate \$2.5 billion in revenues and which begin in January 2021 and are multi-year agreements. Also in 2019, we extended our long-term agreement through 2029 with Rolls-Royce to supply rotating disc quality specialty materials for their Trent engine family. This agreement covers the production of a wide-range of critical products used to make Rolls-Royce's next-generation jet engines as well as spare parts for in-service engines. It supports ATI's market-leading alloy development and broad production capabilities, including our iso-thermal forging operations.

Our products are manufactured from a wide range of advanced materials including metallic powder alloys, made from titanium and titanium-based alloys, nickel-based alloys and superalloys, and a variety of other specialty materials. These materials are made into a variety of product forms that include precision forgings, machined parts and others. We are integrated across these alloy systems in melt, forging, finishing, and machining processes. Most of the products in this segment are sold directly to end-use customers, and a significant portion of our HPMC segment products are sold under multi-year agreements.

Principal competitors in the HPMC segment include: Berkshire Hathaway Inc., for nickel-based alloys and superalloys and specialty steel alloys, titanium and titanium-based alloys, and precision forgings through its ownership of Precision Castparts Corporation and subsidiaries; Arconic Inc., for titanium and titanium-based alloys and precision forgings through its ownership of RTI International Metals, Inc. and Firth Rixson; Carpenter Technology Corporation for nickel-based alloys and superalloys and specialty steel alloys; VSMPO-AVISMA for titanium and titanium-based alloys; and Aubert & Duval for precision forgings.

Flat Rolled Products Segment

Our FRP segment produces nickel-based alloys, specialty alloys, titanium and titanium-based alloys, and stainless steel in a variety of forms including plate, sheet, engineered strip, and Precision Rolled Strip® products. The major end markets for our flat-rolled products are oil & gas, aerospace & defense, automotive, food processing equipment and appliances, construction & mining, electronics, communication equipment and computers. The operations in this segment include our Flat Rolled Products business and the Chinese joint venture company known as Shanghai STAL Precision Stainless Steel Company Limited (STAL), in which we hold a 60% interest. Segment results also include our 50% interest in the industrial titanium joint venture known as Uniti LLC and our 50% interest in Allegheny & Tsingshan Stainless (A&T Stainless).

Nickel-based alloys, titanium, and stainless steel sheet products are used in a wide variety of industrial and consumer applications. In 2019, approximately 70% of our stainless sheet products by volume were sold to independent service centers, which have slitting, cutting or other processing facilities, with the remainder sold directly to end-use customers.

Engineered strip and Precision Rolled Strip products, which are under 0.015 inches thick, are used by customers to fabricate a variety of products primarily in the automotive, construction, and electronics markets. In 2019, approximately 90% of these products by volume were sold directly to end-use customers or through our own distribution network, with the remainder sold to independent service centers. In 2018, we completed the construction of our third Precision Rolled Strip manufacturing facility at our STAL joint venture in China.

Nickel-based alloy, titanium, and stainless steel plate products are primarily used in aerospace & defense, and corrosion and industrial markets. In 2019, approximately 65% of our plate products by volume were sold to independent service centers, with the remainder sold directly to end-use customers.

Competition in the FRP segment includes domestic stainless steel competitors North American Stainless, a subsidiary of Acerinox S.A., Outokumpu Stainless USA, LLC, and AK Steel Corporation, as well as imports from numerous foreign producers, including Aperam, based in Europe. Competitors for nickel-based alloys and superalloys and specialty steel alloys include Haynes International and VDM Metals GmbH.

We have taken important steps toward improving the capacity utilization of our HRPF with the agreement for carbon steel hot-rolling conversion services with NLMK USA, which was extended and expanded in 2019 for one year through December 2020, as well as with the A&T Stainless joint venture to manufacture 60" wide stainless sheet. In late March 2018, ATI filed for an exclusion from the Section 232 tariffs on behalf of A&T Stainless, which imports semi-finished stainless slab products from Indonesia. In April 2019, we learned that this exclusion request was denied by the U.S. Department of Commerce. ATI filed a new request on behalf of A&T Stainless for exclusion from the Section 232 tariffs in October 2019, and A&T Stainless continues to be subject to the 25% tariff levied on its imports of semi-finished stainless slab products from Indonesia pending the outcome of the October 2019 request. Results of A&T Stainless have been and will continue to be negatively impacted by these tariffs on imported stainless slab products. The joint venture partners have continued to evaluate longer-term solutions to return this strategic initiative to profitability, and determined during the fourth quarter of 2019 that idling the Midland, PA facility is probable if a near-term tariff exclusion is not received.

Significant global overcapacity for stainless steel flat-rolled products has intensified the price competition in the FRP segment over the last several years. Some of our foreign competitors are either directly or indirectly subsidized by governments. In 1999, the United States imposed anti-dumping and countervailing duties on unfairly low-priced and subsidized imports of stainless steel sheet and strip in coils and stainless steel plate in coils from companies in ten foreign countries. The anti-dumping and countervailing duty orders were reviewed in 2011 by the U.S. Department of Commerce and the U.S. International Trade Commission to determine whether the orders should remain in place for another five years. The agencies decided that eight such orders against five countries would continue in effect. In July 2016, the U.S. Department of Commerce and the U.S. International Trade Commission initiated a third review of the eight orders. The four orders covering imports of stainless steel plate in coils from three countries were continued for an additional five years in December 2016. In October 2017, the U.S. Department of Commerce published a notice continuing for an additional five years four orders covering imports of stainless steel sheet and strip in coils from three countries.

Additionally, in February 2016, ATI and the three domestic stainless steel competitors filed antidumping and countervailing duty petitions concurrently with the U.S. Department of Commerce and the U.S. International Trade Commission, charging that unfairly traded imports of stainless steel sheet and strip from the People's Republic of China are causing material injury to the domestic stainless steel industry. In February 2017, the U.S. Department of Commerce issued its final determinations, calculating antidumping duties ranging from 64% and 77% percent and countervailing duties ranging from 76% and 191%. These duties are generally applied in combination. The U.S. International Trade Commission reached a unanimous affirmative determination in early March 2017. The antidumping duties and subsidy margins, which have remained unchanged since the Commerce Department published the unfair trade orders in April 2017, are expected to act as a significant deterrent to the illegal dumping of Chinese government-subsidized imports of stainless steel sheet and strip into the U.S. market. We continue to monitor imports from foreign producers for appropriate action, including whether imports entering the U.S. are circumventing or evading the anti-dumping and countervailing duty orders that are being enforced by U.S. Customs and Border Protection and Department of Commerce.

Raw Materials and Supplies

Substantially all raw materials and supplies required in the manufacture of our products are available from more than one supplier, and the sources and availability of raw materials essential to our businesses are currently adequate. The principal raw materials we use in the production of our specialty materials are scrap (including iron-, nickel-, chromium-, titanium-, and molybdenum-bearing scrap), nickel, titanium sponge, zirconium sand and sponge, ferrochromium, ferrosilicon, molybdenum

and molybdenum alloys, manganese and manganese alloys, cobalt, niobium, vanadium and other alloying materials. While we enter into raw materials futures contracts from time-to-time to hedge exposure to price fluctuations, such as for nickel, we cannot be certain that our hedge position adequately reduces exposure. We believe that we have adequate controls to monitor these contracts, but we may not be able to accurately assess exposure to price volatility in the markets for critical raw materials.

Over the last several years, significant global capacity has been added to produce titanium sponge, which is a key raw material used to produce ATI's titanium products. ATI has entered into long-term cost competitive supply agreements with several producers of premium-grade and standard-grade titanium sponge.

Other raw materials, such as nickel, cobalt, and ferrochromium, are available to us and our specialty materials industry competitors primarily from foreign sources. Some of these foreign sources are located in countries that may be subject to unstable political and economic conditions, which could disrupt supplies or affect the price of these materials.

We purchase our nickel requirements principally from producers in Australia, Canada, Norway, Russia, and the Dominican Republic. Zirconium raw materials are primarily purchased from the United States and China. Cobalt is purchased primarily from producers in Canada. More than 80% of the world's reserves of ferrochromium are located in South Africa, Zimbabwe, Albania, and Kazakhstan. Niobium is purchased principally from producers in Brazil, and our titanium sponge comes from sources in Japan and Kazakhstan.

Certain key supplies used in melting and other processing operations, such as graphite electrodes and industrial gases including helium and argon, are from time-to-time limited in availability and may be subject to significant price inflation. We enter into long-term supply contracts where possible to ensure an adequate supply of these items, however overall industry shortages may impact our operations and scheduling.

Export Sales and Foreign Operations

International sales represent approximately 40% of our total annual sales, with direct export sales by our U.S.-based operations to customers in foreign countries accounting for approximately 30% of our total sales. Our overseas sales, marketing and distribution efforts are aided by our international marketing and distribution offices, ATI Europe, ATI Europe Distribution, and ATI Asia, or by independent representatives at various locations throughout the world. We believe that at least 50% of ATI's 2019 sales were driven by global markets when we consider exports of our customers.

Our HPMC segment has manufacturing capabilities for melting, remelting, forging and finishing nickel-based alloys and specialty alloys in the United Kingdom, and manufacturing capabilities for precision forging and machining in Poland, primarily serving the aerospace, construction & mining and transportation markets. Within our FRP segment, our STAL joint venture in the People's Republic of China produces Precision Rolled Strip products, which enables us to offer these products more effectively to markets in China and other Asian countries. Our Uniti LLC joint venture allows us to offer titanium products to global industrial markets more effectively.

Backlog, Seasonality and Cyclical

Our backlog of confirmed orders was approximately \$2.3 billion at December 31, 2019 and \$2.2 billion at December 31, 2018. We expect that approximately 80% of confirmed orders on hand at December 31, 2019 will be filled during the year ending December 31, 2020. Our HPMC's segment backlog of confirmed orders was approximately \$2.1 billion at December 31, 2019 and \$2.0 billion at December 31, 2018. We expect that approximately 80% of the confirmed orders on hand at December 31, 2019 for this segment will be filled during the year ending December 31, 2020. Our FRP's segment backlog of confirmed orders was approximately \$0.2 billion at December 31, 2019 and 2018. We expect that all of the confirmed orders on hand at December 31, 2019 for this segment will be filled during the year ending December 31, 2020.

Demand for our products is cyclical over longer periods because specialty materials customers operate in cyclical industries and are subject to changes in general economic conditions and other factors both external and internal to those industries. The HPMC segment typically experiences modest seasonal weakness in the third quarter of each fiscal year due to many European customers, particularly in the aerospace supply chain, taking plant outages during this summer period. ATI also typically performs corresponding annual preventative maintenance outages at several facilities during this same period.

Research, Development and Technical Services

We believe that our research and development capabilities give ATI an advantage in developing new products and manufacturing processes that contribute to the long-term profitable growth potential of our businesses. We conduct research and development at our various operating locations both for our own account and, on a limited basis, for customers on a contract basis. Research and development expenditures for the years ended December 31, 2019, 2018, and 2017 included the following:

<i>(In millions)</i>	2019	2018	2017
Company-Funded:			
High Performance Materials & Components	\$ 12.3	\$ 17.6	\$ 9.3
Flat Rolled Products	3.3	2.6	2.7
Corporate	2.2	2.5	1.3
	<u>17.8</u>	<u>22.7</u>	<u>13.3</u>
Customer-Funded:			
High Performance Materials & Components	2.4	2.2	1.4
Total Research and Development	<u>\$ 20.2</u>	<u>\$ 24.9</u>	<u>\$ 14.7</u>

Our research, development and technical service activities are closely interrelated and are directed toward development of new products, improvement of existing products, cost reduction, process improvement and control, quality assurance and control, development of new manufacturing methods, and improvement of existing manufacturing methods. The increased activity in 2019 and 2018 was largely related to materials and manufacturing methods for products supporting the aerospace & defense markets.

We own hundreds of United States patents, many of which are also filed under the patent laws of other nations. Although these patents, as well as our numerous trademarks, technical information, license agreements, and other intellectual property, have been and are expected to be of value, we believe that the loss of any single such item or technically related group of such items would not materially affect the conduct of our business.

Environmental, Health and Safety Matters

We are subject to various domestic and international environmental laws and regulations that govern the discharge of pollutants and disposal of wastes, and which may require that we investigate and remediate the effects of the release or disposal of materials at sites associated with past and present operations. We could incur substantial cleanup costs, fines, civil or criminal sanctions, third party property damage or personal injury claims as a result of violations or liabilities under these laws or non-compliance with environmental permits required at our facilities. We are currently involved in the investigation and remediation of a number of our current and former sites as well as third party sites.

We consider environmental compliance to be an integral part of our operations. We have a comprehensive environmental management and reporting program that focuses on compliance with applicable federal, state, regional and local environmental laws and regulations. Each operating company has an environmental management system that includes mechanisms for regularly evaluating environmental compliance and managing changes in business operations while assessing environmental impact.

Our *Corporate Guidelines for Business Conduct and Ethics* address compliance with environmental laws as well as employment and workplace safety laws, and also describe our commitment to equal opportunity and fair treatment of employees. We continued to focus on safety across ATI's operations during 2019.

Employees

We have approximately 8,100 full-time employees, of which approximately 17% are located outside the United States. Approximately 40% of our workforce is covered by various collective bargaining agreements (CBAs), predominantly with the United Steel, Paper and Forestry, Rubber, Manufacturing, Energy, Allied & Industrial Service Workers International Union, AFL-CIO, CLC (USW). The Company has CBAs with approximately 1,500 full-time employees that expire on February 29, 2020 involving USW-represented employees located primarily within the Flat Rolled Products segment operations and at two facilities in the High Performance Materials & Components segment.

Available Information

Our Internet website address is www.atimetals.com. Our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as well as proxy and information statements and other information that we file, are available free of charge through our Internet website as soon as reasonably practicable after we electronically file such material with, or furnish such material to, the United States Securities and Exchange Commission (“SEC”). Our Internet website and the content contained therein or connected thereto are not intended to be incorporated into this Annual Report on Form 10-K. The SEC maintains an Internet website at www.sec.gov, which also contains reports, proxy and information statements and other information that we file electronically with the SEC.

Item 1A. Risk Factors

There are inherent risks and uncertainties associated with our business that could adversely affect our operating performance and financial condition. Set forth below are descriptions of those risks and uncertainties that we currently believe to be material, but the risks and uncertainties described are not the only risks and uncertainties that could affect our business. See the discussion under “Forward-Looking Statements” in Item 7. Management’s Discussion and Analysis of Financial Condition and Results of Operations, in this Annual Report on Form 10-K.

Cyclical Demand for Products. The cyclical nature of the industries in which our customers operate causes demand for our products to be cyclical, creating potential uncertainty regarding future profitability. Various changes in general economic conditions may affect the industries in which our customers operate. These changes could include decreases in the rate of consumption or use of our customers’ products due to economic downturns. Other factors that may cause fluctuation in our customers’ positions are changes in market demand, lower overall pricing due to domestic and international overcapacity, currency fluctuations, lower priced imports and increases in use or decreases in prices of substitute materials. As a result of these factors, our profitability has been and may in the future be subject to significant fluctuation.

Risks Associated with the Commercial Aerospace Industry. A significant portion of the sales of our HPMC segment represents products sold to customers in the commercial aerospace industry. Fulfilling contractual arrangements to provide various products to customers in this industry often involves meeting highly exacting performance requirements and product specifications, and our failure to meet those requirements and specifications on a timely and cost efficient basis could have a material adverse effect on our results of operations, business and financial condition. The commercial aerospace industry has historically been cyclical due to factors both external and internal to the airline industry. These factors include general economic conditions, airline profitability, consumer demand for air travel, varying fuel and labor costs, changes in projected build rates (including, e.g., the ongoing suspension in production of the Boeing 737 MAX aircraft), price competition, and international and domestic political conditions such as military conflict and the threat of terrorism. The length and degree of cyclical fluctuation are influenced by these factors and therefore are difficult to predict with certainty. Demand for our products, particularly those produced in our HPMC segment, is subject to these cyclical trends. Although the commercial aerospace industry is currently experiencing a period of production expansion related to the introduction of next-generation engines and aircraft, we cannot provide any assurance as to the ultimate magnitude or duration of this trend or its impact on our business. A downturn in the commercial aerospace industry has had, and may in the future have, an adverse effect on the prices at which we are able to sell our products, and our results of operations, business and financial condition could be materially adversely affected.

Risks Associated with the Oil & Gas Industry. The oil and gas industry, which historically has been a significant end market for both our HPMC and FRP segments, is highly cyclical and subject to volatility as a result of worldwide economic activity and associated demand for oil and natural gas, anticipated future prices for oil and natural gas, fluctuation in the level of drilling activity, changes in applicable regulation, global geopolitical conditions and numerous other factors. Demand for our products are likewise subject to these trends. In recent years, our business has been negatively impacted by the downturn and slow recovery in the oil and gas industry. While we believe that conditions in this end market are improving, and we are beginning to see positive impacts on our business as a result, we expect that it will remain a highly cyclical industry and future downturns could have an adverse effect on the prices at which we are able to sell our products, and our results of operations, business and financial condition could be materially adversely affected.

Volatility of Raw Material Costs. Most of our inventory is valued utilizing the last-in, first-out (LIFO) costing methodology. Inventory of our non-U.S. operations is valued using average cost or first-in, first-out (FIFO) methods. Under the LIFO inventory valuation method, changes in the cost of raw materials and production activities are recognized in cost of sales in the current period even though these material and other costs may have been incurred at significantly different values due to the length of time of our production cycle. In a period of rising prices, cost of sales expense recognized under LIFO is generally higher than the cash costs incurred to acquire the inventory sold. Conversely, in a period of declining raw material prices, cost of sales recognized under LIFO is generally lower than cash costs incurred to acquire the inventory sold. Generally, over time

based on overall inflationary trends in raw materials, labor and overhead costs, the use of the LIFO inventory valuation method will result in a LIFO inventory valuation reserve, as the higher current period costs are included in cost of sales and the balance sheet carrying value of inventory is reduced.

The prices for many of the raw materials we use have been volatile during the past several years. Since we value most of our inventory utilizing the LIFO inventory costing methodology, a fall in raw material costs results in a benefit to operating results by reducing cost of sales and increasing the inventory carrying value, while conversely, a rise in raw material costs has a negative effect on our operating results by increasing cost of sales while lowering the carrying value of inventory.

Due primarily to persistent raw material deflation in prior years, we are in an unusual situation of having a LIFO inventory balance that exceeds replacement cost. In cases where inventory at FIFO cost is lower than the LIFO carrying value, a write-down of the inventory to market may be required, subject to a lower of cost or market evaluation. In applying the lower of cost or market principle, market means current replacement cost, subject to a ceiling (market value shall not exceed net realizable value) and a floor (market shall not be less than net realizable value reduced by an allowance for a normal profit margin). We evaluate product lines on a quarterly basis to identify inventory values that exceed estimated net realizable value. The calculation of a resulting reserve, if any, is recognized as an expense in the period that the need for the reserve is identified.

Due to the long lead times required to manufacture many of our products, volatility in raw material prices exposes us to cash costs that may not be fully recovered through surcharge and index pricing mechanisms.

Product Pricing. From time-to-time, reduced demand, intense competition and excess manufacturing capacity have resulted in reduced prices, excluding raw material surcharges, for many of our products. These factors have had and may have an adverse impact on our revenues, operating results and financial condition.

Although inflationary trends in recent years have been moderate, during most of the same period, certain critical raw material costs, such as nickel, titanium sponge, cobalt, chromium, and molybdenum and scrap containing iron, nickel, titanium, chromium, and molybdenum have been volatile. While we have been able to mitigate some of the adverse impact of volatile raw material costs through raw material surcharges or indices to customers, rapid changes in raw material costs causes volatility in, and may adversely affect, our results of operations.

We change prices on certain of our products from time-to-time. The ability to implement price increases is dependent on market conditions, economic factors, raw material costs and availability, competitive factors, operating costs and other factors, some of which are beyond our control. The benefits of any price increases may be delayed due to long manufacturing lead times and the terms of existing contracts.

Export Sales and International Trade Matters. We believe that export sales will continue to account for a significant percentage of our future revenues. We also import certain raw materials, and recently formed, together with an affiliate company of Tsingshan Group, our A&T Stainless joint venture, which imports semi-finished stainless steel slab products from Indonesia to support its U.S. production of finished 60-inch wide stainless steel sheet products for sale in North America. Risks associated with such international trade include, among others: political and economic instability, including weak conditions in the world's economies; accounts receivable collection; export controls; trade sanctions, changes in legal and regulatory requirements; policy changes affecting the markets for our products; changes in tax laws; and exchange rate fluctuations (which may affect sales to international customers and the value of profits earned on export sales when converted into dollars). Any of these factors could materially adversely affect our results for the period in which they occur.

Additionally, changes in international trade duties and other aspects of international trade policy, both in the U.S. and abroad, could materially impact our business. For example, in March 2018, the U.S. imposed an additional 25% tariff under Section 232 of the Trade Expansion Act of 1962, as amended, on steel products, including stainless steel, imported into the U.S. Currently, the semi-finished stainless steel slabs that our A&T Stainless joint venture imports from Indonesia are subject to the additional tariff. The A&T Stainless joint venture filed for exclusions from the 232 tariff based on the nature of the imported product, its country of origin, and its lack of availability in the U.S. However, in April 2019, the U.S. Commerce Department denied the joint venture's original exclusion request. On October 15, 2019, the A&T Stainless joint venture filed a new exclusion request, but that request remains pending. Consequently the joint venture continues to be subject to the 25% tariff levied on its imports of semi-finished stainless steel slab products from Indonesia, which are continuing to negatively impact the joint venture's results. There can be no assurance that the joint venture will be successful in its efforts to obtain an exclusion for the products that it intends to import, or that its operations and results will not continue to be impacted by the imposition of these tariffs. For the fourth quarter of 2019, ATI recorded an \$11.4 million impairment charge for the A&T Stainless joint venture, including ATI's share of a long-lived asset impairment charge recognized by the joint venture on the carrying value of its production facility in Midland, PA.

Moreover, these new tariffs, or other changes in U.S. trade policy, have resulted in, and may continue to trigger, retaliatory actions by affected countries. Certain foreign governments have instituted or are considering imposing trade sanctions on certain U.S. goods. Others are considering the imposition of sanctions that will deny U.S. companies access to critical raw materials. A “trade war” of this nature or other governmental action related to tariffs or international trade agreements or policies has the potential to adversely impact demand for our products, our costs, customers, suppliers and/or the U.S. economy or certain sectors thereof and, thus, to adversely impact our businesses.

Goodwill or Long-Lived Asset Impairments. We have various long-lived assets that are subject to impairment testing. We review the recoverability of goodwill annually, or more frequently whenever significant events or changes in circumstances indicate that the recorded goodwill of a reporting unit may be below that reporting unit’s fair value. Our businesses operate in highly cyclical industries, such as commercial aerospace and oil & gas, and as such, our estimates of future cash flows, market demand, the cost of capital, and forecasted growth rates and other factors may fluctuate, which may lead to changes in estimated fair value and, therefore, impairment charges in future periods. For the 2019 annual goodwill impairment evaluation, both of our reporting units with goodwill had fair values that were significantly in excess of carrying value. Additionally, we have a significant amount of property, plant and equipment and acquired intangible assets that may be subject to impairment testing, depending on factors such as market conditions, the demand for our products, and facility utilization levels. Any determination requiring the impairment of a significant portion of goodwill or other long-lived assets has had, and may in the future have, a negative impact on our financial condition and results of operations.

Risks Associated with Strategic Capital Projects and Maintenance Activities. From time-to-time, we undertake strategic capital projects in order to enhance, expand and/or upgrade our facilities and operational capabilities. Our ability to achieve the anticipated increased revenues or otherwise realize acceptable returns on these investments or other strategic capital projects that we may undertake is subject to a number of risks, many of which are beyond our control, including a variety of market, operational, permitting, and labor-related factors. In addition, the cost to implement any given strategic capital project ultimately may prove to be greater than originally anticipated. If we are not able to achieve the anticipated results from the implementation of any of our strategic capital projects, or if we incur unanticipated implementation costs or delays, our results of operations and financial position may be materially adversely affected.

Additionally, we periodically undertake maintenance activities, routine or otherwise, involving facilities and pieces of equipment that are key to our operations, and it is possible that unanticipated maintenance needs, or unanticipated circumstances arising in connection with planned maintenance activities could result in equipment outages that are longer, or costs that exceed, those originally anticipated. Significant repair delays or unanticipated costs associated with these activities could have a negative impact on our results of operations and financial condition.

Dependence on Critical Raw Materials Subject to Price and Availability Fluctuations. We rely to a substantial extent on third parties to supply certain raw materials that are critical to the manufacture of our products. Purchase prices and availability of these critical items are subject to volatility. At any given time, we may be unable to obtain an adequate supply of these critical raw materials on a timely basis, on price and other terms acceptable to us, or at all.

If suppliers increase the price of critical raw materials, we may not have alternative sources of supply. In addition, to the extent that we have quoted prices to customers and accepted customer orders for products prior to purchasing necessary raw materials, or have existing contracts, we may be unable to raise the price of products to cover all or part of the increased cost of the raw materials.

The manufacture of some of our products is a complex process and requires long lead times. As a result, we may experience delays or shortages in the supply of raw materials. If unable to obtain adequate and timely deliveries of required raw materials, we may be unable to timely manufacture sufficient quantities of products. This could cause us to lose sales, incur additional costs, delay new product introductions, or suffer harm to our reputation.

We acquire certain important raw materials that we use to produce specialty materials, including nickel, zirconium, niobium, chromium, cobalt, and titanium sponge, from foreign sources. Some of these sources operate in countries that may be subject to unstable political and economic conditions. These conditions may disrupt supplies or affect the prices of these materials.

Dependence on Critical Supplies Subject to Price and Availability Fluctuations. We rely on third parties for certain supplies, such as graphite electrodes and industrial gases including helium and argon that are critical to the manufacture of our products. Purchase prices and availability of these critical items are subject to volatility. At any given time, we may be unable to obtain an adequate supply of these critical supplies on a timely basis, on price and other terms acceptable to us, or at all.

If suppliers increase the price of these items, we may not have alternative sources of supply. The manufacture of some of our products is a complex process and requires long lead times. As a result, we may experience delays or shortages of critical supplies. If unable to obtain adequate and timely deliveries of required raw materials, we may be unable to timely manufacture

sufficient quantities of products. This could cause us to lose sales, incur additional costs, delay new product introductions, or suffer harm to our reputation.

Availability of Energy Resources. We rely upon third parties for our supply of energy resources consumed in the manufacture of our products. The prices for and availability of electricity, natural gas, oil and other energy resources are subject to volatile market conditions. These market conditions often are affected by political and economic factors beyond our control. Disruptions in the supply of energy resources could temporarily impair our ability to manufacture products for customers. Further, increases in energy costs, or changes in costs relative to energy costs paid by competitors, has and may continue to adversely affect our profitability. To the extent that these uncertainties cause suppliers and customers to be more cost sensitive, increased energy prices may have an adverse effect on our results of operations and financial condition.

Risks Associated with Environmental Matters. We are subject to various domestic and international environmental laws and regulations that govern the discharge of pollutants and disposal of wastes, and which may require that we investigate and remediate the effects of the release or disposal of materials at sites associated with past and present operations. We could incur substantial cleanup costs, fines and civil or criminal sanctions, third party property damage or personal injury claims as a result of violations or liabilities under these laws or non-compliance with environmental permits required at our facilities. We are currently involved in the investigation and remediation of a number of our current and former sites as well as third party sites. We also could be subject to future laws and regulations that govern greenhouse gas emissions and various matters related to climate change and other air emissions, which could increase our operating costs.

With respect to proceedings brought under the federal Superfund laws, or similar state statutes, we have been identified as a potentially responsible party (PRP) at approximately 42 of such sites, excluding those at which we believe we have no future liability. Our involvement is limited or de minimis at approximately 34 of these sites, and the potential loss exposure with respect to 8 individual sites is not considered to be material.

We are a party to various cost-sharing arrangements with other PRPs at many of the sites. The terms of the cost-sharing arrangements are subject to non-disclosure agreements as confidential information. Nevertheless, the cost-sharing arrangements generally require all PRPs to post financial assurance of the performance of the obligations or to pre-pay into an escrow or trust account their share of anticipated site-related costs. In addition, the Federal government, through various agencies, is a party to several such arrangements.

We believe that we operate our businesses in compliance in all material respects with applicable environmental laws and regulations. However, from time-to-time, we are a party to lawsuits and other proceedings involving alleged violations of, or liabilities arising from, environmental laws. When our liability is probable and we can reasonably estimate our costs, we record environmental liabilities in our financial statements. In many cases, we are not able to determine whether we are liable or if liability is probable or to reasonably estimate the loss or range of loss. Estimates of our liability remain subject to additional uncertainties, including the nature and extent of site contamination, available remediation alternatives, the extent of corrective actions that may be required, and the participation number and financial condition of other PRPs, as well as the extent of their responsibility for the remediation. We intend to adjust our accruals to reflect new information as appropriate. Future adjustments could have a material adverse effect on our results of operations in a given period, but we cannot reliably predict the amounts of such future adjustments. At December 31, 2019, our reserves for environmental matters totaled approximately \$18 million. Based on currently available information, we do not believe that there is a reasonable possibility that a loss exceeding the amount already accrued for any of the sites with which we are currently associated (either individually or in the aggregate) will be an amount that would be material to a decision to buy or sell our securities. Future developments, administrative actions or liabilities relating to environmental matters, however, could have a material adverse effect on our financial condition or results of operations.

Risks Associated with Current or Future Litigation and Claims. A number of lawsuits, claims and proceedings have been or may be asserted against us relating to the conduct of our currently and formerly owned businesses, including those pertaining to product liability, patent infringement, commercial disputes, government contracting, employment matters, employee and retiree benefits, taxes, environmental matters, health and safety and occupational disease, and stockholder and corporate governance matters. Due to the uncertainties of litigation, we can give no assurance that we will prevail on all claims made against us in the lawsuits that we currently face or that additional claims will not be made against us in the future. While the outcome of litigation cannot be predicted with certainty, and some of these lawsuits, claims or proceedings may be determined adversely to us, we do not believe that the disposition of any such pending matters is likely to have a material adverse effect on our financial condition or liquidity, although the resolution in any reporting period of one or more of these matters could have a material adverse effect on our results of operations for that period. Also, we can give no assurance that any other claims brought in the future will not have a material effect on our financial condition, liquidity or results of operations.

Labor Matters. We have approximately 8,100 full-time employees, of which approximately 17% are located outside the United States. Approximately 40% of our workforce is covered by various CBAs, predominantly with the USW. At various times, our CBAs expire and are subject to renegotiation. We currently are involved in negotiation on our next significant CBA, which expires February 29, 2020 involving approximately 1,500 USW-represented full-time employees located primarily within the FRP segment operations and at two facilities in the HPMC segment. Generally, collective bargaining agreements that expire may be terminated after notice by the union. After termination, the union may authorize a strike. A labor dispute, which could lead to a strike, lockout, or other work stoppage by the employees covered by one or more of the collective bargaining agreements, could have a material adverse effect on production at one or more of our facilities and, depending upon the length of such dispute or work stoppage, on our operating results. There can be no assurance that we will succeed in concluding collective bargaining agreements to replace those that expire.

Export Sales. We believe that export sales will continue to account for a significant percentage of our future revenues. Risks associated with export sales include: political and economic instability, including weak conditions in the world's economies; accounts receivable collection; export controls; changes in legal and regulatory requirements; policy changes affecting the markets for our products; changes in tax laws and tariffs; trade duties; and exchange rate fluctuations (which may affect sales to international customers and the value of profits earned on export sales when converted into dollars). Any of these factors could materially adversely affect our results for the period in which they occur.

Risks Associated with Indebtedness. Our substantial indebtedness could adversely affect our business, financial condition or results of operations and prevent us from fulfilling our obligations under our outstanding indebtedness. As of December 31, 2019, our total consolidated indebtedness was approximately \$1.4 billion. This substantial level of indebtedness increases the risk that we may be unable to generate enough cash to pay amounts due in respect of our indebtedness. Our substantial indebtedness could have important consequences to our stockholders and significant effects on our business. For example, it could:

- make it more difficult for us to satisfy our obligations with respect to our outstanding indebtedness;
- increase our vulnerability to general adverse economic and industry conditions;
- require us to dedicate a substantial portion of our cash flow from operations to payments on our indebtedness, thereby reducing the availability of our cash flow to fund working capital, capital expenditures, our strategic growth initiatives and development efforts and other general corporate purposes;
- limit our flexibility in planning for, or reacting to, changes in our business and the industry in which we operate;
- restrict us from taking advantage of business opportunities;
- place us at a competitive disadvantage compared to our competitors that have less indebtedness; and
- limit our ability to borrow additional funds for working capital, capital expenditures, acquisitions, debt service requirements, execution of our business strategy or other general corporate purposes.

In addition, the agreements that govern our current indebtedness contain, and the agreements that may govern any future indebtedness that we may incur may contain, financial and other restrictive covenants that could limit our ability to engage in activities that may be in our long-term best interests. Our failure to comply with those covenants could result in an event of default that, if not cured or waived, could result in the acceleration of all of our debt.

In addition, our variable rate indebtedness, including loans outstanding from time to time under our Asset Based Lending (ABL) Credit Facility, may use London Interbank Offering Rate ("LIBOR") as a benchmark for establishing the rate. In 2017, the United Kingdom's Financial Conduct Authority announced that it intends to stop persuading or compelling banks to submit LIBOR rates after 2021. It is expected that most, if not all, banks currently reporting information to set LIBOR will stop doing so at such time, which could either cause LIBOR publication to stop immediately or cause LIBOR's regulator to announce the discontinuation of its publication. During any such transition period, LIBOR may perform differently than in the past. Consequently, LIBOR has been the subject of recent regulatory guidance and proposals for reform that could result in changes to the method by which LIBOR is calculated or in the use of alternate reference rates. Our ABL credit facility includes provisions intended to provide for such transitions, but the potential consequences of these changes cannot be fully predicted and could impact the cost of our variable rate indebtedness or the cost or value of other financial obligations or extensions of credit held by or due to us from time to time, which could adversely affect our financial condition.

Risks Associated with Retirement Benefits. At December 31, 2019, our U.S. qualified defined benefit pension plans were approximately 73% funded as calculated in accordance with U.S. generally accepted accounting principles. Based upon current regulations and actuarial studies, we expect to make approximately \$130 million in cash contributions to the U.S. qualified defined benefit pension plans in 2020, and we currently expect to have average annual funding requirements of approximately \$85 million for the next few years thereafter for these plans, using a 7.16% weighted average expected rate of return on pension plan assets. However, these estimates are subject to significant uncertainty, including the performance of our pension trust assets. Depending on the timing and amount, a requirement that we fund the U.S. qualified defined benefit pension plans could have a material adverse effect on our results of operations and financial condition.

Risks Associated with Acquisition and Disposition Strategies. We intend to continue to strategically position our businesses in order to improve our ability to compete. Strategies we employ to accomplish this may include seeking new or expanding existing specialty market niches for our products, expanding our global presence, acquiring businesses complementary to existing strengths, and continually evaluating the performance and strategic fit of our existing business units. From time-to-time, management holds discussions with management of other companies to explore acquisitions, joint ventures, and other business combination opportunities as well as possible business unit dispositions. As a result, the relative makeup of the businesses comprising our Company is subject to change. Acquisitions, joint ventures, and other business combinations involve various inherent risks, such as: assessing accurately the value, strengths, weaknesses, contingent and other liabilities and potential profitability of acquisition or other transaction candidates; the potential loss of key personnel of an acquired business; our ability to achieve identified financial and operating synergies, growth or other benefits anticipated to result from an acquisition or other transaction; and unanticipated changes in business and economic conditions affecting an acquisition or other transaction. International acquisitions and other transactions could be affected by export controls, exchange rate fluctuations, domestic and foreign political conditions, changes in tax laws and a deterioration in domestic and foreign economic conditions.

Risks Associated with Information Technology. Information technology infrastructure is critical to supporting business objectives; failure of our information technology infrastructure to operate effectively could adversely affect our business. We depend heavily on information technology infrastructure to achieve our business objectives. If a problem occurs that impairs this infrastructure, the resulting disruption could impede our ability to record or process orders, manufacture and ship in a timely manner, or otherwise carry on business in the normal course. Any such events could cause us to lose customers or revenue and could require us to incur significant expense to remediate.

As we integrate, implement and deploy new information technology processes and information infrastructure across our operations, we could experience disruptions in our business that could have an adverse effect on our business, financial condition, results of operations and cash flow.

Cyber Security Threats. Increased global information technology threats, vulnerabilities, and a rise in sophisticated and targeted international computer crime pose a risk to the security of our systems and networks and the confidentiality, availability and integrity of our data. We believe that ATI faces the threat of such cyber attacks due to the markets we serve, the products we manufacture, the locations of our operations, and global interest in our technology. Due to the evolving nature of cyber security threats, the scope and impact of any incident cannot be predicted. We continually work to strengthen our threat countermeasures, safeguard our systems and mitigate potential risks. Despite our efforts to fortify our cyber security and protect sensitive information and confidential and personal data, our facilities and systems and those of our third-party service providers may be vulnerable to security breaches. This could lead to disclosure, modification or destruction of proprietary and other key information, production downtimes, operational disruptions, and remediation costs, which in turn could adversely affect our reputation, competitiveness and results of operations.

Internal Controls Over Financial Reporting. Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Insurance. We have maintained various forms of insurance, including insurance covering claims related to our properties and risks associated with our operations. Our existing property and liability insurance coverages contain exclusions and limitations on coverage. From time-to-time, in connection with renewals of insurance, we have experienced additional exclusions and limitations on coverage, larger self-insured retentions and deductibles, and significantly higher premiums. As a result, in the future our insurance coverage may not cover claims to the extent that it has in the past and the costs that we incur to procure insurance may increase significantly, either of which could have an adverse effect on our results of operations.

Global Health Crises. Our business could be adversely affected by the effects of a widespread outbreak of contagious disease, including the recent outbreak of respiratory illness caused by a novel coronavirus first identified in Wuhan, Hubei Province, China, which, among other impacts and potential impacts, has directly impacted our STAL joint venture operations located in Shanghai. Any widespread outbreak of contagious diseases, and other adverse public health developments, could have a material and adverse effect on our business operations. These could include disruptions or restrictions on our ability to travel or to distribute our products, as well as temporary closures of our facilities or the facilities of our suppliers or customers, which could impact our sales and operating results. In addition, a significant outbreak of contagious diseases in the human population could result in a widespread health crisis that could adversely affect the economies and financial markets of many countries, resulting in an economic downturn that could affect demand for our products and likely impact our operating results.

Political and Social Turmoil. The war on terrorism as well as political and social turmoil could put pressure on economic conditions in the United States and worldwide. These political, social and economic conditions could make it difficult for us, our suppliers, and our customers to forecast accurately and plan future business activities, and could adversely affect the financial condition of our suppliers and customers and affect customer decisions as to the amount and timing of purchases from us. As a result, our business, financial condition and results of operations could be materially adversely affected.

Risks Associated with Government Contracts. Some of our operating units perform contractual work directly or indirectly for the U.S. Government, which requires compliance with laws and regulations relating to the performance of Government contracts. Various claims (whether based on U.S. Government or Company audits and investigations or otherwise) could be asserted against us related to our U.S. Government contract work. Depending on the circumstances and the outcome, such proceedings could result in fines, penalties, compensatory and treble damages or the cancellation or suspension of payments under one or more U.S. Government contracts. Under government regulations, a company, or one or more of its operating divisions or units, can also be suspended or debarred from government contracts based on the results of investigations.

Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

Our principal domestic facilities for our HPMC segment include melting operations and production facilities that perform processing and finishing operations. Domestic melting operations are located in Monroe and Bakers, NC, and Lockport, NY (vacuum induction melting, vacuum arc re-melt, electro-slag re-melt, plasma melting), Richland, WA (electron beam melting), and Albany, OR (vacuum arc re-melt). Production of high performance materials, most of which are in long product form, takes place at our domestic facilities in Monroe and Bakers, NC, Lockport, NY, Richburg, SC, Albany, OR, and Oakdale, PA. Our production of zirconium and related specialty alloys takes place at facilities located in Millersburg, OR and Huntsville, AL. Our production of highly engineered forgings and machined components takes place at facilities in Cudahy and Coon Valley, WI, East Hartford, CT, Irvine, CA, Billerica, MA, and Salem, OR. Metal alloy-based additive manufacturing for the aerospace and defense industries takes place in New Britain, CT.

Our principal domestic locations for melting stainless steel and other flat-rolled specialty materials are located in Brackenridge and Latrobe, PA. Hot-rolling is performed at our domestic facilities in Brackenridge and Washington, PA. Finishing of our flat-rolled products takes place at our domestic facilities located in Brackenridge, Vandergrift, Washington, Rochester, Monaca, and Zelienople, PA, and in Waterbury, CT, New Bedford, MA, Louisville, OH, and Bridgeview, IL. Substantially all of our properties are owned.

We also own or lease facilities in a number of foreign countries, including France, Germany, the United Kingdom, Poland, and the People's Republic of China. We own and/or lease and operate facilities for melting and re-melting, machining and bar mill operations, laboratories and offices located in Sheffield, England. We own highly engineered forging and machining operations in Stalowa Wola, Poland. Through our STAL joint venture, we operate facilities for finishing Precision Rolled Strip products in the Xin-Zhuang Industrial Zone, Shanghai, China.

Our executive offices, located in PPG Place in Pittsburgh, PA, are leased.

Although our facilities vary in terms of age and condition, we believe that they have been well maintained and are in sufficient condition for us to carry on our activities.

Item 3. Legal Proceedings

From time-to-time, we become involved in various lawsuits, claims and proceedings relating to the conduct of our current and formerly owned businesses, including those pertaining to product liability, environmental, health and safety matters and occupational disease (including as each relates to alleged asbestos exposure), as well as patent infringement, commercial, government contracting, construction, employment, employee and retiree benefits, taxes, environmental, and stockholder and corporate governance matters. While we cannot predict the outcome of any lawsuit, claim or proceeding, our management believes that the disposition of any pending matters is not likely to have a material adverse effect on our financial condition or liquidity. The resolution in any reporting period of one or more of these matters, including those described above, however, could have a material adverse effect on our results of operations for that period.

Information relating to legal proceedings is included in Note 21. Commitments and Contingencies of the Notes to Consolidated Financial Statements and incorporated herein by reference.

Allegheny Technologies Incorporated and its subsidiary, ATI Titanium LLC (“ATI Titanium”), are parties to a lawsuit captioned US Magnesium, LLC v. ATI Titanium LLC (Case No. 2:17-cv-00923-DB) and filed in federal district court in Salt Lake City, UT, pertaining to a Supply and Operating Agreement between US Magnesium LLC (“USM”) and ATI Titanium entered into in 2006 (the “Supply Agreement”). In 2016, ATI Titanium notified USM that it would suspend performance under the Supply Agreement in reliance on certain terms and conditions included in the Supply Agreement. USM subsequently filed a claim challenging ATI Titanium’s right to suspend performance under the Supply Agreement, claiming that such suspension was a material breach of the Supply Agreement and seeking monetary damages, and ATI Titanium filed a counterclaim for breach of contract against USM. In 2018, USM obtained leave of the court to add Allegheny Technologies Incorporated as a separate party defendant, and ATI Titanium filed a motion to dismiss the claim against Allegheny Technologies Incorporated, which the court denied on April 19, 2019. The case is proceeding through discovery, and while ATI intends to vigorously defend against and pursue these claims, it cannot predict their outcomes at this time.

Item 4. Mine Safety Disclosures

Not applicable.

PART II

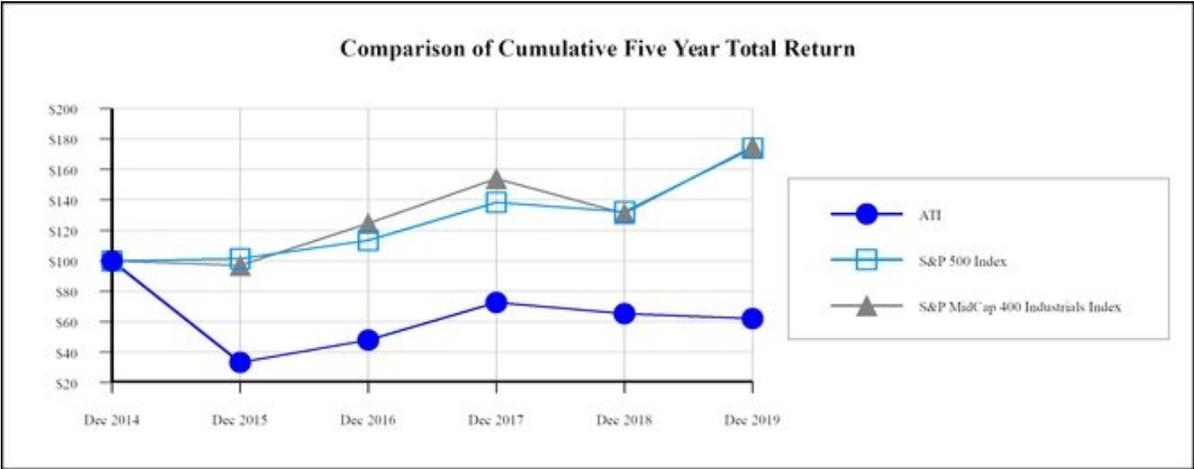
Item 5. Market for the Registrant’s Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities

Common Stock Prices

Our common stock is traded on the New York Stock Exchange (symbol ATI). At February 6, 2020, there were 2,953 record holders of Allegheny Technologies Incorporated common stock. We paid no cash dividends during 2019, 2018 or 2017. Effective with the fourth quarter of 2016, our Board of Directors decided to suspend the quarterly dividend. The payment of dividends and the amount of such dividends depends upon matters deemed relevant by our Board of Directors, such as our results of operations, financial condition, cash requirements, future prospects, any limitations imposed by law, credit agreements or senior securities, and other factors deemed relevant and appropriate. Our Asset Based Lending (ABL) Credit Facility restricts our ability to pay dividends in certain circumstances. For more information on the restrictions under our ABL facility, see Item 7. “Management’s Discussion and Analysis of Financial Condition and Results of Operations - Financial Condition and Liquidity - Dividends.”

Cumulative Total Stockholder Return

The graph set forth below shows the cumulative total stockholder return (i.e., price change plus reinvestment of dividends) on our common stock from December 31, 2014 through December 31, 2019, as compared to the S&P 500 Index and the S&P MidCap 400 Industrials Index. The graph assumes that \$100 was invested on December 31, 2014. The stock performance information included in this graph is based on historical results and is not necessarily indicative of future stock price performance.



Company / Index	Dec 2014	Dec 2015	Dec 2016	Dec 2017	Dec 2018	Dec 2019
ATI	100.00	33.26	47.86	72.53	65.41	62.08
S&P 500 Index	100.00	101.38	113.51	138.29	132.23	173.86
S&P MidCap 400 Industrials Index	100.00	96.87	124.70	154.05	131.12	175.11

Source: Standard & Poor's

Item 6. Selected Financial Data

(In millions)

For the Years Ended December 31,	2019	2018	2017	2016	2015
Revenue by Market:					
Aerospace & Defense	\$ 2,130.4	\$ 1,965.5	\$ 1,718.1	\$ 1,590.4	\$ 1,514.0
Oil & Gas	510.6	546.2	418.2	280.8	538.0
Automotive	296.6	323.4	273.7	232.8	293.8
Energy	286.3	234.5	192.2	232.6	368.1
Food Equipment & Appliances	205.8	244.9	226.0	172.2	217.3
Construction/Mining	195.0	226.0	192.9	160.6	226.3
Medical	172.4	183.1	183.0	195.8	220.7
Electronics/Communication/Computers	163.2	156.9	151.6	109.7	126.4
Other	162.2	166.1	169.4	159.7	215.0
Total	\$ 4,122.5	\$ 4,046.6	\$ 3,525.1	\$ 3,134.6	\$ 3,719.6

(In millions, except per share amounts)

For the Years Ended December 31,	2019	2018	2017	2016	2015
Results of Operations:					
Sales:					
High Performance Materials & Components	\$ 2,398.1	\$ 2,334.2	\$ 2,067.4	\$ 1,930.4	\$ 1,985.9
Flat Rolled Products	1,724.4	1,712.4	1,457.7	1,204.2	1,733.7
Total Sales	\$ 4,122.5	\$ 4,046.6	\$ 3,525.1	\$ 3,134.6	\$ 3,719.6
Segment operating profit (loss):					
High Performance Materials & Components	\$ 343.1	\$ 335.4	\$ 246.4	\$ 168.7	\$ 157.1
Flat Rolled Products	37.6	77.8	37.0	(163.0)	(241.9)
Total segment operating profit (loss)	\$ 380.7	\$ 413.2	\$ 283.4	\$ 5.7	\$ (84.8)
Income (loss) before income taxes	\$ 241.6	\$ 247.7	\$ (86.5)	\$ (734.0)	\$ (478.0)
Income tax provision (benefit)	(28.5)	11.0	(6.8)	(106.9)	(112.1)
Net income (loss)	270.1	236.7	(79.7)	(627.1)	(365.9)
Less: Net income attributable to noncontrolling interests	12.5	14.3	12.2	13.8	12.0
Net income (loss) attributable to ATI	\$ 257.6	\$ 222.4	\$ (91.9)	\$ (640.9)	\$ (377.9)
Basic net income (loss) attributable to ATI per common share					
	\$ 2.05	\$ 1.78	\$ (0.83)	\$ (5.97)	\$ (3.53)
Diluted net income (loss) attributable to ATI per common share					
	\$ 1.85	\$ 1.61	\$ (0.83)	\$ (5.97)	\$ (3.53)

(In millions, except per share amounts and ratios)

As of and for the Years Ended December 31,	2019	2018	2017	2016	2015
Working capital	\$ 1,453.8	\$ 1,409.8	\$ 1,203.1	\$ 1,057.8	\$ 1,181.1
Total assets	5,634.6	5,501.8	5,185.4	5,170.0	5,751.7
Long-term debt	1,387.4	1,535.5	1,530.6	1,771.9	1,491.8
Total debt	1,398.9	1,542.1	1,540.7	1,877.0	1,495.7
Cash and cash equivalents	490.8	382.0	141.6	229.6	149.8
Total ATI Stockholders' equity	2,090.1	1,885.7	1,739.4	1,355.2	2,082.8
Noncontrolling interests	103.1	105.9	105.1	89.6	101.6
Total Stockholders' equity	2,193.2	1,991.6	1,844.5	1,444.8	2,184.4
Dividends declared per common share	\$ —	\$ —	\$ —	\$ 0.24	\$ 0.62

The information presented in Selected Financial Data should be read in conjunction with the information provided in Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations, and in Item 8. Financial Statements and Supplementary Data.

Results of operations include the following items for the years indicated:

2019: Results include a \$91.7 million pre-tax gain on the sale of oil and gas rights in New Mexico, an \$8.1 million pre-tax loss on the sale of two non-core forging facilities, a \$6.2 million pre-tax gain on the sale of the Cast Products business, a \$4.5 million pre-tax restructuring charge to streamline ATI's salaried workforce, a \$21.6 million pre-tax debt extinguishment charge for the full redemption of the \$500 million, 5.95% Senior Notes due 2021 (2021 Notes), and an \$11.4 million pre-tax joint venture impairment charge related to the A&T Stainless joint venture. 2019 results also include a \$41.9 million net discrete tax benefit primarily related to the reversal of a substantial portion of our deferred tax valuation allowances.

2018: Results include a \$15.9 million pre-tax gain on the sale of a 50% noncontrolling interest and subsequent deconsolidation of the A&T Stainless joint venture in March 2018.

2017: Results include a \$114.4 million pre-tax goodwill impairment charge, a \$37.0 million pre-tax debt extinguishment charge for the full redemption of the \$350.0 million, 9.375% Senior Notes due 2019 (2019 Notes), and \$4.1 million of tax benefits from the 2017 Tax Cuts and Jobs Act legislation.

2016: Results include \$538.5 million of pre-tax restructuring and other charges, primarily related to the indefinite idling of the Rowley, UT titanium sponge production facility. 2016 results also include \$171.5 million in deferred tax valuation allowances which reduced the income tax benefit.

2015: Results include \$131.5 million of pre-tax net realizable value inventory reserves, which are required to offset ATI's aggregate net debit LIFO inventory balance that exceeds current inventory replacement cost, \$216.3 million of pre-tax goodwill impairment, restructuring and inventory revaluation charges, and \$74.5 million of deferred tax valuation allowances, which reduced the income tax benefit.

Total debt in 2019 reflects the issuance of \$350 million of 5.875% Senior Notes due 2027, the proceeds of which were used, along with cash on hand, to redeem the \$500 million 2021 Notes. Total debt in 2017 reflects the redemption of all \$350 million aggregate principal amount of our 9.375% Senior Notes due 2019 (2019 Notes). In 2016, we issued \$287.5 million of 4.75% Convertible Senior Notes due 2022, and added a \$100 million term loan to our asset based lending facility. A portion of the convertible note proceeds were used to make \$250 million in contributions to the U.S. qualified defined benefit pension plan in 2016 and 2017.

Total ATI stockholders' equity in 2018 includes a \$15.5 million increase to retained earnings for the cumulative effect of adoption of ASC 606, Revenue from Contracts with Customers. (see Note 2 in Item 8. "Financial Statements and Supplementary Data" for further explanation). Total ATI stockholders' equity in 2017 increased due to our issuance of 17 million shares of common stock at \$24.00 per share before expenses in an underwritten registered public offering. This offering resulted in proceeds of \$397.8 million, net of transaction costs, which were used to redeem all of ATI's outstanding 2019 Notes. Stockholders' equity changes include net decreases of \$139.8 million, \$141.4 million, \$42.7 million, \$60.6 million, and \$69.6 million for 2019, 2018, 2017, 2016, and 2015, respectively, related to remeasurements of ATI's retirement

benefit obligations. In addition, ATI stockholders' equity for 2019, 2018, 2017 and 2016 included a \$7.8 million increase, a \$20.5 million decrease, a \$16.8 million increase and a \$45.6 million decrease, respectively, from income tax valuation allowances on amounts recorded in other comprehensive income.

Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations

Certain statements contained in this Management's Discussion and Analysis of Financial Condition and Results of Operations are forward-looking statements. Actual results or performance could differ materially from those encompassed within such forward-looking statements as a result of various factors, including those described below. Net income and net income per share amounts referenced below are attributable to Allegheny Technologies Incorporated and Subsidiaries. The following discussion on the Company's results of operations, financial condition and liquidity for fiscal year 2019 as compared to 2018 is presented. Information on the Company's results of operations, financial condition and liquidity for fiscal year 2018 as compared to 2017 is included in our Annual Report on Form 10-K in Item 7. "Management's Discussion and Analysis of Financial Condition and Results of Operations" filed on February 28, 2019 and is incorporated herein by reference.

ATI Overview

ATI is a global manufacturer of technically advanced specialty materials and complex components. Our largest markets are aerospace & defense, representing approximately 50% of total sales, led by products for jet engines. Additionally, we have a strong presence in the oil & gas and electrical energy markets. In aggregate, these markets represent about 70% of our revenue. ATI is a market leader in manufacturing differentiated products that require our materials science capabilities and unique process technologies, including our new product development competence.

We operate in two business segments: High Performance Materials & Components (HPMC), and Flat Rolled Products (FRP). Over 75% of 2019 HPMC business segment sales were to the aerospace & defense markets, and nearly half of HPMC's total sales are products for commercial jet engines. Increasing demand for commercial aerospace products has been the main source of sales and segment operating profit growth for HPMC over the last few years, and is expected to continue to drive HPMC and overall ATI results for the next several years. Other major HPMC end markets include medical and electrical energy. HPMC produces a wide range of high performance materials, parts and components, and advanced metallic powder alloys made from titanium and titanium-based alloys, nickel-based alloys and superalloys, and a variety of other specialty materials. Capabilities range from cast/wrought and powder alloy development to final production of highly engineered finished components, including those used for next-generation jet engine forgings and 3D-printed aerospace products.

The FRP segment serves a diverse group of end markets, with sales to the oil & gas market and aerospace & defense markets collectively representing over 40% of 2019 sales. Other important end markets for FRP include automotive, food processing equipment and appliances, consumer electronics, and construction & mining. FRP produces nickel-based alloys, specialty alloys, and titanium and titanium-based alloys, and stainless steel products in a variety of forms including plate, sheet, engineered strip, and Precision Rolled Strip products.

Overview of 2019 Financial Performance

Sales in 2019 increased 2%, to \$4.12 billion, despite a 2% negative impact due to the sale of two non-core businesses during the second and third quarters, and gross profit increased 1%, to \$638 million, compared to 2018. Income before taxes in 2019 included \$90 million of gains on sales of non-core assets, \$22 million in debt extinguishment charges, and \$16 million in restructuring and impairment charges. Results in 2019 also reflect a \$29 million net tax benefit primarily related to the reversal of most of our deferred tax valuation allowances. Net income in 2019 was \$258 million, or \$1.85 per share, a 15% increase in per-share results over 2018. In 2019, we generated strong cash flow from operating activities as well as from non-core asset sales, enabling continued progress on our strategic initiatives while maintaining strong liquidity.

Revenues in our largest end markets, aerospace & defense, increased \$165 million, or 8%, over 2018, and represented 52% of our 2019 sales, despite a 3% negative impact from business divestitures. International sales, including both U.S. exports and foreign sales from our foreign manufacturing operations, were \$1.67 billion in 2019 and represented 40% of total sales.

A summary of our results is as follows.

<i>(Dollars in millions, except per share amounts)</i>	2019	2018
Sales	\$ 4,122.5	\$ 4,046.6
Gross profit	\$ 637.8	\$ 630.3
Gross profit % of sales	15.5%	15.6%
Income before income taxes	\$ 241.6	\$ 247.7
Net income	\$ 257.6	\$ 222.4
Diluted net income per common share	\$ 1.85	\$ 1.61

Our major strategic accomplishments during 2019 include the following:

- We continued to be an industry leader in on-time delivery of high quality materials and components as indicated by our ability to secure extensions on various important long-term agreements (LTAs) in the HPMC segment in 2019. We extended supply agreements with GE Aviation that are expected to generate \$2.5 billion in revenues and which begin in January 2021 and are multi-year agreements. We extended our long-term agreement through 2029 with Rolls-Royce to supply rotating disc quality specialty materials for their Trent engine family. This agreement covers the production of a wide-range of critical products used to make Rolls-Royce's next-generation jet engines as well as spare parts for in-service engines. We also announced the expansion and 6.5 year extension of our LTA with BWX Technologies to supply materials for the manufacture of naval nuclear components.
- The FRP segment achieved its third straight year of profitability despite the negative impacts from Section 232 tariffs, elevated retirement benefit expense, and soft demand for our standard stainless products and related cost inefficiencies. We remain focused on continuous improvement and profitable growth in this segment. We extended and expanded our agreement with NLMK USA for one year, through December 2020, to provide carbon steel hot-rolling conversion services at our world-class HRFP. This agreement includes significant guaranteed volumes and fixed fee-per-ton revenues.
- We generated \$230 million in cash from operating activities in 2019, which included \$145 million in contributions to ATI's U.S. defined benefit pension trust, and we achieved our long-range managed working capital target at 30% of annualized sales. We also generated \$250 million in cash from non-core asset sales, including two transactions to monetize some of our long-held oil and gas rights and the divestitures of two non-core carbon steel forging facilities and our titanium investment castings business. Overall, we ended the year with \$491 million of cash on hand.
- In the fourth quarter 2019, we reduced our total debt outstanding by \$150 million and lowered our Debt to Adjusted EBITDA ratio to 2.69 at December 31, 2019 compared to 3.07 at year-end 2018 (see the Financial Condition and Liquidity section of Management's Discussion and Analysis for this calculation). We issued \$350 million of 5.875% Senior Notes due 2027, the proceeds of which, along with cash on hand, were used to early redeem our \$500 million 5.95% Senior Notes due 2021. In recognition of these improving credit metrics, Moody's upgraded ATI's credit rating one notch to B1.
- On September 30, 2019, we amended and restated our Asset Based Lending (ABL) Credit Facility, extending the facility through 2024 and increasing the revolving credit portion of the facility by \$100 million. See Financial Condition and Liquidity for further explanation.
- We continued to make capital investments to support our strategic growth initiatives and to have the installed asset base in service and qualified when needed for additional production capacity associated with extended and expanded long-term agreements, principally involving customers in the aerospace & defense markets, including our iso-thermal press and heat-treating capacity expansion at our Iso-Thermal Forging Center of Excellence in Cudahy, WI.
- We made further progress on our risk management strategy for retirement benefit obligations by completing a \$96 million risk transfer through the purchase of an annuity contract with a nationally recognized insurance company. This annuity buyout removed 10% of plan participants, bringing the total pension participant reduction to more than 50% over the past seven years.

Results of Operations

Sales were \$4.12 billion in 2019, compared to \$4.05 billion in 2018, a 2% increase, despite a 2% negative impact from business divestitures. Income before tax was \$241.6 million in 2019, compared to \$247.7 million in 2018. Net income attributable to ATI in 2019 was \$257.6 million, or \$1.85 per share, compared to \$222.4 million, or \$1.61 per share, in 2018. Results in 2019 include a \$28.5 million income tax benefit, while 2018 results reflect \$11.0 million of income tax expense. Through December 31, 2019, we continued to maintain valuation allowances for U.S. federal and state deferred taxes, and results in all periods include impacts from income taxes that differ from the applicable standard tax rate, primarily related to these income tax valuation allowances. At December 31, 2019, we determined that a substantial portion of these income tax valuation allowances were no longer required, and a \$45.1 million discrete tax benefit was recognized.

In 2019, we completed several strategic actions to improve future financial performance, liquidity and our financial condition. These items noted below are excluded from business segment results unless otherwise noted.

During the second quarter of 2019, we completed the sale of two non-core forging facilities in our HPMC segment for \$37 million. Sales from these two forging facilities in 2018 were \$86 million. We received net cash proceeds of \$33.0 million on the sale of this business and recognized an \$8.1 million pre-tax loss in 2019, including \$10.4 million of allocated goodwill. During the third quarter of 2019, we completed the sale of our Cast Products titanium investment castings business in our HPMC segment for \$127 million. Cast Products' sales were \$105 million in 2018. We received net cash proceeds of \$125.1 million on the sale of this business and recognized a \$6.2 million gain in 2019. Results of these businesses are included in HPMC segment results to the dates of their respective sale. See Note 6 of the Notes to Consolidated Financial Statements for further information on business divestitures.

During the second and third quarters of 2019, we recognized \$91.7 million in cash gains on sales of certain oil and gas rights in Eddy County, NM. These oil and gas rights were initially acquired in 1972 along with land purchased by Teledyne, Inc., which later became part of ATI. The land was subsequently sold, with the Company retaining underlying oil and gas rights that it sold in 2019.

During the fourth quarter of 2019, a \$4.5 million restructuring charge was recorded for severance obligations for the reduction of approximately 70 positions to streamline ATI's salaried workforce, primarily to improve the cost competitiveness of the U.S.-based FRP business. The entire \$4.5 million will be paid in 2020 upon completion of these reductions. We expect to generate approximately \$8 million in annual savings from this restructuring once fully implemented, with approximately \$4 million expected to be recognized in 2020. Also during the fourth quarter of 2019, we recorded an \$11.4 million impairment charge for the A&T Stainless joint venture, including ATI's share of a long-lived asset impairment charge recognized by the joint venture on the carrying value of its production facility in Midland, PA.

In the fourth quarter of 2019, we issued \$350 million of 5.875% Senior Notes due 2027 (2027 Notes). Proceeds from the 2027 Notes and cash on hand were used to redeem the \$500 million 5.95% Senior Notes due 2021 (2021 Notes), which had a January 15, 2021 maturity date. A \$21.6 million debt extinguishment charge was recorded as part of this action.

Results for 2019 include \$67.7 million in other (non-operating) income, net on the consolidated statements of operations, which includes the net loss on the sales of the Cast Products and industrial forgings businesses discussed above, gains to monetize oil and gas rights, an \$11.4 million A&T Stainless joint venture impairment charge, and \$10.7 million of net losses from operating results of joint ventures accounted for under the equity method. Equity method joint venture operating results are included in the results of the FRP segment. Other (non-operating) income, net in 2018 includes a \$15.9 million pre-tax gain on the sale of a 50% noncontrolling interest and subsequent deconsolidation of the A&T Stainless joint venture in March 2018.

Results by Business Segment

We operated in two business segments during 2019, HPMC and FRP, and management evaluates financial results on this basis. HPMC sales increased in 2019 by 3%, despite a 4% decline from business divestitures, driven by a 6% increase in sales to the aerospace & defense markets, which comprises 76% of the sales in this segment. Sales increased 1% in the FRP segment, primarily due to nearly 30% higher sales to the aerospace & defense markets, and a 25% increase in energy market sales, partially offset by declines in sales to most general industrial markets for standard stainless products.

Segment operating profit was \$380.7 million, or 9.2% of sales in 2019, compared to segment operating profit of \$413.2 million, or 10.2% of sales, in 2018. Our measure of segment operating profit, which we use to analyze the performance and results of our business segments, excludes income taxes, corporate expenses, net interest expense, closed operations expenses, the effects of LIFO inventory accounting and any related changes in net realizable value (NRV) inventory reserves, goodwill impairment charges, debt extinguishment charges, non-operating gains and losses and restructuring costs, if any. Results on our management basis of reporting were as follows (in millions):

	Fiscal Year Ended	
	December 31, 2019	December 31, 2018
Sales:		
High Performance Materials & Components	\$ 2,398.1	\$ 2,334.2
Flat Rolled Products	1,724.4	1,712.4
Total external sales	\$ 4,122.5	\$ 4,046.6
Operating profit:		
High Performance Materials & Components	\$ 343.1	\$ 335.4
% of Sales	14.3%	14.4%
Flat Rolled Products	\$ 37.6	\$ 77.8
% of Sales	2.2%	4.5%
Total operating profit	\$ 380.7	\$ 413.2
% of Sales	9.2%	10.2%
LIFO and net realizable value reserves	\$ (0.1)	\$ (0.7)
Corporate expenses	(66.8)	(58.1)
Closed operations and other expense	(25.5)	(21.6)
Restructuring and other charges	(4.5)	—
Gain on joint venture deconsolidation	—	15.9
Joint venture impairment charge	(11.4)	—
Gains on asset sales, net	89.8	—
Debt extinguishment charge	(21.6)	—
Interest expense, net	(99.0)	(101.0)
Income before income taxes	\$ 241.6	\$ 247.7

Comparative information for our overall revenues (in millions) by end market, including divested businesses prior to sale, and their respective percentages of total revenues is as follows:

Market	2019		2018	
	\$	%	\$	%
Aerospace & Defense	2,130.4	52%	1,965.5	49%
Oil & Gas	510.6	12%	546.2	13%
Automotive	296.6	7%	323.4	8%
Energy	286.3	7%	234.5	6%
Food Equipment & Appliances	205.8	5%	244.9	6%
Construction/Mining	195.0	5%	226.0	6%
Medical	172.4	4%	183.1	4%
Electronics/Computers/Communication	163.2	4%	156.9	4%
Other	162.2	4%	166.1	4%
Total	\$ 4,122.5	100%	\$ 4,046.6	100%

Comparative information for our major high-value and standard products, including divested businesses prior to sale, based on their percentages of revenues is as follows:

For the Years Ended December 31,	2019	2018
High-Value Products		
Nickel-based alloys and specialty alloys	32%	30%
Precision forgings, castings and components	18%	20%
Titanium and titanium-based alloys	18%	17%
Precision and engineered strip	13%	14%
Zirconium and related alloys	6%	5%
Total High-Value Products	87%	86%
Standard Products		
Total Standard Products	13%	14%
Grand Total	100%	100%

Sales by geographic area (in millions), including divested businesses prior to sale, and as a percentage of total sales, were as follows:

For the Years Ended December 31,	2019		2018	
United States	\$ 2,454.6	58%	\$ 2,348.1	58%
Europe	800.0	22%	877.2	22%
Asia	638.1	15%	602.1	15%
Canada	106.3	2%	106.5	2%
Other	123.5	3%	112.7	3%
Total sales	\$ 4,122.5	100%	\$ 4,046.6	100%

Information with respect to our business segments follows.

High Performance Materials & Components

(In millions)	2019	% Change	2018
Sales to external customers	\$ 2,398.1	3%	\$ 2,334.2
Segment operating profit	\$ 343.1	2%	\$ 335.4
Segment operating profit as a percentage of sales	14.3%		14.4%
International sales as a percentage of sales	45.0%		48.0%

Sales for the HPMC segment in 2019 increased 3%, to \$2.40 billion, despite a 4% negative impact from business divestitures. Sales to the aerospace & defense markets, which are the largest end markets for HPMC at 78% of total segment sales, were 6% higher, despite a 3% decline from divestitures. This was driven by a 17% increase in airframe sales and 28% increase in defense sales. Total commercial jet engine sales decreased 3% when compared to 2018, despite a 6% increase in next-generation jet engine products, due primarily to unfavorable product mix and temporary changes in order patterns from a major aero-engine customer. Energy market sales increased 19% versus the prior year due to export sales into Asia while construction and mining market sales were 42% lower.

Comparative information for our HPMC segment revenues (in millions) by market, including divested businesses prior to sale, the respective percentages of overall segment revenues for the years ended 2019 and 2018, and the percentage change in revenues by market for 2019 is as follows:

Market	2019		2018		Change	
Aerospace & Defense:						
Jet Engines	\$ 1,066.6	44%	\$ 1,100.6	47%	\$ (34.0)	(3)%
Airframes	481.0	20%	411.2	18%	69.8	17 %
Government Aerospace & Defense	331.5	14%	259.5	11%	72.0	28 %
Total Aerospace & Defense	1,879.1	78%	1,771.3	76%	107.8	6 %
Medical	159.2	7%	168.5	7%	(9.3)	(6)%
Energy	156.9	7%	131.4	6%	25.5	19 %
Oil & Gas	64.3	3%	74.9	3%	(10.6)	(14)%
Construction/Mining	42.5	2%	72.8	3%	(30.3)	(42)%
Other	96.1	3%	115.3	5%	(19.2)	(17)%
Total	\$ 2,398.1	100%	\$ 2,334.2	100%	\$ 63.9	3 %

We continue to extend and expand LTAs with certain of our customers for our specialty materials, including powders, parts and components, to reduce their supply uncertainty, including several LTAs with aerospace market OEMs. These LTAs are expected to continue to drive HPMC's growth trajectory for the next several years and are for the sale of ATI's specialty materials, parts and components that are required for both next-generation and legacy aircraft platforms, including jet engines. Our LTAs include a titanium products supply agreement for aircraft airframes and structural components with The Boeing Company (Boeing), which continues through 2022. This LTA covers value-added titanium products and provides opportunity for greater use of ATI's next generation and advanced titanium alloys in both long product and flat-rolled product forms, including highly engineered titanium forged products. The agreement includes both long-product forms that are manufactured within the HPMC segment, and a significant amount of plate products that are manufactured utilizing assets of both the HPMC and FRP segments. Revenues and profits associated with these titanium products covered by the Boeing long-term agreement are included primarily in the results for the HPMC segment.

We extended LTAs with GE Aviation in 2019 for the supply of premium titanium alloys, nickel-based alloys, and vacuum-melted specialty alloys products for commercial and military jet engine applications which begin in January 2021 and are multi-year agreements, and are negotiating LTA extensions with Snecma (Safran) for the supply of premium titanium alloys, nickel-based alloys, and vacuum melted specialty alloys for commercial and military jet engine applications. In addition, we have LTAs with Rolls-Royce plc for the supply of disc-quality products and precision forgings for commercial jet engine applications. In 2019, we extended our long-term agreement through 2029 with Rolls-Royce to supply rotating disc quality specialty materials for their Trent engine family. This agreement covers the production of a wide-range of critical products used to make Rolls-Royce's next-generation jet engines as well as spare parts for in-service engines. In 2017, we entered into a new LTA with United Technologies Corporation to supply its Pratt & Whitney subsidiaries with isothermal forgings and powder alloys for next-generation jet engines, as well as for structural components for airframe applications. We also supply products to other important parts of the aviation market such as helicopters and rotary engine fixed wing aircraft.

The commercial aerospace market is ramping up production of the next generation of single aisle and large twin aisle aircraft, and next-generation jet engines. New airframe designs contain a larger percentage of titanium alloys, and the jet engines that power them use newer nickel-based alloys and titanium-based alloys, in both cases for improved performance and more economical operating costs, compared to legacy airframe and engine designs. Boeing and Airbus have multi-year backlogs of orders for both legacy models and next-generation aircraft, and there are over 27,000 jet engines with firm orders (Aero Engine News, February 2020). Due to manufacturing cycle times, demand for our specialty materials leads the deliveries of new aircrafts by approximately 6 to 12 months.

Our 2019 HPMC results reflect this demand growth, as the next-generation of aircraft and engines use significantly more of the products we make. Use of these newer materials, particularly for jet engine applications, is expected to continue to increase for several years, with strong growth expected in powder metal alloys, including increased usage of isothermal forging and additive manufacturing production processes.

Additionally, new entrants to the commercial jet aircraft market for single aisle and regional jets are expected to increase demand for products made with titanium- and nickel-based alloys over the next several years. In addition, as our specialty materials are used in rotating components of jet engines, demand for our products for spare parts is impacted by aircraft flight

activity and engine refurbishment requirements of U.S. and foreign aviation regulatory authorities. As the number of aircraft in service increases, the need for our materials associated with engine refurbishment is expected to increase.

Our HPMC segment produces a wide range of high performance materials, including titanium and titanium-based alloys, nickel- and cobalt-based alloys and superalloys, zirconium and related alloys including hafnium and niobium, advanced powder alloys and other specialty materials, in long product forms such as ingot, billet, bar, rod, wire, shapes and rectangles, and seamless tubes, plus precision forgings, components, and machined parts. In 2019, we also announced the expansion and 6.5 year extension of our LTA with BWX Technologies to supply materials for the manufacture of naval nuclear components.

Stronger demand for titanium and nickel-based products, sales of which were up 12% and 4%, respectively, in 2019 were partially offset by declines in sales of forged products. Comparative information for HPMC's major product categories, including divested businesses prior to sale, based on their percentages of the segment's overall revenue is as follows:

<u>For the Years Ended December 31,</u>	2019	2018
High-Value Products		
Nickel-based alloys and specialty alloys	32%	31%
Precision forgings, castings and components	30%	34%
Titanium and titanium-based alloys	28%	25%
Zirconium and related alloys	10%	10%
Total High-Value Products	100%	100%

HPMC segment operating profit for 2019 increased 2% compared to 2018, to \$343.1 million, or 14.3% of sales. As the year progressed, results reflected a better balance of raw material prices and index-based selling prices, however, the first half of 2019 reflected adverse impacts from a rapid drop in raw material prices, particularly in cobalt, which compressed profit margins due to the length of the manufacturing cycle compared to index-based selling price changes, offsetting benefits from higher productivity. Results for 2019 also reflect temporary near-term headwinds related to one of our jet engine customer's cash management efforts. Net results of divested businesses were not material to prior period HPMC segment operating profit.

We anticipate significant industry demand growth for advanced powder materials required to satisfy expanding aerospace & defense market production requirements, and for emerging additive manufacturing of parts and components. To proactively meet this growing demand for complex powder alloy products, ATI designed and built an all-new nickel and super alloy powder production facility in North Carolina, which started production in 2018. We also expanded titanium alloys powder production capabilities at the same North Carolina site, which was completed in early 2019. We acquired assets in 2018 to accelerate the development of our capabilities in metal alloy-based additive manufacturing to provide comprehensive customer solutions ranging from the design of parts for additive manufacturing to the production of ready-to-install components. Ongoing strategic capital projects in HPMC to support future growth include the iso-thermal press and heat-treating capacity expansion at our Iso-Thermal Forging Center of Excellence in Cudahy, WI, which is expected to be placed into service and begin customer qualification steps in mid-2020.

In the medical market, in 2018 we entered into a joint technology development agreement with Bruker Energy & Supercon Technologies, to advance state-of-the-art niobium-based superconductors, including those used in MRI magnets for the medical industry, and preclinical MRI magnets used in the life-science tools industry.

Competition continues to be very strong across most key end markets, particularly within the aerospace & defense, oil & gas, and medical market supply chains. We believe that our HPMC segment is well-positioned for profitable growth, especially in the next-generation jet engine platforms through LTAs that provide significant growth and share gains for ATI on next-generation airplanes and the jet engines that power them. Despite near-term uncertainty posed by the 737 MAX grounding and associated changes in order patterns in the supply chain for this airframe and related engine program, we believe the long-term fundamentals driving demand growth in commercial aerospace remain intact across the range of next-generation aircraft and engines.

Flat Rolled Products

<i>(In millions)</i>	2019	% Change	2018
Sales to external customers	\$ 1,724.4	1 %	\$ 1,712.4
Segment operating profit	\$ 37.6	(52)%	\$ 77.8
Segment operating profit as a percentage of sales	2.2%		4.5%
International sales as a percentage of sales	34.2%		33.8%

Sales for the FRP segment in 2019 increased 1% compared to 2018, to \$1.72 billion. Sales to the aerospace & defense markets increased almost 30% versus the prior year, supported by significantly higher production of titanium armor plate, additional titanium volumes for commercial airframes, and increased nickel and cobalt-bearing alloy sheet products for jet engines. Sales to the electrical energy market were 25% higher, driven by demand for marine scrubber products for exhaust systems on ships. The oil & gas market, including chemical and hydrocarbon processing applications, had slightly lower sales due primarily to the timing of project-based demand. Sales to the oil & gas, automotive and other industrial markets declined in 2019. Overall, increased sales of high-value products offset 9% lower sales of standard stainless products, compared to 2018.

Comparative information for our Flat Rolled Products segment revenues (in millions) by market, the respective percentages of overall segment revenues, for the years ended 2019 and 2018, and the percentage change in revenues by market for 2019 is as follows:

Market	2019		2018		Change	
Oil & Gas	\$ 446.3	26%	\$ 471.3	28%	\$ (25.0)	(5)%
Automotive	286.1	17%	313.9	18%	(27.8)	(9)%
Aerospace & Defense	251.3	15%	194.2	11%	57.1	29 %
Food Equipment & Appliances	205.5	12%	244.5	14%	(39.0)	(16)%
Electronics/Computers/Communication	157.4	9%	149.0	9%	8.4	6 %
Construction/Mining	152.5	9%	153.2	9%	(0.7)	— %
Energy	129.4	7%	103.1	6%	26.3	26 %
Other	95.9	5%	83.2	5%	12.7	15 %
Total	\$ 1,724.4	100%	\$ 1,712.4	100%	\$ 12.0	1 %

Our FRP segment produces nickel-based alloys, specialty alloys, titanium and titanium-based alloys, and stainless steel products, in a variety of forms including plate, sheet, engineered strip, and Precision Rolled Strip products. FRP also provides hot-rolling conversion services, including titanium products of the Uniti joint venture (JV), and beginning in 2018, standard stainless sheet products of the A&T Stainless JV and carbon steel products for NLMK USA.

Comparative information for the Flat Rolled Products segment's major product categories, based on their percentages of revenue are presented in the following table. Conversion services are excluded.

<u>For the Years Ended December 31,</u>	2019	2018
High-Value Products		
Precision and engineered strip	32%	33%
Nickel-based alloys and specialty alloys	32%	28%
Titanium and titanium-based alloys	6%	5%
Total High-Value Products	70%	66%
Standard Products		
Total Standard Products	30%	34%
Grand Total	100%	100%

Comparative shipment volume and average selling price information on the segment's products for the years ended December 31, 2019 and 2018 is provided in the following table:

	2019	2018	% change
Volume (000's pounds):			
High-Value	351,841	346,564	2 %
Standard	361,736	400,995	(10)%
Total	713,577	747,559	(5)%
Average prices (per lb.):			
High-Value	\$3.30	\$3.20	3 %
Standard	\$1.41	\$1.41	— %
Combined Average	\$2.34	\$2.24	4 %

Segment operating profit in 2019 was \$37.6 million, or 2.2% of sales, a 52% decline from segment operating profit of \$77.8 million, or 4.5% of sales, in 2018. FRP segment results for 2019 reflect higher retirement benefit expense of \$24 million and a \$12 million loss for ATI's share of the A&T Stainless JV, primarily due to Section 232 tariffs, compared to a \$4 million loss from the A&T Stainless JV in the prior year. While project-based demand for nickel-based alloys in the U.S. business remained solid, weaker demand for standard stainless products resulted in lower segment operating profit compared to 2018.

We continue to make progress toward our FRP goal of capital efficient asset utilization improvements as evidenced by our agreement in 2018 to provide carbon steel hot-rolling conversion services for NLMK USA at our HRFP, which was recently extended for an additional year through December 2020. We expect 2020 volumes covered under this agreement to meaningfully increase over 2019 levels. This agreement includes significant guaranteed volumes and fixed fee-per-ton revenues.

On March 1, 2018, we announced the formation of the A&T Stainless joint venture with Tsingshan to produce 60-inch wide stainless sheet products for sale in North America. This joint venture utilizes Tsingshan-supplied stainless steel slabs from its vertically integrated operations in Indonesia. The Tsingshan-supplied stainless steel slabs are hot-rolled into coils on the FRP segment's HRPF under a conversion agreement. The hot-rolled coils are finished into stainless steel sheet using ATI's previously-idled Direct Roll Anneal and Pickle production facility in Midland, PA, which is ATI's major investment in the joint venture. In late March 2018, ATI filed for an exclusion from the Section 232 tariffs on behalf of A&T Stainless, which imports semi-finished stainless slab products from Indonesia. In April 2019, the Company learned that this exclusion request was denied by the U.S. Department of Commerce. The A&T Stainless JV filed a new request for exclusion in October 2019, but will continue to be subject to the 25% tariff levied on its imports of semi-finished stainless slab products from Indonesia pending the outcome of this new request. Results of A&T Stainless have been and will continue to be negatively impacted by these tariffs on imported stainless slab products. The joint venture partners have continued to evaluate longer-term solutions to return this strategic initiative to profitability, and determined during the fourth quarter of 2019 that idling this facility is probable if a near-term tariff exclusion is not received. ATI recognized an \$11.4 million impairment charge in 2019 related to the A&T Stainless JV, primarily related to ATI's equity-method share of the JV's long-lived asset impairment charge for the Midland facility, that is excluded from FRP segment results.

LIFO and Net Realizable Value Reserves

The net effect of changes in LIFO and NRV inventory reserves was expense of \$0.1 million and \$0.7 million in 2019 and 2018, respectively. Falling inventory costs in 2019 resulted in a \$25.5 million pretax LIFO inventory valuation reserve benefit, which was offset by a \$25.6 million pretax non-cash charge for NRV inventory reserves that are required to offset the Company's aggregate net debit LIFO inventory balance that exceeds current inventory replacement cost. Rising inventory costs in 2018 resulted in a \$28.6 million pretax LIFO inventory valuation reserve charge, which was offset by a \$27.9 million pretax non-cash benefit for NRV inventory reserves.

Corporate Expenses

Corporate expenses, which are included in selling and administrative expenses in the statement of operations, were \$66.8 million in 2019 compared to \$58.1 million in 2018. This increase was due primarily due to higher incentive compensation expenses.

Closed Operations and Other Expenses

Closed operations and other expenses are presented primarily in selling and administrative expenses in the consolidated statements of operations, and include legal, environmental, retirement benefit and insurance obligations associated with closed operations. Closed operations and other expenses were \$25.5 million in 2019, compared to \$21.6 million in 2018. These expenses were higher compared to 2018 primarily due to higher retirement benefit expenses.

Restructuring and Other Gains/Charges

A \$4.5 million restructuring charge was recorded in the fourth quarter 2019 to streamline our salaried workforce, primarily to improve the cost competitiveness of the U.S.-based FRP business. This restructuring charge is excluded from segment operating results.

Gain on Joint Venture Deconsolidation

On March 1, 2018, we announced the formation of A&T Stainless, in which ATI has a 50% ownership interest. Our joint venture partner purchased its 50% joint venture interest during the first quarter of 2018, and as a result of this sale and the subsequent deconsolidation of the A&T Stainless entity, we recognized a \$15.9 million gain in the first quarter of 2018. This gain is reported in other income, net, on the consolidated statement of operations for the year ended December 31, 2018 and is excluded from FRP segment results.

Joint Venture Impairment Charge

We recorded an \$11.4 million impairment charge in 2019 for the A&T Stainless joint venture, including ATI's share of a long-lived asset impairment charge recognized by the joint venture on the carrying value of its production facility in Midland, PA. ATI recognized a \$7.1 million equity loss for its 50% share of a \$14.2 million long-lived asset impairment recognized by A&T Stainless. In addition, as of December 31, 2019, ATI had net receivables for working capital advances and administrative services from A&T Stainless of \$36.8 million that were also evaluated for collectability, and a \$4.3 million reserve was recorded in December 2019 based on ATI's share of the estimated fair value of the joint venture's net assets. This charge is excluded from FRP segment results.

Gains on Asset Sales, net

During the third quarter of 2019, we completed the sale of our Cast Products business for \$127 million. This business produced titanium investment castings that are primarily used by aerospace & defense OEMs in the production of commercial jet airframes and engines. We recognized a \$6.2 million gain in 2019, which included a \$10.2 million impairment charge on the carrying value of long-lived assets of the retained Salem operation. During the second quarter of 2019, we completed the sale of two non-core forging facilities, located in Portland, IN and Lebanon, KY, that used primarily traditional forging methods to produce carbon steel forged products for use in the oil & gas, transportation and construction & mining industries. We recognized an \$8.1 million pre-tax loss in 2019. Both of these divested businesses were previously reported as part of the HPMC segment. Also during the second and third quarters of 2019, we recognized \$91.7 million of total cash gains on sales of certain oil and gas rights in Eddy County, NM. Results for 2019 include \$89.8 million in net pretax gains from these non-core asset sales which are reported in other income, net, on the consolidated statement of income and are excluded from segment operating results.

Debt Extinguishment Charge

In December 2019, we redeemed all \$500 million aggregate principal amount of the 2021 Notes, resulting in a \$21.6 million pre-tax debt extinguishment charge, which included a \$20.9 million cash payment as a make-whole provision on the early extinguishment of debt, and a \$0.7 million charge for previously-unrecognized debt issue costs.

Interest Expense, Net

Interest expense, net of interest income and interest capitalization, was \$99.0 million in 2019, compared to \$101.0 million in 2018. This decrease primarily reflects lower borrowings in the current year under the Company's Asset Based Lending Credit Facility, and increased interest income. Interest expense is presented net of interest income of \$5.9 million in 2019, \$1.1 million in 2018, and \$1.1 million in 2017. Interest expense in 2019, 2018, and 2017 was reduced by \$4.7 million, \$4.1 million, and \$2.6 million, respectively, related to interest capitalization on major strategic capital projects.

Income Taxes

Beginning in 2015, ATI results reflected a three-year cumulative loss from U.S. operations, and valuation allowances were established on our federal and state deferred tax assets as accounting standards limit the ability to consider projections of future results as positive evidence to assess the realizability of deferred tax assets in situations where a three year cumulative loss condition exists. On December 22, 2017, the U.S. government enacted comprehensive tax legislation commonly referred to as the Tax Cuts and Jobs Act (the "Tax Act"). The Tax Act made broad and complex changes to the U.S. tax code. Certain sections of the Internal Revenue Code are still being finalized, and our results continue to reflect changes in the interpretive guidance since the Tax Act was enacted.

In 2018, we reported income before tax of \$247.7 million, of which \$190.8 million was attributable to the U.S. The overall income, along with certain taxable income inclusions, resulted in ATI utilizing net operating loss (NOL) deferred tax assets in 2018, causing a U.S. valuation allowance release of \$46.3 million for 2018. At December 31, 2018, we continued to maintain a valuation allowance on the net deferred tax assets for U.S. federal and state income tax purposes, with the exception of the indefinite lived deferred tax liability related to goodwill and the withholding tax liability associated with our permanent reinvestment assertion, and also maintained valuation allowances for certain foreign operations.

At December 31, 2019, our U.S. results have switched from a three-year cumulative loss position to a three-year cumulative income position, allowing us to utilize forecasts of future profits as a source of income when evaluating the overall need for a valuation allowance. We determined that valuation allowances on net deferred tax asset balances for federal and certain state jurisdictions are no longer required. Certain individual tax attributes still require a valuation allowance based on expected utilization. The change in the overall valuation allowance for 2019 includes amounts utilized during the year as part of the reported effective tax rate, as well as a \$45.1 million reduction at December 31, 2019 based on a change in judgment on the realizability of deferred tax assets.

Results in 2019 and 2018 include impacts from income taxes that differ from applicable standard tax rates, primarily related to income tax valuation allowances which lowered the effective tax rate on pre-tax income. The 2019 income tax benefit was \$28.5 million, which included the \$45.1 million discrete tax benefit related to the release of U.S. federal and state valuation allowances, along with the current year benefit related to the release of valuation allowances due to positive income in 2019. Total discrete tax items including this valuation allowance change were a \$41.9 million tax benefit in 2019, and our effective tax rate excluding these items was 5.5% of pre-tax income in 2019. In 2018, we reported an income tax provision of \$11.0 million, or 4.4% of the pre-tax income in 2018, which also included benefits from NOL utilization and related valuation allowance changes. Following this change in judgment on deferred tax asset realizability, we expect to report our results in future periods using a 23-25% tax rate, although we will continue to have minimal cash tax requirements in the U.S. due to the ongoing benefits of NOL tax carryforwards for the next few years.

Financial Condition and Liquidity

On September 30, 2019, we amended and restated our ABL Credit Facility, which is collateralized by the accounts receivable and inventory of our domestic operations. This amendment and restatement extends the ABL facility through September 30, 2024 and includes an increase of \$100 million in the revolving credit facility to \$500 million, a letter of credit sub-facility of up to \$200 million, and a \$100 million term loan (Term Loan). Additionally, the amendment and restatement gives us the ability, through June 30, 2020 and as long as no default or event of default has occurred and is continuing, to borrow an additional term loan of up to \$100 million in total, using one or two draws (the Delayed-Draw Term Loan). We also have the right to request an increase of up to \$200 million in the maximum amount available under the revolving credit facility for the duration of the ABL. The Term Loan has an amended interest rate of 2.0% plus a LIBOR spread and can be prepaid in increments of \$25 million if certain minimum liquidity conditions are satisfied. In July 2019, we amended our \$50 million floating-for-fixed interest rate swap which converts half of the Term Loan to a fixed rate (now 4.21% following the September 30, 2019 ABL amendment and restatement) with a June 2024 maturity.

As amended and restated, the applicable interest rate for revolving credit borrowings under the ABL facility includes interest rate spreads based on available borrowing capacity that range between 1.25% and 1.75% for LIBOR-based borrowings and between 0.25% and 0.75% for base rate borrowings. The ABL facility contains a financial covenant whereby we must maintain a fixed charge coverage ratio of not less than 1.00:1.00 after an event of default has occurred and is continuing or if the undrawn availability under the ABL revolving credit portion of the facility is less than the greater of (i) 12.5% of the then applicable maximum borrowing amount under the revolving credit portion of the ABL and any outstanding Term Loan balance, or (ii) \$62.5 million. We were in compliance with the fixed charge coverage ratio covenant at December 31, 2019. Additionally, we must demonstrate minimum liquidity, as calculated in accordance with the terms of the ABL facility, during the 90 day period immediately preceding the stated maturity date of each of the 4.75% Convertible Notes due 2022 (2022 Convertible Notes) and 5.875% Notes due 2023 (2023 Notes). Costs associated with entering into the 2019 ABL amendment

were \$2.2 million, and are being amortized to interest expense over the extended term of the facility ending September 2024, along with \$2.1 million of unamortized deferred costs previously recorded for the ABL.

There were no revolving credit borrowings under the ABL during 2019, however \$35.3 million of available capacity was utilized to support the issuance of letters of credit at December 31, 2019. Average borrowings under the ABL for the fiscal year ended December 31, 2018 were \$43 million, bearing an average annual interest rate of 3.7%.

On November 22, 2019, we issued \$350 million aggregate principal amount of 5.875% Senior Note due 2027. Underwriting fees and other third-party expenses for the issuance of the 2027 notes were \$5.5 million, and are being amortized to interest expense over the eight year term of the 2027 Notes. Net proceeds of \$344.5 million from this issuance, as well as cash on hand, were used to retire all \$500 million aggregate principal amount of the 2021 Notes in December 2019, resulting in a \$21.6 million pre-tax debt extinguishment charge, which included a \$20.9 million cash payment as a make-whole provision on the early extinguishment of debt, and a \$0.7 million charge for deferred debt issue costs.

At December 31, 2019, we had \$491 million of cash and cash equivalents, and available additional liquidity under the ABL facility of approximately \$450 million. We do not expect to pay any significant U.S. federal or state income taxes in the next several years due to net operating loss carryforwards.

During the second and third quarters of 2019, we received approximately \$250 million in cash from non-core asset sales, net of closing adjustments and transaction costs, consisting of \$33 million for the sale of two non-core forging facilities, \$125 million for the sale of the Cast Products business, and \$92 million for the sale of certain oil and gas rights in Eddy County, NM.

In 2019, the Company made \$145 million in cash contributions to its U.S. qualified defined benefit pension plans. Based on pension trust assets as of December 31, 2019, and the expected rate of return on pension assets in future years, we currently expect our funding requirements to the U.S. qualified defined benefit pension plans to be approximately \$130 million in 2020, and to have annual funding requirements of approximately \$85 million to these pension plans for the next few years thereafter. However, these funding estimates are subject to significant uncertainty including the actual pension trust assets' fair value, and the discount rates used to measure pension liabilities.

We believe that internally generated funds, current cash on hand and available borrowings under the ABL facility will be adequate to meet our liquidity needs, including currently projected required contributions to our pension plans. If we needed to obtain additional financing using the credit markets, the cost and the terms and conditions of such borrowings may be influenced by our credit rating. In addition, we regularly review our capital structure, various financing alternatives and conditions in the debt and equity markets in order to opportunistically enhance our capital structure. In connection therewith, we may seek to refinance or retire existing indebtedness, incur new or additional indebtedness or issue equity or equity-linked securities, in each case, depending on market and other conditions.

We have no off-balance sheet arrangements as defined in Item 303(a)(4) of SEC Regulation S-K.

Cash Flow and Working Capital

Cash provided by operations for 2019 was \$230.1 million, including cash provided by an \$88.4 million reduction in managed working capital balances. This was despite \$29 million in short-term working capital advances to the A&T Stainless joint venture for 2019 and \$145 million of cash contributions to ATI's U.S. qualified defined benefit pension plans in 2019. Cash provided by operations was \$392.8 million in 2018, which included a \$74.1 million reduction in managed working capital balances and was partially offset by \$40 million in cash contributions to ATI's U.S. qualified defined benefit pension plans and \$11 million in short-term working capital advances to the A&T Stainless joint venture.

As part of managing the liquidity of our business, we focus on controlling managed working capital, which is defined as gross accounts receivable, short-term contract assets and gross inventories, less accounts payable and short-term contract liabilities. In measuring performance in controlling this managed working capital, we exclude the effects of LIFO and other inventory valuation reserves, and reserves for uncollectible accounts receivable which, due to their nature, are managed separately. We measure managed working capital as a percentage of the prior three months annualized sales to evaluate our performance based on recent levels of business volume. In 2019, managed working capital decreased to 30.0% of annualized total ATI sales compared to 31.6% of annualized sales at December 31, 2018, a 160 basis point reduction despite year-over-year business growth. The \$88.4 million decrease in managed working capital in 2019 resulted from a \$12.7 million decrease in short-term contract assets, a \$70.9 million decrease in inventory, a \$22.4 million increase in accounts payable and \$7.3 million increase in short-term contract liabilities, partially offset by a \$24.9 million increase in accounts receivable. Days sales outstanding, which measures actual collection timing for accounts receivable, worsened by approximately 3% at year-end 2019 compared to 2018. Gross inventory turns, which exclude the effect of LIFO and any applicable offsetting NRV inventory valuation reserves, remained consistent in 2019 compared to 2018.

The components of managed working capital were as follows:

<i>(In millions)</i>	December 31, 2019	December 31, 2018
Accounts receivable	\$ 554.1	\$ 527.8
Short-term contract assets	38.5	51.2
Inventory	1,155.3	1,211.1
Accounts payable	(521.2)	(498.8)
Short-term contract liabilities	(78.7)	(71.4)
Subtotal	1,148.0	1,219.9
Allowance for doubtful accounts	4.6	6.0
LIFO reserve	(33.6)	(2.9)
Inventory reserves	104.1	88.5
Managed working capital	\$ 1,223.1	\$ 1,311.5
Annualized prior 3 months sales	\$ 4,047.4	\$ 4,151.3
Managed working capital as a % of annualized sales	30.0%	31.6%
December 31, 2019 change in managed working capital	\$ (88.4)	

Cash provided by investing activities was \$81.7 million in 2019, reflecting \$250.1 million in net proceeds from non-core asset sales consisting of \$33.0 million for the sale of two non-core forging facilities, \$125.1 million for the sale of the Cast Products business and \$92.0 million of proceeds from property, plant and equipment, largely due to the sale of certain oil and gas rights in Eddy County, NM. Capital expenditures for 2019 were \$168.2 million primarily related to HMPC growth projects including the previously announced new iso-thermal press and heat-treating expansion in Cudahy, WI. Cash used in investing activities in 2018 was \$145.1, consisting primarily of \$139.2 million of capital expenditures and \$10.0 million for the acquisition of Addaero, a metal alloy-based additive manufacturer for the aerospace & defense industries.

Cash used in financing activities in 2019 was \$203.0 million, with \$507.6 million of payments on long-term debt and finance leases consisting largely of the redemption of all \$500 million aggregate principal amount of the 2021 Notes outstanding. The redemption included a \$20.9 million cash make-whole payment related to the early extinguishment of this debt as required under the applicable indenture. Borrowings on long-term debt were \$350.0 million reflecting the issuance of the 2027 Notes. Such issuance included \$5.5 million of payments for underwriting fees and other third-party expenses. Cash used in financing activities in 2019 also reflects a \$14.0 million dividend payment to the 40% noncontrolling interest in our STAL joint venture. Cash used in financing activities in 2018 was \$7.3 million, consisting of \$10.0 million in dividend payments to the 40% noncontrolling interest in our STAL joint venture and a \$5.9 million reduction in foreign credit facility borrowings, partially offset by \$2.7 million for the sale of noncontrolling interest related to Next Gen Alloys, our meltless titanium alloy powder joint venture with GE, and \$12.0 million of installment payments from our joint venture partner for the \$17.5 million purchase price of its 50% joint venture interest in A&T Stainless.

At December 31, 2019, cash and cash equivalents on hand totaled \$490.8 million, a \$108.8 million increase from year-end 2018. Cash and cash equivalents held by our foreign subsidiaries was \$52.3 million at December 31, 2019, of which \$22.9 million was held by the STAL joint venture.

Debt

Total debt outstanding declined in 2019 to \$1,411.2 million at December 31, 2019, due to the \$150 net reduction from the redemption of the 2021 Notes partially offset by the issuance of the 2027 Notes.

In managing our overall capital structure, some of the measures on which we focus are debt to EBITDA, which measures our ability to repay our incurred debt, net debt to total capitalization, which is the percentage of our debt, net of cash that may be available to reduce borrowings, to our total invested and borrowed capital, and total debt to total capitalization, which excludes cash balances. We define EBITDA as income from continuing operations before interest and income taxes, plus depreciation and amortization. We define Adjusted EBITDA as EBITDA excluding significant non-cash charges or credits, including goodwill impairment charges, restructuring charges including long-lived asset impairments, and other postretirement/pension curtailment and settlement gains and losses. We believe that EBITDA and Adjusted EBITDA are useful to investors because these measures are commonly used to analyze companies on the basis of operating performance, leverage and liquidity. Furthermore, analogous measures are used by industry analysts to evaluate operating performance. EBITDA and Adjusted EBITDA are not intended to be measures of free cash flow for management's discretionary use, as they do not consider certain cash requirements such as interest payments, tax payments and capital expenditures. EBITDA and Adjusted EBITDA are not intended to represent, and should not be considered more meaningful than, or as alternatives to, a measure of operating performance as determined in accordance with U.S. generally accepted accounting principles.

All of these leverage ratios improved in 2019, primarily as a result of lower debt and higher earnings. At year-end 2019, our debt to Adjusted EBITDA ratio was 2.69, compared to 3.07 at December 31, 2018, and net debt to Adjusted EBITDA ratio was 1.75, compared to 2.32 at December 31, 2018.

	December 31, 2019	December 31, 2018
Income before income taxes	\$ 241.6	\$ 247.7
Interest expense	99.0	101.0
Depreciation and amortization	151.1	156.4
Joint venture impairment charge	11.4	—
Debt extinguishment charge	21.6	—
Adjusted EBITDA	\$ 524.7	\$ 505.1
Total debt (a)	\$ 1,411.2	\$ 1,552.5
Less: Cash	(490.8)	(382.0)
Net debt	\$ 920.4	\$ 1,170.5
Debt to Adjusted EBITDA	2.69	3.07
Net Debt to Adjusted EBITDA	1.75	2.32

At year-end 2019, our net debt to total capitalization was 30.6%, compared to 38.3% at December 31, 2018.

<i>(In millions)</i>	December 31, 2019	December 31, 2018
Total debt (a)	\$ 1,411.2	\$ 1,552.5
Less: Cash	(490.8)	(382.0)
Net debt	\$ 920.4	\$ 1,170.5
Total ATI stockholders' equity	2,090.1	1,885.7
Net ATI capital	\$ 3,010.5	\$ 3,056.2
Net debt to ATI capital	30.6%	38.3%

Total debt to total capitalization was 40.3% at December 31, 2019 compared to 45.2% at December 31, 2018.

<i>(In millions)</i>	December 31, 2019	December 31, 2018
Total debt (a)	\$ 1,411.2	\$ 1,552.5
Total ATI stockholders' equity	2,090.1	1,885.7
Total ATI capital	\$ 3,501.3	\$ 3,438.2
Total debt to ATI capital	40.3%	45.2%

(a) Excludes debt issuance costs.

On November 22, 2019, we issued \$350 million aggregate principal amount of the 2027 Notes. Net proceeds of \$344.5 million from this issuance were used, together with cash on hand, to redeem all \$500 million aggregate principal amount outstanding of the 5.95% 2021 Notes in December 2019.

The 5.875% stated interest rate payable on our \$500 million Notes due 2023 (2023 Notes) is subject to adjustment in the event of changes in the credit ratings on the 2023 Notes by either Moody's or Standard & Poor's (S&P). Each notch of credit rating downgrade from the credit ratings in effect when the 2023 Notes were issued in July 2013 increases interest expense by 0.25% on the 2023 Notes, up to a maximum of four notches by each of the two rating agencies, or a total 2.0% potential interest rate change up to 7.875%.

The 2023 Notes presently bear the maximum 7.875% annual interest rate as a result of credit rating downgrades. Any further credit rating downgrades have no effect on the interest rate of the 2023 Notes, and increases in our credit ratings from these ratings agencies would reduce interest expense incrementally on the 2023 Notes to the original 5.875% interest rate in a similar manner. In November 2019, Moody's increased our credit rating one notch, to B1 with a stable outlook, however our credit rating from both rating agencies remains below the level at which the current 2023 Notes interest rate would reset to a lower

rate. At our present credit rating levels, we would need a one-notch ratings upgrade by Moody's, to Ba3, and a two-notch increase by S&P, to BB-, before the 2023 Notes interest rate would be lowered in each case by 0.25%.

STAL, the Company's Chinese joint venture company in which ATI has a 60% interest, has a separate \$20 million revolving credit facility. Borrowings under the STAL revolving credit facility are in U.S. dollars based on U.S. interbank offered rates. The credit facility is supported solely by STAL's financial capability without any guarantees from the joint venture partners. The credit facility requires STAL to maintain a minimum level of shareholders' equity, and certain financial ratios.

A summary of required payments under financial instruments (excluding accrued interest) and other commitments are presented below.

<i>(In millions)</i>	Total	Less than 1 year	1-3 years	4-5 years	After 5 years
Contractual Cash Obligations					
Total Debt including Finance Leases	\$ 1,411.2	\$ 11.5	\$ 296.3	\$ 603.4	\$ 500.0
Interest on Debt (A)	444.7	95.4	169.3	107.9	72.1
Operating Lease Obligations (B)	97.8	20.0	33.5	19.7	24.6
Other Long-term Liabilities	91.2	—	33.9	20.5	36.8
Pension and OPEB Obligations (C)	713.4	171.8	247.7	169.8	124.1
Unconditional Purchase Obligations					
Raw Materials (D)	1,245.9	317.7	374.2	308.0	246.0
Capital expenditures	116.5	105.4	10.6	0.3	0.2
Other (E)	82.8	46.4	27.1	8.8	0.5
Total	\$ 4,203.5	\$ 768.2	\$ 1,192.6	\$ 1,238.4	\$ 1,004.3
Other Financial Commitments					
Lines of Credit (F)	\$ 566.9	\$ 66.9	\$ —	\$ 500.0	\$ —
Guarantees	\$ 27.9				

- (A) Amounts include contractual interest payments using the interest rates in effect as of December 31, 2019 applicable to the Company's 2022 Convertible Notes, the 2023 Notes, the Term Loan due 2024, the Allegheny Ludlum 6.95% Debentures due 2025 and the 2027 Notes.
- (B) Amounts include operating lease obligations at their undiscounted value. These obligations are presented in other current liabilities and other long-term liabilities on the consolidated balance sheets at their discounted value, using applicable interest rates. See Note 11, Leases for further information.
- (C) Based on current actuarial studies, amounts include payments for the next 10 years to defined benefit pension plans, assuming the expected long-term returns on pension assets are achieved. Projections of minimum required payments to the U.S. qualified defined benefit pension plans are subject to significant uncertainty based on a number of factors including actual pension plan asset returns, changes in estimates of participant longevity, and changes in interest rates. Amounts also include actuarial projections of payments under other postemployment benefit plans for the next 10 years. In most retiree healthcare plans, our contributions are capped based on the cost as of a certain date. See Note 14, Retirement Benefits for further information.
- (D) We have contracted for physical delivery for certain of our raw materials to meet a portion of our needs. These contracts are based upon fixed or variable price provisions. We used current market prices as of December 31, 2019, for raw material obligations with variable pricing.
- (E) We have various contractual obligations that extend through 2025 for services involving production facilities and administrative operations. Our purchase obligation as disclosed represents the estimated termination fees payable if we were to exit these contracts.
- (F) At December 31, 2019, there were no amounts drawn under foreign credit agreements. Drawn amounts on the U.S. facility were \$35.3 million utilized under the \$500 million ABL facility for standby letters of credit, which renew annually. These letters of credit are used to support: \$29.8 million in workers' compensation and general insurance arrangements, \$5.4 million related to environmental matters and \$0.1 million for ATI's assurance of performance to a customer.

Commitments and Contingencies

At December 31, 2019, our reserves for environmental remediation obligations totaled approximately \$18 million, of which \$7 million was included in other current liabilities. These reserves included estimated probable future costs of: \$3 million for federal Superfund and comparable state-managed sites; \$13 million for formerly owned or operated sites for remediation or indemnification obligations; \$1 million for owned or controlled sites at which our operations have been discontinued; and \$1 million for sites utilized by the Company in its ongoing operations. We continue to evaluate whether we may be able to recover a portion of future costs for environmental liabilities from third parties and to pursue such recoveries where appropriate. The timing of expenditures depends on a number of factors that vary by site. ATI expects that it will expend present accruals over many years and that remediation of all sites with which it has been identified will be completed within thirty years.

At December 31, 2019, we had recognized asset retirement obligations (AROs) of \$24 million related to landfill closures, decommissioning costs, facility leases and conditional AROs associated with manufacturing activities using what may be characterized as potentially hazardous materials.

Based on currently available information, it is reasonably possible that the costs for active matters may exceed our recorded reserves by as much as \$16 million. However, future investigation or remediation activities may result in the discovery of additional hazardous materials, potentially higher levels of contamination than discovered during prior investigation, and may impact costs of the success or lack thereof in remedial solutions. Therefore, future developments, administrative actions or liabilities relating to environmental matters could have a material adverse effect on the ATI's consolidated financial condition or results of operations.

Labor Matters

We currently are involved in negotiation on our next significant collective bargaining agreement with the United Steel, Paper and Forestry, Rubber, Manufacturing, Energy, Allied & Industrial Service Workers International Union, AFL-CIO, CLC (USW), which expires February 29, 2020 involving approximately 1,500 USW-represented full-time employees located primarily within the FRP segment operations and at two facilities in the HPMC segment.

Retirement Benefits

All of ATI's defined benefit pension plans are now closed to new entrants, and at most ATI operations with pension participants the plans are frozen for all future benefit accruals, with less than 10% of participants in ATI's U.S. qualified defined benefit plans still earning additional pension service. Additionally, all of the remaining collectively-bargained defined benefit retiree health care plans at ATI's operations are now closed to new entrants, with cost caps in place for these obligations. As a result of these actions, ATI's retirement savings and other postretirement benefit programs have largely transitioned to a defined contribution structure.

At December 31, 2019, our U.S. qualified defined benefit pension plans were approximately 73% funded in accordance with generally accepted accounting principles, and were remeasured at that date using a 3.40% discount rate to measure the projected benefit obligation. For ERISA funding purposes, discount rates used to measure pension liabilities for U.S. qualified defined benefit plans are calculated on a different basis using an IRS-determined segmented yield curve, which currently results in a higher discount rate than the discount rate methodology required by accounting standards. Funding requirements are also affected by IRS-determined mortality assumptions, which may differ from those used under accounting standards. Based upon current regulations and actuarial studies, we currently expect to make approximately \$130 million in cash contributions to the U.S. qualified defined benefit pension plans in 2020, and we expect to have average annual funding requirements of approximately \$85 million to these pension plans for the next few years thereafter, using a 7.16% weighted average expected rate of return on pension plan assets. However, these estimates are subject to significant uncertainty, including the performance of our pension trust assets and the discount rates used to measure pension liabilities. Pension trust asset performance for both our accounting and ERISA funding calculations is determined using the market value of plan assets at the end of each year.

Dividends

Effective with the fourth quarter of 2016, our Board of Directors decided to suspend the quarterly dividend. The payment of dividends and the amount of such dividends depends upon matters deemed relevant by our Board of Directors on a quarterly basis, such as our results of operations, financial condition, cash requirements, future prospects, any limitations imposed by law, credit agreements or senior securities, and other factors deemed relevant and appropriate. Under the ABL facility, there is no limit on dividend declarations or payments provided that the undrawn availability, after giving effect to a particular dividend payment, is at least the greater of \$150 million and 30% of the maximum revolving credit availability, and no event of default under the ABL facility has occurred and is continuing or would result from paying the dividend. In addition, there is no limit on dividend declarations or payments if the undrawn availability is less than the greater of \$150 million and 30% of the

maximum revolving credit advance amount but more than the greater of \$75 million and 15% of the maximum revolving credit advance amount, if (i) no event of default has occurred and is continuing or would result from paying the dividend, (ii) we demonstrate to the administrative agent that, prior to and after giving effect to the payment of the dividend (A) the undrawn availability, as measured both at the time of the dividend payment and as an average for the 60 consecutive day period immediately preceding the dividend payment, is at least the greater of \$75 million and 15% of the maximum revolving credit availability, and (B) we maintain a fixed charge coverage ratio of at least 1.00:1.00, as calculated in accordance with the terms of the ABL facility.

Critical Accounting Policies

The accompanying consolidated financial statements have been prepared in conformity with United States generally accepted accounting principles. When more than one accounting principle, or the method of its application, is generally accepted, management selects the principle or method that is appropriate in our specific circumstances. Application of these accounting principles requires our management to make estimates about the future resolution of existing uncertainties; as a result, actual results could differ from these estimates. In preparing these consolidated financial statements, management has made its best estimates and judgments of the amounts and disclosures included in the financial statements giving due regard to materiality.

Inventories

At December 31, 2019, we had net inventory of \$1,155.3 million. Inventories are stated at the lower of cost (LIFO, FIFO and average cost methods) or market. Costs include direct material, direct labor and applicable manufacturing and engineering overhead, and other direct costs. Most of our inventory is valued utilizing the LIFO costing methodology. Inventory of our non-U.S. operations is valued using average cost or FIFO methods. Under the LIFO inventory valuation method, changes in the cost of raw materials and production activities are recognized in cost of sales in the current period even though these material and other costs may have been incurred at significantly different values due to the length of time of our production cycle. In a period of rising prices, cost of sales expense recognized under LIFO is generally higher than the cash costs incurred to acquire the inventory sold. Conversely, in a period of declining raw material prices, cost of sales recognized under LIFO is generally lower than cash costs incurred to acquire the inventory sold. Generally, over time based on overall inflationary trends in raw materials, labor and overhead costs, the use of the LIFO inventory valuation method will result in a LIFO inventory valuation reserve, as the higher current period costs are included in cost of sales and the balance sheet carrying value of inventory is reduced.

The prices for many of the raw materials we use have been volatile during the past several years, while labor and overhead costs have been generally stable, with a modest inflationary trend. Raw material cost changes typically have the largest impact on the LIFO inventory costing methodology based on the overall proportion of raw material costs to other inventoriable costs. Since we value most of our inventory utilizing the LIFO inventory costing methodology, a fall in material costs generally results in a benefit to operating results by reducing cost of sales and increasing the inventory carrying value, while conversely, a rise in raw material costs generally has a negative effect on our operating results by increasing cost of sales while lowering the carrying value of inventory. For example, for the year ended December 31, 2019, the LIFO inventory valuation method resulted in cost of sales that were \$25.5 million lower than would have been recognized under the FIFO methodology to value our inventory, while in 2018, the LIFO inventory valuation method resulted in cost of sales that were \$28.6 million higher than would have been recognized under the FIFO methodology to value our inventory. Our NRV reserves were \$33.6 million and \$8.0 million at December 31, 2019 and 2018, respectively.

Due primarily to persistent raw material deflation in prior years, we are in the unusual situation of having a LIFO inventory balance that exceeds replacement cost. In cases where inventory at FIFO cost is lower than the LIFO carrying value, a write-down of the inventory to market may be required, subject to a lower of cost or market evaluation. In applying the lower of cost or market principle, market means current replacement cost, subject to a ceiling (market value shall not exceed net realizable value) and a floor (market shall not be less than net realizable value reduced by an allowance for a normal profit margin). We evaluate product lines on a quarterly basis to identify inventory values that exceed estimated net realizable value. The calculation of a resulting NRV inventory reserve, if any, is recognized as an expense in the period that the need for the reserve is identified.

The impact to our cost of sales for changes in the LIFO costing methodology and associated NRV inventory reserves were as follows (in millions):

	Fiscal year ended December 31,		
	2019	2018	2017
LIFO benefit (charge)	\$ 25.5	\$ (28.6)	\$ (54.2)
NRV benefit (charge)	(25.6)	27.9	54.0
Net cost of sales impact	\$ (0.1)	\$ (0.7)	(0.2)

It is our general policy to write-down to scrap value any inventory that is identified as obsolete and any inventory that has aged or has not moved in more than twelve months. In some instances this criterion is up to twenty-four months due to the longer manufacturing and distribution process for certain products.

The LIFO inventory valuation methodology is not utilized by many of the companies with which we compete, including foreign competitors. As such, our results of operations may not be comparable to those of our competitors during periods of volatile material costs due, in part, to the differences between the LIFO inventory valuation method and other acceptable inventory valuation methods.

Asset Impairment

We monitor the recoverability of the carrying value of our long-lived assets. An impairment charge is recognized when the expected net undiscounted future cash flows from an asset's use (including any proceeds from disposition) are less than the asset's carrying value, and the asset's carrying value exceeds its fair value. Changes in the expected use of a long-lived asset group, and the financial performance of the long-lived asset group and its operating segment, are evaluated as indicators of possible impairment. Future cash flow value may include appraisals for property, plant and equipment, land and improvements, future cash flow estimates from operating the long-lived assets, and other operating considerations. In the fourth quarter of each year in conjunction with the annual business planning cycle, or more frequently if new material information is available, we evaluate the recoverability of idled facilities.

Goodwill is reviewed annually in the fourth quarter of each year for impairment or more frequently if impairment indicators arise. Other events and changes in circumstances may also require goodwill to be tested for impairment between annual measurement dates. For our annual goodwill impairment evaluation performed in the fourth quarter of 2019, quantitative goodwill assessments were performed for the two HPMC reporting units with goodwill. Fair values were determined by using a quantitative assessment that may include discounted cash flow and multiples of cash earnings valuation techniques, plus valuation comparisons to recent public sale transactions of similar businesses, if any, which represents Level 3 unobservable information in the fair value hierarchy. These impairment assessments and valuation methods require us to make estimates and assumptions regarding future operating results, cash flows, changes in working capital and capital expenditures, selling prices, profitability, and the cost of capital. Many of these assumptions are determined by reference to market participants we have identified. For example, our weighted average cost of capital used in our discounted cash flow assessments was approximately 11% and long-term growth rates ranged from 3% to 3.5%. Although we believe that the estimates and assumptions used were reasonable, actual results could differ from those estimates and assumptions.

For our annual goodwill impairment evaluation, a reconciliation of the aggregate fair values of all reporting units to market capitalization was performed using a reasonable control premium in order to validate the reasonableness of the estimated fair values of the reporting units as of the valuation date. No impairments were determined to exist from the annual goodwill impairment evaluations for the years ended December 31, 2019, 2018 and 2017. For the 2019 evaluation, our two HPMC reporting units with goodwill had fair values that were significantly in excess of carrying value.

During the third quarter of 2017, we performed an interim goodwill impairment analysis on ATI Cast Products, a titanium investment casting business, due to impairment indicators including lower actual results versus projections. This reporting unit had a fair value that exceeded carrying value by 12% as a result of our 2016 annual goodwill impairment evaluation. As a result of the 2017 interim goodwill impairment evaluation, we determined that the fair value of the Cast Products business was significantly below the carrying value, including goodwill. This was primarily due to lower projected revenues, profitability and cash flows associated with revised expectations for the rate of operational improvement and profitability of this business based on current customer agreements. Consequently, during the third quarter of 2017, we recorded a \$114.4 million pre-tax impairment charge to write-off all of the goodwill associated with ATI Cast Products, most of which was assigned from our 2011 Ladish acquisition that was not deductible for income tax purposes.

As part of the divestiture of the titanium investment castings business, which was completed early in the third quarter 2019, ATI retained a small post-casting machining operation in Salem, OR. We recognized a \$10.2 million impairment charge on the

carrying value of long-lived assets of the retained Salem operation (\$4.5 million for property, plant and equipment, \$1.4 million for operating lease right of use assets, \$1.0 million for finance lease right of use assets, and \$3.3 million of finite-lived intangible assets). This long-lived asset impairment charge was based on an analysis of the estimated fair values, including asset appraisals using market approaches, which represent Level 3 unobservable information in the fair value hierarchy. This impairment charge is categorized as part of the net gain on sale of the titanium investment castings business.

Income Taxes

On December 22, 2017, the U.S. government enacted comprehensive tax legislation commonly referred to as the Tax Cuts and Jobs Act (the "Tax Act"). The Tax Act made broad and complex changes to the U.S. tax code. Changes impacting ATI's tax provision for the past three years include the following:

- (1) Reducing the U.S. federal current and deferred rate to 21%; The change in the U.S. federal corporate tax rate from 35% to 21% resulted in a \$2.6 million benefit, which was recognized in 2017, as it related to the remeasurement of indefinite lived deferred tax liabilities.
- (2) Repeal of the alternative minimum tax, which resulted in a \$1.5 million decrease in the deferred tax asset valuation allowance that was recognized in 2017. This tax benefit, along with the benefit related to the remeasurement of indefinite lived deferred tax assets is combined for a total benefit of \$4.1 million.
- (3) Requiring companies to pay a one-time transition tax on certain unrepatriated earnings of foreign subsidiaries, with \$5.9 million included in the 2018 tax provision.
- (4) Requiring a current year inclusion in U.S. federal taxable income of certain earnings of controlled foreign corporations, commonly referred to as Global Intangible Low-Taxed Income (GILTI), for which we are currently utilizing pre-January 1, 2018 net operating losses (NOLs) to offset the 2019 income inclusion of \$16.8 million (\$3.5 million net tax effect) and utilized pre-January 1, 2018 losses in 2018 to offset the \$25.7 million (\$5.4 million net tax effect) inclusion.
- (5) Creating a new limitation on deductible interest expense, for which we have estimated the federal limitation to be \$24 million in 2019, creating an indefinite lived deferred tax asset for which a valuation allowance was not established. This limitation is affected by the interpretation of the meaning of depreciation in the proposed regulations, which could change as additional guidance and/or final regulations are issued. We continue to analyze additional planning around the overall calculation and continue to wait for final regulations.

The provision for, or benefit from, income taxes includes deferred taxes resulting from temporary differences in income for financial and tax purposes using the liability method. Such temporary differences result primarily from differences in the carrying value of assets and liabilities. Future realization of deferred income tax assets requires sufficient taxable income within the carryback and/or carryforward period available under tax law. On a quarterly basis, we evaluate the realizability of our deferred tax assets.

The evaluation includes the consideration of all available evidence, both positive and negative, regarding the estimated future reversals of existing taxable temporary differences, estimated future taxable income exclusive of reversing temporary differences and carryforwards, historical taxable income in prior carryback periods if carryback is permitted, and potential tax planning strategies which may be employed to prevent an operating loss or tax credit carryforward from expiring unused. The verifiable evidence such as future reversals of existing temporary differences and the ability to carryback are considered before the subjective sources such as estimate future taxable income exclusive of temporary differences and tax planning strategies. Valuation allowances are established when it is estimated that it is more likely than not that the tax benefit of the deferred tax asset will not be realized.

Beginning in 2015, ATI results reflected a three year cumulative loss from U.S. operations, and valuation allowances were established on its' federal and state deferred tax assets. In 2017, our results reflected a partial release of the valuation allowance related to the federal and state deferred tax assets, along with the one-time transition tax inclusion in 2017. In 2018 based upon updated guidance, approximately \$28.2 million of available tax credits were used instead of the NOL to offset the transition tax inclusion. This overall change in presentation was reflected within the 2018 effective tax rate.

In 2018, we reported income before tax of \$247.7 million, of which \$190.8 million was attributable to the U.S. The overall income, along with the GILTI inclusion for the year, resulted in ATI utilizing NOL deferred tax assets in 2018, which resulted in a U.S. valuation allowance release of \$46.3 million for 2018. At December 31, 2018, we continued to maintain a valuation allowance on the net deferred tax assets for U.S. federal and state income tax purposes, with the exception of the indefinite

lived deferred tax liability related to goodwill and the withholding tax liability associated with its permanent reinvestment assertion, as well as valuation allowances for certain foreign operations.

At December 31, 2019, our U.S. results have switched from a three-year cumulative loss position to a three-year cumulative income position, allowing ATI to utilize forecasts of future profits as a source of income when evaluating the overall need for a valuation allowance. We determined that valuation allowances on net deferred tax asset balances for federal and certain state jurisdictions are no longer required. Certain individual tax attributes still require a valuation allowance based on expected utilization. At December 31, 2019, our deferred tax asset valuation allowance was \$94.5 million. The change in the overall valuation allowance for 2019 includes amounts utilized during the year as part of the reported effective tax rate, as well as a \$45.1 million reduction at December 31, 2019 based on a change in judgment on the realizability of deferred tax assets.

Retirement Benefits

We have defined contribution retirement plans or benefit pension plans covering substantially all of our employees. We also sponsor several postretirement plans covering certain hourly and salaried employees and retirees. These plans provide health care and life insurance benefits for eligible employees. Company contributions to defined contribution retirement plans are generally based on a percentage of eligible pay or based on hours worked, and are funded with cash. All of ATI's defined benefit pension plans are now closed to new entrants, and at most ATI operations with pension participants the plans are frozen for all future benefit accruals, with less than 10% of participants in ATI's U.S. qualified defined benefit plans still earning additional pension service. Additionally, all of the remaining, collectively-bargained defined benefit retiree health care plans at ATI's operations are now closed to new entrants, with cost caps in place for these obligations. As a result of these actions, ATI's retirement savings and other postretirement benefit programs have largely transitioned to a defined contribution structure.

Under U.S. generally accepted accounting principles, amounts recognized in financial statements for defined benefit pension plans are determined on an actuarial basis, rather than as contributions are made to the plan. A significant element in determining our pension income or expense in accordance with the accounting standards is the expected investment return on plan assets. In establishing the expected return on plan investments, which is reviewed annually in the fourth quarter, we take into consideration input from our third party pension plan asset managers and actuaries regarding the types of securities the plan assets are invested in, how those investments have performed historically, and expectations for how those investments will perform in the future. Our weighted average expected long-term return on pension plan investments was 7.52% in 2019, and the weighted average expected long-term rate of return on pension plan investments for 2020 will be 7.16%. We apply this assumed rate to the market value of plan assets at the end of the previous year. This produces the expected return on plan assets that is included in annual pension expense for the current year. The actual returns on pension plan assets for the last five years have been 15.1% for 2019, (4.8)% for 2018, 16.9% for 2017, 5.3% for 2016, and (1.2)% for 2015. The effect of increasing, or lowering, the expected return on pension plan investments by 0.25% would result in additional pre-tax annual income, or expense, of approximately \$5 million. The cumulative difference between the expected return and the actual return on plan assets is deferred and amortized into pension income or expense over future periods. The amount of expected return on plan assets can vary significantly from year-to-year since the calculation is dependent on the market value of plan assets as of the end of the preceding year. U.S. generally accepted accounting principles allow companies to calculate the expected return on pension assets using either an average of fair market values of pension assets over a period not to exceed five years, which reduces the volatility in reported pension income or expense, or their fair market value at the end of the previous year. However, the U.S. Securities and Exchange Commission currently does not permit companies to change from the fair market value at the end of the previous year methodology, which is the methodology that we use, to an averaging of fair market values of plan assets methodology. As a result, our results of operations and those of other companies, including companies with which we compete, may not be comparable due to these different methodologies in calculating the expected return on pension investments.

In accordance with accounting standards, we determine the discount rate used to value pension plan liabilities as of the last day of our fiscal year. The discount rate reflects the current rate at which the pension liabilities could be effectively settled. In estimating this rate, we receive input from our actuaries regarding the rates of return on high quality, fixed-income investments with maturities matched to the expected future retirement benefit payments. Based on this assessment, we established a discount rate of 3.40% for valuing the pension liabilities as of December 31, 2019, and for determining the pension expense for 2020. We had previously assumed a discount rate of 4.40% at the end of 2018 and 3.85% at the end of 2017. The estimated effect of changing the discount rate by 0.50% would decrease pension liabilities in the case of an increase in the discount rate, or increase pension liabilities in the case of a decrease in the discount rate, by approximately \$140 million. Such a change in the discount rate would decrease pension expense in the case of an increase in the discount rate, or increase pension expense in the case of a decrease in the discount rate, by less than \$1 million. The effect on pension liabilities for changes to the discount rate, as well as the net effect of other changes in actuarial assumptions and experience, are deferred and amortized over future periods in accordance with the accounting standards.

As discussed above, gains and losses due to differences between actual and expected results for investment returns on plan assets, changes in the discount rate used to value benefit obligations, and other changes in estimates such as participant life expectancy are deferred and recognized in the consolidated statement of operations over future periods. However for balance sheet presentation, these gains and losses are included in the determination of benefit obligations, net of plan assets, included on the year-end consolidated balance sheet. At December 31, 2019, the Company had approximately \$1.6 billion of pre-tax net actuarial losses on its pension obligations, primarily related to an extended decline over the last several years in the discount rate used to value the pension obligations. These actuarial losses have been recognized on the consolidated balance sheet through a reduction in stockholders' equity, and are being recognized in the consolidated statement of operations through expense amortizations over future years. Due to all of ATI's defined benefit plans being closed to new entrants, and in most cases frozen for future benefit accruals, the amortization period for accumulated other comprehensive loss recognition for all of these plans is average remaining life expectancy, which is approximately 18 years on a weighted average basis.

With respect to our postretirement plans, under most of the plans, our contributions towards retiree medical premiums are capped based upon the cost as of certain dates, thereby creating a defined contribution. In accordance with U.S. generally accepted accounting standards, postretirement expenses recognized in financial statements associated with defined benefit plans are determined on an actuarial basis, rather than as benefits are paid. We use actuarial assumptions, including the discount rate and the expected trend in health care costs, to estimate the costs and benefit obligations for these plans. The discount rate, which is determined annually at the end of each fiscal year, is developed based upon rates of return on high quality, fixed-income investments. At the end of 2019, we determined the rate to be 3.25%, compared to a 4.35% discount rate in 2018, and a 3.80% discount rate in 2017. The estimated effect of changing the discount rate by 0.50% would decrease postretirement obligations in the case of an increase in the discount rate, or increase postretirement obligations in the case of a decrease in the discount rate, by approximately \$15 million. Such a change in the discount rate would decrease postretirement benefit expense in the case of an increase in the discount rate, or increase postretirement benefit expense in the case of a decrease in the discount rate, by less than \$1 million. Based upon predictions of continued significant medical cost inflation in future years, the annual assumed rate of increase in the per capita cost of covered benefits of health care plans is 6.0% in 2020 and is assumed to gradually decrease to 4.5% in the year 2038 and remain level thereafter. Assumed health care cost trend rates can have a significant effect on the benefit obligation for health care plans, however, the Company's contributions for most of its' retiree health plans are capped based on a fixed premium amount, which limits the impact of future health care cost increases.

New Accounting Pronouncements Adopted

In January 2019, we adopted changes issued by the Financial Accounting Standards Board (FASB) related to leases. See Note 11 for further explanation related to this adoption, including all newly expanded disclosure requirements.

Pending Accounting Pronouncements

In August 2018, the FASB issued new disclosure guidance on fair value measurement. This new guidance modifies the disclosure requirements on fair value measurements, including removal and modifications of various current disclosures as well as some additional disclosure requirements for Level 3 fair value measurements. Some of these disclosure changes must be applied prospectively while others retrospectively depending on requirement. This guidance is required to be adopted beginning in fiscal year 2020, with early adoption permitted. We did not early adopt this guidance. The adoption of these changes is not expected to have an impact on our consolidated financial statements other than disclosures.

In June 2016, the FASB added a new impairment model (known as the current expected credit loss (CECL) model) that is based on expected losses rather than incurred losses. Under the new guidance, an entity recognizes as an allowance its estimate of expected credit losses. The CECL model applies to trade receivables, other receivables, contract assets and most debt instruments. The CECL model does not have a minimum threshold for recognition of impairment losses, and entities will need to measure expected credit losses on assets that have a low risk of loss. We adopted this guidance in fiscal year 2020 without significant impact to the consolidated financial statements.

In December 2019, the FASB issued new guidance to simplify the accounting for income taxes. The areas for simplification in the guidance involve the removal of certain exceptions to the general principals in the current guidance, including intraperiod allocation and the calculation of income taxes in an interim period when a year to date loss exceeds the anticipated loss for the year. The new guidance also simplifies the accounting for income taxes in the area of franchise taxes. This new guidance is effective fiscal year 2021, with early adoption permitted. We early adopted this guidance in fiscal year 2020 without significant impact to the consolidated financial statements.

Forward-Looking Statements

From time-to-time, the Company has made and may continue to make “forward-looking statements” within the meaning of the Private Securities Litigation Reform Act of 1995. Certain statements in this report relate to future events and expectations and, as such, constitute forward-looking statements. Forward-looking statements include those containing such words as “anticipates,” “believes,” “estimates,” “expects,” “would,” “should,” “will,” “will likely result,” “forecast,” “outlook,” “projects,” and similar expressions. Such forward-looking statements are based on management’s current expectations and include known and unknown risks, uncertainties and other factors, many of which the Company is unable to predict or control, that may cause our actual results or performance to materially differ from any future results or performance expressed or implied by such statements. Various of these factors are described in Item 1A, Risk Factors, of this Annual Report on Form 10-K and will be described from time-to-time in the Company filings with the SEC, including the Company’s Annual Reports on Form 10-K and the Company’s subsequent reports filed with the SEC on Form 10-Q and Form 8-K, which are available on the SEC’s website at www.sec.gov and on the Company’s website at www.atimetals.com. We assume no duty to update our forward-looking statements.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

As part of our risk management strategy, we utilize derivative financial instruments, from time to time, to hedge our exposure to changes in energy and raw material prices, foreign currencies, and interest rates. We monitor the third-party financial institutions that are our counterparty to these financial instruments on a daily basis and diversify our transactions among counterparties to minimize exposure to any one of these entities. Fair values for derivatives were measured using exchange-traded prices for the hedged items including consideration of counterparty risk and the Company’s credit risk. Our exposure to volatility in interest rates is presently not material, as nearly all of our debt is at fixed interest rates.

Volatility of Interest Rates. We may enter into derivative interest rate contracts to maintain a reasonable balance between fixed- and floating-rate debt. In July 2019, we amended our \$50 million floating-for-fixed interest rate swap which converts half of the Term Loan to a fixed rate (now 4.21% following the September 30, 2019 ABL amendment), with a June 2024 maturity. The Company designated the interest rate swap as a cash flow hedge of the Company’s exposure to the variability of the payment of interest on a portion of its Term Loan borrowings. The ineffectiveness at hedge inception, determined from the fair value of the swap immediately prior to amendment, will be amortized to interest expense over the initial Term Loan swap maturity date of January 12, 2021. Any gain or loss associated with this hedging arrangement is included in interest expense. At December 31, 2019, the net mark-to-market valuation of the outstanding interest rate swap was an unrealized pre-tax loss of \$1.5 million, comprised of \$0.3 million in other current liabilities and \$1.2 million in other long-term liabilities on the balance sheet.

Volatility of Energy Prices. Energy resources markets are subject to conditions that create uncertainty in the prices and availability of energy resources. The prices for and availability of electricity, natural gas, oil and other energy resources are subject to volatile market conditions. These market conditions often are affected by political and economic factors beyond our control. Increases in energy costs, or changes in costs relative to energy costs paid by competitors, have and may continue to adversely affect our profitability. To the extent that these uncertainties cause suppliers and customers to be more cost sensitive, increased energy prices may have an adverse effect on our results of operations and financial condition. We use approximately 8 to 10 million MMBtu’s of natural gas annually, depending upon business conditions, in the manufacture of our products. These purchases of natural gas expose us to risk of higher gas prices. For example, a hypothetical \$1.00 per MMBtu increase in the price of natural gas would result in increased annual energy costs of approximately \$8 to \$10 million. We use several approaches to minimize any material adverse effect on our financial condition or results of operations from volatile energy prices. These approaches include incorporating an energy surcharge on many of our products and using financial derivatives to reduce exposure to energy price volatility.

At December 31, 2019, the outstanding financial derivatives used to hedge our exposure to energy cost volatility included natural gas hedges. At December 31, 2019, we hedged approximately 70% of our annual forecasted domestic requirements for natural gas for 2020 and approximately 50% for 2021. The net mark-to-market valuation of the outstanding natural gas hedges at December 31, 2019 was an unrealized pre-tax loss of \$3.5 million, comprised of \$2.5 million in other current liabilities and \$1.0 million in other long-term liabilities on the balance sheet. For the year ended December 31, 2019, the effects of natural gas hedging activity increased cost of sales by \$1.2 million.

Volatility of Raw Material Prices. We use raw materials surcharge and index mechanisms to offset the impact of increased raw material costs; however, competitive factors in the marketplace can limit our ability to institute such mechanisms, and there can be a delay between the increase in the price of raw materials and the realization of the benefit of such mechanisms. For example, in 2019 we used approximately 105 million pounds of nickel; therefore a hypothetical change of \$1.00 per pound in nickel prices would result in increased costs of approximately \$105 million. In addition, in 2019 we also used approximately 360 million pounds of ferrous scrap in the production of our flat-rolled products and a hypothetical change of \$0.01 per pound

would result in increased costs of approximately \$3.6 million. While we enter into raw materials futures contracts from time-to-time to hedge exposure to price fluctuations, such as for nickel, we cannot be certain that our hedge position adequately reduces exposure. We believe that we have adequate controls to monitor these contracts, but we may not be able to accurately assess exposure to price volatility in the markets for critical raw materials.

The majority of our products are sold utilizing raw material surcharges and index mechanisms. However as of December 31, 2019, we had entered into financial hedging arrangements, primarily at the request of our customers, related to firm orders, for an aggregate amount of approximately 7 million pounds of nickel with hedge dates through 2023. The aggregate notional amount hedged is approximately 7% of a single year's estimated nickel raw material purchase requirements. Any gain or loss associated with these hedging arrangements is included in cost of sales. At December 31, 2019, the net mark-to-market valuation of our outstanding raw material hedges was an unrealized pre-tax gain of \$3.1 million, comprised of \$4.4 million in prepaid expenses and other current assets, \$1.2 million in other assets, and \$2.5 million in other current liabilities on the balance sheet.

Foreign Currency Risk. Foreign currency exchange contracts are used, from time-to-time, to limit transactional exposure to changes in currency exchange rates. We sometimes purchase foreign currency forward contracts that permit us to sell specified amounts of foreign currencies expected to be received from our export sales for pre-established U.S. dollar amounts at specified dates. The forward contracts are denominated in the same foreign currencies in which export sales are denominated. These contracts are designated as hedges of the variability in cash flows of a portion of the forecasted future export sales transactions which otherwise would expose the Company to foreign currency risk, primarily the euro. In addition, we may also hedge forecasted capital expenditures and designate cash balances held in foreign currencies as hedges of forecasted foreign currency transactions. At December 31, 2019, we held euro forward purchase contracts for forecasted capital expenditures designated as cash flow hedges with a notional value of approximately 2 million euro with maturity dates through May 2020.

In 2015, we entered into 244.7 million euro notional value of foreign currency forward contracts designated as fair value hedges with maturity dates through 2017. The Company recorded \$2.7 million of charges during the fiscal year ended December 31, 2017 in costs of sales on the consolidated statement of operations for maturities and mark-to-market changes on these fair value hedges. There were no outstanding fair value hedges as of December 31, 2019, 2018 and 2017.

We may also enter into foreign currency forward contracts that are not designated as hedges, which are denominated in the same foreign currency in which export sales are denominated. We have no euro notional value outstanding as of December 31, 2019 of foreign currency forward contracts not designated as hedges.

At December 31, 2019, the net mark-to-market valuation of the outstanding foreign currency forward contracts was not material.

Item 8. Financial Statements and Supplementary Data

Report of Independent Registered Public Accounting Firm

To the Shareholders and the Board of Directors of Allegheny Technologies Incorporated and Subsidiaries

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Allegheny Technologies Incorporated and Subsidiaries (the Company) as of December 31, 2019 and 2018, the related consolidated statements of operations, comprehensive income (loss), cash flows, and statements of changes in consolidated equity for each of the three years in the period ended December 31, 2019, and the related notes (collectively referred to as the “consolidated financial statements”). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company at December 31, 2019 and 2018, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2019, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company’s internal control over financial reporting as of December 31, 2019, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) and our report dated February 25, 2020 expressed an unqualified opinion thereon.

Basis for Opinion

These financial statements are the responsibility of the Company’s management. Our responsibility is to express an opinion on the Company’s financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

Critical Audit Matters

The critical audit matters communicated below are matters arising from the current period audit of the financial statements that were communicated or required to be communicated to the audit committee and that: (1) relate to accounts or disclosures that are material to the financial statements and (2) involved our especially challenging, subjective or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matters below, providing separate opinions on the critical audit matters or on the accounts or disclosures to which they relate.

Valuation of goodwill

Description of the Matter

At December 31, 2019, the Company had \$525.8 million of goodwill. As discussed in Note 1 to the consolidated financial statements, goodwill is tested annually for impairment, or more frequently if impairment indicators arise. The assessment of goodwill for impairment requires a comparison of the fair value of each reporting unit that has goodwill associated with its operations to its carrying amount, including goodwill. If the Company's carrying amount of a reporting unit exceeds its fair value, an impairment loss would be recognized in an amount equal to the excess of the carrying amount over the calculated fair value.

Auditing the Company's goodwill impairment test was complex and highly judgmental due to the significant estimation required to determine the fair value of the reporting units. In particular, the fair value estimate was sensitive to significant assumptions, such as future operating results, cash flows and the weighted average cost of capital. These significant assumptions are forward looking and could be materially affected by future market or economic conditions.

How We Addressed the Matter in Our Audit

We obtained an understanding, evaluated the design and tested the operating effectiveness of controls over the Company's goodwill impairment testing process, including controls over management's review of the significant assumptions described above.

Our audit procedures to test the estimated fair value of the Company's reporting units included, among others, evaluating the reasonableness of management's significant assumptions described above and used within the fair value methods, involving our valuation specialists to assist in assessing fair valuation methodologies utilized in the Company's annual impairment test, and testing the completeness and accuracy of the underlying data. For example, we evaluated the reasonableness of management's significant assumptions by analyzing the general economic environment and the economic environment of the Company's industry. We compared certain significant assumptions to existing market information and, where relevant, to the plans of the Company, including management's expectations with regard to the Company's business model, customer base, product mix and other relevant factors. We assessed the historical accuracy of management's projected cash flows, where applicable, and performed sensitivity analyses of the significant assumptions to evaluate the changes in the fair value of the reporting units that would result from changes in the assumptions. We involved our valuation specialists to assist in evaluating the discount rate, which included comparison of the selected discount rate to the Company's weighted average cost of capital and the risk associated with projected cash flows. In addition, we tested management's reconciliation of the fair value of the reporting units to the market capitalization of the Company and assessed the adequacy of the disclosures in the consolidated financial statements related to the matter described above.

Valuation allowances on deferred tax assets

Description of the Matter The Company is subject to various income tax laws in the jurisdictions in which it operates. Beginning in 2015, the Company's results reflected a three-year cumulative loss from US operations, and valuation allowances were established on its federal and state deferred tax assets. As described in Note 1 to the consolidated financial statements, valuation allowances are established when it is estimated that it is more likely than not that the tax benefit of the deferred tax asset will not be realized. In making such determination, the Company considers all available evidence, both positive and negative, regarding the estimated future reversals of existing taxable temporary differences; estimated future taxable income, exclusive of reversing temporary differences and carryforwards; historical taxable income in prior carryback periods if carryback is permitted; and potential tax planning strategies, which may be employed to prevent an operating loss or tax credit carryforward from expiring unused. As further discussed in Note 17 to the consolidated financial statements, the Company exited the three-year cumulative loss condition for US Federal and certain state jurisdictions at December 31, 2019. The Company considered the reversals of taxable temporary differences and utilized projected financial results as a source of positive evidence to evaluate the future realizability of deferred tax assets, which triggered the release of \$45.1 million of deferred tax asset valuation allowances and recognition of an income tax benefit in the fourth quarter of 2019. At December 31, 2019, the Company had total deferred tax assets of \$537.9 million, net of \$94.5 million of valuation allowances for deferred tax assets.

Auditing the Company's assertion that it was more likely than not that the deferred tax assets would be realized and the related measurement of the valuation allowance was complex due to the highly judgmental nature of the projections of future sources and the amounts of taxable income, which rely on significant assumptions, such as future reversals of existing temporary differences, impact of tax planning strategies, and future taxable income. Certain of these significant assumptions are forward looking and could be materially affected by future market or economic conditions.

How We Addressed the Matter in Our Audit We obtained an understanding, evaluated the design and tested the operating effectiveness of controls over the Company's process to assess the realizability of the deferred tax assets and measurement of the valuation allowances, including controls over management's review of the significant assumptions described above.

To test the realizability of the deferred tax assets and measurement of the valuation allowances, our audit procedures included, among others, evaluating the methodologies used, the significant assumptions for each type of evidence discussed above, and testing the completeness and accuracy of the underlying data used by the Company in its analysis. For example, as part of our evaluation of management's significant assumptions, we considered the relevant tax laws and regulations in the various jurisdictions, including considering whether the estimated future sources of taxable income were of the appropriate character to utilize the deferred tax assets. We evaluated the cumulative income or loss positions of the Company's various jurisdictions, assessed management's model of estimated future reversals of existing temporary differences and evaluated the Company's forecasts of future profits for the purposes of assessing the reasonableness of the Company's estimated future taxable income. We inspected historical taxable income in prior carryback periods and evaluated the projections of future taxable income by analyzing the general economic environment and the economic environment of the Company's industry. We compared certain assumptions to existing market information and, where relevant, to the plans of the Company, including management's expectations with regard to the Company's business model, customer base, product mix and other relevant factors. We also assessed the accuracy of management's historical projections, compared the estimate of future taxable income with other forecasted financial information prepared by the Company and performed sensitivity analyses of the significant assumptions to evaluate the changes in realizability of deferred tax assets that would result from changes in the assumptions. In addition, we evaluated the Company's income tax disclosures related to the matters described above.

/s/ Ernst & Young LLP

We have served as the Company's auditor since 1996.

Pittsburgh, Pennsylvania

February 25, 2020

Allegheny Technologies Incorporated and Subsidiaries
Consolidated Statements of Operations

(In millions, except per share amounts)

For the Years Ended December 31,

	2019	2018	2017
Sales	\$ 4,122.5	\$ 4,046.6	\$ 3,525.1
Cost of sales	3,484.7	3,416.3	3,028.1
Gross profit	637.8	630.3	497.0
Selling and administrative expenses	267.2	268.2	248.0
Impairment of goodwill	—	—	114.4
Restructuring charges	4.5	—	—
Operating income	366.1	362.1	134.6
Nonoperating retirement benefit expense	(73.6)	(33.9)	(54.3)
Interest expense, net	(99.0)	(101.0)	(133.8)
Debt extinguishment charge	(21.6)	—	(37.0)
Other income, net	69.7	20.5	4.0
Income (loss) before income taxes	241.6	247.7	(86.5)
Income tax provision (benefit)	(28.5)	11.0	(6.8)
Net income (loss)	270.1	236.7	(79.7)
Less: Net income attributable to noncontrolling interests	12.5	14.3	12.2
Net income (loss) attributable to ATI	\$ 257.6	\$ 222.4	\$ (91.9)
Basic net income (loss) attributable to ATI per common share	\$ 2.05	\$ 1.78	\$ (0.83)
Diluted net income (loss) attributable to ATI per common share	\$ 1.85	\$ 1.61	\$ (0.83)

The accompanying notes are an integral part of these statements.

Allegheny Technologies Incorporated and Subsidiaries
Consolidated Statements of Comprehensive Income (Loss)

(In millions)

For the Years Ended December 31,	2019		2018		2017	
Net income (loss)	\$	270.1	\$	236.7	\$	(79.7)
Currency translation adjustment						
Unrealized net change arising during the period		(4.0)		(26.6)		39.1
Derivatives						
Net derivatives gain (loss) on hedge transactions		9.7		(6.4)		14.3
Reclassification to net income (loss) of net realized loss gain		(4.1)		(11.7)		(7.2)
Income taxes on derivative transactions		(4.7)		—		—
Total		10.3		(18.1)		7.1
Postretirement benefit plans						
Actuarial loss						
Amortization of net actuarial loss		87.2		76.5		71.6
Net loss arising during the period		(180.5)		(141.4)		(42.7)
Prior service cost						
Amortization to net income (loss) of net prior service credits		(2.6)		(2.6)		(1.6)
Income taxes on postretirement benefit plans		(20.4)		—		—
Total		(75.5)		(67.5)		27.3
Other comprehensive income (loss), net of tax		(69.2)		(112.2)		73.5
Comprehensive income (loss)		200.9		124.5		(6.2)
Less: Comprehensive income attributable to noncontrolling interests		11.2		8.1		19.8
Comprehensive income (loss) attributable to ATI	\$	189.7	\$	116.4	\$	(26.0)

The accompanying notes are an integral part of these statements.

Allegheny Technologies Incorporated and Subsidiaries
Consolidated Balance Sheets

(In millions, except share and per share amounts)

	December 31, 2019	December 31, 2018
Assets		
Cash and cash equivalents	\$ 490.8	\$ 382.0
Accounts receivable, net	554.1	527.8
Short-term contract assets	38.5	51.2
Inventories, net	1,155.3	1,211.1
Prepaid expenses and other current assets	64.3	74.6
Total Current Assets	2,303.0	2,246.7
Property, plant and equipment, net	2,450.1	2,475.0
Goodwill	525.8	534.7
Other assets	355.7	245.4
Total Assets	\$ 5,634.6	\$ 5,501.8
Liabilities and Stockholders' Equity		
Accounts payable	\$ 521.2	\$ 498.8
Short-term contract liabilities	78.7	71.4
Short-term debt and current portion of long-term debt	11.5	6.6
Other current liabilities	237.8	260.1
Total Current Liabilities	849.2	836.9
Long-term debt	1,387.4	1,535.5
Accrued postretirement benefits	312.5	318.4
Pension liabilities	731.5	730.0
Other long-term liabilities	160.8	89.4
Total Liabilities	3,441.4	3,510.2
Equity:		
ATI Stockholders' Equity:		
Preferred stock, par value \$0.10: authorized-50,000,000 shares; issued-none	—	—
Common stock, par value \$0.10: authorized-500,000,000 shares; issued- 126,695,171 shares at December 31, 2019 and 2018; outstanding-126,085,348 shares at December 31, 2019 and 125,684,396 shares at December 31, 2018	12.7	12.7
Additional paid-in capital	1,618.0	1,615.4
Retained earnings	1,679.3	1,422.0
Treasury stock: 609,823 shares at December 31, 2019 and 1,010,775 shares at December 31, 2018	(18.2)	(30.6)
Accumulated other comprehensive loss, net of tax	(1,201.7)	(1,133.8)
Total ATI Stockholders' Equity	2,090.1	1,885.7
Noncontrolling Interests	103.1	105.9
Total Stockholders' Equity	2,193.2	1,991.6
Total Liabilities and Stockholders' Equity	\$ 5,634.6	\$ 5,501.8

The accompanying notes are an integral part of these statements.

Allegheny Technologies Incorporated and Subsidiaries
Consolidated Statements of Cash Flows

(In millions)

For the Years Ended December 31,	2019	2018	2017
Operating Activities:			
Net income (loss)	\$ 270.1	\$ 236.7	\$ (79.7)
Adjustments to reconcile net income (loss) to net cash provided by operating activities:			
Depreciation and amortization	151.1	156.4	160.8
Deferred taxes	(40.9)	2.1	(1.4)
Gain on joint venture deconsolidation	—	(15.9)	—
Impairment of goodwill	—	—	114.4
Debt extinguishment charge	21.6	—	37.0
Gain from disposal of property, plant and equipment, net	(90.6)	(1.2)	(0.5)
Net loss from sales of businesses	1.8	—	—
Non-cash joint venture impairment charge	11.4	—	—
Change in operating assets and liabilities:			
Retirement benefits	(103.3)	(32.6)	(110.3)
Accounts receivable	(52.1)	16.0	(93.2)
Inventories	25.4	(108.5)	(139.2)
Accounts payable	30.1	153.7	125.8
Accrued income taxes	4.9	1.4	(1.9)
Accrued liabilities and other	0.6	(15.3)	10.6
Cash provided by operating activities	230.1	392.8	22.4
Investing Activities:			
Purchases of property, plant and equipment	(168.2)	(139.2)	(122.7)
Proceeds from disposal of property, plant and equipment	92.0	2.8	2.7
Purchases of businesses	—	(10.0)	—
Proceeds from sales of businesses, net of transaction costs	158.1	—	—
Other	(0.2)	1.3	0.4
Cash provided by (used in) investing activities	81.7	(145.1)	(119.6)
Financing Activities:			
Borrowings on long-term debt	350.0	7.1	8.5
Payments on long-term debt and finance leases	(507.6)	(6.4)	(353.0)
Net borrowings (payments) under credit facilities	4.9	(5.9)	1.6
Debt issuance costs	(5.5)	—	(0.8)
Debt extinguishment charge	(20.9)	—	(35.8)
Issuance of common stock	—	—	397.8
Dividends paid to noncontrolling interests	(14.0)	(10.0)	(8.0)
Sale to noncontrolling interest	—	14.4	3.7
Shares repurchased for income tax withholding on share-based compensation	(9.9)	(6.5)	(4.8)
Cash (used in) provided by financing activities	(203.0)	(7.3)	9.2
Increase (decrease) in cash and cash equivalents	108.8	240.4	(88.0)
Cash and cash equivalents at beginning of year	382.0	141.6	229.6
Cash and cash equivalents at end of year	\$ 490.8	\$ 382.0	\$ 141.6

Amounts presented on the Consolidated Statements of Cash Flows may not agree to the corresponding changes in consolidated balance sheet items due to the accounting for purchases and sales of businesses and the effects of foreign currency translation.

The accompanying notes are an integral part of these statements.

Allegheny Technologies Incorporated and Subsidiaries
Statements of Changes in Consolidated Equity

<i>(In millions, except per share amounts)</i>	ATI Stockholders							Total Equity
	Common Stock	Additional Paid-In Capital	Retained Earnings	Treasury Stock	Accumulated Other Comprehensive Income (Loss)	Non-controlling Interests		
Balance, December 31, 2016	\$ 11.0	\$ 1,188.8	\$ 1,277.1	\$ (28.0)	\$ (1,093.7)	\$ 89.6	\$ 1,444.8	
Net income (loss)	—	—	(91.9)	—	—	12.2	(79.7)	
Other comprehensive income	—	—	—	—	65.9	7.6	73.5	
Issuance of common stock	1.7	396.1	—	—	—	—	397.8	
Dividends paid to noncontrolling interest	—	—	—	—	—	(8.0)	(8.0)	
Sales of subsidiary shares to noncontrolling interest	—	—	—	—	—	3.7	3.7	
Employee stock plans	—	11.4	(0.9)	1.9	—	—	12.4	
Balance, December 31, 2017	\$ 12.7	\$ 1,596.3	\$ 1,184.3	\$ (26.1)	\$ (1,027.8)	\$ 105.1	\$ 1,844.5	
Net income	—	—	222.4	—	—	14.3	236.7	
Other comprehensive loss	—	—	—	—	(106.0)	(6.2)	(112.2)	
Cumulative effect of adoption of new accounting standard	—	—	15.5	—	—	—	15.5	
Dividends paid to noncontrolling interest	—	—	—	—	—	(10.0)	(10.0)	
Sale of subsidiary shares to noncontrolling interest	—	—	—	—	—	2.7	2.7	
Employee stock plans	—	19.1	(0.2)	(4.5)	—	—	14.4	
Balance, December 31, 2018	\$ 12.7	\$ 1,615.4	\$ 1,422.0	\$ (30.6)	\$ (1,133.8)	\$ 105.9	\$ 1,991.6	
Net income	—	—	257.6	—	—	12.5	270.1	
Other comprehensive loss	—	—	—	—	(67.9)	(1.3)	(69.2)	
Dividends paid to noncontrolling interest	—	—	—	—	—	(14.0)	(14.0)	
Employee stock plans	—	2.6	(0.3)	12.4	—	—	14.7	
Balance, December 31, 2019	\$ 12.7	\$ 1,618.0	\$ 1,679.3	\$ (18.2)	\$ (1,201.7)	\$ 103.1	\$ 2,193.2	

The accompanying notes are an integral part of these statements.

Notes to Consolidated Financial Statements

Note 1. Summary of Significant Accounting Policies

Principles of Consolidation

The consolidated financial statements include the accounts of Allegheny Technologies Incorporated and its subsidiaries. The financial results of majority-owned joint ventures are consolidated into the Company's operating results and financial position, with the minority ownership interest recognized in the consolidated statement of operations as net income attributable to noncontrolling interests, and as equity attributable to the noncontrolling interests within total stockholders' equity. Investments in which the Company exercises significant influence, but which it does not control (generally a 20% to 50% ownership interest) are accounted for under the equity method of accounting, whereby ATI's carrying value of the equity method investment on the statement of financial position is the capital investment and any undistributed profit or loss, and is classified in Other (noncurrent) assets. The profit or loss attributable to ATI from equity method investments is included in the consolidated statements of operations as a component of Other (non-operating) income (expense). See Note 7 for further explanation of the Company's joint ventures. Intercompany accounts and transactions have been eliminated. Unless the context requires otherwise, "Allegheny Technologies," "ATI" and the "Company" refer to Allegheny Technologies Incorporated and its subsidiaries.

Risks and Uncertainties and Use of Estimates

The preparation of consolidated financial statements in conformity with United States generally accepted accounting principles requires management to make estimates and assumptions that affect reported amounts of assets and liabilities at the date of the financial statements, as well as the reported amounts of income and expenses during the reporting period. Actual results could differ from those estimates. Management believes that the estimates are reasonable. Certain prior year amounts have been reclassified in order to conform with the 2019 presentation.

The Company markets its products to a diverse customer base, principally throughout the United States. No single customer accounted for more than 10% of sales for any year presented. The major end markets for the ATI's products are customers in the aerospace & defense, oil & gas, energy, automotive, construction and mining, food equipment and appliances, and medical markets.

At December 31, 2019, ATI has approximately 8,100 full-time employees, of which approximately 17% are located outside the United States. Approximately 40% of ATI's workforce is covered by various collective bargaining agreements (CBAs), predominantly with the United Steel, Paper and Forestry, Rubber, Manufacturing, Energy, Allied & Industrial Service Workers International Union, AFL-CIO, CLC (USW). The Company is currently involved in negotiation on its next significant CBA with approximately 1,500 full-time employees that expire on February 29, 2020 involving USW-represented employees located primarily within the Flat Rolled Products segment operations and at two facilities in the High Performance Materials & Components segment.

Cash and Cash Equivalents

Cash equivalents are highly liquid investments that are readily convertible to cash with original maturities of three months or less.

Accounts Receivable

Accounts receivable are presented net of a reserve for doubtful accounts of \$4.6 million and \$6.0 million at December 31, 2019 and 2018, respectively. Trade credit is extended based upon evaluations of each customer's ability to perform its obligations, which are updated periodically. Accounts receivable reserves are determined based upon an aging of accounts and a review for collectability of specific accounts. Amounts are written-off against the reserve in the period it is determined that the receivable is uncollectible.

Inventories

Inventories are stated at the lower of cost (last-in, first-out (LIFO), first-in, first-out (FIFO), and average cost methods) or market. Costs include direct material, direct labor and applicable manufacturing and engineering overhead, and other direct costs. Most of the Company's inventory is valued utilizing the LIFO costing methodology. Inventory of the Company's non-U.S. operations is valued using average cost or FIFO methods.

The Company evaluates product lines on a quarterly basis to identify inventory carrying values that exceed estimated net realizable value. In applying the lower of cost or market principle, market means current replacement cost, subject to a ceiling

(market value shall not exceed net realizable value) and a floor (market shall not be less than net realizable value reduced by an allowance for a normal profit margin). The calculation of a resulting reserve, if any, is recognized as an expense in the period that the need for the reserve is identified. However, in cases where inventory at FIFO cost is lower than the LIFO carrying value, a write-down of the inventory to market may be required, subject to the ceiling and floor. It is the Company's general policy to write-down to scrap value any inventory that is identified as slow-moving or aged more than twelve months, subject to sales, backlog and anticipated orders considerations. In some instances this aging criterion is up to twenty-four months. Inventory valuation reserves also include amounts pertaining to intercompany profit elimination between different subsidiaries.

Long-Lived Assets

Property, plant and equipment are recorded at cost, including capitalized interest, and include long-lived assets acquired under finance leases. Depreciation is primarily recorded using the straight-line method. Property, plant and equipment associated with the Hot-Rolling and Processing Facility (HRPF) in the Flat Rolled Products segment is being depreciated utilizing the units of production method of depreciation, which the Company believes provides a better matching of costs and revenues. The Company periodically reviews estimates of useful life and production capacity assigned to new and in service assets. Significant enhancements, including major maintenance activities that extend the lives of property and equipment, are capitalized. Costs related to repairs and maintenance are charged to expense in the period incurred. The cost and related accumulated depreciation of property and equipment retired or disposed of are removed from the accounts and any related gains or losses are included in income.

The Company monitors the recoverability of the carrying value of its long-lived assets. An impairment charge is recognized when an indicator of impairment occurs and the expected net undiscounted future cash flows from an asset's use (including any proceeds from disposition) are less than the asset's carrying value and the asset's carrying value exceeds its fair value. Assets to be disposed of by sale are stated at the lower of their fair values or carrying amounts and depreciation is no longer recognized.

Leases

On January 1, 2019 the Company adopted Accounting Standards Codification Topic 842 (ASC 842), Leases. This new guidance requires a lessee to recognize assets and liabilities on the balance sheet for all leases, with the result being the recognition of a right of use (ROU) asset and a lease liability. The lease liability is equal to the present value of the minimum lease payments for the term of the lease, including any optional renewal periods determined to be reasonably certain to be exercised, using the discount rate determined at lease commencement. This discount rate is the rate implicit in the lease, if known; otherwise, the incremental borrowing rate (IBR) for the expected lease term is used. The Company's IBRs approximate the rate the Company would have to pay to borrow on a collateralized basis over a similar term at lease inception. The ROU asset is equal to the initial measurement of the lease liability plus any lease payments made to the lessor at or before the commencement date and any unamortized initial direct costs incurred by the lessee, less any unamortized lease incentives received.

The Company has lease contracts for real property and machinery and equipment, primarily for mobile, office and information technology equipment. At inception of a contract, the Company determines whether the contract is or contains a lease. If the Company has a right to obtain substantially all of the economic benefits from the use of the identified asset and the right to direct the use of the asset, then the contract contains a lease. Several of the Company's real property lease contracts include options to extend the lease term, and the Company reassesses the likelihood of renewal on at least an annual basis. In addition, several real property leases include variable lease payments, for items such as common area maintenance and utilities, which are expensed as incurred as variable lease expense.

There are two types of leases, operating leases and finance leases. Lease classification is determined at lease commencement. The criteria used for a lease to be classified as a finance lease is generally consistent with the criteria under the previous lease accounting guidance, ASC 840, for capital leases. All other leases not meeting the finance lease criteria are classified as operating leases. Operating lease expense is recognized on a straight-line basis on the consolidated statement of income. Finance leases have front-loaded expense recognition which is reported as amortization expense and interest expense on the consolidated statement of income. ROU assets for operating leases are classified in other long-term assets, and ROU assets for finance leases are classified in property, plant and equipment on the consolidated balance sheet. For operating leases, short-term lease liabilities are classified in other current liabilities, and long-term lease liabilities are classified in other long-term liabilities on the consolidated balance sheet. For finance leases, short-term lease liabilities are classified in short-term debt, and long-term lease liabilities are classified in long-term debt on the consolidated balance sheet. On the cash flow statement, payments for operating leases are classified as operating activities. Payments for finance leases are classified as a financing activity, with the exception of the interest component of the payment which is classified as an operating activity.

Goodwill

Goodwill is reviewed annually for impairment, or more frequently if impairment indicators arise. The review for goodwill impairment requires a comparison of the fair value of each reporting unit that has goodwill associated with its operations with its carrying amount, including goodwill. If this comparison reflects impairment, then the loss would be measured as the excess of the carrying value over the calculated fair value.

Generally accepted accounting standards provide the option to qualitatively assess goodwill for impairment before completing a quantitative assessment. Under the qualitative approach, if, after assessing the totality of events or circumstances, including both macroeconomic, industry and market factors, and entity-specific factors, the Company determines it is likely (more likely than not) that the fair value of a reporting unit is greater than its carrying amount, then the quantitative impairment analysis is not required. The quantitative assessment may be performed each year for a reporting unit at the Company's option without first performing a qualitative assessment. The Company's quantitative assessment of goodwill for possible impairment includes estimating the fair market value of a reporting unit which has goodwill associated with its operations using discounted cash flow and multiples of cash earnings valuation techniques, plus valuation comparisons to recent public sale transactions of similar businesses, if any. These impairment assessments and valuation methods require the Company to make estimates and assumptions regarding future operating results, cash flows, changes in working capital and capital expenditures, selling prices, profitability, and the cost of capital. Many of these assumptions are determined by reference to market participants identified by the Company. Although management believes that the estimates and assumptions used were reasonable, actual results could differ from those estimates and assumptions.

Other events and changes in circumstances may also require goodwill to be tested for impairment between annual measurement dates. While a decline in stock price and market capitalization is not specifically cited as a goodwill impairment indicator, a company's stock price and market capitalization should be considered in determining whether it is more likely than not that the fair value of a reporting unit is less than its carrying value. Additionally, a significant decline in a company's stock price may suggest that an adverse change in the business climate may have caused the fair value of one or more reporting units to fall below carrying value. A sustained decline in market capitalization below book value may be determined to require an interim goodwill impairment review.

Environmental

Costs that mitigate or prevent future environmental contamination or extend the life, increase the capacity or improve the safety or efficiency of property utilized in current operations are capitalized. Other costs that relate to current operations or an existing condition caused by past operations are expensed. Environmental liabilities are recorded when the Company's liability is probable and the costs are reasonably estimable, but generally not later than the completion of the feasibility study or the Company's recommendation of a remedy or commitment to an appropriate plan of action. The accruals are reviewed periodically and, as investigations and remediations proceed, adjustments of the accruals are made to reflect new information as appropriate. Accruals for losses from environmental remediation obligations do not take into account the effects of inflation, and anticipated expenditures are not discounted to their present value. The accruals are not reduced by possible recoveries from insurance carriers or other third parties, but do reflect allocations among potentially responsible parties (PRPs) at Federal Superfund sites or similar state-managed sites after an assessment is made of the likelihood that such parties will fulfill their obligations at such sites and after appropriate cost-sharing or other agreements are entered. The measurement of environmental liabilities by the Company is based on currently available facts, present laws and regulations, and current technology. Such estimates take into consideration the Company's prior experience in site investigation and remediation, the data concerning cleanup costs available from other companies and regulatory authorities, and the professional judgment of the Company's environmental experts in consultation with outside environmental specialists, when necessary.

Foreign Currency Translation

Assets and liabilities of international operations are translated into U.S. dollars using year-end exchange rates, while revenues and expenses are translated at average exchange rates during the period. The resulting net translation adjustments are recorded as a component of accumulated other comprehensive income (loss) in stockholders' equity.

Sales Recognition

The following is the Company's accounting policy as it relates to Accounting Standards Codification Topic 606 (ASC 606), Revenue from Customers. This guidance provides a five-step analysis of transactions to determine when and how revenue is recognized, and requires an entity to recognize revenue to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services.

The following is the Company's accounting policy as it relates to the five-step analysis for revenue recognition:

1. **Identify the contract**: The Company has determined that the contract with the customer is established when the customer purchase order is accepted or acknowledged. Long-term agreements (LTAs), which typically extend multiple years, are used by the Company and certain of its customers for its specialty materials, in the form of mill products, powders, parts and components, to reduce their supply uncertainty. While these LTAs generally define commercial terms including pricing, termination clauses and other contractual requirements, they do not represent the contract with the customer.
2. **Identify the performance obligation in the contract**: When the Company accepts or acknowledges the customer purchase order, the type of good or service is defined on a line by line basis. Individual performance obligations are established by virtue of the individual line items identified on the sales order acknowledgment at the time of issuance. Generally, the Company's revenue relates to the sale of goods and contains a single performance obligation for each distinct good. Conversion services that transform customer-owned inventory to a different dimension, product form, and/or changed mechanical properties are classified as "goods".
3. **Determine the transaction price**: Pricing is also defined on a sales order acknowledgment on a line item basis and includes an estimate of variable consideration when required by the terms of the individual customer contract. Variable consideration is when the selling price of the good is not known or is subject to adjustment under certain conditions. Types of variable consideration may include volume discounts, customer rebates and surcharges. ATI also provides assurances that goods or services will meet the product specifications contained within the acknowledged customer contract. As such, returns and refunds reserves are estimated based upon past product line history or, at certain locations, on a claim by claim basis.
4. **Allocate the transaction price to the performance obligation**: Since a customer contract generally contains only one performance obligation, this step of the analysis is generally not applicable to the Company.
5. **Recognize revenue when or as the performance obligation is satisfied**: Performance obligations generally occur at a point in time and are satisfied when control passes to the customer. For most transactions, control passes at the time of shipment in accordance with agreed upon delivery terms. On occasion, shipping and handling charges occur after the customer obtains control of the good. When this occurs, the shipping and handling services are considered activities to fulfill the promise to transfer the good. This approach is consistent with our revenue recognition approach in prior years.

Certain customer agreements involving production of parts and components in the High Performance Materials and Components segment require revenue to be recognized over time due to there being no alternative use for the product without significant economic loss and an enforceable right to payment including a normal profit margin from the customer in the event of contract termination. The Company uses an input method for determining the amount of revenue, and associated standard cost, to recognize over-time revenue, cost and gross margin for these customer agreements. The input methods used for these agreements include costs incurred and labor hours expended, both of which give an accurate representation of the progress made toward complete satisfaction of that particular performance obligation.

Contract assets are recognized when ATI's conditional right to consideration for goods or services have transferred to the customer. A conditional right indicates that additional performance obligations associated with the contract are yet to be satisfied. Contract assets are assessed separately for impairment purposes. If ATI's right to consideration from the customer is unconditional, this asset is accounted for as a receivable and presented separately from other contract assets. A right is unconditional if nothing other than the passage of time is required before payment of that consideration is due. Performance obligations that are recognized as revenue at a point-in-time and are billed to the customer are recognized as accounts receivable. Payment terms vary from customer to customer depending upon credit worthiness, prior payment history and other credit considerations.

Contract costs are the incremental costs of obtaining and fulfilling a contract (i.e., costs that would not have been incurred if the contract had not been obtained) to provide goods and services to customers. Contract costs for ATI largely consist of design and development costs for molds, dies and other tools that ATI will own and that will be used in producing the products under the supply arrangement. Contract costs are classified as non-current assets and amortized to expense on a systematic and rational basis over a period consistent with the transfer to the customer of the goods or services to which the asset relates.

Contract liabilities are recognized when ATI has received consideration from a customer to transfer goods or services at a future point in time when the Company performs under the contract. Elements of variable consideration discussed above may be recorded as contract liabilities. In addition, progress billings and advance payments from customers for costs incurred to date are also reported as contract liabilities.

Research and Development

Our research, development and technical service activities are closely interrelated and are directed toward development of new products, improvement of existing products, cost reduction, process improvement and control, quality assurance and control, development of new manufacturing methods, and improvement of existing manufacturing methods. Research and development costs are expensed as incurred. Company funded research and development costs were \$17.8 million in 2019, \$22.7 million in 2018, and \$13.3 million in 2017. Customer funded research and development costs were \$2.4 million in 2019, \$2.2 million in 2018, and \$1.4 million in 2017.

Stock-based Compensation

The Company accounts for stock-based compensation transactions, such as nonvested restricted stock or stock units and performance equity awards, using fair value. Compensation expense for an award is estimated at the date of grant and is recognized over the requisite service period. Compensation expense is adjusted for equity awards that do not vest because service or performance conditions are not satisfied. However, compensation expense already recognized on plans which vest based solely on the attainment of market conditions, such as total shareholder return measures, is not adjusted based on the award attainment status at the end of the measurement period. Compensation expense is adjusted for estimated forfeitures over the award measurement period.

Income Taxes

The provision for, or benefit from, income taxes includes deferred taxes resulting from temporary differences in income for financial and tax purposes using the liability method. Such temporary differences result primarily from differences in the carrying value of assets and liabilities. Future realization of deferred income tax assets requires sufficient taxable income within the carryback and/or carryforward period available under tax law.

The Company evaluates on a quarterly basis whether, based on all available evidence, it is probable that the deferred income tax assets are realizable. Valuation allowances are established when it is estimated that it is more likely than not that the tax benefit of the deferred tax asset will not be realized. The evaluation includes the consideration of all available evidence, both positive and negative, regarding the estimated future reversals of existing taxable temporary differences, estimated future taxable income exclusive of reversing temporary differences and carryforwards, historical taxable income in prior carryback periods if carryback is permitted, and potential tax planning strategies which may be employed to prevent an operating loss or tax credit carryforward from expiring unused. The verifiable evidence such as future reversals of existing temporary differences and the ability to carryback are considered before the subjective sources such as estimate future taxable income exclusive of temporary differences and tax planning strategies.

It is the Company's policy to classify interest and penalties recognized on underpayment of income taxes as income tax expense. It is also the Company's policy to recognize deferred tax amounts stranded in accumulated other comprehensive income (AOCI), which result from tax rate differences on changes in AOCI balances, as an element of income tax expense in the period that the related balance sheet item associated with the AOCI balance ceases to exist. In the case of derivative financial instruments accounted for as hedges, or marketable securities, ATI uses the portfolio method where the stranded deferred tax amount is recognized when all items of a particular category, such as cash flow hedges of a particular risk such as a foreign currency hedge, are settled. In the case of defined benefit pension and other postretirement benefit plans, the stranded deferred tax balance is recognized as an element of income tax expense in the period the benefit plan is extinguished.

Net Income Per Common Share

Basic and diluted net income per share are calculated by dividing the net income available to common stockholders by the weighted average number of common shares outstanding during the year. Diluted amounts assume the issuance of common stock for all potentially dilutive share equivalents outstanding. The calculations of all diluted income/loss per share figures for

a period exclude the potentially dilutive effect of dilutive share equivalents if there is a net loss since the inclusion in the calculation of additional shares in the net loss per share would result in a lower per share loss and therefore be anti-dilutive.

New Accounting Pronouncements Adopted

In January 2019, the Company adopted changes issued by the Financial Accounting Standards Board (FASB) related to leases. See Note 11 for further explanation related to this adoption, including all newly expanded disclosure requirements.

Pending Accounting Pronouncements

In August 2018, the FASB issued new disclosure guidance on fair value measurement. This new guidance modifies the disclosure requirements on fair value measurements, including removal and modifications of various current disclosures as well as some additional disclosure requirements for Level 3 fair value measurements. Some of these disclosure changes must be applied prospectively while others retrospectively depending on requirement. This guidance is required to be adopted by the Company beginning in fiscal year 2020, with early adoption permitted. The Company did not early adopt this guidance. The adoption of these changes is not expected to have an impact on the Company's consolidated financial statements other than disclosures.

In June 2016, the FASB added a new impairment model (known as the current expected credit loss (CECL) model) that is based on expected losses rather than incurred losses. Under the new guidance, an entity recognizes as an allowance its estimate of expected credit losses. The CECL model applies to trade receivables, other receivables, contract assets and most debt instruments. The CECL model does not have a minimum threshold for recognition of impairment losses, and entities will need to measure expected credit losses on assets that have a low risk of loss. This guidance was adopted by the Company in fiscal year 2020 without significant impact to the consolidated financial statements.

In December 2019, the FASB issued new guidance to simplify the accounting for income taxes. The areas for simplification in the guidance involve the removal of certain exceptions to the general principals in the current guidance, including intraperiod allocation and the calculation of income taxes in an interim period when a year to date loss exceeds the anticipated loss for the year. The new guidance also simplifies the accounting for income taxes in the area of franchise taxes. This new guidance is effective for the Company in fiscal year 2021, with early adoption permitted. This guidance was early adopted by the Company in fiscal year 2020 without significant impact to the consolidated financial statements.

Note 2. Revenue from Contracts with Customers

Adoption Method and Impact

On January 1, 2018, the Company adopted ASC 606, Revenue from Contracts with Customers. The Company applied ASC 606 to all contracts not completed at January 1, 2018 and adopted the accounting standard using the modified retrospective method, with the cumulative effect of initially applying ASC 606 recognized at the beginning of the 2018 fiscal year. Comparative information has not been adjusted and continues to be reported under the previous accounting guidance. The Company recognized a \$15.5 million increase to retained earnings at the beginning of the 2018 fiscal year for the cumulative effect of adoption of this standard, representing the favorable impact to prior results had the over-time revenue recognition requirements under ASC 606 been applied to several customer agreements.

In addition, as a result of this over-time recognition of these customer agreements, fiscal year 2018 sales on the consolidated statement of operations were lower by \$4.3 million and cost of sales were lower by \$5.4 million as compared to what those amounts would have been under the previous revenue recognition guidance. On the consolidated balance sheet, inventories, net, were \$5.4 million higher at December 31, 2018 as compared to what this amount would have been under the previous guidance. Also, \$45.3 million of contract assets were recognized on the consolidated balance sheet at December 31, 2018 (\$45.2 million in short-term contract assets and \$0.1 million in other long-term assets) related to this over-time revenue recognition. There was no impact to cash flow from operating activities on the consolidated statement of cash flows as a result of this accounting standard adoption.

Disaggregation of Revenue

The Company operates in two business segments; High Performance Materials & Components (HPMC) and Flat Rolled Products (FRP). Revenue is disaggregated within these two business segments by diversified global markets, primary geographical markets, and diversified products. Comparative information of the Company's overall revenues (in millions) by global and geographical markets for the fiscal years ended December 31, 2019, 2018 and 2017 were as follows:

(in millions)	2019			2018			2017		
	HPMC	FRP	Total	HPMC	FRP	Total	HPMC	FRP	Total
Diversified Global Markets:									
Aerospace & Defense	\$ 1,879.1	\$ 251.3	\$ 2,130.4	\$ 1,771.3	\$ 194.2	\$ 1,965.5	\$ 1,568.9	\$ 149.2	\$ 1,718.1
Oil & Gas	64.3	446.3	510.6	74.9	471.3	546.2	63.9	354.3	418.2
Automotive	10.5	286.1	296.6	9.5	313.9	323.4	8.8	264.9	273.7
Energy	156.9	129.4	286.3	131.4	103.1	234.5	113.1	79.1	192.2
Food Equipment & Appliances	0.3	205.5	205.8	0.4	244.5	244.9	1.1	224.9	226.0
Construction/Mining	42.5	152.5	195.0	72.8	153.2	226.0	51.1	141.8	192.9
Medical	159.2	13.2	172.4	168.5	14.6	183.1	170.4	12.6	183.0
Electronics/Computers/Communications	5.8	157.4	163.2	7.9	149.0	156.9	4.4	147.2	151.6
Other	79.5	82.7	162.2	97.5	68.6	166.1	85.7	83.7	169.4
Total	\$ 2,398.1	\$ 1,724.4	\$ 4,122.5	\$ 2,334.2	\$ 1,712.4	\$ 4,046.6	\$ 2,067.4	\$ 1,457.7	\$ 3,525.1

(in millions)	2019			2018			2017		
	HPMC	FRP	Total	HPMC	FRP	Total	HPMC	FRP	Total
Primary Geographical Market:									
United States	\$ 1,319.7	\$ 1,134.9	\$ 2,454.6	\$ 1,214.1	\$ 1,134.0	\$ 2,348.1	\$ 1,096.5	\$ 974.1	\$ 2,070.6
China	103.0	252.6	355.6	83.1	236.9	320.0	51.1	214.5	265.6
Germany	178.2	41.1	219.3	192.7	54.5	247.2	170.5	46.6	217.1
United Kingdom	164.9	8.9	173.8	232.4	9.7	242.1	220.9	10.7	231.6
France	145.8	9.7	155.5	172.7	10.9	183.6	157.8	7.8	165.6
Japan	104.4	43.3	147.7	136.5	78.4	214.9	95.2	36.5	131.7
Rest of World	382.1	233.9	616.0	302.7	188.0	490.7	275.4	167.5	442.9
Total	\$ 2,398.1	\$ 1,724.4	\$ 4,122.5	\$ 2,334.2	\$ 1,712.4	\$ 4,046.6	\$ 2,067.4	\$ 1,457.7	\$ 3,525.1

Comparative information of the Company's major high-value and standard products based on their percentages of sales is included in the following table. FRP conversion services are excluded from this presentation.

	2019			2018			2017		
	HPMC	FRP	Total	HPMC	FRP	Total	HPMC	FRP	Total
Diversified Products:									
High-Value Products									
Nickel-based alloys and specialty alloys	32%	32%	32%	31%	28%	30%	31%	24%	28%
Precision forgings, castings and components	30%	—%	18%	34%	—%	20%	32%	—%	19%
Titanium and titanium-based alloys	28%	6%	18%	25%	5%	17%	26%	5%	17%
Precision and engineered strip	—%	32%	13%	—%	33%	14%	—%	34%	14%
Zirconium and related alloys	10%	—%	6%	10%	—%	5%	11%	—%	6%
Total High-Value Products	100%	70%	87%	100%	66%	86%	100%	63%	84%
Standard Products									
Standard stainless products	—%	30%	13%	—%	34%	14%	—%	37%	16%
Total	100%								

The Company maintains a backlog of confirmed orders totaling \$2.3 billion, \$2.2 billion and \$2.1 billion at December 31, 2019, 2018 and 2017, respectively. Due to the structure of the Company's LTAs, 81% of this backlog at December 31, 2019 represented booked orders with performance obligations that will be satisfied within the next twelve months. The backlog does not reflect any elements of variable consideration.

Accounts Receivable

As of December 31, 2019 and 2018, accounts receivable with customers were \$558.7 million and \$533.8 million, respectively. The following represents the rollforward of accounts receivable - reserve for doubtful accounts for the fiscal years ended December 31, 2019, 2018 and 2017:

(in millions)

Accounts Receivable - Reserve for Doubtful Accounts

Balance as of December 31, 2016	\$	7.3
Expense to increase the reserve		0.1
Write-off of uncollectible accounts		(1.5)
Balance as of December 31, 2017		5.9
Expense to increase the reserve		1.9
Write-off of uncollectible accounts		(1.8)
Balance as of December 31, 2018		6.0
Expense to increase the reserve		0.2
Write-off of uncollectible accounts		(1.6)
Balance as of December 31, 2019	\$	<u>4.6</u>

Contract balances

The following represents the rollforward of contract assets and liabilities for the fiscal years ended December 31, 2019 and 2018:

(in millions)

Contract Assets

Short-term	2019	2018
Balance as of beginning of fiscal year	\$ 51.2	\$ 36.5
Recognized in current year	74.5	92.9
Reclassified to accounts receivable	(79.9)	(95.8)
Impairment	—	—
Reclassification to/from long-term	—	16.8
Divestiture	(7.3)	—
Other	—	0.8
Balance as of period end	<u>\$ 38.5</u>	<u>\$ 51.2</u>
Long-term	2019	2018
Balance as of beginning of fiscal year	\$ 0.1	\$ 16.9
Recognized in current year	—	—
Reclassified to accounts receivable	—	—
Impairment	—	—
Reclassification to/from short-term	—	(16.8)
Balance as of period end	<u>\$ 0.1</u>	<u>\$ 0.1</u>

(in millions)

Contract Liabilities

Short-term	2019		2018	
Balance as of beginning of fiscal year	\$	71.4	\$	69.7
Recognized in current year		126.1		76.7
Amounts in beginning balance reclassified to revenue		(49.2)		(49.6)
Current year amounts reclassified to revenue		(76.0)		(42.7)
Other		1.9		2.7
Reclassification to/from long-term		4.5		14.6
Balance as of period end	\$	78.7	\$	71.4
Long-term	2019		2018	
Balance as of beginning of fiscal year	\$	7.3	\$	22.2
Recognized in current year		24.2		0.7
Amounts in beginning balance reclassified to revenue		(1.1)		(1.0)
Current year amounts reclassified to revenue		—		—
Other		—		—
Reclassification to/from short-term		(4.5)		(14.6)
Balance as of period end	\$	25.9	\$	7.3

Contract costs for obtaining and fulfilling a contract were \$6.5 million and \$5.2 million as of December 31, 2019 and 2018, respectively, which are reported in other long-term assets on the consolidated balance sheet. Amortization expense for the fiscal years ended December 31, 2019 and 2018 of these contract costs was \$1.4 million and \$1.2 million, respectively.

Note 3. Inventories

Inventories at December 31, 2019 and 2018 were as follows (in millions):

	2019		2018	
Raw materials and supplies	\$	164.9	\$	191.5
Work-in-process		899.6		914.1
Finished goods		161.3		191.1
Total inventories at current cost		1,225.8		1,296.7
Adjustment from current cost to LIFO cost basis		33.6		2.9
Inventory valuation reserves		(104.1)		(88.5)
Total inventories, net	\$	1,155.3	\$	1,211.1

Inventories determined on the LIFO method were \$776.1 million at December 31, 2019, and \$794.3 million at December 31, 2018. The remainder of the inventory was determined using the FIFO and average cost methods, and these inventory values do not differ materially from current cost. Due to deflationary impacts primarily related to raw materials, the carrying value of the Company's inventory as valued on LIFO exceeds current replacement cost, and based on a lower of cost or market value analysis, the Company maintains net realizable value (NRV) inventory valuation reserves to adjust carrying value of LIFO inventory to current replacement cost. These NRV reserves were \$33.6 million and \$8.0 million at December 31, 2019 and 2018, respectively. In applying the lower of cost or market principle, market means current replacement cost, subject to a ceiling (market value shall not exceed net realizable value) and a floor (market shall not exceed net realizable value reduced by an allowance for a normal profit margin).

Impacts to cost of sales for changes in the LIFO costing methodology and associated NRV inventory reserves were as follows (in millions):

	Fiscal year ended December 31,		
	2019	2018	2017
LIFO benefit (charge)	\$ 25.5	\$ (28.6)	\$ (54.2)
NRV benefit (charge)	(25.6)	27.9	54.0
Net cost of sales impact	\$ (0.1)	\$ (0.7)	(0.2)

During 2019 and 2017, inventory usage resulted in liquidations of LIFO inventory quantities, increasing cost of sales by \$1.8 million and \$4.6 million, respectively. During 2018, inventory usage resulted in liquidations of LIFO inventory quantities, decreasing cost of sales by \$0.8 million. These inventories were carried at differing costs prevailing in prior years as compared with the cost of current manufacturing cost and purchases.

The results for fiscal year 2017 included \$17.7 million in inventory valuation charges related to the market-based valuation of titanium products.

ATI's overall LIFO inventory valuation reserves also increased above replacement cost by \$5.2 million at December 31, 2019 compared to December 31, 2018 due to the second quarter 2019 sale of the industrial forgings business, which used the LIFO costing methodology and maintained a LIFO valuation below current replacement cost.

Note 4. Property, Plant and Equipment

Property, plant and equipment at December 31, 2019 and 2018 was as follows:

<i>(In millions)</i>	2019	2018
Land	\$ 34.6	\$ 31.5
Buildings	832.7	851.7
Equipment and leasehold improvements	3,671.3	3,622.7
	<u>4,538.6</u>	<u>4,505.9</u>
Accumulated depreciation and amortization	<u>(2,088.5)</u>	<u>(2,030.9)</u>
Total property, plant and equipment, net	<u>\$ 2,450.1</u>	<u>\$ 2,475.0</u>

Construction in progress at December 31, 2019 and 2018 was \$177.3 million and \$83.7 million, respectively. Depreciation and amortization for the years ended December 31, 2019, 2018 and 2017 was as follows:

<i>(In millions)</i>	2019	2018	2017
Depreciation of property, plant and equipment	\$ 127.1	\$ 131.9	\$ 135.2
Software and other amortization	24.0	24.5	25.6
Total depreciation and amortization	<u>\$ 151.1</u>	<u>\$ 156.4</u>	<u>\$ 160.8</u>

Note 5. Goodwill and Other Intangible Assets

At December 31, 2019, the Company had \$525.8 million of goodwill on its consolidated balance sheet, all of which relates to the HPMC segment. Goodwill decreased \$8.9 million in 2019 due to the allocation of \$10.4 million to the sale of two non-core forging facilities (see Note 6), partially offset by a \$1.5 million increase from the impact of foreign currency translation on goodwill denominated in functional currencies other than the U.S. dollar.

On July 12, 2018, the Company acquired the assets of Addaero for \$10.0 million of cash consideration. Addaero is a metal alloy-based additive manufacturer for the aerospace & defense industries, located in New Britain, CT. This business is reported as part of the HPMC segment from the date of the acquisition. The purchase price allocation included a \$2.0 million technology intangible asset and goodwill of \$6.0 million, which is deductible for tax purposes. The final allocation of the purchase price was completed in the third quarter of 2018.

The Company performs its annual goodwill impairment evaluations in the fourth quarter of each year. For the Company's annual goodwill impairment evaluation performed in the fourth quarter of 2019, quantitative goodwill assessments were performed for the two HPMC reporting units with goodwill. Both of these reporting units had fair values that were significantly in excess of carrying value, and as a result, no impairments were determined to exist from the annual goodwill impairment evaluation for the year ended December 31, 2019. In order to validate the reasonableness of the estimated fair values of the reporting units as of the valuation date, a reconciliation of the aggregate fair values of all reporting units to market capitalization was performed using a reasonable control premium.

During the third quarter of 2017, the Company performed an interim goodwill impairment analysis on ATI Cast Products, a titanium investment casting business, due to impairment indicators including lower actual results versus projections. This reporting unit had a fair value that exceeded carrying value by 12% according to the 2016 annual goodwill impairment evaluation. For the 2017 interim impairment analysis, fair value was determined by using a quantitative assessment using a discounted cash flow technique, which represents Level 3 unobservable information in the fair value hierarchy. As a result of the 2017 interim goodwill impairment evaluation, the Company determined that the fair value of the Cast Products business

was significantly below the carrying value, including goodwill. This was primarily due to lower projected revenues, profitability and cash flows associated with revised expectations for the rate of operational improvement and profitability of this business based on current customer agreements. Consequently, during the third quarter of 2017, the Company recorded a \$114.4 million pre-tax impairment charge to write-off all of the goodwill associated with ATI Cast Products, most of which was assigned from the Company's 2011 Ladish acquisition that was not deductible for income tax purposes. This goodwill impairment charge was excluded from 2017 HPMC business segment results.

Accumulated goodwill impairment losses as of December 31, 2019, 2018 and 2017 were \$241.0 million.

Other intangible assets, which are included in Other assets on the accompanying consolidated balance sheets as of December 31, 2019 and 2018 were as follows:

<i>(in millions)</i>	December 31, 2019		December 31, 2018	
	Gross carrying amount	Accumulated amortization	Gross carrying amount	Accumulated amortization
Technology	\$ 76.8	\$ (29.7)	\$ 93.4	\$ (31.9)
Customer relationships	27.0	(9.3)	35.7	(10.6)
Trademarks	52.4	(20.9)	64.6	(21.5)
Total amortizable intangible assets	\$ 156.2	\$ (59.9)	\$ 193.7	\$ (64.0)

During 2019, total amortizable intangible assets net, decreased \$23.8 million due to the sale of the Company's Cast Products business. This decrease consists of the sale of \$33.2 million gross intangible assets, net of \$12.7 million accumulated amortization, associated with the divested business and the impairment of \$4.3 million gross intangible assets, net of \$1.0 million accumulated amortization, pertaining to the retained Salem, OR operations. See Note 6 for further information.

Amortization expense related to intangible assets was approximately \$9.5 million for the year ended December 31, 2019 and approximately \$10 million for the years ended December 31, 2018 and 2017. For each of the years ending December 31, 2020 through 2024, annual amortization expense is expected to be approximately \$8 million.

Note 6. Divestitures

On June 3, 2019, the Company completed the sale of two non-core forging facilities for \$37 million. Located in Portland, IN and Lebanon, KY, these operations primarily use traditional forging methods to produce carbon steel forged products for use in the oil & gas, transportation and construction & mining industries. The Company received cash proceeds, net of transaction costs and net working capital adjustments, of \$33.0 million on the sale of this business during the fiscal year ended December 31, 2019, which is reported as an investing activity on the consolidated statement of cash flows. With \$10.4 million of goodwill allocated to these operations from ATI's Forged Products reporting unit, the Company recognized an \$8.1 million pre-tax loss in 2019, which is recorded in other income, net, on the consolidated statement of income and is excluded from HPMC segment results. This business is reported as part of the HPMC segment through the date of sale. Sales from these two forging facilities in 2018 were \$86 million in the aggregate.

On July 22, 2019, the Company completed the sale of its Cast Products business, which produces titanium investment castings that are primarily used by aerospace & defense OEMs in the production of commercial jet airframes and engines. As part of the \$127 million transaction, ATI retained a small post-casting machining facility in Salem, OR and continues to provide these services to the buyer and others. The Company received cash proceeds, net of transaction costs and net working capital adjustments, of \$125.1 million on the sale of this business in 2019, which is reported as an investing activity on the consolidated statement of cash flows. The Company recognized a \$6.2 million gain in 2019, which included a \$10.2 million impairment charge on the carrying value of long-lived assets of the retained Salem operation (\$4.5 million for property, plant and equipment, \$1.4 million for operating lease right of use assets, \$1.0 million for finance lease right of use assets, and \$3.3 million of finite-lived intangible assets). This long-lived asset impairment charge was based on an analysis of the estimated fair values, including asset appraisals using market approaches, which represent Level 3 unobservable information in the fair value hierarchy. This gain on the sale of the Cast Products business is recorded in other income, net, on the consolidated statement of income and is excluded from HPMC segment results. This business is reported as part of the HPMC segment through the date of sale. Cast Products' sales were \$105 million in 2018.

Note 7. Joint Ventures

The financial results of majority-owned joint ventures are consolidated into the Company's operating results and financial position, with the minority ownership interest recognized in the consolidated statement of operations as net income attributable to noncontrolling interests, and as equity attributable to the noncontrolling interests within total stockholders' equity. Investments in which the Company exercises significant influence, but which it does not control (generally a 20% to 50% ownership interest) are accounted for under the equity method of accounting. Stockholders' equity includes undistributed earnings of investees accounted for under the equity method of accounting of approximately \$14.5 million at December 31, 2019.

Majority-Owned Joint Ventures

STAL:

The Company has a 60% interest in the Chinese joint venture known as Shanghai STAL Precision Stainless Steel Company Limited (STAL). The remaining 40% interest in STAL is owned by China Baowu Steel Group Corporation Limited, a state authorized investment company whose equity securities are publicly traded in the People's Republic of China. STAL is part of ATI's Flat Rolled Products segment, and manufactures Precision Rolled Strip stainless products mainly for the electronics, communication equipment, computers and automotive markets located in Asia. Cash and cash equivalents held by STAL as of December 31, 2019 were \$22.9 million.

Next Gen Alloys LLC:

During 2017, the Company formed Next Gen Alloys LLC, a joint venture with GE Aviation for the development of a new meltless titanium alloy powder manufacturing technology. ATI owns a 51% interest in this joint venture. The titanium alloy powders are being developed for use in additive manufacturing applications, including 3D printing. Next Gen Alloys LLC funds its development activities through the sale of shares to the two joint venture partners, and in 2018 the Company received \$2.7 million from sales of noncontrolling interests to its joint venture partner, which is reported as a financing activity on the consolidated statements of cash flows. Cash and cash equivalents held by this joint venture as of December 31, 2019 were \$9.9 million.

Equity Method Joint Ventures

A&T Stainless:

On March 1, 2018, the Company announced the formation of the Allegheny & Tsingshan Stainless (A&T Stainless) joint venture with an affiliate company of Tsingshan Group (Tsingshan) to produce 60-inch wide stainless sheet products for sale in North America. Tsingshan purchased a 50% joint venture interest in A&T Stainless for \$17.5 million, of which \$12.0 million was received in 2018 and reported as a financing activity on the consolidated statements of cash flows. The A&T Stainless operations include the Company's previously-idled direct roll and pickle facility in Midland, PA. ATI provides hot-rolling conversion services to A&T Stainless using the FRP segment's Hot-Rolling and Processing Facility. As a result of this sale of a 50% noncontrolling interest and the subsequent deconsolidation of the A&T Stainless entity, the Company recognized a \$15.9 million gain during the first quarter of 2018 under deconsolidation and derecognition accounting guidance covering the loss of control of a subsidiary determined to be a business. The gain, including ATI's retained 50% share, was based on the fair value of the joint venture, as determined by the cash purchase price for the noncontrolling interest, and is reported in other income, net on the consolidated statement of operations, and is excluded from FRP segment results. Following this deconsolidation, ATI accounts for the A&T Stainless joint venture under the equity method of accounting.

In late March 2018, ATI filed for an exclusion from the Section 232 tariffs on behalf of A&T Stainless, which imports semi-finished stainless slab products from Indonesia. In April 2019, the Company learned that this exclusion request was denied by the U.S. Department of Commerce. ATI filed a new request on behalf of A&T Stainless for exclusion from the Section 232 tariffs in October 2019, and A&T Stainless continues to be subject to the 25% tariff levied on its imports of semi-finished stainless slab products from Indonesia pending the outcome of this new request. Results of A&T Stainless have been and will continue to be negatively impacted by these tariffs on imported stainless slab products.

As the tariff exclusion denial represents a potential impairment indicator, A&T Stainless evaluated its long-lived assets for impairment. The joint venture partners have continued to evaluate longer-term solutions to return this strategic initiative to profitability, and determined during the fourth quarter of 2019 that idling this facility is probable if a near-term tariff exclusion is not received. In addition, based on the current financial forecast, the undiscounted cash flows of the joint venture indicate that the carrying value of the long-lived assets is not recoverable. As a result, A&T Stainless recorded a \$14.2 million non-cash impairment charge during December 2019 on its long-lived assets. ATI recognized a \$7.1 million equity loss for its 50% share of this \$14.2 million impairment. In addition, as of December 31, 2019 and 2018, ATI had net receivables for working capital

advances and administrative services from A&T Stainless of \$36.8 million and \$10.5 million, respectively. For the 2019 net receivables, \$8.3 million was reported in prepaid expenses and other current assets and \$28.5 million in other long-term assets on the consolidated balance sheet, while all \$10.5 million for 2018 was reported in prepaid expenses and other current assets. These balances were also evaluated for collectability, and a \$4.3 million reserve was recorded in December 2019 based on ATI's share of the estimated fair value of the joint venture's net assets. The total \$11.4 million joint venture impairment charge for the long-lived asset impairment and receivables reserve is reported within other income, net on the consolidated statement of operations in December 2019 and is excluded from FRP segment results.

ATI's share of the A&T Stainless results were losses of \$19.3 million and \$3.9 million for the fiscal years ended December 31, 2019 and 2018, respectively. For 2019, ATI's share of A&T Stainless results includes the \$7.1 million loss related to the long-lived asset impairment charge for the joint venture's Midland, PA operations, which is excluded from segment results. FRP segment results in 2019 and 2018 include equity method recognition of A&T Stainless operating losses of \$12.2 million and \$3.9 million, respectively.

Sales to A&T Stainless, which are included in ATI's consolidated statement of operations for the 2019 and 2018 fiscal years, were \$14.6 million and \$4.1 million, respectively. At December 31, 2019 and 2018, accounts receivable from A&T Stainless were \$0.1 million and \$0.6 million, respectively.

Uniti:

ATI has a 50% interest in the industrial titanium joint venture known as Uniti LLC (Uniti), with the remaining 50% interest held by VSMPO, a Russian producer of titanium, aluminum, and specialty steel products. Uniti is accounted for under the equity method of accounting. ATI's share of Uniti's income was \$1.5 million in 2019, \$2.9 million in 2018, and \$0.6 million in 2017, which is included in FRP segment's operating results, and within other income, net in fiscal year ended December 31, 2019 and 2018 on the consolidated statement of operations. This equity income is classified in cost of sales for the fiscal year ended December 31, 2017 on the consolidated statements of operations. Sales to Uniti, which are included in ATI's consolidated statements of operations, were \$31.3 million in 2019, \$49.4 million in 2018, and \$38.6 million in 2017. Accounts receivable from Uniti were \$0.2 million and \$1.8 million at December 31, 2019 and 2018, respectively.

Note 8. Asset Retirement Obligations

The Company maintains reserves where a legal obligation exists to perform an asset retirement activity and the fair value of the liability can be reasonably estimated. These asset retirement obligations (AROs) include liabilities where the timing and (or) method of settlement may be conditional on a future event, that may or may not be within the control of the entity. At December 31, 2019, the Company had recognized AROs of \$23.7 million related to landfill closures, decommissioning costs, facility leases and conditional AROs associated with manufacturing activities using what may be characterized as potentially hazardous materials.

Estimates of AROs are evaluated annually in the fourth quarter, or more frequently if material new information becomes known. Accounting for asset retirement obligations requires significant estimation and in certain cases, the Company has determined that an ARO exists, but the amount of the obligation is not reasonably estimable. The Company may determine that additional AROs are required to be recognized as new information becomes available.

Changes in asset retirement obligations for the years ended December 31, 2019 and 2018 were as follows:

<i>(In millions)</i>	2019	2018
Balance at beginning of year	\$ 23.1	\$ 23.5
Accretion expense	0.9	0.8
Payments	(0.3)	(1.2)
Balance at end of year	\$ 23.7	\$ 23.1

Note 9. Supplemental Financial Statement Information

Cash and cash equivalents at December 31, 2019 and 2018 were as follows:

<i>(In millions)</i>	2019	2018
Cash	\$ 190.8	\$ 264.4
Other short-term investments	300.0	117.6
Total cash and cash equivalents	<u>\$ 490.8</u>	<u>\$ 382.0</u>

Other current liabilities included salaries, wages and other payroll-related liabilities of \$94.5 million and \$95.8 million, and accrued interest of \$25.0 million and \$36.6 million at December 31, 2019 and 2018, respectively.

Other income (expense) for the years ended December 31, 2019, 2018, and 2017 was as follows:

<i>(in millions)</i>	2019	2018	2017
Rent, royalty income and other income	\$ 2.9	\$ 3.1	\$ 3.5
Gains from disposal of property, plant and equipment, net	90.7	1.3	0.5
Equity loss on joint ventures (See Note 7)	(10.7)	(1.0)	—
Loss on sales of businesses, net (See Note 6)	(1.9)	—	—
Gain on joint venture deconsolidation (See Note 7)	—	15.9	—
Joint venture impairment charge (See Note 7)	(11.4)	—	—
Other	0.1	1.2	—
Total other income, net	<u>\$ 69.7</u>	<u>\$ 20.5</u>	<u>\$ 4.0</u>

Gains from disposal of property, plant and equipment, net for the year ended December 31, 2019 includes a \$91.7 million gain on the sale of certain oil and gas rights in Eddy County, NM. This cash gain is reported as an investing activity on the consolidated statement of cash flows for the year ended December 31, 2019, and is excluded from segment operating results. These oil and gas rights were initially acquired in 1972 along with land purchased by Teledyne, Inc., which later became part of ATI. The land was subsequently sold, with the Company retaining the underlying oil and gas rights that it sold in 2019.

Note 10. Debt

Debt at December 31, 2019 and 2018 was as follows:

<i>(In millions)</i>	2019	2018
Allegheny Technologies \$500 million 5.875% Senior Notes due 2023 (a)	\$ 500.0	\$ 500.0
Allegheny Technologies \$500 million 5.95% Senior Notes due 2021	—	500.0
Allegheny Technologies \$350 million 5.875% Senior Notes due 2027	350.0	—
Allegheny Technologies \$287.5 million 4.75% Convertible Senior Notes due 2022	287.5	287.5
Allegheny Ludlum 6.95% Debentures due 2025	150.0	150.0
Term Loan due 2024	100.0	100.0
U.S. revolving credit facility	—	—
Foreign credit agreements	4.9	—
Finance leases and other	18.8	15.0
Debt issuance costs	(12.3)	(10.4)
Total short-term and long-term debt	<u>1,398.9</u>	<u>1,542.1</u>
Short-term debt and current portion of long-term debt	11.5	6.6
Total long-term debt	<u>\$ 1,387.4</u>	<u>\$ 1,535.5</u>

(a) Bearing interest at 7.875% effective February 15, 2016.

In December 2019, the Company redeemed all \$500 million aggregate principal amount outstanding of the 5.95% Senior Notes due 2021 (2021 Notes), which had a January 15, 2021 maturity date, resulting in a \$21.6 million pre-tax debt extinguishment charge, which included a \$20.9 million cash make-whole payment related to the early extinguishment of the Notes as required by the applicable indenture, and a \$0.7 million charge for deferred debt issue costs.

In December 2017, the Company redeemed all \$350 million aggregate principal amount outstanding of the 9.375% Senior Notes due 2019, resulting in a \$37.0 million pre-tax debt extinguishment charge, which included a \$35.8 million cash make-

whole payment related to the early extinguishment of the Notes as required by the applicable indenture, and a \$1.2 million charge for deferred debt issue costs.

Interest expense was \$104.9 million in 2019, \$102.1 million in 2018, and \$134.9 million in 2017. Interest expense was reduced by \$4.7 million, \$4.1 million, and \$2.6 million, in 2019, 2018, and 2017, respectively, from interest capitalization on capital projects. Interest and commitment fees paid were \$105.7 million in 2019, \$102.6 million in 2018, and \$133.8 million in 2017. Net interest expense includes interest income of \$5.9 million in 2019, \$1.1 million in 2018, and \$1.1 million in 2017.

Scheduled principal payments during the next five years are \$11.5 million in 2020, \$4.8 million in 2021, \$291.5 million in 2022, \$502.7 million in 2023, and \$100.7 million in 2024. See Note 11, Leases, for the portion of these payments that are related to finance leases.

2027 Notes

On November 22, 2019, ATI issued \$350 million aggregate principal amount of 5.875% Senior Note due 2027 (2027 Notes). Interest on the 2027 Notes is payable semi-annually in arrears at a rate of 5.875% per year and will mature on December 1, 2027. Net proceeds of \$344.5 million from this issuance, as well as cash on hand, were used to retire the 2021 Notes as discussed above. Underwriting fees and other third-party expenses for the issuance of the 2027 notes were \$5.5 million, and are being amortized to interest expense over the 8-year term of the 2027 Notes. The 2027 Notes are unsecured and unsubordinated obligations of the Company and equally ranked with all of its existing and future senior unsecured debt. The 2027 Notes restrict the Company's ability to create certain liens, to enter into sale leaseback transactions, guarantee indebtedness and to consolidate or merge all, or substantially all, of its assets. The Company has the option to redeem the 2027 Notes, as a whole or in part, at any time or from time to time, on at least 30 days, but not more than 60 days, prior notice to the holders of the Notes at redemption prices specified in the 2027 Notes. The 2027 Notes are subject to repurchase upon the occurrence of a change in control repurchase event (as defined in the 2027 Notes) at a repurchase price in cash equal to 101% of the aggregate principal amount of the Notes repurchased, plus any accrued and unpaid interest on the 2027 Notes repurchased.

2023 Notes

The 5.875% stated interest rate payable on the Company's Senior Notes due 2023 (2023 Notes) is subject to adjustment in the event of changes in the credit ratings on the 2023 Notes by either Moody's or Standard & Poor's (S&P). Each notch of credit rating downgrade from the credit ratings in effect when the 2023 Notes were issued in July 2013 increases interest expense by 0.25% on the 2023 Notes, up to a maximum 4 notches by each of the two rating agencies, or a total 2.0% potential interest rate change up to 7.875%.

The annual interest rate on the 2023 Notes has been at the maximum 7.875% since February 2016. Any further credit rating downgrades have no effect on the interest rate of the 2023 Notes, and increases in the Company's credit ratings from these ratings agencies would reduce interest expense incrementally on the 2023 Notes to the original 5.875% interest rate in a similar manner.

Credit Agreements

On September 30, 2019, the Company amended and restated its Asset Based Lending (ABL) Credit Facility, which is collateralized by the accounts receivable and inventory of the Company's domestic operations. This amendment and restatement extends the ABL facility through September 30, 2024 and includes an increase of \$100 million in the revolving credit facility to \$500 million, a letter of credit sub-facility of up to \$200 million, and a \$100 million term loan (Term Loan). Additionally, the amendment and restatement gives the Company the ability, through June 30, 2020 and as long as no default or event of default has occurred and is continuing, to borrow an additional term loan of up to \$100 million in total, using one or two draws (the Delayed-Draw Term Loan). The Company also has the right to request an increase of up to \$200 million in the maximum amount available under the revolving credit facility for the duration of the ABL. The Term Loan has an amended interest rate of 2.0% plus a LIBOR spread and can be prepaid in increments of \$25 million if certain minimum liquidity conditions are satisfied. In July 2019, the Company amended its \$50 million floating-for-fixed interest rate swap which converts half of the Term Loan to a fixed rate (now 4.21% following the September 30, 2019 ABL amendment and restatement) with a June 2024 maturity.

As amended and restated, the applicable interest rate for revolving credit borrowings under the ABL facility includes interest rate spreads based on available borrowing capacity that range between 1.25% and 1.75% for LIBOR-based borrowings and between 0.25% and 0.75% for base rate borrowings. The ABL facility contains a financial covenant whereby the Company must maintain a fixed charge coverage ratio of not less than 1.00:1.00 after an event of default has occurred and is continuing or if the undrawn availability under the ABL revolving credit portion of the facility is less than the greater of (i) 12.5% of the then applicable maximum borrowing amount under the revolving credit portion of the ABL and any outstanding Term Loan

balance, or (ii) \$62.5 million. The Company was in compliance with the fixed charge coverage ratio covenant at December 31, 2019. Additionally, the Company must demonstrate minimum liquidity, as calculated in accordance with the terms of the ABL facility, during the 90 day period immediately preceding the stated maturity date of each of the 4.75% Convertible Notes due 2022 and 5.875% Notes due 2023. Costs associated with entering into the 2019 ABL amendment were \$2.2 million, and are being amortized to interest expense over the extended term of the facility ending September 2024, along with \$2.1 million of unamortized deferred costs previously recorded for the ABL.

There were no revolving credit borrowings under the ABL during 2019, however \$35.3 million of available capacity was utilized to support the issuance of letters of credit at December 31, 2019. Average borrowings under the ABL for the fiscal year ended December 31, 2018 were \$43 million, bearing an average annual interest rate of 3.7%.

Convertible Notes

In 2016, the Company issued and sold \$287.5 million aggregate principal amount of 4.75% Convertible Senior Notes due 2022 (2022 Convertible Notes). Interest on the 2022 Convertible Notes is payable in cash semi-annually in arrears on each January 1 and July 1, commencing January 1, 2017.

The Company does not have the right to redeem the 2022 Convertible Notes prior to their stated maturity date. Holders of the 2022 Convertible Notes have the option to convert their notes into shares of the Company's common stock, at any time prior to the close of business on the business day immediately preceding the stated maturity date (July 1, 2022). The initial conversion rate for the 2022 Convertible Notes is 69.2042 shares of ATI common stock per \$1,000 (in whole dollars) principal amount of Notes (19.9 million shares), equivalent to conversion price of \$14.45 per share, subject to adjustment in certain events. Other than receiving cash in lieu of fractional shares, holders do not have the option to receive cash instead of shares of common stock upon conversion. Accrued and unpaid interest that exists upon conversion of a note will be deemed paid by the delivery of shares of ATI common stock and no cash payment or additional shares will be given to the holders.

If the Company undergoes a fundamental change as defined in the agreement, holders of the 2022 Convertible Notes may require the Company to repurchase the notes in whole or in part for cash at a price equal to 100% of the principal amount of the notes to be purchased plus any accrued and unpaid interest to, but excluding, the repurchase date.

Foreign and Other Credit Facilities

STAL, the Company's Chinese joint venture company in which ATI has a 60% interest, has a separate \$20 million revolving credit facility. Borrowings under the STAL revolving credit facility are in U.S. dollars based on U.S. interbank offered rates. The credit facility is supported solely by STAL's financial capability without any guarantees from the joint venture partners. The credit facility requires STAL to maintain a minimum level of shareholders' equity, and certain financial ratios.

The Company has no off-balance sheet financing relationships as defined in Item 303(a)(4) of SEC Regulation S-K, with variable interest entities, structured finance entities, or any other unconsolidated entities. At December 31, 2019, the Company had not guaranteed any third-party indebtedness.

Note 11. Leases

Adoption Method and Impact

On January 1, 2019 the Company adopted ASC 842, Leases. The Company applied ASC 842 to all leases in effect at January 1, 2019 and adopted the accounting standard using the alternative transition method, which does not require the restatement of prior years. Comparative information has not been adjusted and continues to be reported under the previous accounting guidance. The Company has elected the package of practical expedients, which allows entities to not reassess (1) whether contracts are or contain leases, (2) lease classification and (3) initial direct costs. The Company has also elected the practical expedient to not separate lease components from non-lease components for all asset classes, and did not elect the hindsight practical expedient to determine the lease term. The Company has made an accounting policy election to apply the short-term exception, which does not require the capitalization of leases with terms of 12 months or less. On January 1, 2019, the Company recognized \$51.7 million of ROU assets and \$55.6 million of lease liabilities (\$12.5 million short-term and \$43.1 million long-term) on the consolidated balance sheet for operating leases, with the difference due to deferred rent balances as of December 31, 2018 that reduced the ROU asset balance on January 1, 2019. The adoption did not have a material impact on the Company's results of operations or cash flows, and had no impact to the net deferred tax position on the consolidated balance sheet due to the Company's income tax valuation allowances for federal and state purposes (see Note 17).

The Company has entered into finance lease contracts with lenders for progress payments on machinery and equipment that is being constructed at the request and specification of the Company. As of December 31, 2019, the lenders had made \$5.3 million of progress payments on behalf of the Company, and \$8.2 million of progress payments are scheduled to be paid. Upon payment of the final progress payments by the lenders, finance leases will commence, and \$13.5 million, discounted using the applicable discount rates at lease inceptions, of ROU assets and lease liabilities will be recognized by the Company.

The following represents the components of lease cost and other information for both operating and financing leases for the fiscal year ending December 31, 2019:

(\$ in millions)

	Fiscal year ended	
	December 31, 2019	
Lease Cost		
Finance Lease Cost:		
Amortization of right of use asset	\$	1.7
Interest on lease liabilities		0.5
Operating lease cost		20.5
Short-term lease cost		3.1
Variable lease cost		0.8
Sublease income		—
Total lease cost	\$	26.6
Other information		
Cash paid for amounts included in the measurement of lease liabilities		
Operating cash flows from finance leases	\$	0.5
Operating cash flows from operating leases	\$	20.8
Financing cash flows from finance leases	\$	2.4
Right of use assets obtained in exchange for new finance lease liabilities	\$	14.1
Right of use assets obtained in exchange for new operating lease liabilities (a)	\$	35.9
Weighted average remaining lease term - finance leases		4 years
Weighted average remaining lease term - operating leases		6 years
Weighted average discount rate - finance leases		5.3%
Weighted average discount rate - operating leases		7.0%

(a) Several of the Company's real property lease contracts include options to extend the lease term. During the fourth quarter of 2019, the Company reassessed the likelihood of renewal and has included \$10.2 million for the renewal options for several of these operating leases in the ROU asset and lease liability because the likelihood of renewal was determined to be reasonably certain.

Rental expense under operating leases was \$24.4 million in 2018 and \$21.1 million in 2017.

The following table reconciles future minimum undiscounted rental commitments for operating leases to the operating lease liabilities recorded on the consolidated balance sheet as of December 31, 2019 (in millions):

	December 31, 2019	
2020	\$	20.0
2021		18.2
2022		15.3
2023		11.7
2024		8.0
2025 and thereafter		24.6
Total undiscounted lease payments	\$	97.8
Present value adjustment		(20.1)
Operating lease liabilities	\$	77.7

The following table reconciles future minimum undiscounted rental commitments for finance leases to the finance lease liabilities recorded on the consolidated balance sheet as of December 31, 2019 (in millions):

	December 31, 2019	
2020	\$	4.5
2021		4.2
2022		3.9
2023		2.7
2024		0.7
2025 and thereafter		—
Total undiscounted lease payments	\$	16.0
Present value adjustment		(1.5)
Finance lease liabilities	\$	14.5

Note 12. Derivative Financial Instruments and Hedging

As part of its risk management strategy, the Company, from time-to-time, utilizes derivative financial instruments to manage its exposure to changes in raw material prices, energy costs, foreign currencies, and interest rates. In accordance with applicable accounting standards, the Company accounts for most of these contracts as hedges.

The Company sometimes uses futures and swap contracts to manage exposure to changes in prices for forecasted purchases of raw materials, such as nickel, and natural gas. Under these contracts, which are generally accounted for as cash flow hedges, the price of the item being hedged is fixed at the time that the contract is entered into and the Company is obligated to make or receive a payment equal to the net change between this fixed price and the market price at the date the contract matures.

The majority of ATI's products are sold utilizing raw material surcharges and index mechanisms. However, as of December 31, 2019, the Company had entered into financial hedging arrangements primarily at the request of its customers, related to firm orders, for an aggregate notional amount of approximately 7 million pounds of nickel with hedge dates through 2023. The aggregate notional amount hedged is approximately 7% of a single year's estimated nickel raw material purchase requirements.

At December 31, 2019, the outstanding financial derivatives used to hedge the Company's exposure to energy cost volatility included natural gas cost hedges. At December 31, 2019, the company hedged approximately 70% of the Company's annual forecasted domestic requirements for natural gas for 2020 and approximately 50% for 2021.

While the majority of the Company's direct export sales are transacted in U.S. dollars, foreign currency exchange contracts are used, from time-to-time, to limit transactional exposure to changes in currency exchange rates for those transactions denominated in a non-U.S. currency. The Company sometimes purchases foreign currency forward contracts that permit it to sell specified amounts of foreign currencies expected to be received from its export sales for pre-established U.S. dollar amounts at specified dates. The forward contracts are denominated in the same foreign currencies in which export sales are denominated. These contracts are designated as hedges of the variability in cash flows of a portion of the forecasted future export sales transactions which otherwise would expose the Company to foreign currency risk, primarily euros. In addition, the Company may also hedge forecasted capital expenditures and designate cash balances held in foreign currencies as hedges of forecasted foreign currency transactions. At December 31, 2019, the Company held euro forward purchase contracts for forecasted capital expenditures designated as cash flow hedges with a notional value of approximately 2 million euro with maturity dates through May 2020.

In 2015, the Company entered into 244.7 million euro notional value of foreign currency forward contracts designated as fair value hedges maturity dates through 2017. The Company recorded \$2.7 million of charges during the fiscal year ended December 31, 2017 in costs of sales on the consolidated statement of operations for maturities and mark-to-market changes on these fair value hedges. There were no outstanding fair value hedges as of December 31, 2019, 2018 and 2017.

The Company may enter into derivative interest rate contracts to maintain a reasonable balance between fixed- and floating-rate debt. In July 2019, the Company amended its \$50 million floating-for-fixed interest rate swap which converts half of the Term Loan to a fixed rate (now 4.21% following the September 30, 2019 ABL amendment), with a June 2024 maturity. The Company designated the interest rate swap as a cash flow hedge of the Company's exposure to the variability of the payment of interest on a portion of its Term Loan borrowings. The ineffectiveness at hedge inception, determined from the fair value of the swap immediately prior to amendment, will be amortized to interest expense over the initial Term Loan swap maturity date of January 12, 2021.

There are no credit risk-related contingent features in the Company's derivative contracts, and the contracts contained no provisions under which the Company has posted, or would be required to post, collateral. The counterparties to the Company's derivative contracts were substantial and creditworthy commercial banks that are recognized market makers. The Company controls its credit exposure by diversifying across multiple counterparties and by monitoring credit ratings and credit default swap spreads of its counterparties. The Company also enters into master netting agreements with counterparties when possible.

The fair values of the Company's derivative financial instruments are presented below, representing the gross amounts recognized which are not offset by counterpart or by type of item hedged. All fair values for these derivatives were measured using Level 2 information as defined by the accounting standard hierarchy, which includes quoted prices for similar assets or liabilities in active markets, quoted prices for identical or similar assets or liabilities in markets that are not active, and inputs derived principally from or corroborated by observable market data.

(In millions)

<u>Asset derivatives</u>	<u>Balance sheet location</u>	December 31, 2019	December 31, 2018
Derivatives designated as hedging instruments:			
Natural gas contracts	Prepaid expenses and other current assets	\$ —	\$ 0.8
Nickel and other raw material contracts	Prepaid expenses and other current assets	4.4	1.2
Natural gas contracts	Other assets	—	0.2
Nickel and other raw material contracts	Other assets	1.2	0.8
Total derivatives designated as hedging instruments		5.6	3.0
Derivatives not designated as hedging instruments:			
Foreign exchange contracts	Prepaid expenses and other current assets	—	0.4
Total derivatives not designated as hedging instruments:		—	0.4
Total asset derivatives		\$ 5.6	\$ 3.4
<u>Liability derivatives</u>	<u>Balance sheet location</u>		
Derivatives designated as hedging instruments:			
Interest rate swap	Other current liabilities	\$ 0.3	\$ 0.2
Foreign exchange contracts	Other current liabilities	—	0.6
Natural gas contracts	Other current liabilities	2.5	0.1
Nickel and other raw material contracts	Other current liabilities	2.5	6.8
Interest rate swap	Other long-term liabilities	1.2	0.3
Natural gas contracts	Other long-term liabilities	1.0	0.3
Nickel and other raw material contracts	Other long-term liabilities	—	2.1
Total derivatives designated as hedging instruments		7.5	10.4
Total liability derivatives		\$ 7.5	\$ 10.4

Assuming market prices remain constant with those at December 31, 2019, a pre-tax loss of \$0.9 million is expected to be recognized over the next 12 months.

For derivative financial instruments that are designated as cash flow hedges, the gain or loss on the derivative is reported as a component of other comprehensive income (OCI) and reclassified into earnings in the same period or periods during which the hedged item affects earnings. For derivative financial instruments that are designated as fair value hedges, changes in the fair value of these derivatives are recognized in current period results and are reported as changes within accrued liabilities and other on the consolidated statements of cash flows. The Company did not use net investment hedges for the periods presented. The effects of derivative instruments in the tables below are presented net of related income taxes, excluding any impacts of changes to income tax valuation allowances affecting results of operations or other comprehensive income, when applicable. The 2019 income tax provision includes \$6.0 million of tax expense for the recognition of a stranded deferred tax balance arising from deferred tax valuation allowances that was associated with a cash flow hedge portfolio that fully settled in the fourth quarter of 2019 (see Notes 15 and 17 for further explanation on tax impacts within accumulated other comprehensive income (loss)). This tax impact is also excluded from the table below.

Activity with regard to derivatives designated as cash flow hedges for the years ended December 31, 2019 and 2018 were as follows (in millions):

Derivatives in Cash Flow Hedging Relationships	Amount of Gain (Loss) Recognized in OCI on Derivatives		Amount of Gain (Loss) Reclassified from Accumulated OCI into Income (a)	
	2019	2018	2019	2018
Nickel and other raw material contracts	\$ 11.3	\$ (6.4)	\$ 3.9	\$ 7.7
Natural gas contracts	(4.0)	1.5	(0.9)	0.4
Foreign exchange contracts	1.0	0.5	0.5	1.0
Interest rate swap	(0.9)	(0.5)	(0.4)	(0.2)
Total	\$ 7.4	\$ (4.9)	\$ 3.1	\$ 8.9

- (a) The gains (losses) reclassified from accumulated OCI into income related to the derivatives, with the exception of the interest rate swap, are presented in cost of sales in the same period or periods in which the hedged item affects earnings. The gains (losses) reclassified from accumulated OCI into income on the interest rate swap are presented in interest expense in the same period as the interest expense on the Term Loan is recognized in earnings.

The disclosures of gains or losses presented above for nickel and other raw material contracts and foreign currency contracts do not take into account the anticipated underlying transactions. Since these derivative contracts represent hedges, the net effect of any gain or loss on results of operations may be fully or partially offset.

Changes in the fair value of foreign exchange contract derivatives not designated as hedging instruments are recorded in cost of sales and are reported as changes within accrued liabilities and other on the consolidated statements of cash flows. The Company has no outstanding foreign currency forward contracts not designated as hedges as of December 31, 2019.

Derivatives Not Designated as Hedging Instruments	Amount of Gain (Loss) Recognized in Income on Derivatives	
	2019	2018
Foreign exchange contracts	\$ 0.1	\$ 0.3

Note 13. Fair Value of Financial Instruments

The estimated fair value of financial instruments at December 31, 2019 was as follows:

(In millions)	Total Carrying Amount	Fair Value Measurements at Reporting Date Using		
		Total Estimated Fair Value	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Observable Inputs (Level 2)
Cash and cash equivalents	\$ 490.8	\$ 490.8	\$ 490.8	\$ —
Derivative financial instruments:				
Assets	5.6	5.6	—	5.6
Liabilities	7.5	7.5	—	7.5
Debt (a)	1,411.2	1,676.5	1,552.8	123.7

The estimated fair value of financial instruments at December 31, 2018 was as follows:

(In millions)	Total Carrying Amount	Fair Value Measurements at Reporting Date Using		
		Total Estimated Fair Value	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Observable Inputs (Level 2)
Cash and cash equivalents	\$ 382.0	\$ 382.0	\$ 382.0	\$ —
Derivative financial instruments:				
Assets	3.4	3.4	—	3.4
Liabilities	10.4	10.4	—	10.4
Debt (a)	1,552.5	1,739.4	1,624.4	115.0

- (a) The total carrying amount for debt excludes debt issuance costs related to the recognized debt liability which is presented in the consolidated balance sheet as a direct reduction from the carrying amount of the debt liability.

In accordance with accounting standards, fair value is defined as the exchange price that would be received for an asset or paid to transfer a liability (an exit price) in the principal or most advantageous market for the asset or liability in an orderly transaction between market participants at the measurement date. Accounting standards established three levels of a fair value hierarchy that prioritizes the inputs used to measure fair value. This hierarchy requires entities to maximize the use of observable inputs and minimize the use of unobservable inputs. The three levels of inputs used to measure fair value are as follows:

Level 1 – Quoted prices in active markets for identical assets or liabilities.

Level 2 – Observable inputs other than quoted prices included in Level 1, such as quoted prices for similar assets and liabilities in active markets; quoted prices for identical or similar assets and liabilities in markets that are not active; or other inputs that are observable or can be corroborated by observable market data.

Level 3 – Unobservable inputs that are supported by little or no market activity and that are significant to the fair value of the assets and liabilities. This includes certain pricing models, discounted cash flow methodologies and similar techniques that use significant unobservable inputs.

The availability of observable market data is monitored to assess the appropriate classification of financial instruments within the fair value hierarchy. Changes in economic conditions or model-based valuation techniques may require the transfer of financial instruments from one fair value level to another. In such instances, the transfer is reported at the beginning of the reporting period. No transfers between levels were reported in 2019 or 2018.

The following methods and assumptions were used by the Company in estimating the fair value of its financial instruments:

Cash and cash equivalents: Fair values were determined using Level 1 information.

Derivative financial instruments: Fair values for derivatives were measured using exchange-traded prices for the hedged items. The fair value was determined using Level 2 information, including consideration of counterparty risk and the Company's credit risk.

Short-term and long-term debt: The fair values of the 2021 Notes (prior to redemption in December 2019), the 2022 Convertible Notes, the 2023 Notes, the Allegheny Ludlum 6.95% Debentures due 2025 and the 2027 Notes (subsequent to issuance in November 2019) were determined using Level 1 information. The fair values of other short-term and long-term debt were determined using Level 2 information.

Note 14. Retirement Benefits

The Company has defined contribution retirement plans or defined benefit pension plans covering substantially all employees. Company contributions to defined contribution retirement plans are generally based on a percentage of eligible pay or based on hours worked. Benefits under the defined benefit pension plans are generally based on years of service and/or final average pay.

The Company also sponsors several postretirement plans covering certain collectively-bargained salaried and hourly employees. The plans provide health care and life insurance benefits for eligible retirees. In most retiree health care plans, Company contributions towards premiums are capped based on the cost as of a certain date, thereby creating a defined contribution.

ATI instituted several actions over the last few years as part of its retirement benefit liability management strategy. Future benefit accruals for all participants in the U.S. defined benefit pension plans other than those subject to a CBA were frozen at the end of 2014, and subsequently CBAs were negotiated to close these plans to new entrants. As a result of these actions, the Company has now completely closed all defined benefit pension plans to new entrants, and has substantially limited the number of employees still accruing benefit service to approximately 1,300 participants, or less than 10% of the population in the U.S. qualified defined benefit pension plans. Additionally, all of ATI's remaining collectively-bargained, capped defined benefit retiree health care plans are now closed to new entrants. These liability management actions have transitioned ATI's retirement benefit and other postretirement benefit programs largely to a defined contribution structure.

Costs for defined contribution retirement plans were \$44.8 million in 2019, \$39.9 million in 2018, and \$35.5 million in 2017. Company contributions to these defined contribution plans are funded with cash. Other postretirement benefit costs for a defined contribution plan were \$1.0 million, \$1.0 million, and \$1.7 million for the fiscal years ended December 31, 2019, 2018 and 2017, respectively.

The components of pension and other postretirement benefit expense for the Company's defined benefit plans included the following:

<i>(In millions)</i>	Pension Benefits			Other Postretirement Benefits		
	2019	2018	2017	2019	2018	2017
Service cost—benefits earned during the year	\$ 12.7	\$ 16.4	\$ 14.1	\$ 1.9	\$ 2.5	\$ 2.4
Interest cost on benefits earned in prior years	105.5	104.8	116.7	14.8	12.7	14.6
Expected return on plan assets	(131.3)	(157.9)	(146.9)	—	—	—
Amortization of prior service cost (credit)	0.3	0.3	1.3	(2.9)	(2.9)	(2.9)
Amortization of net actuarial loss	73.7	65.9	62.6	13.5	10.6	9.0
Curtailed loss	—	0.4	—	—	—	—
Total retirement benefit expense	\$ 60.9	\$ 29.9	\$ 47.8	\$ 27.3	\$ 22.9	\$ 23.1

On June 1, 2018, a new CBA was ratified by USW-represented employees of the Company's Specialty Alloys & Components (SAC) operations in Millersburg, OR. The new SAC CBA resulted in changes to retirement benefit programs, including a freeze to new entrants to the U.S. defined benefit pension plan and to postretirement health care benefits, and a hard freeze for most current pension plan participants covered by the SAC CBA, effective July 31, 2018. New hires covered by the CBA, and pension plan participants who are subject to the hard freeze, will receive Company contributions to a defined contribution retirement plan. The CBA also included pension benefit increases for all current pension plan participants affecting both prior and future service. The Company recognized a \$0.4 million pension curtailment charge in the second quarter 2018 for the prior service cost of these pension benefit increases in connection with employees being hard frozen in the pension plan.

Actuarial assumptions used to develop the components of defined benefit pension expense and other postretirement benefit expense were as follows:

	Pension Benefits			Other Postretirement Benefits		
	2019	2018	2017	2019	2018	2017
Discount rate	4.40%	3.85%	4.45%	4.35%	3.80%	4.35%
Rate of increase in future compensation levels	0.50 - 1.00%	0.50 - 1.00%	0.50 - 1.00%	—	—	—
Weighted average expected long-term rate of return on assets	7.52%	7.75%	7.75%	4.0%	4.0%	4.0%

Actuarial assumptions used for the valuation of defined benefit pension and other postretirement benefit obligations at the end of the respective periods were as follows:

	Pension Benefits		Other Postretirement Benefits	
	2019	2018	2019	2018
Discount rate	3.40%	4.40%	3.25%	4.35%
Rate of increase in future compensation levels	0.50 - 1.00%	0.50 - 1.00%	—	—

A reconciliation of the funded status for the Company's defined benefit pension and other postretirement benefit plans at December 31, 2019 and 2018 was as follows:

<i>(In millions)</i>	Pension Benefits		Other Postretirement Benefits	
	2019	2018	2019	2018
Change in benefit obligations:				
Benefit obligation at beginning of year	\$ 2,497.7	\$ 2,829.8	\$ 359.1	\$ 349.9
Service cost	12.7	16.4	1.9	2.5
Interest cost	105.5	104.8	14.8	12.7
Benefits paid	(274.6)	(294.5)	(37.7)	(36.5)
Subsidy paid	—	—	—	—
Effect of currency rates	2.8	(4.5)	—	—
Net actuarial (gains) losses – discount rate change	266.0	(150.4)	30.5	(17.8)
– other	14.3	(5.7)	(18.1)	48.3
Plan curtailments	—	0.4	—	—
Plan amendments	9.5	1.4	(5.2)	—
Benefit obligation at end of year	\$ 2,633.9	\$ 2,497.7	\$ 345.3	\$ 359.1

Pension plan amendments in 2019 pertain to an updated actuarial equivalence evaluation for alternate forms of benefit payments for certain covered groups. Other postretirement benefit plan amendments in 2019 are the result of converting certain covered groups to prospectively receive post-age 65 subsidies on a third-party retiree medical plan exchange, rather than continuing to receive Company-provided health plan benefits. Pension plan curtailments and amendments in 2018 are the result of changes to retirement benefit programs in the SAC CBA as discussed above. Actuarial effects of changes in discount rates are separately identified in the preceding table. During 2018, an actuarial loss was recognized on the Company's other postretirement benefit obligations due to an updated study on attrition rates of participants in certain retiree medical plans.

<i>(In millions)</i>	Pension Benefits		Other Postretirement Benefits	
	2019	2018	2019	2018
Change in plan assets:				
Fair value of plan assets at beginning of year	\$ 1,772.2	\$ 2,129.6	\$ 0.1	\$ 0.6
Actual returns on plan assets and plan expenses	248.2	(107.2)	—	(0.5)
Employer contributions	153.4	49.3	—	—
Effect of currency rates	2.9	(5.0)	—	—
Benefits paid	(274.6)	(294.5)	—	—
Fair value of plan assets at end of year	\$ 1,902.1	\$ 1,772.2	\$ 0.1	\$ 0.1

Pension benefit payments in 2019 include \$96 million for the annuity buyout of smaller pension balances in a U.S. defined benefit pension plan involving approximately 1,800, or 10% of participants. Pension benefit payments in 2018 include \$97 million for the annuity buyout of smaller pension balances in a U.S. defined benefit pension plan involving approximately 3,700, or 17% of participants. These actions were also part of ATI's retirement benefit liability management strategy to reduce the overall size of the pension obligation and to lower administrative costs.

Assets (liabilities) recognized in the consolidated balance sheets:

	Pension Benefits		Other Postretirement Benefits	
	2019	2018	2019	2018
Noncurrent assets	\$ 4.8	\$ 9.2	\$ —	\$ —
Current liabilities	(5.1)	(4.7)	(32.7)	(40.6)
Noncurrent liabilities	(731.5)	(730.0)	(312.5)	(318.4)
Total amount recognized	\$ (731.8)	\$ (725.5)	\$ (345.2)	\$ (359.0)

Changes to accumulated other comprehensive loss related to pension and other postretirement benefit plans in 2019 and 2018 were as follows:

<i>(In millions)</i>	Pension Benefits		Other Postretirement Benefits	
	2019	2018	2019	2018
Beginning of year accumulated other comprehensive loss	\$ (1,470.3)	\$ (1,426.1)	\$ (107.0)	\$ (83.7)
Amortization of net actuarial loss	73.7	65.9	13.5	10.6
Amortization of prior service cost (credit)	0.3	0.3	(2.9)	(2.9)
Remeasurements	(173.4)	(110.4)	(7.1)	(31.0)
End of year accumulated other comprehensive loss	\$ (1,569.7)	\$ (1,470.3)	\$ (103.5)	\$ (107.0)
Net change in accumulated other comprehensive loss	\$ (99.4)	\$ (44.2)	\$ 3.5	\$ (23.3)

Amounts included in accumulated other comprehensive loss at December 31, 2019 and 2018 were as follows:

<i>(In millions)</i>	Pension Benefits		Other Postretirement Benefits	
	2019	2018	2019	2018
Prior service (cost) credit	\$ (11.2)	\$ (2.1)	\$ 11.0	\$ 8.8
Net actuarial loss	(1,558.5)	(1,468.2)	(114.5)	(115.8)
Accumulated other comprehensive loss	(1,569.7)	(1,470.3)	(103.5)	(107.0)
Deferred tax effect	555.7	536.2	34.4	35.3
Accumulated other comprehensive loss, net of tax	\$ (1,014.0)	\$ (934.1)	\$ (69.1)	\$ (71.7)

Amounts in accumulated other comprehensive loss presented above do not include any effects of deferred tax asset valuation allowances. See Note 15 for further discussion on deferred tax asset valuation allowances.

Retirement benefit expense for 2020 for defined benefit plans is estimated to be approximately \$60 million, comprised of \$40 million for pension expense and \$20 million of expense for other postretirement benefits. The net actuarial loss is recognized in the consolidated statement of operations using a corridor method. Because all of ATI's pension plans are inactive, cumulative gains and losses in excess of 10% of the greater of the projected benefit obligation or the market value of plan assets are amortized over the expected average remaining future lifetime of participants, which is approximately 18 years on a weighted average basis. Prior service cost (credit) amortization is recognized in level amounts over the expected service of the active membership as of the amendment effective date. Amounts in accumulated other comprehensive loss that are expected to be recognized as components of net periodic benefit cost in 2020 are:

<i>(In millions)</i>	Pension Benefits	Other Postretirement Benefits	Total
Amortization of prior service cost (credit)	\$ 0.6	\$ (3.8)	\$ (3.2)
Amortization of net actuarial loss	74.5	10.8	85.3
Amortization of accumulated other comprehensive loss	\$ 75.1	\$ 7.0	\$ 82.1

The accumulated benefit obligation for all defined benefit pension plans was \$2,621.1 million and \$2,482.5 million at December 31, 2019 and 2018, respectively. Additional information for pension plans with accumulated benefit obligations and projected benefit obligations in excess of plan assets:

<i>(In millions)</i>	Pension Benefits	
	2019	2018
Projected benefit obligation	\$ 2,538.9	\$ 2,420.8
Accumulated benefit obligation	\$ 2,526.1	\$ 2,405.6
Fair value of plan assets	\$ 1,802.4	\$ 1,686.1

Cash contributions to ATI's U.S. qualified defined benefit pension plans were \$145 million in 2019, \$40 million in 2018 and \$135 million in 2017. The Company funds the U.S. defined benefit pension plans in accordance with the Employee Retirement Income Security Act of 1974, as amended, and the Internal Revenue Code. Based upon current regulations and actuarial studies, the Company expects to make approximately \$130 million in cash contributions to its U.S. qualified defined benefit pension plans in 2020. In addition, for 2020, the Company expects approximately \$9 million of payments for U.S. nonqualified pension benefits and for contributions to its U.K. defined benefit pension plan.

The following table summarizes expected benefit payments from the Company's various pension and other postretirement defined benefit plans through 2029, and also includes estimated Medicare Part D subsidies projected to be received during this period based on currently available information. Pension benefit payments for the U.S. qualified defined benefit pension plans and the U.K. defined benefit plan are made from pension plan assets.

<i>(In millions)</i>	Pension Benefits	Other Postretirement Benefits	Medicare Part D Subsidy
2020	\$ 174.7	\$ 32.8	\$ 0.3
2021	172.0	34.1	0.3
2022	170.3	31.6	0.2
2023	168.3	29.4	0.2
2024	166.0	27.4	0.2
2025- 2029	786.5	110.1	0.7

The annual assumed rate of increase in the per capita cost of covered benefits (the health care cost trend rate) for health care plans was 6.0% in 2020 and is assumed to gradually decrease to 4.5% in the year 2038 and remain at that level thereafter. Assumed health care cost trend rates can have a significant effect on the amounts reported for the health care plans, however, the Company's contributions for most of its' retiree health plans are capped based on a fixed premium amount, which limits the impact of future health care cost increases.

The fair values of the Company's pension plan assets are determined using net asset value (NAV) as a practical expedient, or by information categorized in the fair value hierarchy level based on the inputs used to determine fair value, as further discussed in Note 13. The fair values at December 31, 2019 were as follows:

<i>(In millions)</i>			Quoted Prices in Active Markets for Identical Assets	Significant Observable Inputs	Significant Unobservable Inputs
Asset category	Total	NAV	(Level 1)	(Level 2)	(Level 3)
Equity securities:					
U.S. equities	443.6	254.7	188.9	—	—
International equities	326.1	299.6	26.5	—	—
Debt securities and cash:					
Fixed income and cash equivalents	650.7	419.9	58.7	172.1	—
Floating rate	51.0	51.0	—	—	—
Private equity	129.0	129.0	—	—	—
Hedge funds	263.9	263.9	—	—	—
Real estate and other	37.8	37.8	—	—	—
Total assets	\$ 1,902.1	\$ 1,455.9	\$ 274.1	\$ 172.1	\$ —

The fair values of the Company's pension plan assets at December 31, 2018 were as follows:

<i>(In millions)</i>			Quoted Prices in Active Markets for Identical Assets	Significant Observable Inputs	Significant Unobservable Inputs
Asset category	Total	NAV	(Level 1)	(Level 2)	(Level 3)
Equity securities:					
U.S. equities	362.9	219.9	143.0	—	—
International equities	377.4	335.7	41.7	—	—
Debt securities and cash:					
Fixed income and cash equivalents	493.7	116.9	6.3	370.5	—
Floating rate	90.1	68.9	21.2	—	—
Private equity	137.1	137.1	—	—	—
Hedge funds	258.3	258.3	—	—	—
Real estate and other	52.7	52.7	—	—	—
Total assets	\$ 1,772.2	\$ 1,189.5	\$ 212.2	\$ 370.5	\$ —

A financial instrument's categorization within the valuation hierarchy is based upon the lowest level of input that is significant to the fair value measurement. Investments in U.S. and International equities, and Fixed Income are predominantly held in common/collective trust funds and registered investment companies. Some of these investments are publicly traded securities and are classified as Level 1, while others are public investment vehicles valued using the NAV provided by the administrator of the fund. The NAV is based on the value of the underlying assets owned by the fund, minus its liabilities, and then divided by the number of shares outstanding. These investments are not classified in the fair value hierarchy. In addition, some fixed income instruments are investments in debt instruments that are valued using external pricing vendors and are classified within Level 2 of the fair value hierarchy.

Floating interest rate global debt instruments are both domestic and foreign and include first lien debt, second lien debt and structured finance obligations, among others. These instruments are valued using NAV and are not classified in the fair value hierarchy, or are publicly traded securities and are classified as Level 1.

Private equity investments include both Direct Funds and Fund-of-Funds. Direct Funds are investments in Limited Partnership (LP) interests. Fund-of-Funds are investments in private equity funds that invest in other private equity funds or LPs. Fair value of these investments is determined utilizing net asset values, and are not classified in the fair value hierarchy.

Hedge fund investments are made as a limited partner in hedge funds managed by a general partner. Fair value of these investments is determined utilizing net asset values, and are not classified in the fair value hierarchy.

Real estate investments are made as a limited partner in a portfolio of properties managed by a general partner. Fair value of these investments is determined utilizing net asset values, and are not classified in the fair value hierarchy.

For certain investments which have formal financial valuations reported on a one-quarter lag, fair value is determined utilizing net asset values adjusted for subsequent cash flows, estimated financial performance and other significant events.

For 2020, the weighted average expected long-term rate of return on defined benefit pension assets is 7.16%. In developing expected long-term rate of return assumptions, the Company evaluated input from its third party pension plan asset managers and actuaries, including reviews of their asset class return expectations and long-term inflation assumptions. An expected long-term rate of return is based on expected asset allocations within ranges for each investment category and projected annual compound returns. The Company's actual, weighted average returns on pension assets for the last five years have been 15.1% for 2019, (4.8)% for 2018, 16.9% for 2017, 5.3% for 2016, and (1.2)% for 2015.

The plan assets for the ATI Pension Plan, the Company's primary U.S. qualified defined benefit pension plan, represent over 90% of total pension plan assets at December 31, 2019. The ATI Pension Plan invests in a diversified portfolio consisting of an array of asset classes that attempts to maximize returns while minimizing volatility. These asset classes include U.S. domestic equities, non-U.S. developed market equities, emerging market equities, hedge funds, private equity, traditional fixed income consisting of long government/credit and alternative credit, and real estate. The Company continually monitors the investment results of these asset classes and its fund managers, and explores other potential asset classes for possible future investment.

The target asset allocations for ATI Pension Plan for 2020, by major investment category, are:

<u>Asset category</u>	Target asset allocation range
U.S. equity	18% - 40%
Global equity	10% - 30%
Debt securities and cash	15% - 40%
Private equity	0% - 15%
Hedge funds	10% - 20%
Real estate and other	0% - 10%

As of December 31, 2019, the Company's pension plans had outstanding commitments to invest up to \$46 million in global debt securities, \$91 million in private equity investments and \$51 million in real estate investments. These commitments are expected to be satisfied through the reallocation of pension trust assets while maintaining investments within the target asset allocation ranges.

The Company contributes to several multiemployer defined benefit pension plans under collective bargaining agreements that cover certain of its union-represented employees. The risks of participating in such plans are different from the risks of single-employer plans, in the following respects:

- a. Assets contributed to a multiemployer plan by one employer may be used to provide benefits to employees of other participating employers.
- b. If a participating employer ceases to contribute to the plan, the unfunded obligations of the plan may be borne by the remaining participating employers.
- c. If the Company ceases to have an obligation to contribute to the multiemployer plan in which it had been a contributing employer, it may be required to pay to the plan an amount based on the underfunded status of the plan and on the history of the Company's participation in the plan prior to the cessation of its obligation to contribute. The amount that an employer that has ceased to have an obligation to contribute to a multiemployer plan is required to pay to the plan is referred to as a withdrawal liability.

The Company's participation in multiemployer plans for the years ended December 31, 2019, 2018 and 2017 is reported in the following table. The Company's contributions to the Steelworkers Western Independent Shops Pension Plan exceed 5% of this plan's total contributions for the plan year ended September 30, 2018, which is the most recent information available from the Plan Administrator.

Pension Fund	EIN / Pension Plan Number	Pension Protection Act Zone Status (1)		FIP / RP Status Pending / Implemented (2)	in millions			Surcharge Imposed (3)	Expiration Dates of Collective Bargaining Agreements
		2019	2018		Company Contributions				
					2019	2018	2017		
Steelworkers Western Independent Shops Pension Plan	90-0169564 / 001	Green	Green	N/A	\$ 0.9	\$ 0.8	\$ 0.6	No	2/29/2020
Boilermakers-Blacksmiths National Pension Trust	48-6168020 / 001	Red	Yellow	Yes	2.5	2.5	2.2	No	9/30/2026
IAM National Pension Fund	51-6031295 / 002	Red	Green	Yes	2.2	2.1	1.7	Yes	Various between 2021-2022 (4)
Total contributions					\$ 5.6	\$ 5.4	\$ 4.5		

- (1) The most recent Pension Protection Act Zone Status is based on information provided to ATI and other participating employers by each plan, as certified by the plan's actuary. A plan in the "red" zone had been determined to be in "critical status", based on criteria established by the Internal Revenue Code (Code), and is generally less than 65% funded. A plan in the "yellow" zone has been determined to be in "endangered status", based on criteria established under the Code, and is generally less than 80% funded. A plan in the "green" zone has been determined to be neither in "critical status" nor in "endangered status", and is generally at least 80% funded. Additionally, a plan may voluntarily place itself into a rehabilitation plan. In April 2019, the Company received notification from the IAM National Pension Fund (IAM Fund) that its' actuary certified the IAM Fund as "endangered status" for the plan year beginning January 1, 2019, and that the IAM Fund was voluntarily placing itself in "red" zone status and implementing a rehabilitation plan. A 5% contribution surcharge has been imposed as of June 1, 2019 for the rest of 2019, increasing to a 10% surcharge rate beginning January 1, 2020 in addition to the contribution rate specified in the applicable collective bargaining agreements. The contribution surcharge ends when an employer begins contributing under a collective bargaining agreement that includes terms consistent with the rehabilitation plan. In April 2019, the Company received notification from the Boilermakers-Blacksmiths National Pension Trust (Blacksmiths Trust) that it was certified by its actuary as being in "red" zone status for the plan year beginning January 1, 2019. A rehabilitation plan has been adopted for the Blacksmiths Trust, and the Company and the Blacksmiths union agreed to adopt the rehabilitation plan in 2019 prior to a contribution surcharge being imposed.
- (2) The "FIP / RP Status Pending / Implemented" column indicates whether a Funding Improvement Plan, as required under the Code by plans in the "yellow" zone, or a Rehabilitation Plan, as required under the Code to be adopted by plans in the "red" zone, is pending or has been implemented as of the end of the plan year that ended in 2019.
- (3) The "Surcharge Imposed" column indicates whether ATI's contribution rate for 2019 included an amount in addition to the contribution rate specified in the applicable collective bargaining agreement, as imposed by a plan in "critical status", in accordance with the requirements of the Code.
- (4) The Company is party to five separate bargaining agreements that require contributions to this plan. Expiration dates of these collective bargaining agreements range between November 14, 2021 and July 14, 2022.

Note 15. Accumulated Other Comprehensive Income (Loss)

The changes in AOCI by component, net of tax, for the fiscal years ended December 31, 2019, 2018 and 2017 were as follows (in millions):

	Post-retirement benefit plans	Currency translation adjustment	Derivatives	Deferred Tax Asset Valuation Allowance	Total
Attributable to ATI:					
Balance, December 31, 2016	\$ (965.5)	\$ (85.0)	\$ 2.4	\$ (45.6)	\$ (1,093.7)
OCI before reclassifications	(32.5)	31.5	11.1	—	10.1
Amounts reclassified from AOCI	(a) 43.5	(b) —	(c) (4.5)	(d) 16.8	55.8
Net current-period OCI	11.0	31.5	6.6	16.8	65.9
Balance, December 31, 2017	(954.5)	(53.5)	9.0	(28.8)	(1,027.8)
OCI before reclassifications	(107.2)	(20.4)	(4.9)	—	(132.5)
Amounts reclassified from AOCI	(a) 55.9	(b) —	(c) (8.9)	(d) (20.5)	26.5
Net current-period OCI	(51.3)	(20.4)	(13.8)	(20.5)	(106.0)
Balance, December 31, 2018	(1,005.8)	(73.9)	(4.8)	(49.3)	(1,133.8)
OCI before reclassifications	(141.6)	(2.7)	7.4	—	(136.9)
Amounts reclassified from AOCI	(a) 64.3	(b) —	(c) (3.1)	(d) 7.8	69.0
Net current-period OCI	(77.3)	(2.7)	4.3	7.8	(67.9)
Balance, December 31, 2019	\$ (1,083.1)	\$ (76.6)	\$ (0.5)	\$ (41.5)	\$ (1,201.7)
Attributable to noncontrolling interests:					
Balance, December 31, 2016	\$ —	\$ 9.7	\$ —	\$ —	\$ 9.7
OCI before reclassifications	—	7.6	—	—	7.6
Amounts reclassified from AOCI	—	(b) —	—	—	—
Net current-period OCI	—	7.6	—	—	7.6
Balance, December 31, 2017	—	17.3	—	—	17.3
OCI before reclassifications	—	(6.2)	—	—	(6.2)
Amounts reclassified from AOCI	—	(b) —	—	—	—
Net current-period OCI	—	(6.2)	—	—	(6.2)
Balance, December 31, 2018	—	11.1	—	—	11.1
OCI before reclassifications	—	(1.3)	—	—	(1.3)
Amounts reclassified from AOCI	—	(b) —	—	—	—
Net current-period OCI	—	(1.3)	—	—	(1.3)
Balance, December 31, 2019	\$ —	\$ 9.8	\$ —	\$ —	\$ 9.8

(a) Amounts were included in net periodic benefit cost for pension and other postretirement benefit plans (see Note 14).

(b) No amounts were reclassified to earnings.

(c) For 2018, following the Company's January 1, 2018 adoption of changes issued by the FASB related to accounting guidance for derivatives, amounts related to derivatives are included in cost of goods sold or interest expense in the period or periods the hedged item affects earnings (see Note 12). For 2017, amounts related to the effective portion of the derivatives were included in cost of goods sold in the period or periods the hedged item affects earnings, and amounts related to the ineffective portion of the derivatives were presented in selling and administrative expenses on the consolidated statements of operations (see Note 12).

(d) Represents the net change in deferred tax asset valuation allowances on changes in AOCI balances between the balance sheet dates. The 2019 income tax provision includes \$6.0 million of tax expense for the recognition of a stranded deferred tax balance arising from deferred tax valuation allowances that was associated with a cash flow hedge portfolio that fully settled in the fourth quarter of 2019.

Other comprehensive income (loss) amounts (OCI) reported above by category are net of applicable income tax expense (benefit) for each year presented. Income tax expense (benefit) on OCI items is recorded as a change in a deferred tax asset or liability. Amounts recognized in OCI include the impact of any deferred tax asset valuation allowances, when applicable.

Foreign currency translation adjustments, including those pertaining to noncontrolling interests, are generally not adjusted for income taxes as they relate to indefinite investments in non-U.S. subsidiaries.

Reclassifications out of AOCI for the fiscal years ended December 31, 2019, 2018 and 2017 were as follows:

Details about AOCI Components (In millions)	Amount reclassified from AOCI (c)			Affected line item in the consolidated statement of operations
	Fiscal year ended			
	December 31, 2019	December 31, 2018	December 31, 2017	
Postretirement benefit plans				
Prior service credit	\$ 2.6 (a)	\$ 2.6 (a)	\$ 1.6 (a)	
Actuarial losses	(87.2) (a)	(76.5) (a)	(71.6) (a)	
	(84.6) (c)	(73.9) (c)	(70.0) (c)	Total before tax
	(20.3)	(18.0)	(26.5)	Tax benefit (d)
	\$ (64.3)	\$ (55.9)	\$ (43.5)	Net of tax
Derivatives				
Nickel and other raw material contracts	\$ 5.1 (b)	\$ 10.2 (b)	\$ (3.4) (b)	
Natural gas contracts	(1.2) (b)	0.5 (b)	(5.3) (b)	
Foreign exchange contracts	0.7 (b)	1.3 (b)	15.9 (b)	
Interest rate swap	(0.5) (b)	(0.3) (b)	— (b)	
	4.1 (c)	11.7 (c)	7.2 (c)	Total before tax
	1.0	2.8	2.7	Tax provision (d)
	\$ 3.1	\$ 8.9	\$ 4.5	Net of tax

(a) Amounts are included in nonoperating retirement benefit expense (see Note 14).

(b) For 2018, following the Company's January 1, 2018 adoption of changes issued by the FASB related to accounting guidance for derivatives, amounts related to derivatives, with the exception of the interest rate swap are included in cost of goods sold in the period or periods the hedged item affects earnings. Amounts related to the interest rate swap are included in interest expense in the same period as the interest expense on the Term Loan is recognized in earnings (see Note 12). For 2017, amounts related to the effective portion of the derivatives were included in cost of goods sold in the period or periods the hedged item affects earnings, and amounts related to the ineffective portion of the derivatives were presented in selling and administrative expenses on the consolidated statements of operations (see Note 12).

(c) For pretax items, positive amounts are income and negative amounts are expense in terms of the impact to net income. Tax effects are presented in conformity with ATI's presentation in the consolidated statements of operations.

(d) These amounts exclude the impact of any deferred tax asset valuation allowances, when applicable, including recognition of stranded balances (see Note 17 for further explanation).

Note 16. Stockholders' Equity

Preferred Stock

Authorized preferred stock may be issued in one or more series, with designations, powers and preferences as shall be designated by the Board of Directors. At December 31, 2019, there were no shares of preferred stock issued.

Common Stock

On November 7, 2017, the Company issued 17 million shares of common stock at \$24.00 per share before expenses in an underwritten registered public offering. This equity offering resulted in proceeds, net of transaction costs, of \$397.8 million. In December 2017, the Company used the proceeds from the equity offering to redeem all of the Senior Notes due 2019 (see Note 10).

Dividends

Under the ABL facility, there is no limit on dividend declarations or payments provided that the undrawn availability, after giving effect to a particular dividend payment, is at least the greater of \$150 million and 30% of the maximum revolving credit availability, and no event of default under the ABL facility has occurred and is continuing or would result from paying the dividend. In addition, there is no limit on dividend declarations or payments if the undrawn availability is less than the greater of \$150 million and 30% of the maximum revolving credit advance amount but more than the greater of \$75 million and 15% of the maximum revolving credit advance amount, if (i) no event of default has occurred and is continuing or would result from paying the dividend, (ii) the Company demonstrates to the administrative agent that, prior to and after giving effect to the payment of the dividend (A) the undrawn availability, as measured both at the time of the dividend payment and as an average for the 60 consecutive day period immediately preceding the dividend payment, is at least the greater of \$75 million and 15% of the maximum revolving credit availability, and (B) the Company maintains a fixed charge coverage ratio of at least 1.00:1.00, as calculated in accordance with the terms of the ABL facility.

Share-based Compensation

During 2015, the Company adopted the Allegheny Technologies Incorporated 2015 Incentive Plan (the “2015 Incentive Plan”). In May 2017, the Company adopted the Allegheny Technologies Incorporated 2017 Incentive Plan (the “2017 Incentive Plan”).

Upon adoption of the 2017 Incentive Plan, all new awards are being made under the 2017 Incentive Plan. Shares previously remaining available for grant under the 2015 Incentive Plan, or which become available for award due to the forfeiture or cancellation of prior awards under the 2015 Incentive Plan, are available for award under the 2017 Incentive Plan. Outstanding grants previously made under the 2015 Incentive Plan remain in effect in accordance with their terms and the terms of their respective Plan.

Awards earned under the Company’s share-based incentive compensation programs are generally paid with shares held in treasury, if sufficient treasury shares are held, and any additional required share payments are made with newly issued shares. At December 31, 2019, 4.1 million shares of common stock were available for future awards under the 2017 Incentive Plan. The general terms of each arrangement granted under the 2015 Incentive Plan or the 2017 Incentive Plan, and predecessor plans, the method of estimating fair value for each arrangement, and award activity is reported below.

Beginning in 2016, the Company implemented a new share-based incentive compensation program, the Long-Term Incentive Plan (LTIP). The LTIP consists of both Restricted Share Units (RSU) and Performance Share Units (PSU).

For years prior to 2016, the Company’s two principal share-based incentive compensation programs were the Performance/Restricted Stock Program (PRSP) of nonvested stock awards and the Long-Term Performance Plan (LTPP). The LTPP was adopted in 2014 and included performance shares under the Total Shareholder Return (TSR) portion and nonvested stock awards under the Long-Term Shareholder Value (LTSV) portion.

Nonvested stock awards/units:

Restricted Share Units: Beginning in 2016, annual awards of RSUs were granted to employees, with service conditions. RSUs are rights to receive shares of Company stock when the award vests. The RSUs generally vest over three years based on employment service, with one-third of the award vesting on each of the first, second and third anniversaries of the grant date. No dividends are accumulated or paid on the RSUs. The fair value of the RSU award is measured based on the stock price at the grant date. In 2017, 2018 and 2019, 320,808, 253,393 and 345,400 RSUs, respectively, were awarded to employees under the LTIP. In February 2019, one-third of the 2016, 2017 and 2018 RSU awards vested, comprising 175,287, 102,188 and 83,312 shares, respectively. In February 2018, one-third of the 2016 and 2017 RSU awards vested, comprising 178,335 and 102,279 shares, respectively. In February 2017, one-third of the 2016 RSU award vested, comprising 190,421 shares.

Nonvested stock awards: Prior to 2016, awards of nonvested stock were granted to employees under the PRSP, with either performance and/or service conditions. Awards of nonvested stock are also granted to non-employee directors, with service conditions. For nonvested stock awards, dividend equivalents, whether in stock or cash form, accumulate but are not paid until the underlying award vests.

LTSV awards vest at the end of a three-year measurement period subject to the achievement, in whole or in part, of specified operational goals. At December 31, 2017, 60% of the operational goals for the 2015 LTSV were attained and 73,734 shares vested and 49,148 shares were forfeited. As of December 31, 2017, there were no remaining LTSV awards outstanding.

The fair value of nonvested stock awards is measured based on the stock price at the grant date, adjusted for non-participating dividends, as applicable, based on the current dividend rate. For nonvested stock awards to employees in 2012, 2013, 2014 and 2015 under the Company’s PRSP, one-half of the nonvested stock (“performance shares”) vested only on the attainment of an

income target, measured cumulatively over a three-year period. The remaining nonvested stock awarded to most employees under the 2015 PRSP vests over a service period of three years; for certain senior executives this service period is five years for the 2015 award. The remaining PRSP nonvested stock awarded to employees under the 2012, 2013 and 2014 vest over a service period of five years, with accelerated vesting to three years if the performance shares' vesting criterion was attained. Expense for each of these awards was recognized based on estimates of attaining the performance criterion, including estimated forfeitures. The three-year cumulative income statement metrics in 2012, 2013, 2014 and 2015 PRSP awards were not met, and performance share forfeitures were 171,083, 244,899, 214,571 and 196,196 shares, respectively. The remaining service portion of the 2014 PRSP, comprising 207,751 shares, vested in February 2019. The remaining service portion of the 2013 PRSP, comprising 233,896 shares, vested in February 2018. The remaining service portion of the 2012 PRSP, comprising of 166,929 shares, vested in February 2017. The remaining service portion of the 2015 PRSP for all employees except certain senior executives, comprising of 126,585 shares, vested at December 31, 2017. Vesting of the remaining service portion of the 2015 PRSP awards for certain senior executives continues over the five-year service period through February 2020.

Compensation expense related to all nonvested stock awards and units was \$9.8 million in 2019, \$9.7 million in 2018, and \$9.8 million in 2017. Approximately \$5.9 million of unrecognized fair value compensation expense relating to nonvested stock awards and restricted stock units is expected to be recognized through 2022, including \$4.6 million expected to be recognized in 2020, based on estimated service period forfeitures. Activity under the Company's nonvested stock awards and restricted share units for the years ended December 31, 2019, 2018, and 2017 was as follows:

(Shares in thousands, \$ in millions)

	2019		2018		2017	
	Number of shares/units	Weighted Average Grant Date Fair Value	Number of shares/units	Weighted Average Grant Date Fair Value	Number of shares	Weighted Average Grant Date Fair Value
Nonvested, beginning of year	1,055	\$ 28.3	1,320	\$ 32.5	1,852	\$ 51.5
Granted	396	10.8	290	7.8	378	7.1
Vested	(681)	(14.5)	(540)	(11.7)	(591)	(16.9)
Forfeited	(14)	(0.4)	(15)	(0.3)	(319)	(9.2)
Nonvested, end of year	756	\$ 24.2	1,055	\$ 28.3	1,320	\$ 32.5

Performance awards:

Performance Share Units: In 2016, the Company established the PSU award. PSU award opportunities are determined at a target number of shares, and the number of shares awarded is based on attainment of two ATI financial performance metrics. The metrics for awards through 2018 measured (1) net income attributable to ATI and (2) return on invested capital, over a three-year performance period. The metrics for the 2019 award measured (1) net income attributable to ATI and (2) return on capital employed, over a three-year performance period. For certain senior executives, the number of PSUs to be awarded based on the performance criteria is modified up or down by up to 20% based on the Company's relative total shareholder return over the performance measurement period ("TSR Modifier"), but not above the maximum number of PSUs to be vested. The TSR Modifier is measured as the return of the Company's stock price (including assumed dividend reinvestment, if any) at the end of the performance period as compared to the stock prices (including assumed dividend reinvestment, if any) of a group of industry peers. The fair value of the PSU award is measured based on the stock price at the grant date, including the effect of the TSR Modifier. The fair value of the TSR Modifier is estimated using Monte Carlo simulations of stock price correlation, projected dividend yields and other variables over a three-year time horizon matching the TSR performance measurement period.

In 2017, 2018 and 2019, the Company awarded 589,980, 456,318 and 479,364 share units, respectively, at the target level with a weighted average grant date fair value of \$12.4 million, \$12.9 million and \$14.7 million respectively. The 2017 PSU performance, and share units, each have a threshold attainment of 25% and a maximum attainment of 150% of the target financial performance metrics and target share units, measured over the applicable three-year performance period. The 2018 and 2019 PSU performance, and share units, each have a threshold attainment of 25% and a maximum attainment of 200% of the target financial performance metrics and target share units, measured over the applicable three-year performance period. At December 31, 2019, a maximum of 1.8 million shares have been reserved for issuance for the PSU awards. At December 31, 2019, the 2017 PSU awards vested above target and at +20% for the TSR Modifier, resulting in the issuance of 669,898 shares. At December 31, 2018, the 2016 PSU awards vested with financial performance attainment between threshold and target and at +20% for the TSR Modifier, resulting in the issuance of 329,897 shares. Aggregate compensation expense recognized over the three year performance periods for the 2018 and 2019 PSU awards could range from zero to \$51 million, including estimated forfeitures, based on the actual financial performance attained. Compensation expense for the PSUs during the performance period is recognized based on estimates of attaining the performance criteria, including estimated forfeitures, which is

evaluated on a quarterly basis. The Company recognized \$3.8 million, \$11.4 million and \$14.6 million of compensation expense in 2017, 2018 and 2019, respectively, for the PSU awards. As of December 31, 2019, ATI estimates achieving financial performance attainment for the 2018 and 2019 PSU awards slightly above target levels. Based on these estimates, there is \$12.9 million of cumulative unrecognized compensation expense remaining for the PSU awards, including estimated forfeitures, which is expected to be recognized over the remaining performance periods through fiscal year 2021. This includes \$7.7 million expected to be recognized in 2020. Forfeited share units in 2017, 2018 and 2019 were 67,521, 21,848 and 48,598, respectively, with a weighted average grant date fair value of \$1.0 million, \$0.5 million and \$1.1 million, respectively.

Total Shareholder Return: Award opportunities under the TSR portion of the formerly-used LTPP incentive compensation program were determined at a target number of shares, and performance equity awards paid out based on the measured return of the Company's stock price and dividend performance at the end of three-year periods as compared to the stock price and dividend performance of a group of industry peers. The actual number of shares awarded at the end of the performance measurement period may range from a minimum of zero to a maximum of two times target. Fair values for these performance awards were estimated using Monte Carlo simulations of stock price correlation, projected dividend yields and other variables over three-year time horizons matching the total shareholder return performance measurement periods. Compensation expense was \$3.6 million in 2017 for the TSR awards. As of December 31, 2017, there were no remaining TSR awards under the LTPP outstanding.

Note 17. Income Taxes

Income (loss) before income taxes for the Company's U.S. and non-U.S. operations was as follows:

<i>(In millions)</i>	2019	2018	2017
U.S.	\$ 190.2	\$ 190.8	\$ (119.8)
Non-U.S.	51.4	56.9	33.3
Income (loss) before income taxes	<u>\$ 241.6</u>	<u>\$ 247.7</u>	<u>\$ (86.5)</u>

The income tax provision (benefit) was as follows:

<i>(In millions)</i>	2019	2018	2017
Current:			
Federal	\$ 2.2	\$ 1.0	\$ (0.8)
State	0.2	(0.8)	(1.3)
Foreign	8.1	10.1	6.2
Total	<u>10.5</u>	<u>10.3</u>	<u>4.1</u>
Deferred:			
Federal	(4.6)	1.3	2.4
State	(40.4)	(0.5)	(14.4)
Foreign	6.0	(0.1)	1.1
Total	<u>(39.0)</u>	<u>0.7</u>	<u>(10.9)</u>
Income tax provision (benefit)	<u>\$ (28.5)</u>	<u>\$ 11.0</u>	<u>\$ (6.8)</u>

The following is a reconciliation of income taxes computed at the statutory U.S. Federal income tax rate to the actual effective income tax provision (benefit):

<i>(In millions)</i>	2019	2018	2017
Taxes computed at the federal rate	\$ 50.7	\$ 52.0	\$ (30.3)
Goodwill impairment	—	—	36.6
State and local income taxes, net of federal tax benefit	0.3	(0.5)	—
Valuation allowance	(90.1)	(48.0)	(14.5)
Repatriation of foreign earnings (GILTI starting in 2018)	3.5	5.4	14.2
Restructuring	4.2	—	—
Impacts of U.S. Tax Act	—	5.9	(4.1)
Foreign earnings taxed at different rate	2.7	3.2	(3.5)
Adjustment to prior years' taxes	—	(5.8)	(5.2)
Withholding taxes	2.7	2.7	2.2
Preferential tax rate	(4.1)	(4.8)	(3.7)
Other	1.6	0.9	1.5
Income tax provision (benefit)	\$ (28.5)	\$ 11.0	\$ (6.8)

On December 22, 2017, the U.S. government enacted comprehensive tax legislation commonly referred to as the Tax Cuts and Jobs Act (the "Tax Act"). The Tax Act made broad and complex changes to the U.S. tax code. Changes impacting the Company's tax provision for the past three years include the following:

- (1) Reducing the U.S. federal current and deferred rate to 21%; The change in the U.S. federal corporate tax rate from 35% to 21% resulted in a \$2.6 million benefit, which was recognized in 2017, as it related to the remeasurement of indefinite lived deferred tax liabilities. In addition, the reconciliation of income taxes utilized a 35% U.S. federal tax rate for 2017 compared to 2019 and 2018 which utilized a 21% federal tax rate.
- (2) Repeal of the alternative minimum tax, which resulted in a \$1.5 million decrease in the deferred tax asset valuation allowance that was recognized in 2017. This tax benefit, along with the benefit related to the remeasurement of indefinite lived deferred tax assets is combined for a total benefit of \$4.1 million and presented within the 2017 income tax reconciliation as Impact from U.S. tax reform in the above table.
- (3) Requiring companies to pay a one-time transition tax on certain unrepatriated earnings of foreign subsidiaries, with \$5.9 million included in the 2018 tax provision. This is also reported as Impact from U.S. tax reform for 2018.
- (4) Requiring a current year inclusion in U.S. federal taxable income of certain earnings of controlled foreign corporations, commonly referred to as Global Intangible Low-Taxed Income (GILTI), for which the Company is currently utilizing pre-January 1, 2018 net operating losses (NOLs) to offset the 2019 income inclusion of \$16.8 million (\$3.5 million net tax effect) and utilized pre-January 1, 2018 losses in 2018 to offset the \$25.7 million (\$5.4 million net tax effect) inclusion. The Company has elected to recognize GILTI liabilities as an element of income tax expense in the period incurred.
- (5) Creating a new limitation on deductible interest expense, for which the Company has estimated the federal limitation to be \$24 million in 2019, creating an indefinite lived deferred tax asset for which a valuation allowance was not established. This limitation is affected by the interpretation of the meaning of depreciation in the proposed regulations, which could change as additional guidance and/or final regulations are issued. The Company continues to analyze additional planning around the overall calculation and continues to wait for final regulations.

In 2018, the Company was granted a preferential tax rate related to the STAL joint venture operations in China for tax years 2018 through 2020. The preferential tax rate is 15%, compared to the statutory rate of 25%. The Company has benefited from past preferential tax rate grants by the Chinese government, and the previous 15% three-year preferential tax rate expired on December 31, 2017.

In 2019, the Company restructured certain foreign legal entities, including the elimination of entities that were no longer cost-effective following changes of the Tax Act, which resulted in \$4.2 million of tax expense related to previously-recognized net operating loss carryforwards.

The Company recognizes deferred tax assets to the extent it believes these deferred tax assets are more likely than not to be realized. Valuation allowances are established when it is estimated that it is more likely than not the tax benefit of the deferred tax asset will not be realized. In making such determination, the Company considers all available evidence, both positive and negative, regarding the estimated future reversals of existing taxable temporary differences, estimated future taxable income exclusive of reversing temporary differences and carryforwards, historical taxable income in prior carryback periods if carryback is permitted, and potential tax planning strategies which may be employed to prevent an operating loss or tax credit carryforward from expiring unused. The verifiable evidence such as future reversals of existing temporary differences and the ability to carryback are considered before the subjective sources such as estimate future taxable income exclusive of temporary differences and tax planning strategies. In situations where a three-year cumulative loss position exists, accounting standards limit the ability to consider projections of future results as positive evidence to assess the realizability of deferred tax assets. If the Company determines that it would not be able to realize its deferred tax assets in the future in excess of their recorded net amount, an adjustment to the deferred tax asset valuation allowance would result.

Beginning in 2015, the Company's results reflected a three year cumulative loss from U.S. operations, and valuation allowances were established on its' federal and state deferred tax assets. In 2017, the Company's results reflected a partial release of the valuation allowance related to the federal and state deferred tax assets, along with the one-time transition tax inclusion in 2017. In 2018 based upon updated guidance, approximately \$28.2 million of available tax credits were used instead of the NOL to offset the transition tax inclusion. This overall change in presentation was reflected within the 2018 effective tax rate.

In 2018, the Company reported income before tax of \$247.7 million, of which \$190.8 million was attributable to the U.S. The overall income, along with the GILTI inclusion for the year, resulted in the Company utilizing NOL deferred tax assets in 2018, which resulted in a U.S. valuation allowance release of \$46.3 million for 2018. At December 31, 2018, the Company continued to maintain a valuation allowance on the net deferred tax assets for U.S. federal and state income tax purposes, with the exception of the indefinite lived deferred tax liability related to goodwill and the withholding tax liability associated with its permanent reinvestment assertion, as well as valuation allowances for certain foreign operations.

At December 31, 2019, the Company's U.S. results have switched from a three-year cumulative loss position to a three-year cumulative income position, allowing the Company to utilize forecasts of future profits as a source of income when evaluating the overall need for a valuation allowance. The Company determined that valuation allowances on net deferred tax asset balances for federal and certain state jurisdictions are no longer required. Certain individual tax attributes still require a valuation allowance based on expected utilization. The change in the overall valuation allowance for 2019 includes amounts utilized during the year as part of the reported effective tax rate, as well as a \$45.1 million reduction at December 31, 2019 based on a change in judgment on the realizability of deferred tax assets.

The Company also established valuation allowances on deferred tax amounts recorded in accumulated other comprehensive loss in 2017, 2018 and 2019 of \$28.8 million, \$49.3 million and \$41.5 million, respectively, which are not reflected in the preceding table reconciling amounts recognized in the income tax provision (benefit) recorded on the statement of operations (see Note 15). Due to the change in judgment on the realizability of deferred tax assets at December 31, 2019, no changes to the beginning of year balances for U.S. deferred tax valuation allowances were recognized in accumulated other comprehensive loss in 2019. The 2019 income tax provision includes \$6.0 million of tax expense for the recognition of a stranded deferred tax balance in accumulated other comprehensive loss arising from deferred tax valuation allowances that was associated with a cash flow hedge portfolio that fully settled in the fourth quarter of 2019. See Notes 12 and 15 for additional information on cash flow hedge activity.

Deferred income taxes result from temporary differences in the recognition of income and expense for financial and income tax reporting purposes, and differences between the fair value of assets acquired in business combinations accounted for as purchases for financial reporting purposes and their corresponding tax bases. Deferred income taxes represent future tax benefits or costs to be recognized when those temporary differences reverse. The categories of assets and liabilities that have resulted in differences in the timing of the recognition of income and expense at December 31, 2019 and 2018 were as follows:

<i>(In millions)</i>	2019	2018
Deferred income tax assets		
Pensions	\$ 155.5	\$ 159.4
Postretirement benefits other than pensions	83.8	87.3
Net operating loss tax carryovers	264.4	307.5
Tax credits	42.6	49.7
Other items	86.1	69.7
Gross deferred income tax assets	632.4	673.6
Valuation allowance for deferred tax assets	(94.5)	(194.8)
Total deferred income tax assets	537.9	478.8
Deferred income tax liabilities		
Bases of property, plant and equipment	364.2	371.5
Inventory valuation	65.5	67.1
Bases of amortizable intangible assets	23.7	29.9
Other items	27.0	14.5
Total deferred tax liabilities	480.4	483.0
Net deferred tax asset (liability)	\$ 57.5	\$ (4.2)

The following summarizes the carryforward periods for the tax attributes related to NOLs and credits by jurisdiction.

(\$ in millions, U.S. and U.K. NOL amounts are pre-tax and all other items are after-tax)

Jurisdiction	Attribute	Amount	Expiration Period	Amount expiring within 5 years	Amount expiring in 5-20 years
U.S.	NOL	\$766	20 years	\$—	\$766
U.S.	Foreign Tax Credit	\$30	10 years	\$7	\$23
U.S.	Research and Development Credit	\$2	20 years	\$—	\$2
State	NOL	\$136	Various	\$30	\$106
State	Credits	\$11	Various	\$3	\$8
U.K.	NOL	\$23	Indefinite	\$—	\$—
Poland	Economic Zone Credit	\$2	7 years	\$—	\$2

Income taxes paid and amounts received as refunds were as follows:

<i>(In millions)</i>	2019	2018	2017
Income taxes paid	\$ 15.1	\$ 9.7	\$ 10.4
Income tax refunds received	(9.2)	(1.6)	(7.1)
Income taxes paid, net	\$ 5.9	\$ 8.1	\$ 3.3

In general, the Company is responsible for filing consolidated U.S. federal, foreign and combined, unitary or separate state income tax returns. The Company is responsible for paying the taxes relating to such returns, including any subsequent adjustments resulting from the redetermination of such tax liability by the applicable taxing authorities.

Deferred taxes of \$3.5 million have been recorded for foreign withholding taxes on earnings expected to be repatriated to the U.S. The Company does not intend to distribute previously taxed earnings resulting from the one-time transition tax under the Tax Act, and has not recorded any deferred taxes related to such amounts. The remaining excess of the amount for financial reporting over the tax basis of investments in foreign subsidiaries is indefinitely reinvested, and the determination of any deferred tax liability on this amount is not practicable.

Uncertain tax positions are recorded using a two-step process based on (1) determining whether it is more-likely-than-not the tax positions will be sustained on the basis of the technical merits of the position and (2) for those positions that meet the more-likely-than-not recognition threshold, the Company records the largest amount of the tax benefit that is more than 50 percent likely to be realized upon ultimate settlement with the related tax authority. The changes in the liability for unrecognized income tax benefits for the years ended December 31, 2019, 2018 and 2017 were as follows:

<i>(In millions)</i>	2019	2018	2017
Balance at beginning of year	\$ 14.7	\$ 14.7	\$ 22.7
Increases in prior period tax positions	—	—	—
Decreases in prior period tax positions	—	(0.1)	(0.7)
Increases in current period tax positions	0.9	0.7	0.7
Expiration of the statute of limitations	(1.2)	(0.6)	(0.4)
Settlements	—	—	(7.6)
Balance at end of year	<u>\$ 14.4</u>	<u>\$ 14.7</u>	<u>\$ 14.7</u>

For years ended December 31, 2019, 2018 and 2017, the liability includes \$11.5 million, \$12.1 million and \$11.7 million, respectively, of unrecognized tax benefits that are classified within deferred income taxes as a reduction of NOL carryforwards and other tax attributes. The total estimated unrecognized tax benefit that, if recognized, would affect ATI's effective tax rate is approximately \$3 million. At this time, the Company believes that it is reasonably possible that approximately \$2 million of the estimated unrecognized tax benefits as of December 31, 2019 will be recognized within the next twelve months based on the expiration of statutory review periods.

The Company recognizes accrued interest and penalties related to uncertain tax positions as income tax expense. The amounts accrued for interest and penalty charges for the years ended December 31, 2019, 2018 and 2017 were not significant. At both December 31, 2019 and 2018, the accrued liabilities for interest and penalties related to unrecognized tax benefits were \$2.7 million.

The Company, and/or one of its subsidiaries, files income tax returns in the U.S. federal jurisdiction and in various state and foreign jurisdictions. A summary of tax years that remain subject to examination, by major tax jurisdiction, is as follows:

<i>Jurisdiction</i>	Earliest Year Open to Examination
U.S. Federal	2018
States:	
Pennsylvania	2016
Foreign:	
China	2016
Poland	2013
United Kingdom	2017

Note 18. Business Segments

The Company operates in two business segments: High Performance Materials & Components (HPMC) and Flat Rolled Products (FRP). Over 75% of 2019 HPMC business segment sales are to the aerospace & defense markets, and nearly half of HPMC's total sales are products for commercial jet engines. Other major HPMC end markets include medical and electrical energy. HPMC produces a wide range of high performance materials, and components, and advanced metallic powder alloys made from titanium and titanium-based alloys, nickel-based alloys and superalloys, and a variety of other specialty materials. Capabilities range from cast/wrought and powder alloy development to final production of highly engineered finished components, including those used for next-generation jet engine forgings and 3D-printed aerospace products.

The FRP segment serves a diverse group of end markets, with sales to the oil & gas market and aerospace & defense markets collectively representing over 40% of 2019 sales. Other important end markets for FRP include automotive, food processing equipment and appliances, consumer electronics, and construction & mining. FRP produces nickel-based alloys, specialty alloys, and titanium and titanium-based alloys, and stainless steel products in a variety of forms including plate, sheet, engineered strip, and Precision Rolled Strip products. The business units in this segment include ATI Flat Rolled Products and STAL, in which the Company has a 60% ownership interest. Segment results also include ATI's 50% interests in the A&T Stainless and Uniti joint ventures, which are accounted for under the equity method. See Note 7 for further information on the Company's joint ventures.

The measure of segment operating profit excludes all effects of LIFO inventory accounting and any related changes in net realizable value inventory reserves which offset the Company's aggregate net debit LIFO valuation balance, income taxes, corporate expenses, net interest expense, closed operations and other expenses, charges for goodwill impairment, restructuring and asset impairment charges, debt extinguishment charges and non-operating gains or losses. Management believes segment operating profit, as defined, provides an appropriate measure of controllable operating results at the business segment level.

Intersegment sales are generally recorded at full cost or market. Common services are allocated on the basis of estimated utilization.

<i>(In millions)</i>	2019	2018	2017
Total sales:			
High Performance Materials & Components	\$ 2,501.9	\$ 2,413.6	\$ 2,127.0
Flat Rolled Products	1,820.9	1,799.0	1,527.5
Total sales	4,322.8	4,212.6	3,654.5
Intersegment sales:			
High Performance Materials & Components	103.8	79.4	59.6
Flat Rolled Products	96.5	86.6	69.8
Total intersegment sales	200.3	166.0	129.4
Sales to external customers:			
High Performance Materials & Components	2,398.1	2,334.2	2,067.4
Flat Rolled Products	1,724.4	1,712.4	1,457.7
Total sales to external customers	\$ 4,122.5	\$ 4,046.6	\$ 3,525.1

Total international sales were \$1,667.9 million in 2019, \$1,698.4 million in 2018, and \$1,454.5 million in 2017. Of these amounts, sales by operations in the United States to customers in other countries were \$1,262.6 million in 2019, \$1,303.8 million in 2018, and \$1,078.6 million in 2017.

<i>(In millions)</i>	2019	2018	2017
Operating profit:			
High Performance Materials & Components	\$ 343.1	\$ 335.4	\$ 246.4
Flat Rolled Products	37.6	77.8	37.0
Total operating profit	380.7	413.2	283.4
LIFO and net realizable value reserves (See Note 3)	(0.1)	(0.7)	(0.2)
Corporate expenses	(66.8)	(58.1)	(50.5)
Closed operations and other expenses	(25.5)	(21.6)	(34.0)
Restructuring and other charges	(4.5)	—	—
Impairment of goodwill (See Note 5)	—	—	(114.4)
Debt extinguishment charge (See Note 10)	(21.6)	—	(37.0)
Gain on joint venture deconsolidation (See Note 7)	—	15.9	—
Joint venture impairment charge (See Note 7)	(11.4)	—	—
Gain on asset sales, net	89.8	—	—
Interest expense, net	(99.0)	(101.0)	(133.8)
Income (loss) before income taxes	\$ 241.6	\$ 247.7	\$ (86.5)

Closed operations and other expenses are primarily presented in selling and administrative expenses in the consolidated statements of operations. These items included costs at closed facilities, including legal matters, environmental, real estate and other facility costs, and changes in foreign currency remeasurement impacts primarily related to our European Treasury Center operation.

Restructuring and other charges for 2019 are comprised of severance obligations for the reduction of approximately 70 positions in order to streamline ATI's salaried workforce primarily to improve the cost competitiveness of the U.S.-based FRP business. The entire \$4.5 million will be paid in 2020 upon completion of these reductions.

The \$89.8 million net gain on asset sales for 2019 consists of a \$91.7 million gain on the sale of certain oil and gas rights in Eddy County, NM (see Note 9) and a \$6.2 million gain on the sale of the Company's Cast Products business, partially offset by

an \$8.1 million loss on the sale of two non-core forging facilities, located in Portland, IN and Lebanon, KY. See Note 6 for further explanation regarding the sale of business transactions.

Certain additional information regarding the Company's business segments is presented below:

<i>(In millions)</i>	2019	2018	2017
Depreciation and amortization:			
High Performance Materials & Components	\$ 99.1	\$ 106.5	\$ 109.3
Flat Rolled Products	49.1	47.0	45.6
Corporate	2.9	2.9	5.9
Total depreciation and amortization	\$ 151.1	\$ 156.4	\$ 160.8
Capital expenditures:			
High Performance Materials & Components	\$ 132.5	\$ 79.8	\$ 62.7
Flat Rolled Products	34.8	56.4	59.1
Corporate	0.9	3.0	0.9
Total capital expenditures	\$ 168.2	\$ 139.2	\$ 122.7
Identifiable assets:			
	2019	2018	2017
High Performance Materials & Components	\$ 2,689.9	\$ 2,765.4	\$ 2,662.3
Flat Rolled Products	2,255.8	2,225.7	2,218.4
Discontinued Operations	—	—	0.2
Corporate:			
Deferred Taxes	64.5	8.7	7.6
Cash and cash equivalents and other	624.4	502.0	296.9
Total assets	\$ 5,634.6	\$ 5,501.8	\$ 5,185.4

<i>(\$ in millions)</i>	2019	Percent of total	2018	Percent of total	2017	Percent of total
Total assets:						
United States	\$ 4,956.4	88%	\$ 4,859.1	88%	\$ 4,547.7	88%
China	288.1	5%	287.3	5%	276.0	5%
United Kingdom	141.3	3%	136.7	3%	122.7	2%
Other	248.8	4%	218.7	4%	239.0	5%
Total Assets	\$ 5,634.6	100%	\$ 5,501.8	100%	\$ 5,185.4	100%

Note 19. Per Share Information

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

(In millions, except per share amounts)

For the Years Ended December 31,	2019	2018	2017
Numerator:			
Numerator for basic net income (loss) per common share -			
Net income (loss) attributable to ATI	\$ 257.6	\$ 222.4	\$ (91.9)
Effect of dilutive securities:			
4.75% Convertible Senior Notes due 2022	12.8	12.9	—
Numerator for diluted net income (loss) per common share -			
Net income (loss) attributable to ATI after assumed conversions	\$ 270.4	\$ 235.3	\$ (91.9)
Denominator:			
Denominator for basic net income (loss) per common share—weighted average shares			
	125.8	125.2	110.1
Effect of dilutive securities:			
Share-based compensation	0.8	0.8	—
4.75% Convertible Senior Notes due 2022	19.9	19.9	—
Denominator for diluted net income (loss) per common share—adjusted weighted average shares and assumed conversions			
	146.5	145.9	110.1
Basic net income (loss) attributable to ATI per common share			
	\$ 2.05	\$ 1.78	\$ (0.83)
Diluted net income (loss) attributable to ATI per common share			
	\$ 1.85	\$ 1.61	\$ (0.83)

Common stock that would be issuable upon the assumed conversion of the 2022 Convertible Notes and other option equivalents and contingently issuable shares are excluded from the computation of contingently issuable shares, and therefore, from the denominator for diluted earnings per share, if the effect of inclusion would have been anti-dilutive. There were no anti-dilutive shares for 2019 and 2018. There were 20.8 million anti-dilutive shares for 2017.

Note 20. Financial Information for Subsidiary and Guarantor Parent

The payment obligations under the \$150.0 million 6.95% Debentures due 2025 issued by Allegheny Ludlum, LLC (formerly known as Allegheny Ludlum Corporation) (the “Subsidiary”) are fully and unconditionally guaranteed by ATI (the “Guarantor Parent”). In accordance with positions established by the U.S. Securities and Exchange Commission, the following financial information sets forth separately financial information with respect to the Subsidiary, the Non-guarantor Subsidiaries and the Guarantor Parent. The principal elimination entries eliminate investments in subsidiaries and certain intercompany balances and transactions.

ATI is the plan sponsor for the U.S. qualified defined benefit pension plans, which cover certain current and former employees of the Subsidiary and the Non-guarantor Subsidiaries. As a result, the balance sheets presented for the Subsidiary and the Non-guarantor Subsidiaries do not include any U.S. qualified defined benefit pension assets or liabilities, or the related deferred taxes. These assets, liabilities and related deferred taxes and pension income or expense are recognized by the Guarantor Parent. Management and royalty fees charged to the Subsidiary and to the Non-guarantor Subsidiaries by the Guarantor Parent have been excluded solely for purposes of this presentation. The effects of income tax valuation allowances on U.S. Federal and State deferred tax assets are excluded from the Subsidiary’s financial results, and are reported by the Guarantor Parent or the Non-guarantor Subsidiaries, as applicable.

Allegheny Technologies Incorporated
Financial Information for Subsidiary and Guarantor Parent
Balance Sheets
December 31, 2019

<i>(In millions)</i>	Guarantor Parent	Subsidiary	Non-guarantor Subsidiaries	Eliminations	Consolidated
Assets:					
Cash and cash equivalents	\$ 0.3	\$ 4.2	\$ 486.3	\$ —	\$ 490.8
Accounts receivable, net	—	123.7	430.4	—	554.1
Intercompany notes receivable	—	—	4,402.8	(4,402.8)	—
Short-term contract assets	—	—	38.5	—	38.5
Inventories, net	—	213.0	942.3	—	1,155.3
Prepaid expenses and other current assets	5.6	18.5	40.2	—	64.3
Total current assets	5.9	359.4	6,340.5	(4,402.8)	2,303.0
Property, plant and equipment, net	6.5	1,539.3	904.3	—	2,450.1
Goodwill	—	—	525.8	—	525.8
Intercompany notes receivable	—	—	200.0	(200.0)	—
Investments in subsidiaries	6,434.3	37.7	—	(6,472.0)	—
Other assets	98.3	83.1	174.3	—	355.7
Total assets	\$ 6,545.0	\$ 2,019.5	\$ 8,144.9	\$ (11,074.8)	\$ 5,634.6
Liabilities and stockholders' equity:					
Accounts payable	\$ 4.6	\$ 184.0	\$ 332.6	\$ —	\$ 521.2
Intercompany notes payable	2,457.1	1,945.7	—	(4,402.8)	—
Short-term contract liabilities	—	26.4	52.3	—	78.7
Short-term debt and current portion of long-term debt	1.4	0.2	9.9	—	11.5
Other current liabilities	51.5	68.1	118.2	—	237.8
Total current liabilities	2,514.6	2,224.4	513.0	(4,402.8)	849.2
Long-term debt	1,130.1	150.4	106.9	—	1,387.4
Intercompany notes payable	—	200.0	—	(200.0)	—
Accrued postretirement benefits	—	261.2	51.3	—	312.5
Pension liabilities	678.8	3.8	48.9	—	731.5
Other long-term liabilities	28.3	44.1	88.4	—	160.8
Total liabilities	4,351.8	2,883.9	808.5	(4,602.8)	3,441.4
Total stockholders' equity (deficit)	2,193.2	(864.4)	7,336.4	(6,472.0)	2,193.2
Total liabilities and stockholders' equity	\$ 6,545.0	\$ 2,019.5	\$ 8,144.9	\$ (11,074.8)	\$ 5,634.6

Allegheny Technologies Incorporated
Financial Information for Subsidiary and Guarantor Parent
Statements of Operations
For the year ended December 31, 2019

<i>(In millions)</i>	Guarantor Parent	Subsidiary	Non-guarantor Subsidiaries	Eliminations	Consolidated
Sales	\$ —	\$ 1,429.0	\$ 2,693.5	\$ —	\$ 4,122.5
Cost of sales	13.5	1,302.8	2,168.4	—	3,484.7
Gross profit (loss)	(13.5)	126.2	525.1	—	637.8
Selling and administrative expenses	116.5	33.2	117.5	—	267.2
Restructuring charges	4.5	—	—	—	4.5
Operating income (loss)	(134.5)	93.0	407.6	—	366.1
Nonoperating retirement benefit expense	(47.5)	(24.7)	(1.4)	—	(73.6)
Interest income (expense), net	(148.2)	(131.6)	180.8	—	(99.0)
Debt extinguishment charge	(21.6)	—	—	—	(21.6)
Other income (expense) including equity in income of unconsolidated subsidiaries	593.4	(22.0)	90.2	(591.9)	69.7
Income (loss) before income taxes	241.6	(85.3)	677.2	(591.9)	241.6
Income tax provision (benefit)	(28.5)	(18.3)	115.6	(97.3)	(28.5)
Net income (loss)	270.1	(67.0)	561.6	(494.6)	270.1
Less: Net income attributable to noncontrolling interest	—	—	12.5	—	12.5
Net income (loss) attributable to ATI	\$ 270.1	\$ (67.0)	\$ 549.1	\$ (494.6)	\$ 257.6

Allegheny Technologies Incorporated
Financial Information for Subsidiary and Guarantor Parent
Statements of Comprehensive Income (Loss)
For the year ended December 31, 2019

<i>(In millions)</i>	Guarantor Parent	Subsidiary	Non-guarantor Subsidiaries	Eliminations	Consolidated
Net income (loss)	\$ 270.1	\$ (67.0)	\$ 561.6	\$ (494.6)	\$ 270.1
Other comprehensive income (loss)					
Currency translation adjustment arising during the period	(4.0)	—	(4.0)	4.0	(4.0)
Net derivative gain on hedge transactions	10.3	—	—	—	10.3
Pension and postretirement benefits	(75.5)	3.8	(15.2)	11.4	(75.5)
Other comprehensive income (loss), net of tax	(69.2)	3.8	(19.2)	15.4	(69.2)
Comprehensive income (loss)	200.9	(63.2)	542.4	(479.2)	200.9
Less: Comprehensive income attributable to noncontrolling interest	—	—	11.2	—	11.2
Comprehensive income (loss) attributable to ATI	\$ 200.9	\$ (63.2)	\$ 531.2	\$ (479.2)	\$ 189.7

Condensed Statements of Cash Flows
For the year ended December 31, 2019

<i>(In millions)</i>	Guarantor Parent	Subsidiary	Non-guarantor Subsidiaries	Eliminations	Consolidated
Cash flows provided by (used in) operating activities	\$ 16.1	\$ (109.1)	\$ 344.1	\$ (21.0)	\$ 230.1
Investing Activities:					
Purchases of property, plant and equipment	(0.7)	(33.4)	(134.1)	—	(168.2)
Net receipts (payments) on intercompany activity	—	—	(308.0)	308.0	—
Proceeds from disposals of property, plant and equipment	—	0.1	91.9	—	92.0
Proceeds from sales of businesses, net of transaction costs	—	—	158.1	—	158.1
Other	(0.2)	—	—	—	(0.2)
Cash flows provided by (used in) investing activities	(0.9)	(33.3)	(192.1)	308.0	81.7
Financing Activities:					
Borrowings on long-term debt	350.0	—	—	—	350.0
Payments on long-term debt and finance leases	(500.7)	(0.2)	(6.7)	—	(507.6)
Net borrowings under credit facilities	—	—	4.9	—	4.9
Debt issuance costs	(5.5)	—	—	—	(5.5)
Debt extinguishment charge	(20.9)	—	—	—	(20.9)
Net receipts (payments) on intercompany activity	172.0	136.0	—	(308.0)	—
Dividends paid to stockholders	—	—	(21.0)	21.0	—
Dividends paid to noncontrolling interests	—	—	(14.0)	—	(14.0)
Shares repurchased for income tax withholding on share-based compensation and other	(9.9)	—	—	—	(9.9)
Cash flows provided by (used in) financing activities	(15.0)	135.8	(36.8)	(287.0)	(203.0)
Increase (decrease) in cash and cash equivalents	\$ 0.2	\$ (6.6)	\$ 115.2	\$ —	\$ 108.8

Allegheny Technologies Incorporated
Financial Information for Subsidiary and Guarantor Parent
Balance Sheets
December 31, 2018

<i>(In millions)</i>	Guarantor Parent	Subsidiary	Non-guarantor Subsidiaries	Eliminations	Consolidated
Assets:					
Cash and cash equivalents	\$ 0.1	\$ 10.8	\$ 371.1	\$ —	\$ 382.0
Accounts receivable, net	—	126.3	401.5	—	527.8
Intercompany notes receivable	—	—	3,968.8	(3,968.8)	—
Short-term contract assets	—	—	51.2	—	51.2
Inventories, net	—	216.1	995.0	—	1,211.1
Prepaid expenses and other current assets	12.9	29.3	32.4	—	74.6
Total current assets	13.0	382.5	5,820.0	(3,968.8)	2,246.7
Property, plant and equipment, net	1.7	1,548.4	924.9	—	2,475.0
Goodwill	—	—	534.7	—	534.7
Intercompany notes receivable	—	—	200.0	(200.0)	—
Investments in subsidiaries	6,096.4	37.7	—	(6,134.1)	—
Other assets	35.6	30.7	179.1	—	245.4
Total assets	\$ 6,146.7	\$ 1,999.3	\$ 7,658.7	\$ (10,302.9)	\$ 5,501.8
Liabilities and stockholders' equity:					
Accounts payable	\$ 3.3	\$ 177.5	\$ 318.0	\$ —	\$ 498.8
Intercompany notes payable	2,102.8	1,866.0	—	(3,968.8)	—
Short-term contract liabilities	—	33.0	38.4	—	71.4
Short-term debt and current portion of long-term debt	0.2	0.7	5.7	—	6.6
Other current liabilities	59.1	71.7	129.3	—	260.1
Total current liabilities	2,165.4	2,148.9	491.4	(3,968.8)	836.9
Long-term debt	1,278.8	151.8	104.9	—	1,535.5
Intercompany notes payable	—	200.0	—	(200.0)	—
Accrued postretirement benefits	—	259.2	59.2	—	318.4
Pension liabilities	681.6	4.0	44.4	—	730.0
Other long-term liabilities	29.3	17.6	42.5	—	89.4
Total liabilities	4,155.1	2,781.5	742.4	(4,168.8)	3,510.2
Total stockholders' equity (deficit)	1,991.6	(782.2)	6,916.3	(6,134.1)	1,991.6
Total liabilities and stockholders' equity	\$ 6,146.7	\$ 1,999.3	\$ 7,658.7	\$ (10,302.9)	\$ 5,501.8

Allegheny Technologies Incorporated
Financial Information for Subsidiary and Guarantor Parent
Statements of Operations
For the year ended December 31, 2018

<i>(In millions)</i>	Guarantor Parent	Subsidiary	Non-guarantor Subsidiaries	Eliminations	Consolidated
Sales	\$ —	\$ 1,410.3	\$ 2,636.3	\$ —	\$ 4,046.6
Cost of sales	16.6	1,302.4	2,097.3	—	3,416.3
Gross profit (loss)	(16.6)	107.9	539.0	—	630.3
Selling and administrative expenses	101.7	34.2	132.3	—	268.2
Operating income (loss)	(118.3)	73.7	406.7	—	362.1
Nonoperating retirement benefit expense	(12.7)	(19.5)	(1.7)	—	(33.9)
Interest income (expense), net	(138.8)	(114.6)	152.4	—	(101.0)
Other income (expense) including equity in income of unconsolidated subsidiaries	517.5	16.8	0.8	(514.6)	20.5
Income (loss) before income taxes	247.7	(43.6)	558.2	(514.6)	247.7
Income tax provision (benefit)	11.0	(8.7)	83.9	(75.2)	11.0
Net income (loss)	236.7	(34.9)	474.3	(439.4)	236.7
Less: Net income attributable to noncontrolling interest	—	—	14.3	—	14.3
Net income (loss) attributable to ATI	\$ 236.7	\$ (34.9)	\$ 460.0	\$ (439.4)	\$ 222.4

Allegheny Technologies Incorporated
Financial Information for Subsidiary and Guarantor Parent
Statements of Comprehensive Income (Loss)
For the year ended December 31, 2018

<i>(In millions)</i>	Guarantor Parent	Subsidiary	Non-guarantor Subsidiaries	Eliminations	Consolidated
Net income (loss)	\$ 236.7	\$ (34.9)	\$ 474.3	\$ (439.4)	\$ 236.7
Other comprehensive income (loss)					
Currency translation adjustment arising during the period	(26.6)	—	(26.6)	26.6	(26.6)
Net derivative loss on hedge transactions	(18.1)	—	—	—	(18.1)
Pension and postretirement benefits	(67.5)	(19.1)	0.7	18.4	(67.5)
Other comprehensive income (loss), net of tax	(112.2)	(19.1)	(25.9)	45.0	(112.2)
Comprehensive income (loss)	124.5	(54.0)	448.4	(394.4)	124.5
Less: Comprehensive income attributable to noncontrolling interest	—	—	8.1	—	8.1
Comprehensive income (loss) attributable to ATI	\$ 124.5	\$ (54.0)	\$ 440.3	\$ (394.4)	\$ 116.4

Condensed Statements of Cash Flows
For the year ended December 31, 2018

<i>(In millions)</i>	Guarantor Parent	Subsidiary	Non-guarantor Subsidiaries	Eliminations	Consolidated
Cash flows provided by (used in) operating activities	\$ (107.0)	\$ (223.9)	\$ 738.7	\$ (15.0)	\$ 392.8
Investing Activities:					
Purchases of property, plant and equipment	(2.1)	(26.2)	(110.9)	—	(139.2)
Net receipts (payments) on intercompany activity	—	—	(346.5)	346.5	—
Proceeds from disposal of property, plant and equipment	—	2.6	0.2	—	2.8
Purchases of businesses	—	—	(10.0)	—	(10.0)
Other	1.3	—	—	—	1.3
Cash flows provided by (used in) investing activities	(0.8)	(23.6)	(467.2)	346.5	(145.1)
Financing Activities:					
Borrowings on long-term debt	—	—	7.1	—	7.1
Payments on long-term debt and finance leases	(0.2)	(0.9)	(5.3)	—	(6.4)
Net payments under credit facilities	—	—	(5.9)	—	(5.9)
Net receipts (payments) on intercompany activity	112.5	234.0	—	(346.5)	—
Dividends paid to stockholders	—	—	(15.0)	15.0	—
Dividends paid to noncontrolling interests	—	—	(10.0)	—	(10.0)
Sale of noncontrolling interests	—	11.7	2.7	—	14.4
Shares repurchased for income tax withholding on share-based compensation and other	(6.5)	—	—	—	(6.5)
Cash flows provided by (used in) financing activities	105.8	244.8	(26.4)	(331.5)	(7.3)
Increase (decrease) in cash and cash equivalents	\$ (2.0)	\$ (2.7)	\$ 245.1	\$ —	\$ 240.4

Allegheny Technologies Incorporated
Financial Information for Subsidiary and Guarantor Parent
Statements of Operations
For the year ended December 31, 2017

<i>(In millions)</i>	Guarantor Parent	Subsidiary	Non-guarantor Subsidiaries	Eliminations	Consolidated
Sales	\$ —	\$ 1,178.9	\$ 2,346.2	\$ —	\$ 3,525.1
Cost of sales	14.6	1,085.5	1,928.0	—	3,028.1
Gross profit (loss)	(14.6)	93.4	418.2	—	497.0
Selling and administrative expenses	86.6	36.9	124.5	—	248.0
Impairment of goodwill	—	—	114.4	—	114.4
Operating income (loss)	(101.2)	56.5	179.3	—	134.6
Nonoperating retirement benefit expense	(32.2)	(18.7)	(3.4)	—	(54.3)
Interest income (expense), net	(155.8)	(90.0)	112.0	—	(133.8)
Debt extinguishment charge	(37.0)	—	—	—	(37.0)
Other income (expense) including equity in income of unconsolidated subsidiaries	239.7	1.6	2.4	(239.7)	4.0
Income (loss) before income taxes	(86.5)	(50.6)	290.3	(239.7)	(86.5)
Income tax provision (benefit)	(6.8)	(16.6)	131.4	(114.8)	(6.8)
Net income (loss)	(79.7)	(34.0)	158.9	(124.9)	(79.7)
Less: Net income attributable to noncontrolling interest	—	—	12.2	—	12.2
Net income (loss) attributable to ATI	\$ (79.7)	\$ (34.0)	\$ 146.7	\$ (124.9)	\$ (91.9)

Allegheny Technologies Incorporated
Financial Information for Subsidiary and Guarantor Parent
Statements of Comprehensive Income (Loss)
For the year ended December 31, 2017

<i>(In millions)</i>	Guarantor Parent	Subsidiary	Non-guarantor Subsidiaries	Eliminations	Consolidated
Net income (loss)	\$ (79.7)	\$ (34.0)	\$ 158.9	\$ (124.9)	\$ (79.7)
Other comprehensive income (loss)					
Currency translation adjustment arising during the period	39.1	—	39.1	(39.1)	39.1
Net derivative gain on hedge transactions	7.1	—	—	—	7.1
Pension and postretirement benefits	27.3	(5.8)	(10.7)	16.5	27.3
Other comprehensive income (loss), net of tax	73.5	(5.8)	28.4	(22.6)	73.5
Comprehensive income (loss)	(6.2)	(39.8)	187.3	(147.5)	(6.2)
Less: Comprehensive income attributable to noncontrolling interest	—	—	19.8	—	19.8
Comprehensive income (loss) attributable to ATI	\$ (6.2)	\$ (39.8)	\$ 167.5	\$ (147.5)	\$ (26.0)

Condensed Statements of Cash Flows
For the year ended December 31, 2017

<i>(In millions)</i>	Guarantor Parent	Subsidiary	Non-guarantor Subsidiaries	Eliminations	Consolidated
Cash flows provided by (used in) operating activities	\$ (78.8)	\$ (101.5)	\$ 214.7	\$ (12.0)	\$ 22.4
Investing Activities:					
Purchases of property, plant and equipment	(0.9)	(38.5)	(83.3)	—	(122.7)
Net receipts (payments) on intercompany activity	—	—	(223.9)	223.9	—
Proceeds from disposal of property, plant and equipment	—	0.1	2.6	—	2.7
Other	—	—	0.4	—	0.4
Cash flows provided by (used in) investing activities	(0.9)	(38.4)	(304.2)	223.9	(119.6)
Financing Activities:					
Borrowings on long-term debt	—	—	8.5	—	8.5
Payments on long-term debt and finance leases	(350.4)	(0.3)	(2.3)	—	(353.0)
Net borrowings under credit facilities	—	—	1.6	—	1.6
Debt issuance costs	—	—	(0.8)	—	(0.8)
Debt extinguishment charge	(35.8)	—	—	—	(35.8)
Net receipts (payments) on intercompany activity	72.7	151.2	—	(223.9)	—
Issuance of common stock	397.8	—	—	—	397.8
Dividends paid to stockholders	—	—	(12.0)	12.0	—
Dividends paid to noncontrolling interests	—	—	(8.0)	—	(8.0)
Sale to noncontrolling interest	—	—	3.7	—	3.7
Shares repurchased for income tax withholding on share-based compensation	(4.8)	—	—	—	(4.8)
Cash flows provided by (used in) financing activities	79.5	150.9	(9.3)	(211.9)	9.2
Increase (decrease) in cash and cash equivalents	\$ (0.2)	\$ 11.0	\$ (98.8)	\$ —	\$ (88.0)

Note 21. Commitments and Contingencies

Future minimum rental commitments under leases are disclosed in Note 11. Commitments for expenditures on property, plant and equipment at December 31, 2019 were approximately \$116.5 million.

The Company is subject to various domestic and international environmental laws and regulations that govern the discharge of pollutants and disposal of wastes, and which may require that it investigate and remediate the effects of the release or disposal of materials at sites associated with past and present operations. The Company could incur substantial cleanup costs, fines, and civil or criminal sanctions, third party property damage or personal injury claims as a result of violations or liabilities under these laws or noncompliance with environmental permits required at its facilities. The Company is currently involved in the investigation and remediation of a number of its current and former sites, as well as third party sites.

Environmental liabilities are recorded when the Company's liability is probable and the costs are reasonably estimable. In many cases, however, the Company is not able to determine whether it is liable or, if liability is probable, to reasonably estimate the loss or range of loss. Estimates of the Company's liability remain subject to additional uncertainties, including the nature and extent of site contamination, available remediation alternatives, the extent of corrective actions that may be required, and the number, participation, and financial condition of other potentially responsible parties (PRPs). The Company adjusts its accruals to reflect new information as appropriate. Future adjustments could have a material adverse effect on the Company's consolidated results of operations in a given period, but the Company cannot reliably predict the amounts of such future adjustments.

At December 31, 2019, the Company's reserves for environmental remediation obligations totaled approximately \$18 million, of which \$7 million was included in other current liabilities. The reserve includes estimated probable future costs of \$3 million for federal Superfund and comparable state-managed sites; \$13 million for formerly owned or operated sites for which the Company has remediation or indemnification obligations; \$1 million for owned or controlled sites at which Company operations have been discontinued; and \$1 million for sites utilized by the Company in its ongoing operations. The Company continues to evaluate whether it may be able to recover a portion of future costs for environmental liabilities from third parties and to pursue such recoveries where appropriate.

Based on currently available information, it is reasonably possible that the costs for active matters may exceed the Company's recorded reserves by as much as \$16 million. Future investigation or remediation activities may result in the discovery of additional hazardous materials, potentially higher levels of contamination than discovered during prior investigation, and may impact costs of the success or lack thereof in remedial solutions. Therefore, future developments, administrative actions or liabilities relating to environmental matters could have a material adverse effect on the Company's consolidated financial condition or results of operations.

The timing of expenditures depends on a number of factors that vary by site. The Company expects that it will expend present accruals over many years and that remediation of all sites with which it has been identified will be completed within thirty years.

A number of other lawsuits, claims and proceedings have been or may be asserted against the Company relating to the conduct of its currently and formerly owned businesses, including those pertaining to product liability, patent infringement, commercial, government contracting, construction, employment, employee and retiree benefits, taxes, environmental, health and safety, occupational disease, and stockholder and corporate governance matters. While the outcome of litigation cannot be predicted with certainty, and some of these lawsuits, claims or proceedings may be determined adversely to the Company, management does not believe that the disposition of any such pending matters is likely to have a material adverse effect on the Company's consolidated financial condition or liquidity, although the resolution in any reporting period of one or more of these matters could have a material adverse effect on the Company's consolidated results of operations for that period.

Allegheny Technologies Incorporated and its subsidiary, ATI Titanium LLC ("ATI Titanium"), are parties to a lawsuit captioned US Magnesium, LLC v. ATI Titanium LLC (Case No. 2:17-cv-00923-DB) and filed in federal district court in Salt Lake City, UT, pertaining to a Supply and Operating Agreement between US Magnesium LLC ("USM") and ATI Titanium entered into in 2006 (the "Supply Agreement"). In 2016, ATI Titanium notified USM that it would suspend performance under the Supply Agreement in reliance on certain terms and conditions included in the Supply Agreement. USM subsequently filed a claim challenging ATI Titanium's right to suspend performance under the Supply Agreement, claiming that such suspension was a material breach of the Supply Agreement and seeking monetary damages, and ATI Titanium filed a counterclaim for breach of contract against USM. In 2018, USM obtained leave of the court to add Allegheny Technologies Incorporated as a separate party defendant, and ATI Titanium filed a motion to dismiss the claim against Allegheny Technologies Incorporated, which the court denied on April 19, 2019. The case is proceeding through discovery, and while ATI intends to vigorously defend against and pursue these claims, it cannot predict their outcomes at this time.

**Note 22. Selected Quarterly Financial Data
(Unaudited)**

<i>(In millions, except per share amounts)</i>	Quarter Ended			
	March 31	June 30	September 30	December 31
2019 -				
Sales	\$ 1,004.8	\$ 1,080.4	\$ 1,018.7	\$ 1,018.6
Gross Profit	131.1	177.7	159.7	169.3
Net income	16.3	78.5	115.3	60.0
Net income attributable to ATI	15.0	75.1	111.0	56.5
Basic income attributable to ATI per common share	\$ 0.12	\$ 0.60	\$ 0.88	\$ 0.45
Diluted income attributable to ATI per common share	\$ 0.12	\$ 0.54	\$ 0.78	\$ 0.41
Average shares outstanding	125.8	126.1	126.1	126.1
2018 -				
Sales	\$ 979.0	\$ 1,009.5	\$ 1,020.2	\$ 1,037.9
Gross Profit	148.6	173.7	160.4	147.6
Net income	60.5	75.6	55.6	45.0
Net income attributable to ATI	58.0	72.8	50.5	41.1
Basic income attributable to ATI per common share	\$ 0.46	\$ 0.58	\$ 0.40	\$ 0.33
Diluted income attributable to ATI per common share	\$ 0.42	\$ 0.52	\$ 0.37	\$ 0.30
Average shares outstanding	125.7	125.7	125.7	125.7

Quarterly earnings per share amounts above may not add to year-to-date amounts due to rounding as well as the impact of dilutive securities for each individual quarterly period versus the year-to-date period.

Second quarter 2019 results include a \$29.3 million pre-tax (\$27.3 million, net of tax) gain on the sale of oil and gas rights in New Mexico. See Note 9 for further explanation. Second quarter 2019 results also include a \$7.7 million pre-tax (\$7.2 million, net of tax) loss on the sale of two non-core forging facilities. See Note 6 for further explanation.

Third quarter 2019 results include a \$62.4 million pre-tax (\$60.5 million, net of tax) gain on an additional sale of oil and gas rights in New Mexico. See Note 9 for further explanation. Third quarter 2019 results also include a \$6.2 million pre-tax (\$6.0 million, net of tax) net gain on the sale of the Cast Products business. See Note 6 for further explanation.

Fourth quarter 2019 results include the following:

- \$4.5 million pre-tax (\$4.3 million, net of tax) restructuring charge to streamline ATI's salaried workforce primarily to improve the cost competitiveness of the U.S.-based Flat Rolled Products business. See Note 18 for further explanation.
- \$21.6 million pre-tax (\$20.5 million, net of tax) debt extinguishment charge for the full redemption of the 2021 Notes. See Note 10 for further explanation.
- \$11.4 million pre-tax (\$10.8 million, net of tax) joint venture impairment charge related to the A&T Stainless joint venture. See Note 7 for further explanation.
- \$41.9 million net discrete tax benefit primarily related to the reversal of a significant portion of the Company's deferred tax valuation allowances. See Note 17 for further explanation.

First quarter 2018 results include a \$15.9 million pre-tax (\$14.7 million, net of tax) gain on deconsolidation of A&T Stainless following the sale of a 50% noncontrolling interest and subsequent derecognition. See Note 7 for further explanation.

Net of tax amounts presented above generally use the effective tax rate for the applicable quarterly period which differs from the effective tax rate for the full year.

Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure

Not applicable.

Item 9A. Controls and Procedures

(a) Evaluation of Disclosure Controls and Procedures.

In accordance with Securities Exchange Act Rules 13-1-15(e) and 15d-15(e), our management, under the supervision of our Chief Executive Officer and Chief Financial Officer, conducted an evaluation of the effectiveness of the design and operation of our disclosure controls and procedures as of the end of the period covered by this Annual Report on Form 10-K. Based on that evaluation, the Chief Executive Officer and Chief Financial Officer concluded that our disclosure controls and procedures were effective as of December 31, 2019.

(b) Management's Report on Internal Control over Financial Reporting.

Management is responsible for establishing and maintaining adequate internal control over financial reporting for the Company. Internal control over financial reporting is defined in Rules 13a-15(f) and 15d-15(f) promulgated under the Securities Exchange Act of 1934, as amended, as a process designed by, or under the supervision of, the company's principal executive and principal financial officers and effected by the company's board of directors, management and other personnel, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles and includes those policies and procedures that:

Pertain to the maintenance of records that in reasonable detail accurately and fairly reflect the transactions and dispositions of the assets of the company;

Provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and

Provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Internal control over financial reporting cannot provide absolute assurance of achieving financial reporting objectives because of its inherent limitations. Internal control over financial reporting is a process that involves human diligence and compliance and is subject to lapses in judgment and breakdowns resulting from human failures. Internal control over financial reporting can also be circumvented by collusion or improper management override. Because of such limitations, there is a risk that material misstatements may not be prevented or detected on a timely basis by internal control over financial reporting. However, these inherent limitations are known features of the financial reporting process. Therefore, it is possible to design into the process safeguards to reduce, though not eliminate, this risk.

The Company's management assessed the effectiveness of the Company's internal control over financial reporting as of December 31, 2019. In making this assessment, the Company's management used the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) (COSO) in Internal Control-Integrated Framework.

Based on that assessment, the Chief Executive Officer and Chief Financial Officer concluded as of December 31, 2019, the Company's internal control over financial reporting was effective based on those criteria.

The Company's independent registered public accounting firm that audited the consolidated financial statements included in this Annual Report issued an attestation report on effectiveness of the Company's internal control over financial reporting as of December 31, 2019.

(c) Changes to Internal Control over Financial Reporting.

There were no changes to our internal control over financial reporting that occurred during the quarter ended December 31, 2019 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Management's Certifications

The certifications of the Company's Chief Executive Officer and Chief Financial Officer required by the Sarbanes-Oxley Act are included as Exhibits 31 and 32 to this Annual Report on Form 10-K. In addition, in 2019, the Company's Chief Executive Officer provided to the New York Stock Exchange the annual CEO certification pursuant to Section 303A regarding the Company's compliance with the New York Stock Exchange's corporate governance listing standards.

Report of Independent Registered Public Accounting Firm

To the Shareholders and the Board of Directors of
Allegheny Technologies Incorporated and Subsidiaries

Opinion on Internal Control over Financial Reporting

We have audited Allegheny Technologies Incorporated and Subsidiaries' internal control over financial reporting as of December 31, 2019, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) (the COSO criteria). In our opinion, Allegheny Technologies Incorporated and Subsidiaries (the Company) maintained, in all material respects, effective internal control over financial reporting as of December 31, 2019, based on the COSO criteria.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheets of the Company as of December 31, 2019 and 2018, the related consolidated statements of operations, comprehensive income (loss), cash flows and statement of changes in consolidated equity for each of the three years in the period ended December 31, 2019, and the related notes and our report dated February 25, 2020 expressed an unqualified opinion thereon.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting included in the accompanying Management's Report on Internal Control over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects.

Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control Over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ Ernst & Young LLP

Pittsburgh, Pennsylvania
February 25, 2020

Item 9B. Other Information

Not applicable.

PART III**Item 10. Directors and Executive Officers of the Registrant**

The information concerning our directors required by this item is incorporated and made part hereof by reference to the material appearing under the heading “Our Corporate Governance” and “Election of Directors” and the information concerning our executive officers required by this item is incorporated and made part hereof by reference to the material appearing under the heading “Members of ATI’s Executive Management,” in the Allegheny Technologies Proxy Statement for the 2020 Annual Meeting of Stockholders (the “2020 Proxy Statement”), which will be filed with the Securities and Exchange Commission, pursuant to Regulation 14A, not later than 120 days after the end of the fiscal year. Information concerning the Audit Committee and its financial expert required by this item is incorporated and made part hereof by reference to the material appearing under the heading “Our Corporate Governance-Board Information- Board Committees” in the 2020 Proxy Statement.

Allegheny Technologies has adopted *Corporate Guidelines for Business Conduct and Ethics* that apply to all employees including its principal executive officer, principal financial officer, principal accounting officer or controller, or persons performing similar functions. The *Corporate Guidelines for Business Conduct and Ethics* as well as the charters for the Company’s Audit, Finance, Nominating and Governance, Personnel and Compensation, and Technology Committees, as well as periodic and current reports filed with the SEC, are available through the Company’s website at <http://www.atimetals.com> and are available in print free of charge to any shareholder upon request. To obtain a copy, contact the Corporate Secretary, Allegheny Technologies Incorporated, 1000 Six PPG Place, Pittsburgh, Pennsylvania 15222-5479 (telephone: 412-394-2800). The Company intends to post on its website any waiver from or amendment to the guidelines that apply to the Company’s Principal Executive Officer, Principal Financial Officer or Principal Accounting Officer or Controller (or persons performing similar functions) that relate to elements of the code of ethics identified by the Securities and Exchange Commission in Item 406(b) of Regulation S-K.

Item 11. Executive Compensation

Information required by this item is incorporated by reference to “Our Corporate Governance- Director Compensation,” “Executive Compensation” and “Compensation Committee Interlocks and Insider Participation” as set forth in the 2020 Proxy Statement.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters

Information relating to the ownership of equity securities by certain beneficial owners and management is incorporated by reference to “Stock Ownership Information” as set forth in the 2020 Proxy Statement.

Equity Compensation Plan Information

Information about our equity compensation plans at December 31, 2019 was as follows:

	(a)		
	Number of Shares to be Issued Upon Exercise of Outstanding Options, Warrants and Rights (1)	Weighted Average Exercise Price of Outstanding Options, Warrants and Rights (2)	Number of Shares Remaining Available for Future Issuance Under Equity Compensation Plans (3) (excluding securities reflected in column (a))
<i>(In thousands, except per share amounts)</i>			
Equity Compensation Plans Approved by Shareholders	595	\$ —	4,133
Equity Compensation Plans Not Approved by Shareholders	—	—	—
Total	595	\$ —	4,133

(1) Includes stock-settled equity awards previously granted under the Allegheny Technologies Incorporated 2015 Incentive Plan (the “2015 Incentive Plan”) and the Allegheny Technologies Incorporated 2017 Incentive Plan (the “2017 Incentive Plan”). Amounts reflected for such performance-based awards represent the maximum number of shares to be awarded at the conclusion of the applicable performance cycle.

(2) Outstanding stock-settled awards are not included in this calculation.

- (3) Represents shares available for issuance under the 2017 Incentive Plan (which provides for the issuance of stock options, stock appreciation rights, restricted shares, restricted stock units, performance and other stock-based awards). See Note 16. Stockholders' Equity for a discussion of the Company's stock-based compensation plans.

Item 13. Certain Relationships and Related Transactions, and Director Independence

Information required by this item is incorporated by reference to "Related Party Transactions" and "Our Corporate Governance- Board Information- Board Composition and Independence" as set forth in the 2020 Proxy Statement.

Item 14. Principal Accountant Fees and Services

Information required by this item is incorporated by reference to "Ratification of Selection of Independent Auditors" as set forth in the 2020 Proxy Statement.

PART IV

Item 15. Exhibits, Financial Statements and Financial Statement Schedules

(a) Financial Statements, Financial Statement Schedules and Exhibits:

(1) Financial Statements

The following consolidated financial statements and report are filed as part of this report under Item 8 – "Financial Statements and Supplementary Data":

Report of Ernst & Young LLP, Independent Registered Public Accounting Firm

Consolidated Statements of Operations — Years Ended December 31, 2019, 2018, and 2017

Consolidated Statements of Comprehensive Income (Loss) — Years Ended December 31, 2019, 2018, and 2017

Consolidated Balance Sheets at December 31, 2019 and 2018

Consolidated Statements of Cash Flows — Years Ended December 31, 2019, 2018, and 2017

Statements of Changes in Consolidated Equity — Years Ended December 31, 2019, 2018, and 2017

Notes to Consolidated Financial Statements

(2) Financial Statement Schedules

All schedules set forth in the applicable accounting regulations of the Securities and Exchange Commission either are not required under the related instructions or are not applicable and, therefore, have been omitted.

(3) Exhibits

Exhibits required to be filed by Item 601 of Regulation S-K are listed below. Documents not designated as being incorporated herein by reference are filed herewith. The paragraph numbers correspond to the exhibit numbers designated in Item 601 of Regulation S-K.

EXHIBIT INDEX

Exhibit No.	Description
3.1	<u>Certificate of Incorporation of Allegheny Technologies Incorporated, as amended (incorporated by reference to Exhibit 3.1 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 1999 (File No. 1-12001)).</u>
3.2	<u>Third Amended and Restated Bylaws of Allegheny Technologies Incorporated (incorporated by reference to Exhibit 3.1 to the Registrant's Current Report on Form 8-K dated August 10, 2016 (File No. 1-12001)).</u>
4.1	<u>Indenture dated as of December 15, 1995 between Allegheny Ludlum Corporation and The Chase Manhattan Bank (National Association), as trustee, relating to Allegheny Ludlum Corporation's 6.95% Debentures due 2025 (incorporated by reference to Exhibit 4(a) to Allegheny Ludlum Corporation's Report on Form 10-K for the year ended December 31, 1995 (File No. 1-9498)).</u>
4.2	<u>First Supplemental Indenture by and among Allegheny Technologies Incorporated, Allegheny Ludlum Corporation and The Chase Manhattan Bank (National Association), as Trustee, dated as of August 15, 1996 (incorporated by reference to Exhibit 4.1 to Registrant's Current Report on Form 8-K dated August 21, 1996 (File No. 1-12001)).</u>

Exhibit No.	Description
4.3	Supplemental Indenture, dated as of December 22, 2011, among Allegheny Ludlum Corporation, ALC Merger, LLC, and The Bank of New York Mellon (as successor to The Chase Manhattan Bank (National Association)), as Trustee (incorporated by reference to Exhibit 4.4 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2011 (File No. 1-12001)).
4.4	Indenture, dated June 1, 2009, between Allegheny Technologies Incorporated and The Bank of New Your Mellon, as Trustee (incorporated by reference to Exhibit 4.1 to the Registrant's Current Report on Form 8-K dated June 3, 2009 (File No. 1-2001)).
4.5	Third Supplemental Indenture, dated January 7, 2011, between Allegheny Technologies Incorporated and The Bank of New York Mellon, as Trustee (incorporated by reference to Exhibit 4.1 to the Registrant's Current Report on Form 8-K dated January 7, 2011 (File No. 1-12001)).
4.6	Form of 5.950% Senior Note due 2021 (incorporated by reference to Exhibit 4.2 to the Registrant's Current Report on Form 8-K dated January 7, 2011 (File No. 1-12001)).
4.7	Fourth Supplemental Indenture, dated July 12, 2013, between Allegheny Technologies Incorporated and The Bank of New York Mellon, as Trustee (incorporated by reference to Exhibit 4.1 to the Registrant's Current Report on Form 8-K dated July 12, 2013 (File No. 1-12001)).
4.8	Form of 5.875% Senior Note due 2023 (incorporated by reference to Exhibit 4.2 to the Registrant's Current Report on Form 8-K dated July 12, 2013 (File No. 1-12001)).
4.9	Fifth Supplemental Indenture, dated May 24, 2016, between Allegheny Technologies Incorporated and The Bank of New York Mellon, as Trustee (incorporated by reference to Exhibit 4.2 to the Registrant's Current Report on Form 8-K dated May 24, 2016 (File No. 1-12001)).
4.10	Form of 4.75% Convertible Senior Note due 2022 (incorporated by reference to Exhibit A to Exhibit 4.2 to the Registrant's Current Report on Form 8-K dated May 24, 2016 (File No. 1-12004)).
4.11	Form of 5.875% Senior Note due 2027 (incorporated by reference to Exhibit 4.2 to the Registrant's Current Report on Form 8-K dated November 22, 2019 (File No. 1-12001)).
4.12	Sixth Supplemental Indenture, dated November 19, 2019, between Allegheny Technologies Incorporated and The Bank of New York Mellon, as Trustee (incorporated by reference to Exhibit 4.2 to the Registrant's Current Report on Form 8-K dated November 22, 2019 (File No. 1-12001)).
4.13	Description of Securities Registered Pursuant to Section 12 of the Securities Exchange Act of 1934 (filed herewith).
10.1	Allegheny Technologies Incorporated Fee Continuation Plan for Non-Employee Directors, as amended (incorporated by reference to Exhibit 10.3 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2004 (File No. 1-12001)).*
10.2	Supplemental Pension Plan for Certain Key Employees of Allegheny Technologies Incorporated and its subsidiaries (formerly known as the Allegheny Ludlum Corporation Key Man Salary Continuation Plan) (incorporated by reference to Exhibit 10.7 to the Company's Annual Report on Form 10-K for the year ended December 31, 1997 (File No. 1-12001)).*
10.3	Allegheny Technologies Incorporated Benefit Restoration Plan, as amended (incorporated by reference to Exhibit 10.8 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 1999 (File No. 1-12001)).*
10.4	Amendment to the Allegheny Technologies Incorporated Pension Plan effective January 1, 2003 (incorporated by reference to Exhibit 10.20 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2003 (File No. 1-12001)).*
10.5	Allegheny Technologies Incorporated 2007 Incentive Plan As Amended and Restated, effective May 7, 2010 (incorporated by reference to Exhibit 99.1 to the Registrant's Registration Statement on Form S-8 dated May 7, 2010 (File No 333-166628)).*
10.6	Form of Clawback Agreement regarding incentive payments under the Annual Incentive Plan dated March 15, 2012 (incorporated by reference to Exhibit 10.6 to the Registrant's Quarterly Report on Form 10-Q for the quarter ended March 31, 2012 (File No. 1-12001)).*
10.7	Form of Clawback Agreement regarding incentive payments under the long-term incentive plans dated March 15, 2012 (incorporated by reference to Exhibit 10.7 to the Registrant's Quarterly Report on Form 10-Q for the quarter ended March 31, 2012 (File No. 1-12001)).*
10.8	Amendment No. 1 to the Allegheny Technologies Incorporated 2007 Incentive Plan, as Amended and Restated, effective May 11, 2012 (incorporated by reference to Exhibit 99.2 to the Registrant's Registration Statement on Form S-8 dated May 17, 2012 (File No. 333-181491)).*
10.9	Form of Change in Control Severance Agreement (incorporated by reference to Exhibit 99.1 to the Registrant's Current Report on Form 8-K dated December 10, 2019 (File No. 1-12001)).*
10.10	Form of Performance/Restricted Stock Award Agreement (incorporated by reference to Exhibit 10.2 to the Registrant's Quarterly Report on Form 10-Q for the quarter ended March 31, 2015 (File No. 1-12001)).*

Exhibit No.	Description
10.11	<u>Allegheny Technologies Incorporated Defined Contribution Restoration Plan, as amended and restated as of January 1, 2015 (incorporated by reference to Exhibit 10.4 to the Registrant's Quarterly Report on Form 10-Q for the quarter ended March 31, 2015 (File No. 1-12001)).*</u>
10.12	<u>Allegheny Technologies Incorporated 2015 Incentive Plan (incorporated by reference to Appendix A to the Registrant's Definitive Proxy Statement filed on March 20, 2015 (File No 1-12001)).*</u>
10.13	<u>Administrative Rules for the Non-Employee Director Restricted Stock Program, effective as of May 1, 2015 (incorporated by reference to Exhibit 10.5 to the Registrant's Quarterly Report on Form 10-Q for the quarter ended March 31, 2015 (File No. 1-12001)).*</u>
10.14	<u>Form of Long Term Incentive Award Agreement (incorporated by reference to Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q for the quarter ended March 31, 2016 (File No. 1-12001)).*</u>
10.15	<u>Allegheny Technologies Incorporated 2017 Incentive Plan (incorporated by reference to Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q for the quarter ended June 30, 2017 (File No. 1-12001)).*</u>
10.16	<u>Form of Performance-Vested Restricted Stock Unit Agreement (incorporated by reference to the Registrant's Quarterly Report on Form 10-Q for the quarter ended March 31, 2018 (File No. 1-12001)).*</u>
10.17	<u>Form of Time-Vested Restricted Stock Unit Agreement (incorporated by reference to the Registrant's Quarterly Report on Form 10-Q for the quarter ended March 31, 2018 (File No. 1-12001)).*</u>
10.18	<u>Form of Performance-Vested Restricted Stock Unit Agreement (incorporated by reference to the Registrant's Quarterly Report on Form 10-Q for the quarter ended March 31, 2019 (File No. 1-12001)).*</u>
10.19	<u>Form of Time-Vested Restricted Stock Unit Agreement (incorporated by reference to the Registrant's Quarterly Report on Form 10-Q for the quarter ended March 31, 2019 (File No. 1-12001)).*</u>
10.20	<u>First Amended and Restated Revolving Credit, Term Loan, Delayed Draw Term Loan and Security Agreement, dated as of September 30, 2019, by and among the borrowers party thereto, the Company and other guarantors party thereto, the lenders party thereto, and PNC Bank, National Association, as Lender and Agent (incorporated by reference to Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q for the quarter ended September 30, 2019 (File No. 1-12001)).</u>
21.1	<u>Subsidiaries of the Registrant (filed herewith).</u>
23.1	<u>Consent of Ernst & Young LLP (filed herewith).</u>
31.1	<u>Certification of Chief Executive Officer required by Securities and Exchange Commission Rule 13a-14(a) or 15d-14(a) (filed herewith).</u>
31.2	<u>Certification of Principal Financial Officer required by Securities and Exchange Commission Rule 13a-14(a) or 15d-14(a) (filed herewith).</u>
32.1	<u>Certification pursuant to 18 U.S.C. Section 1350 (filed herewith).</u>
101.INS	Inline XBRL Instance Document - the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document.
101.SCH	Inline XBRL Taxonomy Extension Schema Document.
101.CAL	Inline XBRL Taxonomy Extension Calculation Linkbase Document.
101.DEF	Inline XBRL Taxonomy Extension Definition Linkbase Document.
101.LAB	Inline XBRL Taxonomy Extension Label Linkbase Document.
101.PRE	Inline XBRL Taxonomy Extension Presentation Linkbase Document.
104	Cover Page Interactive Data File - the cover page interactive data file does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document.

* *Management contract or compensatory plan or arrangement required to be filed as an Exhibit to this Report.*

Certain instruments defining the rights of holders of long-term debt of the Company and its subsidiaries have been omitted from the Exhibits in accordance with Item 601(b)(4)(iii) of Regulation S-K. A copy of any omitted document will be furnished to the Commission upon request.

Item 16. Form 10-K Summary

Not applicable.

**DESCRIPTION OF THE REGISTRANT'S SECURITIES
REGISTERED PURSUANT TO SECTION 12 OF THE
SECURITIES EXCHANGE ACT OF 1934**

The following description sets forth certain material terms and provisions of the securities of Allegheny Technologies Incorporated (the "Company") that are registered under Section 12 of the Securities Exchange Act of 1934, as amended. This description also summarizes certain relevant provisions of Delaware law. The following summary does not purport to be complete and is subject to, and is qualified in its entirety by reference to, the applicable provisions of Delaware law and the Company's Certificate of Incorporation, as amended (the "Certificate of Incorporation"), and the Company's Third Amended and Restated Bylaws (the "Bylaws"), copies of which are incorporated by reference as exhibits to the Annual Report on Form 10-K of which this exhibit is a part. The Company encourages you to read the Certificate of Incorporation, the Bylaws and the applicable provisions of Delaware law for additional information.

Common Stock

Under the Certificate of Incorporation, the Company is authorized to issue up to 500,000,000 shares of the Company's common stock, par value \$0.10 ("Common Stock").

Dividends. The holders of Common Stock are entitled to receive dividends when, as and if declared by the Company's board of directors, out of funds legally available for their payment subject to the rights of holders of the Company's preferred stock.

Voting Rights. The holders of Common Stock are entitled to one vote per share on all matters submitted to a vote of the Company's stockholders.

Rights upon Liquidation. In the event of the Company's voluntary or involuntary liquidation, dissolution or winding up, the holders of Common Stock will be entitled to share equally in any of the Company's assets available for distribution after the payment in full of all debts and distributions and after the holders of all series of the Company's outstanding preferred stock have received their liquidation preferences in full.

Miscellaneous. The outstanding shares of Common Stock are fully paid and nonassessable. The holders of Common Stock are not entitled to preemptive or redemption rights. Shares of Common Stock are not convertible into shares of any other class of capital stock. Computershare Shareowner Services LLC is the transfer agent and registrar for the Common Stock.

The New York Stock Exchange. The Company's common stock is listed for quotation on The New York Stock Exchange under the symbol "ATI."

Impact of Issuance of Preferred Stock. The Company's Board of Directors is authorized, subject to any limitations prescribed by law, to provide for the issuance of shares of preferred stock in one or more series. In addition, the Company's Board of Directors is authorized to establish from time to time the number of shares to be included in each series of preferred stock and to fix the designation, powers (including but not limited to voting powers, if any), preferences and rights of the shares of each series of preferred stock and any qualifications, limitations or restrictions of each series of preferred stock. The

number of authorized shares of preferred stock may be increased or decreased (but not below the number of shares thereof then outstanding) by the affirmative vote of the holders of a majority of the outstanding Common Stock, without a vote of the holders of the preferred stock, or of any series of preferred stock, unless a vote of any such holders is required pursuant to the terms of any preferred stock.

The Certificate of Incorporation authorizes the Company's Board of Directors without further stockholder action, to provide for the issuance of up to 50,000,000 shares of preferred stock, in one or more series. As of the date of the filing of this exhibit, no shares of preferred stock have been issued, and 50,000,000 shares of preferred stock are available for issuance. As of the date of the filing of this exhibit, the Company has 6,000,000 shares of preferred stock designated as Series A Junior Participating Preferred Stock in connection with its prior rights agreement, leaving 44,000,000 shares of preferred stock remaining available for designation. As of the date of the filing of this exhibit.

Special Charter Provisions. The Certificate of Incorporation provides that:

- The Company's Board of Directors is classified into three classes;
 - In addition to the requirements of law and the other provisions of the Certificate of Incorporation, the affirmative vote of at least two-thirds of the outstanding shares of Common Stock is required for the adoption or authorization of any of the following events unless the event has been approved at a meeting of the Company's Board of Directors by the vote of more than two-thirds of the incumbent members of the Company's Board of Directors:
 - Any merger or consolidation of the Company with or into any other corporation;
 - Any sale, lease, exchange, transfer or other disposition, but excluding a mortgage or any other security device, of all or substantially all of the Company's assets;
 - Any merger or consolidation of a Significant Shareholder (as defined in the Certificate of Incorporation) with or into the Company or a direct or indirect subsidiary of the Company;
 - Any sale, lease, exchange, transfer or other disposition to the Company or to a direct or indirect subsidiary of the Company of any Common Stock held by a Significant Shareholder or any other assets of a Significant Shareholder which, if included with all other dispositions consummated during the same fiscal year of the Company by the same Significant Shareholder, would result in dispositions of assets having an aggregate fair value in excess of five percent of the Company's total consolidated assets as shown on the Company's certified balance sheet as of the end of the fiscal year preceding the proposed disposition;
 - Any reclassification of the Common Stock, or any re-capitalization involving the Common Stock, consummated within five years after a Significant Shareholder becomes a Significant Shareholder, whereby the number of outstanding shares of Common Stock is reduced or any of those shares are converted into or exchanged for cash or other securities;
 - Any dissolution; and
 - Any agreement, contract or other arrangement providing for any of these transactions but notwithstanding anything not including any merger pursuant to the Delaware General Corporation Law, as amended from time to time, which does not require a vote of the Company's stockholders for approval;
 - The Company's stockholders may not alter, amend, supplement or repeal, or adopt any provision inconsistent with the purpose or intent of, certain provisions contained in the Certificate of Incorporation other than by the affirmative vote of 75% of the combined voting power of all of the Company's outstanding voting securities entitled to vote generally in an election of directors, voting together as a single class;
 - The Company's stockholders may not adopt, amend or repeal the Bylaws other than by the affirmative vote of 75% of the combined voting power of all of the Company's outstanding
-

voting securities entitled to vote generally in an election of directors, voting together as a single class;

- Any action required or permitted to be taken by the Company's stockholders must be effected at a duly called annual or special meeting of stockholders and may not be effected by the written consent of the stockholders; and
- Special meetings of the stockholders may be called at any time by a majority of the Company's directors and may not be called by any other person or persons or in any other manner.

SUBSIDIARIES OF THE REGISTRANT

The following lists the subsidiaries of Allegheny Technologies Incorporated, excluding those subsidiaries which, considered in the aggregate as a single subsidiary, do not constitute a significant subsidiary.

Name of Subsidiary	State or Country of Incorporation
ALC Funding Corporation	Delaware
Allegheny Ludlum, LLC	Pennsylvania
ATI Flat Rolled Products Holdings LLC	Pennsylvania
ATI Ladish LLC	Wisconsin
ATI Operating Holdings, LLC	Delaware
ATI Properties, Inc.	Delaware
Shanghai STAL Precision Stainless Steel Company Limited (1)	China
TDY Holdings, LLC	Delaware
TDY Industries, LLC	California

⁽¹⁾ Owned 60% by the registrant and 40% by China Baowu Steel Group Corporation Limited.

Consent of Independent Registered Public Accounting Firm

We consent to the incorporation by reference in the following Registration Statements:

- (1) Registration Statements (Form S-3 No. 333-224542) of Allegheny Technologies Incorporated, and
- (2) Registration Statements (Form S-8 Nos. 333-203784, 333-217942, 333-188641, 333-181491, 333-166628, 333-145651, 333-142559, 333-129485, 333-59161, 333-10229, and 333-45965) pertaining to the employee benefit plans of Allegheny Technologies Incorporated;

of our reports dated February 25, 2020, with respect to the consolidated financial statements of Allegheny Technologies Incorporated and Subsidiaries and the effectiveness of internal control over financial reporting of Allegheny Technologies Incorporated and Subsidiaries included in this Annual Report (Form 10-K) of Allegheny Technologies Incorporated and Subsidiaries for the year ended December 31, 2019.

/s/ Ernst & Young LLP

Pittsburgh, Pennsylvania

February 25, 2020

CERTIFICATIONS

I, Robert S. Wetherbee, certify that:

1. I have reviewed this report on Form 10-K of Allegheny Technologies Incorporated;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this annual report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - a. Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b. Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - c. Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d. Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - a. All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - b. Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 25, 2020

/s/ Robert S. Wetherbee

Robert S. Wetherbee

President and Chief Executive Officer

CERTIFICATIONS

I, Donald P. Newman, certify that:

1. I have reviewed this report on Form 10-K of Allegheny Technologies Incorporated;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this annual report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 25, 2020

/s/ Donald P. Newman

Donald P. Newman

Senior Vice President, Finance and

Chief Financial Officer

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

In connection with the Annual Report of Allegheny Technologies Incorporated (the "Company") on Form 10-K for the period ended December 31, 2019 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), each of the undersigned, in the capacities and on the dates indicated below, hereby certifies pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to his knowledge:

1. The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and
2. The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: February 25, 2020

/s/ Robert S. Wetherbee

Robert S. Wetherbee
President and Chief Executive Officer

Date: February 25, 2020

/s/ Donald P. Newman

Donald P. Newman
Senior Vice President, Finance and
Chief Financial Officer