TPI COMPOSITES, INC

FORM 10-K
(Annual Report)

Filed 03/02/20 for the Period Ending 12/31/19

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Symbol	TPIC
SIC Code	3510 - Engines And Turbines
Industry	Renewable Energy Equipment & Services
Sector	Energy

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

FORM 10-K

(Mark One)

☒ **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 001-37839

TPI Composites, Inc.
(Exact name of Registrant as specified in its charter)

Delaware (State or other jurisdiction of incorporation or organization)	20-1590775 (I.R.S. Employer Identification Number)

8501 N. Scottsdale Rd.
Gainey Center II, Suite 100
Scottsdale, AZ 85253
(480) 305-8910
(Address, including zip code, and telephone number, including area code, of Registrant's principal executive offices)

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

Title of each class	Trading symbol(s)	Name of each exchange on which registered
Common Stock, par value $0.01	TPIC	NASDAQ Global Market

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

Indicate by check mark if the Registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes ☐ No ☒

Indicate by check mark if the Registrant is not required to file reports pursuant to Section 13 or 15(d) of the Act. Yes ☐ No ☒

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

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

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

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

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

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

The aggregate market value of the shares of common stock held by non-affiliates of the Registrant, based on the closing price of the shares of common stock on June 28, 2019 as reported by the NASDAQ Global Market on such date was approximately $740 million. Shares of the Registrant's common stock held by each executive officer, director and holder of 5% or more of the outstanding common stock have been excluded in that such persons may be deemed to be affiliates. This calculation does not reflect a determination that certain persons are affiliates of the Registrant for any other purpose.
As of January 31, 2020, the Registrant had 35,184,189 shares of common stock outstanding.

Documents Incorporated by Reference

Portions of the Registrant's Definitive Proxy Statement relating to the Annual Meeting of Stockholders, scheduled to be held on May 20, 2020, are incorporated by reference into Part III of this Report.

Table of Contents

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This Annual Report on Form 10-K contains forward-looking statements within the meaning of the federal securities law. All statements other than statements of historical facts contained in this Annual Report on Form 10-K, including statements regarding our future results of operations and financial position, business strategy and plans and objectives of management for future operations, are forward-looking statements. In many cases, you can identify forward-looking statements by terms such as “may,” “should,” “expects,” “plans,” “anticipates,” “could,” “intends,” “target,” “projects,” “contemplates,” “believes,” “estimates,” “predicts,” “potential” or “continue” or the negative of these terms or other similar words. Forward-looking statements contained in this Annual Report on Form 10-K include, but are not limited to, statements about:

- growth of the wind energy market and our addressable market;
- the potential impact of the increasing prevalence of auction-based tenders in the wind energy market and increased competition from solar energy on our gross margins and overall financial performance;
- our future financial performance, including our net sales, cost of goods sold, gross profit or gross margin, operating expenses, ability to generate positive cash flow, and ability to achieve or maintain profitability;
- changes in domestic or international government or regulatory policy, including without limitation, changes in trade policy;
- the sufficiency of our cash and cash equivalents to meet our liquidity needs;
- our ability to attract and retain customers for our products, and to optimize product pricing;
- our ability to effectively manage our growth strategy and future expenses, including our startup and transition costs;
- competition from other wind blade and wind blade turbine manufacturers;
- the discovery of defects in our products;
- our ability to successfully expand in our existing wind energy markets and into new international wind energy markets, including our ability to expand our field service inspection and repair services in wind energy markets;
- our ability to successfully open new manufacturing facilities and expand existing facilities on time and on budget;
- the impact of the accelerated pace of new product and wind blade model introductions on our business and our results of operations;
- our ability to successfully expand our transportation business and execute upon our strategy of entering new markets outside of wind energy;
- the potential impact of the Coronavirus on our business and results of operations;
- worldwide economic conditions and their impact on customer demand;
- our ability to maintain, protect and enhance our intellectual property;
- our ability to comply with existing, modified or new laws and regulations applying to our business, including the imposition of new taxes, duties or similar assessments on our products;
- the attraction and retention of qualified employees and key personnel;
- our ability to maintain good working relationships with our employees, and avoid labor disruptions, strikes and other disputes with labor unions that represent certain of our employees;
- our ability to procure adequate supplies of raw materials and components to fulfill our wind blade volume commitments to our customers; and

- the potential impact of one or more of our customers becoming bankrupt or insolvent, or experiencing other financial problems.

These forward-looking statements are only predictions. These statements relate to future events or our future financial performance and involve known and unknown risks, uncertainties and other important factors that may cause our actual results, levels of activity, performance or achievements to materially differ from any future results, levels of activity, performance or achievements expressed or implied by these forward-looking statements. We have described under the heading "Risk Factors" included in Part 1, Item 1A of this Annual Report on Form 10-K the principal risks and uncertainties that we believe could cause actual results to differ from these forward-looking statements. Because forward-looking statements are inherently subject to risks and uncertainties, some of which cannot be predicted or quantified, you should not rely on these forward-looking statements as guarantees of future events.

The forward-looking statements in this Annual Report on Form 10-K represent our views as of the date of this Annual Report on Form 10-K. We anticipate that subsequent events and developments will cause our views to change. However, while we may elect to update these forward-looking statements at some point in the future, we undertake no obligation to update any forward-looking statement to reflect events or developments after the date on which the statement is made or to reflect the occurrence of unanticipated events except to the extent required by applicable law. You should, therefore, not rely on these forward-looking statements as representing our views as of any date after the date of this Annual Report on Form 10-K. Our forward-looking statements do not reflect the potential impact of any future acquisitions, mergers, dispositions, joint ventures, or investments we may make.

PART I

Item 1. Business

Description of Business

TPI Composites, Inc. is the holding company that conducts substantially all of its business operations through its direct and indirect subsidiaries (collectively, the Company or we). The Company was founded in 1968 and has been producing composite wind blades since 2001. The Company's knowledge and experience of composite materials and manufacturing originates with its predecessor company, Tillotson Pearson Inc., a leading manufacturer of high-performance sail and powerboats along with a wide range of composite structures used in other industrial applications. Following the separation from the boat building business in 2004, the Company reorganized in Delaware as LCSI Holding, Inc. and then changed its corporate name to TPI Composites, Inc. in 2008.

Overview

We are the only independent manufacturer of composite wind blades for the wind energy market with a global manufacturing footprint. We enable many of the industry's leading wind turbine original equipment manufacturers (OEM), who have historically relied on in-house production, to outsource the manufacturing of some of their wind blades through our global footprint of advanced manufacturing facilities strategically located to serve large and growing wind markets in a cost-effective manner. Given the importance of wind energy capture, turbine reliability and cost to power producers, the size, quality and performance of wind blades have become highly strategic to our OEM customers. As a result, we have become a key supplier to our OEM customers in the manufacture of wind blades and related precision molding and assembly systems. We have entered into long-term supply agreements pursuant to which we dedicate capacity at our facilities to our customers in exchange for their commitment to purchase minimum annual volumes of wind blade sets (which consist of three wind blades). This collaborative dedicated supplier model provides us with contracted volumes that generate significant revenue visibility, drive capital efficiency and allow us to produce wind blades at a lower total delivered cost, while ensuring critical dedicated capacity for our customers. For a further discussion regarding our wind blade and precision molding and assembly systems manufacturing businesses, refer to the discussion in "Management's Discussion and Analysis of Financial Condition and Results of Operations—Results of Operations" included in Part II, Item 7 of this Annual Report on Form 10-K.

We also provide field service inspection and repair services to our OEM customers and wind farm owners and operators. Our field service inspection and repairs services include diagnostic, repair and maintenance service offerings for wind blades that have been installed on wind turbines located at wind farms. Our field service inspection and repair services can be performed up-tower, where a blade technician performs these services in the air or from the wind turbine tower on a wind turbine blade, or down tower, where a blade is first removed from a wind turbine and these services are performed on the ground at the wind farm site or in a repair facility.

We also leverage our advanced composite technology and history of innovation to supply high strength, lightweight and durable composite products to the transportation market. In November 2017, we signed a five- year supply agreement with Proterra Inc. (Proterra) to supply Proterra Catalyst® composite bus bodies. In February 2018, we entered into an agreement with Navistar, Inc. (Navistar) to design and develop an all composite Class 8 tractor cab. This collaborative development project was entered into in connection with Navistar's recent award under the Department of Energy's (DOE) Super Truck II investment program, which is designed to promote fuel efficiency in commercial vehicles. In 2019, we also agreed to develop prototype composite body delivery vehicles for Workhorse Group. In November 2018, we announced a capital investment of approximately $11.5 million in 2019 to develop a highly automated pilot manufacturing line for the electric vehicle market within our Warren, Rhode Island facility, and we plan to commence operating this pilot line later this year. We expect this investment will enable us to further develop our technology, create defensible product and process IP and demonstrate our capability to manufacture composite components cost effectively at automotive volume rates. We also expect this pilot line will also help our current and potential customers to de-risk the decision-making process to commit to TPI for high-volume manufacturing programs in the future.

Our wind blade and precision molding and assembly systems manufacturing businesses accounted for approximately 96%, 95%, and 96% of our total net sales for each of the years ended December 31, 2019, 2018 and 2017, respectively. As of February 27, 2020, our long-term wind and transportation supply agreements provide for minimum aggregate volume commitments from our customers of approximately $2.8 billion and encourage our customers to purchase additional volume up to, in the aggregate, a total contract value of approximately $5.2 billion through the end of 2023.

Public Offerings and Stock Split

In July 2016, we completed an initial public offering (IPO) of 7,187,500 shares of our common stock at a price of $11.00 per share, which included 937,500 shares issued pursuant to the underwriters' over-allotment option. Certain of our existing stockholders, a non-employee director and executive officers purchased an aggregate of 1,250,000 shares of our common stock in the IPO included in the total issuance above. The net proceeds from the IPO were $67.2 million after deducting underwriting discounts and offering expenses. Immediately prior to the closing of the IPO, all shares of the then-outstanding redeemable preferred shares converted into an aggregate of 21,110,204 shares of our common stock and the redeemable preferred share warrants converted on a net issuance basis into 120,923 shares of our common stock. In addition, concurrent with the closing of the IPO, certain subordinated convertible promissory notes in the aggregate principal and interest amount of $11.9 million were converted into 1,079,749 shares of our common stock at the public offering price of $11.00 per share.

Prior to the IPO, in July 2016 we amended our amended and restated certificate of incorporation to effect a 360-for-1 forward stock split of our common stock. As a result of the stock split, we have adjusted the share amounts authorized and issuable under the share-based compensation plans. All share and per share common stock information (including the share-based compensation plans) referenced throughout the consolidated financial statements and notes thereto have been retroactively adjusted to reflect this stock split. The stock split did not cause an adjustment to the par value of the authorized shares of our common stock.

In May 2017, we completed a secondary public offering of 5,075,000 shares of our common stock at a price of $16.35 per share, which included 575,000 shares issued pursuant to the underwriters' option to purchase additional shares. All of the shares were sold by existing stockholders and certain of our executive officers. The selling stockholders received all of the net proceeds of $78.8 million from the secondary public offering. We did not sell any shares and did not receive any of the proceeds from the offering and the costs paid by us in connection with the offering of $0.8 million were recorded in general and administrative costs in the accompanying consolidated statement of operations.

Financial Information about Segments and Geographic Areas

We divide our business operations into four geographic operating segments—(1) the United States (U.S.), (2) Asia, (3) Mexico and (4) Europe, the Middle East, Africa and India (EMEAI) as follows:

- Our U.S. segment includes (1) the manufacturing of wind blades at our Newton, Iowa plant, (2) the manufacturing of precision molding and assembly systems used to manufacture wind blades at our Warren, Rhode Island facility, (3) the manufacturing of composite solutions for the transportation industry, which we also conduct at our Rhode Island facility, (4) wind blade inspection and repair services in North America, (5) our advanced engineering center in Kolding, Denmark, which provides technical and engineering resources to our manufacturing facilities, (6) our engineering center in Berlin, Germany which we purchased in July 2019 and (7) our corporate headquarters, the costs of which are included in general and administrative expenses.
- Our Asia segment includes (1) the manufacturing of wind blades at our facilities in Dafeng, China and Yangzhou, China, the latter of which commenced operations in March 2019, (2) the manufacturing of precision molding and assembly systems at our Taicang Port, China facility and (3) wind blade inspection and repair services.
- Our Mexico segment manufactures wind blades from three facilities in Juárez, Mexico and a facility in Matamoros, Mexico at which we commenced operations in July 2018. In November 2018, we entered into a new lease agreement with a third party for a new precision molding and assembly systems manufacturing facility in Juárez, Mexico and we commenced operations at this facility in March 2019. This segment also performs wind blade inspection and repair services.
- Our EMEAI segment manufactures wind blades from two facilities in Izmir, Turkey and also performs wind blade inspection and repair services. In February 2019, we entered into a new lease agreement with a third party for a new manufacturing facility that was built in Chennai, India and we commenced operations at this facility in the first quarter of 2020. This segment also performs wind blade inspection and repair services.

For additional information regarding our operating segments and geographic areas, see Note 18 – Segment Reporting of the Notes to Consolidated Financial Statements included in Part II, Item 8 of this Annual Report on Form 10-K.

Business Strategy

Our long-term success will be driven by our business strategy. The key elements of our business strategy are as follows:

- ***Grow our existing relationships and develop new relationships with leading industry OEMs.*** We plan to continue growing and expanding our relationships with existing customers who, according to data from Wood Mackenzie (WoodMac), represented approximately 55% of the global onshore wind energy market, approximately 87% of that market excluding China, and 99% of the U.S. onshore wind turbine market over the three years ended December 31, 2018, based on megawatts (MWs) of energy capacity installed, as well as developing new relationships with other leading industry OEMs. We expect to be presented with opportunities to expand our existing relationships and develop new relationships with industry OEMs as they seek to capitalize on the benefits of outsourced wind blade manufacturing while maintaining high quality customization and dedicated capacity. General Electric International, Inc. and its affiliates (GE Wind) agreed to transition to a larger blade model in our Newton, Iowa plant in early 2019 and to eliminate its option to terminate their supply agreement at this location prior to its December 2020 expiration. In December 2018, we entered into a multiyear supply agreement with Vestas to supply wind blades from a new manufacturing facility that was built in Chennai, India and we commenced operations at this facility in the first quarter of 2020. In the first quarter of 2019, GE Wind executed a joint development agreement to cooperatively develop advanced blade technology for future wind turbines. In August 2019, we reached an agreement with Nordex SE (Nordex) to transition multiple existing lines at one of our Izmir, Turkey locations to longer blades and at the same time extended the contract by two years through 2022.

- ***Leverage our footprint in large and growing wind markets, capitalize on the continuing outsourcing trend, evaluate building wind turbine blades for the offshore market and evaluate strategic acquisitions.*** As the wind energy market continues to expand globally and many wind turbine OEMs continue to shift towards increased outsourcing of wind blade manufacturing, we believe we are well-positioned with our global footprint. We utilize our strengths in composites technology and manufacturing, combined with our collaborative dedicated supplier model to provide our customers with an efficient solution for their expansion in large and growing wind markets. Our quality, reliability and total delivered cost reduce sourcing risk for our customers. In addition, our demonstrated ability to enter into new markets and the strength of our manufacturing capabilities afford us the optionality to build new factories or grow through strategic acquisitions.
- ***Continue to drive down costs of wind energy***. We continue to work with our customers on larger size wind blade models that maximize the capture of wind energy and drive down the levelized cost of energy (LCOE). We also continue to utilize our advanced technology, regional manufacturing facilities strategically located to cost effectively serve large and growing wind markets and ability to source materials globally at competitive costs to deliver high-performing, composite wind blades. Our collaborative engineering approach and our advanced precision molding and assembly systems allow us to integrate our customer's design requirements with cost-efficient, replicable and scalable manufacturing processes. This collaborative engineering approach with our customers also allows us to reduce manufacturing cycle times, new line and factory start up times and new blade model transition times. We also continue to work with our customers to drive down the cost of materials and production, the benefit of which we typically share with our customers contractually in a manner that reduces LCOE for customers, further strengthens our customer relationships and improves our margins.
- ***Expand our field service inspection and repair business.*** Although sales from our field service inspection and repair business currently represent a very small percentage of our total revenue, we plan to expand our field service inspection and repair business by leveraging our existing wind blade manufacturing and composites expertise. We believe there is an increasing demand and growing market for experienced wind blade inspection and repair services worldwide as the number of wind turbines installed worldwide continues to grow and the fleet of existing wind turbines continues to age.
- ***Expand our transportation business and expand into other strategic markets.*** We leverage our advanced composite technology and history of innovation to supply high strength, lightweight and durable composite products to the transportation market. As the vehicle electrification trend continues, reducing the weight of these vehicles is critical to expanding range and/or providing more room for additional batteries or reducing the number of batteries. As a result, we believe there is an increasing demand for composites products for electric vehicles. In addition, we believe there is a potential demand in other strategic markets for composites as to replace aluminum or other more expensive composite materials such as carbon.
- ***Focus on continuing innovation.*** We have a history of innovation in advanced composite technologies and production techniques and use several proprietary technologies related to wind blade manufacturing. With this culture of innovation and a collaborative "design for manufacturability" approach, we continue to address increasing physical dimensions, demanding technical specifications and strict quality control requirements for our customers' most advanced wind blades. We also invest in ongoing simplification and selective automation of production processes for increased efficiency and precision. In addition, we plan to leverage our history of composite industry-first innovations to grow our business in the transportation market, in which we believe there is a demand for high precision, structural composites manufacturing as well as high speed, high volume manufacturing of structural composite components, particularly in the transportation market.

Wind Blade Manufacturing Operations and Process

We have developed significant expertise in advanced composite technology and use high performance composite materials, precision molding and assembly systems including modular tooling, and advanced process technology, as well as sophisticated measurement, inspection, testing and quality assurance tools, allowing us to produce over 55,000 wind blades since 2001 with an excellent field performance record in a market where reliability is critical to our customers' success. We manufacture or have manufactured wind blades ranging from 30 meters to over 70 meters across our global facilities, and have the capability to manufacture wind blades of greater lengths as required by existing or new customers. In combination with our advanced technologies, we seek to create manufacturing processes that are replicable and scalable in our manufacturing facilities located worldwide, regardless of cultural or language barriers. Using continuous improvement principles, we can customize each manufacturing step, from raw materials to finished products. This also allows us to systematically design for the entire manufacturing process so that we can achieve better quality control and increase production efficiencies. We believe that our focus on simplifying and, where feasible, automating production processes is critical to manufacturing high-precision, lightweight and durable products at a reasonable cost to our customers. We produce high unit volumes of near-aerospace grade products at industrial costs.

Raw Materials

The key raw materials for the wind blades we manufacture include highly advanced fiberglass fabrics, select carbon reinforcements, foam, balsa wood, resin, adhesives for assembly of molded components, gel coat or paint for preparation of cosmetic surfaces and attachment hardware including steel components. Most of these materials are available in multiple geographic regions and in reasonably close proximity to our manufacturing facilities. Our agreements for the supply of raw materials are designed to guarantee volumes that we believe will be required to fulfill our customers' wind blade commitments. A portion of our raw materials are subject to price volatility, such as the resins used in our manufacturing processes. Although the majority of materials incorporated into our products are available from a number of sources, certain materials are available only from a relatively limited number of suppliers. We seek multiple suppliers for our raw materials and continually evaluate potential new supplier relationships.

Precision Molding and Assembly Systems

Over the last decade, we have produced hundreds of precision molding and assembly systems, ranging from 30 meters to over 70 meters in length, to support our global operations. We began these operations in our tooling technology center in Warren, Rhode Island. In 2013, we expanded our precision molding and assembly system production capabilities to a facility in Taicang City, China, which was recently moved to Taicang Port, China, which serves customers around the globe. While capable of cost-effectively delivering precision molding and assembly systems across all of our facilities, our Rhode Island tooling technology center primarily serves the North American market. We currently have transitioned most of our North American precision molding and assembly system production capabilities from Warren, Rhode Island to a new facility in Juárez, Mexico, which can serve customers globally. We expect this transition to be completed during 2020. Our precision molding and assembly systems have been used to build tens of thousands of wind blades worldwide.

Our tooling solutions include precision wind blade patterns, precision molding and assembly systems, including modular tooling techniques. We believe that our technological and production expertise are key factors in our continued competitiveness, as we address continually increasing physical dimensions, demanding technical specifications, and strict quality control requirements for wind blades.

Wind Blade Production Process

Production of wind blades requires adherence to the unique specifications of each of our customers, who design their wind turbines and wind blades to optimize performance, reliability and total delivered cost. With our culture of innovation and a collaborative "design for manufacturability" approach, we have the capability and expertise to manufacture wind blades of different designs, utilizing fiberglass, carbon or other advanced composite materials to meet unique customer specifications. We also have the flexibility to quickly transition our manufacturing facilities to produce different wind blade models and sizes using our precision molding and assembly systems, including modular tooling techniques.

We have developed a highly dependable method for making high-quality wind blades. In conjunction with our continuous improvement principles, we design our proprietary manufacturing processes to be replicable, scalable and transferable to each of our advanced manufacturing facilities worldwide. As a result, we can repeatedly move a product from its design phase to volume production while maintaining quality, even in developing regions of the world. Similarly, we have developed the manual portions of our manufacturing processes based on proven technologies and production methods that can be learned and implemented rapidly by line personnel. We focus on consistency and quality control across our facilities, using hands-on training methods and employing repeatable manufacturing processes.

We use an advanced form of vacuum-assisted resin transfer tooling process to pull liquid resin into a dry lay-up, resulting in light, strong, and reliable composite structures. In our manufacturing process, fiber reinforcements and core materials are laid up in a mold while dry, followed by a vacuum bag that is placed over the layup and sealed to the mold. The wind blade component is then placed under vacuum. The resin is introduced into the wind blade component via resin inlet ports and then distributed through the reinforcement and core materials via a flow medium and a series of channels, saturating the wind blade component. The vacuum removes air and gases during processing, thereby eliminating voids. Pressure differentials drive resin uniformly throughout the wind blade component, providing a consistent laminate. By using a variety of reinforcement and core materials, the structural characteristics of the wind blade can be highly engineered to suit the custom specifications of our customers. Although only occasionally required by our customers, we are also capable of employing additional composite fabrication processes, such as pre-impregnated laminates, in addition to our vacuum infusion process.

Wind Blade Long-Term Supply Agreements

Our current wind blade customers, which include Vestas, GE Wind, Nordex, Siemens Gamesa Renewable Energy S.A. (Siemens Gamesa) and ENERCON GmbH (ENERCON), are some of the world's largest wind turbine manufacturers. According to data from WoodMac, our customers represented approximately 55% of the global onshore wind energy market, approximately 87% of that market excluding China, and 99% of the U.S. onshore wind turbine market over the three years ended December 31, 2018, based on MWs of energy capacity installed. In our collaborative dedicated supplier model, our customers are incentivized to maximize the volume of wind blades purchased through lower pricing at higher purchase volumes. As of February 27, 2020, our existing wind blade supply agreements provide for minimum aggregate volume commitments from our customers of approximately $2.7 billion and encourage our customers to purchase additional volume up to, in the aggregate, a total contract value of approximately $5.0 billion through the end of 2023, which we believe provides us with significant future revenue visibility and helps to insulate us from potential short-term fluctuations or legislative changes in any one market. Our supply agreements generally contain liquidated damages provisions in the event of late delivery, however, we generally do not bear the responsibility for transporting the wind blades we manufacture to our customers.

Our long-term supply agreements with our customers generally encourage our customers to maximize the volume of wind blades they purchase from us, since purchasing less than a specified amount triggers higher pricing, as well as provide downside protection for us through minimum annual volume commitments. Some of our long-term supply agreements also provide for annual sales price reductions reflecting assumptions regarding increases in our manufacturing efficiency and productivity. We work to continue to drive down the cost of materials and production through innovation and global sourcing, a portion of the benefit of which we share with our customers contractually, further strengthening our deep customer relationships. Wind blade pricing is based on annual commitments of volume as established in the customer's contract, with orders less than committed volume resulting in additional costs per wind blade to customers. Orders in excess of annual commitments may but generally do not result in discounts to customers from the contracted price for the committed volume. Customers may utilize early payment discounts, which are reported as a reduction of revenue at the time the discount is taken.

Vestas

In 2014, we entered into a new supply agreement with Vestas to supply wind blades from a new manufacturing facility in Dafeng, China. Based on the success of this manufacturing arrangement, we expanded our relationship with Vestas through additional supply agreements for a manufacturing facility in Turkey, Matamoros, Mexico and Yangzhou, China. Additionally, in 2018, we entered into a supply agreement with Vestas to supply wind blades from a new manufacturing facility that was built in Chennai, India and we commenced operations at this facility in the first quarter of 2020. Each of the supply agreements with Vestas provide for a minimum number of wind blade sets to be purchased by Vestas each year during the term, the schedule for which is established at the outset of the agreement. In return, we commit to dedicate a specific number of manufacturing lines to Vestas for each of the years under the supply agreements. Additionally, we create some of the model-specific tooling for Vestas. If either party commits a material breach of the supply agreement, the non-breaching party may terminate the supply agreement if the breach is not remedied or if the parties have not mutually agreed to plan for cure within 30 days after notice of breach has been given.

GE Wind

We have entered into multiple supply agreements with GE Wind to manufacture wind blades from two manufacturing facilities in Juárez, Mexico and our Newton, Iowa manufacturing facility. Each of the supply agreements with GE Wind provide for a minimum number of wind blade sets to be purchased by GE Wind each year during the term, the schedule for which is established at the outset of the agreement. In return, we commit to dedicate a specific number of manufacturing lines to GE Wind for each of the years under the supply agreements. In August 2018, GE Wind agreed to extend our existing supply agreement for one of our Mexico manufacturing facilities by two years to 2022 and increased the number of wind blade manufacturing lines in that facility from three to five. In addition, GE Wind agreed to transition to a larger blade model in our Newton, Iowa plant in early 2019 and to eliminate its option to terminate their supply agreement at this location prior to its December 2020 expiration. Unless otherwise terminated or renewed, our supply agreements with GE Wind are in effect until the end of 2020 for one of our Mexico manufacturing facilities and our Iowa manufacturing facility, and until the end of 2022 for our other Mexico facility. GE Wind may terminate the Mexico supply agreements with no advance notice and paying us termination fees as set forth in the applicable agreement. In addition, either party may terminate these supply agreements upon a material breach by the other party which goes uncured for 30 days after written notice has been provided.

In 2017, General Electric Company (GE) completed its acquisition of LM Wind Power (LM), our largest competitor. We expect that GE Wind will utilize LM for a substantial percentage of its wind blade production in the future and may reduce the volumes of wind blades it purchases from us or not extend any of our supply agreements beyond 2022, which may materially harm our business, financial condition and results of operations. See “Risk Factors—Risks Related to Our Wind Blade Business—GE’s acquisition of LM Wind Power, our largest competitor, may materially harm our business, financial condition and results of operations and may cause the price of our common stock to decline” included in Part I, Item 1A of this Annual Report on Form 10-K for further discuss on the GE’s acquisition of LM and its potential effects on us.

See Note 4 – Related Party Transactions of the Notes to Consolidated Financial Statements included in Part II, Item 8 of this Annual Report on Form 10-K for additional information regarding our related party transactions with GE Wind for the year ended December 31, 2017 when GE Wind was a stockholder of the Company.

Other Long-Term Supply Agreements

We have entered into other long-term supply agreements in China, Mexico and Turkey with Nordex, Siemens Gamesa and ENERCON. With respect to these supply agreements, we agree to dedicate capacity for a set number of wind blades for each calendar year during the term of the agreement in exchange for commitments to purchase minimum annual volumes of wind blade sets. Unless otherwise terminated, these supply agreements generally remain in effect for a period of five years and either party may terminate their respective supply agreements upon a material breach by the other party which goes uncured. Some of these supply agreements contain provisions that allow for our customers to purchase less volume in later years of these supply agreements, reduce the number of dedicated manufacturing lines or to terminate the supply agreement upon notice for reasons such as our failure to deliver the contracted wind blade volumes or our failure to meet certain mutually agreed upon cost reduction targets. See “Risk Factors—Risks Related to Our Wind Blade Business—Our long-term supply agreements with our customers are subject to termination on short notice and our failure to perform our obligations under such agreements, and termination of a significant number of these agreements would materially harm our business” included in Part I, Item 1A of this Annual Report on Form 10-K.

Research and Development

We have a long history of developing composite products as well as the development of new and advanced materials, tooling, manufacturing processes and inspection methods. Our knowledge and experience of composite materials and manufacturing originates with our predecessor company, Tillotson Pearson Inc., a leading manufacturer of high-performance recreational sail and powerboats along with a wide range of composite structures used in other industrial applications. Leveraging our knowledge and experience, we realized the opportunity to specialize in wind energy and other industrial end-markets where there was a demand for high precision composite manufacturing capabilities.

We conduct extensive research and development in close collaboration with our customers on the design, development and deployment of innovative manufacturing processes, including automation, advanced materials and sophisticated product quality inspection tools. We have partnered with the U.S. Department of Energy (DOE), government laboratories, universities and our customers to innovate through cost sharing Advanced Manufacturing Innovation Initiative programs. In 2015, we received a $3.0 million award from the DOE’s Office of Energy Efficiency & Renewable Energy to lead a team of industry and academic participants to design, develop and demonstrate an ultra-light composite vehicle door for high volume manufacturing production in conjunction with other industry and university participants. In February 2018, we entered into an agreement with Navistar to design and develop an all composite Class 8 tractor cab. This collaborative development project was entered into in connection with Navistar’s recent award under the DOE’s Super Truck II investment program, which is designed to promote fuel efficiency in commercial vehicles. Incorporating composite materials into a Class 8 tractor cab offers multiple potential performance and efficiency advantages compared to traditional metals in terms of weight savings, reduced part counts, and non-corrosion. In the first quarter of 2019, we executed a joint development agreement with GE Wind to cooperatively develop advanced blade technology for future wind turbines.

We employ a highly experienced workforce of engineers in various facets of our business, from discrete research and development projects, to the ongoing, real-time development and implementation of incremental manufacturing and material improvements. Our research and development effort places a priority on improving quality through process and procedure improvement, in addition to reducing cost through specification changes and sourcing of more cost-effective suppliers. Other areas of emphasis include composite design, in-house fabrication of precision molding and assembly systems, prototyping, testing, optimization and volume production capabilities. We also encourage our employees to invent and develop new technologies to maintain our competitiveness in the marketplace. In addition to our internal research and development activities, from time to time, we also conduct research and development activities pursuant to funded development arrangements with our customers and other third parties, and intend to continue to seek opportunities for product development programs that could create recurring revenue and increase our overall profitability over the long term.

In July 2019, we acquired certain intellectual property and hired a team of engineering resources from the EUROS group, based in Berlin, Germany. This team of approximately 20 technical experts focuses on blade design, tooling, materials and process technology development, which will strengthen our technical capabilities in support of our global operations and growth. In 2017, we established an advanced engineering center in Kolding, Denmark which provides technical and engineering resources to our manufacturing facilities and our customers.

Competition

The wind blade market is highly concentrated, competitive and subject to evolving customer needs and expectations. In 2017, GE Wind, our largest customer at the time, completed its acquisition of LM, our largest competitor. We also compete primarily with other independent wind blade manufacturers such as Sinoma Science & Technology Co. Ltd., Shanghai Aeolon Wind Energy Technology Development (Group) Co., Ltd., Aeris Industria E Comercio De Equipamentos Para Geracao De Energia S.A. and ZhongFu Lianzhong Composites Group Co., Ltd., as well as regional wind blade suppliers in geographic areas where our current or prospective manufacturing facilities are located.

We also compete with, and in a number of cases supplement, vertically integrated wind turbine OEMs that manufacture their wind blades. We believe that a number of other established companies are manufacturing wind blades that will compete directly with our offerings, and some of our competitors noted above, may have significant financial and institutional resources.

The principal competitive factors in the wind blade market include reliability, total delivered cost, manufacturing capability, product quality, engineering capability and timely completion of wind blades. We believe we compete favorably with our competitors on the basis of the foregoing factors. Our ability to remain competitive will depend to a great extent upon our ongoing performance in the areas of manufacturing capability, timely completion and product quality.

Transportation Products

We seek to create additional recurring revenue opportunities through the supply of other composite structures outside the wind energy market. We believe transportation products, including buses, trucks, electric vehicles and high performance automotive products, are ideally suited for our advanced composite technology because of the benefits derived from weight reduction, corrosion resistance, strength and durability. These benefits should allow us to develop structural composite solutions to assist our customers in developing electric vehicles, including light, medium and heavy duty trucks, buses and automobiles with clean propulsion systems or in meeting new and developing fuel economy standards.

In addition, by producing a range of composite structures, we are able to leverage the materials and manufacturing process technology and expertise developed through one project to maximize production quality, improve performance and minimize costs across our other manufacturing efforts, including our wind blade business. Our projects for customers in the transportation market have historically generated project-related revenues for a specific duration. We intend to seek collaborations with additional customers in these markets that will provide recurring revenue and business opportunities for us, in addition to the opportunities provided by our existing customers and relationships, and contribute to our overall profitability over the long term.

Our facilities in Warren, Rhode Island and Juárez, Mexico manufacture products for customers in the transportation market using a similar proprietary and replicable manufacturing processes that we use to produce wind blades. Our projects for customers in the transportation market include, or have included, the supply of all-composite bodies for electric buses and automated people mover systems for airports. We will cease manufacturing composite bus bodies from our Newton, Iowa facility in the first quarter of 2020.

Our current principal competitors in the transportation market include suppliers of conventional steel and aluminum products and non-structural automotive fiberglass and other advanced composites-based manufacturers for transportation applications.

Intellectual Property

We have a variety of intellectual property rights, including patents issued, filed and applied-for in a number of jurisdictions, including the United States, Germany, the European Union and China, trademarks and copyrights, but we believe that our continued success and competitive position depend, in large part, on our proprietary materials, tooling, process and inspection technologies and our ability to innovate. Accordingly, we take measures to protect the confidentiality and control the disclosure of our proprietary technology. We rely primarily on a combination of patents, know-how and trade secrets to establish and protect our proprietary rights and preserve our competitive position. We also seek to protect our proprietary technology, in part, by confidentiality agreements with our customers, employees, consultants and other contractors. Trade secrets, however, are difficult to protect. These agreements may be breached, and we may not have adequate remedies for any breach. In addition, our trade secrets may otherwise become known or be independently discovered by competitors. To the extent that our customers, employees, consultants or contractors use intellectual property owned by others in their work for us, disputes may arise as to the rights in related or resulting know-how and inventions.

Backlog

As of December 31, 2019 and 2018, our backlog for wind blades and related products totaled $1,038.9 million and $514.8 million, respectively. Our backlog includes purchase orders issued in connection with our long-term supply agreements. We generally record a purchase order into backlog when the following requirements have been met: a signed long-term supply agreement or other contractual agreement has been executed with our customer, a purchase order has been issued by our customer and we expect to ship wind blades to or produce the related products for such customer in satisfaction of any purchase order within 12 months. Backlog as of any particular date should not be relied upon as indicative of our revenue for any future period.

Regulation

Wind Energy

Our operations are subject to various foreign, federal, state and local regulations related to environmental protection, health and safety, labor relationships, general business practices and other matters. These regulations are administered by various foreign, federal, state and local environmental agencies and authorities, including the EPA, the Occupational Safety and Health Administration of the U.S. Department of Labor and comparable agencies in China, Mexico, Turkey, India and individual U.S. states. In addition, our manufacturing operations in China, Mexico, Turkey and India are subject to those countries' wage and price controls, currency exchange control regulations, investment and tax laws, laws restricting our ability to repatriate profits, trade restrictions and laws that may restrict foreign investment in certain industries. Some of these laws have only been recently adopted or are subject to further rulemaking or interpretation, and their impact on our operations, including the cost of complying with these laws, is uncertain. We believe that our operations currently comply, in all material respects, with applicable laws and regulations. Further, as a U.S. corporation, we are subject to The Foreign Corrupt Practices Act of 1977 (FCPA), which generally prohibits U.S. companies and their intermediaries from making improper payments to foreign officials for the purpose of obtaining or keeping business.

In addition, our business has been and will continue to be affected by subsidization of the wind turbine industry with its influence declining over time as wind energy reaches grid parity with traditional sources of energy. In the United States, the federal government has encouraged capital investment in renewable energy primarily through tax incentives. Production tax credits for new renewable energy projects were first established in 1992. The Production Tax Credit for Renewable Energy (PTC) provided the owner of a wind turbine placed in operation before January 1, 2015 with a 10-year credit against its U.S. federal income tax obligations based on the amount of electricity generated by the wind turbine.

The PTC was extended in 2015 for wind power projects through December 31, 2019, and was to be phased down over the term of the PTC extension. Specifically, the PTC was kept at the same rate in effect at the end of 2014 for wind power projects that either commenced construction or met certain safe harbor requirements by the end of 2016, and thereafter was to be reduced by 20% per year in 2017, 2018 and 2019, respectively. In December 2019, Congress extended the PTC through the end of 2020 and increased the rate from 40% to 60% for projects that either commenced construction or met certain safe harbor requirements by the end of 2020 and are commissioned by the end of 2024.

In June 2019, the EPA issued the Affordable Clean Energy Rule, which replaced the Clean Power Plan, which was designed to promote renewable energy. The Clean Power Plan, which was established by the EPA in 2015, set national standards for states to reduce carbon emissions from power plants. Specifically, the Clean Power Plan required states to reduce carbon emissions from power plants 32% below 2005 levels by 2030. In general, the Affordable Clean Energy Rule, provides for efficiency improvements at power plants and directs individual States to choose how they want to regulate power plant emissions. Unlike the Clean Power Plan, the Affordable Clean Energy Rule does not set specific standards or limits for carbon emissions.

At the state level, as of December 31, 2019, 29 states, the District of Columbia and Puerto Rico have implemented renewable portfolio standard (RPS) programs that generally require that, by a specified date, a certain percentage of a utility's electricity supplied to consumers within such state is to be from renewable sources (ranging from 10% to 100% and from between the present and 2045).

In addition, there are also increasing regulatory efforts to promote renewable power. China implemented its 13th 5-Year Plan with a goal of 15% total primary energy from non-fossil fuel sources and targeting 210 gigawatts (GWs) of grid-connected wind capacity by 2020 according to its National Development and Reform Commission, and employs preferential feed-in tariff schemes, in addition to local tax-based incentives. Mexico has established strict targets, aiming for 35% renewable energy by 2024 and 50% by 2050, according to WoodMac, which it is facilitating through tax incentives. Large European Union members have renewable energy targets for 2020 of between 10% and 49% of all energy use derived from renewable energy sources, according to the European Commission. Additionally, Turkey enacted Law No. 5346 in 2005 to promote renewable-based electricity generation within their domestic electricity market by introducing tariffs and purchase obligations for distribution companies requiring purchases from certified renewable energy producers. The World Bank also provided Turkey with an aggregate of $600 million of loan proceeds to encourage investors to construct generation plants with renewable energy resources.

Employees

As of December 31, 2019, we employed over 13,300 full-time employees, approximately 1,300 of whom were located in the United States, 2,900 in China, 5,500 in Mexico, 3,300 in Turkey and 300 in India. Certain of our employees in Turkey and at our manufacturing facility in Matamoros, Mexico are represented by a labor union. We believe that our relations with our employees are generally good.

In January 2019, thousands of workers employed in dozens of manufacturing facilities in Matamoros, Mexico, went on strike. In general, these workers, who were represented by several different labor unions, demanded an increase in their wage rate and an annual bonus. In February 2019, our manufacturing production employees in Matamoros, Mexico, who are represented by a labor union, went on strike also demanding an increase in their hourly wage rate and the payment of an annual bonus, even though our collective bargaining agreement did not provide for such incentives. During this strike, our Matamoros manufacturing facility stopped production from February 15, 2019 until March 2, 2019. In March 2019, we reached an agreement with the labor union to end the strike and we reopened our Matamoros manufacturing facility on March 3, 2019. In the first quarter of 2020, we amended our Matamoros collective bargaining agreement to adjust the salaries and bonuses payable to our associates for calendar year 2020 that are covered by this agreement.

Environmental, Health and Safety

We are subject to various environmental, health and safety laws, regulations and permit requirements in the jurisdictions in which we operate governing, among other things, health, safety, pollution and protection of the environment and natural resources, the handling and use of hazardous substances, the generation, storage, treatment and disposal of wastes, and the cleanup of any contaminated sites. We are not aware of any pending environmental compliance or remediation matters that are reasonably likely to have a material adverse effect on our business, financial position or results of operations. However, failure by us to comply with applicable environmental and other requirements could result in fines, penalties, enforcement actions, third party claims, remediation actions, and could negatively impact our reputation with customers. We have adopted environmental, health and safety policies outlining our commitment to environmental responsibility and accountability. These policies apply to the company as a whole, and our vendors and suppliers and are available on our website. We have a company-wide focus on safety and have implemented a number of measures to promote workplace safety. Customers are increasingly focused on safety records in their sourcing decisions due to increased regulations to report all incidents that occur at their sites and the costs associated with such incidents.

Available Information

Our website address is *www.tpicomposites.com*. All of our filings with the Securities and Exchange Commission (SEC), including this Annual Report on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, statements of changes in beneficial ownership and amendments to those reports, are available free of charge on our website as soon as reasonably practicable after they are electronically filed with, or furnished to, the SEC. The information contained on our website is neither a part of, nor incorporated by reference into, this Annual Report on Form 10-K. The SEC also maintains an Internet website that contains reports, proxy and information statements, and other information regarding issuers, like us, that file electronically with the SEC. The address of that website is *www.sec.gov*.

Our investor relations website address is *www.tpicomposites.com/investors* and includes key information about our corporate governance initiatives, including our Nominating and Corporate Governance Committee charter, charters of the Audit and Compensation committees and our Code of Business Conduct & Ethics.

Information about our Executive Officers

The following table sets forth certain information regarding our Executive Officers as of February 27, 2020:

Name	Age	Position
Steven C. Lockard	58	Chief Executive Officer and Director
William E. Siwek	57	President
Bryan Schumaker	44	Chief Financial Officer
Ramesh Gopalakrishnan	52	Chief Operating Officer, Wind
Thomas J. Castle	48	Senior Vice President—Operations, Strategic Markets
Steven G. Fishbach	50	General Counsel and Secretary

Steven C. Lockard. Mr. Lockard became our President and Chief Executive Officer in 2004 and has served as a member of our board of directors since 2004. In May 2019, he relinquished the title of President to Mr. Siwek. Prior to joining us in 1999, Mr. Lockard was Vice President of Satloc, Inc., a supplier of precision GPS equipment, from 1997 to 1999. Prior to that, Mr. Lockard was Vice President of marketing and business development and a founding officer of ADFlex Solutions, Inc., a NASDAQ-listed international manufacturer of interconnect products for the electronics industry, from 1993 to 1997. Prior to that, Mr. Lockard held several marketing and management positions including Business Unit Manager, Corporate Market Development Manager and Marketing/Applications Engineer at Rogers Corporation from 1982 to 1993. Mr. Lockard currently serves as a member of the Board of Directors for the American Wind Energy Association and previously served as its Chairman from May 2018 to May 2019. Mr. Lockard holds a B.S. degree in Electrical Engineering from Arizona State University.

William E. Siwek. Mr. Siwek joined us in August 2013 as our Chief Financial Officer. In May 2019, Mr. Siwek was named our President and ceased serving as our Chief Financial Officer. Prior to joining us, Mr. Siwek previously served as the Chief Financial Officer for T.W. Lewis Company, an Arizona-based real estate investment company, from September 2012 to September 2013. From May 2010 until September 2012, he was an independent consultant assisting companies in the real estate, construction, insurance and renewable energy industries. Prior to that, Mr. Siwek was Executive Vice President and Chief Financial Officer of Talisker Mountain, Inc., from January 2009 to April 2010. Prior to that, he was President and Chief Financial Officer of the Lyle Anderson Company from December 2002 to December 2008. Prior to that, Mr. Siwek spent 18 years, from September 1984 to May 2002, with Arthur Andersen where he became a Partner in both Audit and Business Consulting Divisions. Mr. Siwek holds B.S. degrees in Accounting and Economics from University of Redlands and is a Certified Public Accountant.

Bryan Schumaker. Mr. Schumaker joined us in May 2019 as our Chief Financial Officer. Prior to joining us, Mr. Schumaker served as the Chief Accounting Officer of First Solar, Inc. from July 2015 to May 2019 and the Chief Financial Officer of 8point3 Energy Partners, a publicly-traded limited partnership formed by First Solar and Sunpower Corporation to own, operate and acquire solar energy generation projects from July 2016 to July 2018. Mr. Schumaker also served as Assistant Corporate Controller of First Solar from April 2008 to December 2011 and Vice President, Corporate Controller from December 2011 to July 2015. Prior to working at First Solar, Mr. Schumaker worked for Swift Transportation from January 2003 to April 2008 in multiple roles, including Vice President, Corporate Controller. Prior to that, Mr. Schumaker worked for KPMG, LLP as a Supervising Senior for the Assurance Practice and for a BDO Alliance Firm as a Senior Audit Associate. Mr. Schumaker holds a B.B.A. degree in Accounting from the University of New Mexico. Mr. Schumaker also serves on the Board of Directors of the Arizona Manufacturing Extension Partnership.

Ramesh Gopalakrishnan. Mr. Gopalakrishnan joined us in September 2016 as Vice President, Technology, Transfer and Launch, and was promoted to Senior Vice President, Technology and Industrialization in August 2017 and Senior Vice President, Global Quality, Technology and Latin American Operations in February 2019. In May 2019, Mr. Gopalakrishnan was named our Chief Operating Officer – Wind. Prior to joining us, Mr. Gopalakrishnan served as Executive Vice President, Manufacturing for Senvion GmbH from May 2015 to August 2016 and Senior Vice President, Global Blades from February 2013 to April 2015. Prior to joining Senvion GmbH, Mr. Gopalakrishnan served as the Chief Executive Officer of Suzlon Energy Composites from February 2011 to January 2014, where he oversaw blade and mold factories in the United States, China and India and engineering centers in Europe. Prior to joining Suzlon Energy Composites, Mr. Gopalakrishnan served in various operations, supply chain and engineering roles at Halliburton Company and General Electric Company. Mr. Gopalakrishnan holds a B.S. in Mechanical Engineering from the Indian Institute of Technology and a M.S. and Ph.D in Mechanical Engineering from the State University of New York at Stony Brook.

Thomas J. Castle. Mr. Castle joined us in November 2015 as our Senior Vice President—North American Wind Operations and Global Operational Excellence. In February 2019, Mr. Castle was named our Senior Vice President—U.S. and Transportation Operations. In May 2019, Mr. Castle was named our Senior Vice President – Operations, Strategic Markets. Prior to joining us, Mr. Castle was with Honeywell Aerospace from 2007 to 2015. Mr. Castle served as the Vice President of Integrated Supply Chain, Americas Electronics Operations Center from 2014 to 2015. From 2012 to 2014, he was the Global Vice President of the Honeywell Operating System for Aerospace. Prior to that, Mr. Castle held various positions at the Americas Services Organization from 2007 to 2012. From 1996 to 2007, Mr. Castle was with GE Aviation in roles of increasing responsibility, most recently as the Managing Director of a manufacturing facility in Thailand from 2005 to 2007. Mr. Castle holds a B.S. degree in Aeronautics from St. Louis University.

Steven G. Fishbach. Mr. Fishbach has served as our General Counsel since January 2015. Prior to joining us, Mr. Fishbach served as Deputy General Counsel of Global Cash Access Holdings, Inc. from 2011 to 2015 and Associate General Counsel from 2009 to 2011. Prior to that, Mr. Fishbach served in various senior roles in the legal department of Fidelity National Information Services, Inc./eFunds Corporation from 2005 to 2008. Mr. Fishbach also practiced corporate and securities law at Squire Sanders (now Squire Patton Boggs) from 2000 to 2005. Mr. Fishbach holds a B.A. degree in American Studies from Georgetown University and a J.D. degree from William & Mary Law School.

Item 1A. Risk Factors

You should carefully consider the following risk factors. If any of the events contemplated by the following discussion of risks should occur, our business, results of operations, financial condition, growth prospects and cash flows could suffer significantly. Additional risks that we currently do not know about or that we currently believe to be immaterial may also impair our business. Certain statements below are forward-looking statements. See "Special Note Regarding Forward-Looking Statements" in this Annual Report on Form 10-K.

Risks Related to Our Wind Blade Business

A significant portion of our business is derived from a small number of customers, and two wind blade customers in particular, therefore any loss of or reduction in purchase orders, failure of these customers to fulfill their obligations or our failure to secure long-term supply agreement renewals from these customers could materially harm our business.

Substantially all of our revenues are derived from four wind blade customers. Two customers, Vestas and GE Wind, accounted for 46.1% and 25.7%, respectively, of our total net sales for the year ended December 31, 2019, and 32.0% and 31.7%, respectively, of our total net sales for the year ended December 31, 2018, and 27.9% and 44.6%, respectively, of our total net sales for the year ended December 31, 2017. In addition, two customers, Nordex and Siemens Gamesa accounted for 16.1% and 5.1%, respectively, of our net sales for the year ended December 31, 2019, 19.0% and 11.2%, respectively, of our net sales for the year ended December 31, 2018, and 16.0% and 9.7%, respectively, of our net sales for the year ended December 31, 2017. Accordingly, we are substantially dependent on continued business from our current wind blade customers, and Vestas and GE Wind in particular. If one or more of our wind blade customers were to reduce or delay wind blade orders, file for bankruptcy or become insolvent, fail to pay amounts due or satisfactorily perform their respective contractual obligations with us or otherwise terminate or fail to renew their long-term supply agreements with us, our business, financial condition and results of operations could be materially harmed.

Defects in materials and workmanship or wind blade failures could harm our reputation, expose us to product warranty or other liability claims, decrease demand for wind blades we manufacture, or materially harm existing or prospective customer relationships.

Defects in the wind blades we manufacture, whether caused by a design, engineering, materials, manufacturing or component failure or deficiencies in our manufacturing processes, are unpredictable and an inherent risk in manufacturing technically advanced products. Under our supply agreements, we warranty the materials and workmanship of the wind blades while our customers are responsible for the fitness of use and design of the wind blades. We have, in the past, experienced wind blade testing failures and defects at some of our facilities during the startup manufacturing phase of new products, and we may experience failures or defects in the future. We have also experienced wind blade failures in the field. Any such customer qualification and wind blade testing failures or other product defects in the future could materially harm our existing and prospective customer relationships. Specifically, negative publicity about the quality of the wind blades we manufacture or defects in the wind blades supplied to our customers could result in a reduction in wind blade orders, increased warranty claims, product liability claims and other damages or termination of our long-term supply agreements or business relationships with current or new customers. In addition, we have recently started wind blade production at a new facility in Yangzhou, China in March 2019 and have commenced operations at a new facility in Chennai, India in the first quarter of 2020 which may expose us to greater risk of warranty claims as these facilities ramp up to serial production levels.

We may determine that resolving potential warranty claims through a negotiated settlement may be in the best interest of the business and long-term customer relationships. Wind blades may also fail due to lightning strikes or other extreme weather, which could also result in negative publicity regarding our wind blades and wind energy in general. In addition, product defects may require costly repairs or replacement components, a change in our manufacturing processes or recall of previously manufactured wind blades, which could result in significant expense and materially harm our existing or prospective customer relationships. Further, defects or product liability claims, with or without merit, may result in negative publicity that could harm our future sales and our reputation in the industry. Any of the foregoing could materially harm our business, operating results and financial condition.

We operate in an industry characterized by changing customer demands and associated transition costs, which could materially harm our business.

The wind energy industry is competitive and is characterized by evolving customer demands. As a result, we must adapt quickly to customer requests for changes to wind blade specifications, which increases our costs and can provide periods of reduced revenue and margins. For instance, during 2019 and into 2020, we have undertaken and will undertake model transitions at several of our facilities for various customer demands. In 2019, we had 10 manufacturing lines in transition which adversely impacted our revenue and profitability. We currently expect to have manufacturing lines in transition during 2020 which could adversely affect our revenue and profitability in 2020. We are generally able to share transition costs with the customer in connection with these changing customer demands, but any sharing is the subject of negotiation and the amount is not always contractually defined. If we do not receive transition payments from our customers sufficient to cover our transition costs or lost margins, our business, financial condition and results of operations could be materially harmed.

We have experienced, and could in the future experience, quality or operational issues in connection with plant construction or expansion, wind blade model transitions and wind blade manufacturing, which could result in losses and cause delays in our ability to complete our projects and may therefore materially harm our business, financial condition and results of operations.

We dedicate most of the capacity of our current wind blade manufacturing facilities to existing customers and, as a result, we may need to build additional manufacturing capacity or facilities to serve the needs of new customers or expanded needs of existing customers. Since the third quarter of 2016, we have commenced operations at four new manufacturing facilities in Mexico, one in Turkey, one in Yangzhou, China, one in Chennai, India and one in Iowa. The construction of new plants and the expansion of existing plants involves significant time, cost and other risks. We generally expect our plants to generate losses in their first 12 to 24 months of operations related to production startup costs. Additionally, numerous factors can contribute, and have in the past contributed, to delays or difficulties in the startup of, or the adoption of our manufacturing lines to produce larger wind blade models, which we refer to as model transitions, in our manufacturing facilities. These factors include permitting, construction or renovation delays, the engineering and fabrication of specialized equipment, the modification of our general production know-how and customer-specific manufacturing processes to address the specific wind blades to be tested and built, changing and evolving customer specifications and expectations and the hiring and training of plant personnel. If our production or the delivery by any third-party suppliers of any custom equipment is delayed, the construction or renovation of the facility, or the addition of a production line would be delayed. Any delays or difficulties in plant startup or expansion may result in cost overruns, production delays, contractual penalties, loss of revenues, reduced margins and impairment of customer relationships, which could materially harm our business, financial condition and results of operations. For example, we experienced construction and startup delays with respect to our new manufacturing facility in Yangzhou, China. These delays resulted in us paying liquidated damages of $7.8 million to one of our customers payable in installment payments in 2019 and 2020.

Some of our long-term supply agreements with our customers are subject to early termination and our failure to perform our obligations under these agreements or the termination of these agreements would materially harm our business, financial condition and results of operation.

Our current long-term supply agreements expire between the end of the third quarter of 2020 and the end of 2023. Some of our long-term supply agreements contain provisions that allow for the early termination of these agreements upon the customer providing us with advance written notice and paying an early termination fee. Additionally, our long-term supply agreements contain provisions allowing our customers to terminate these agreements upon our failure to deliver the contracted wind blade volumes or our failure to meet certain mutually agreed upon cost reductions or a force majeure event that impacts our supply agreements for a contractually specified period of time. Our customers may not continue to maintain long-term supply agreements with us in the future. If one or more of our customers terminate, or reduce the number of lines or fail to renew their long-term supply agreements with us, it would materially harm our business, financial condition and results of operations.

Our long-term supply agreements and our backlog are subject to reduction within contractual parameters and we may not realize all of the expected revenue.

Our current long-term wind blade supply agreements generally establish annual purchase requirements on which we rely for our future production and financial forecasts. However, the timing and volume of purchases, within certain parameters, may be subject to change by our customers. In addition, the amount of the annual purchase requirements typically decline in the later years of our long-term supply agreements. In some instances, our customers have the contractual right to require us to reduce the number of manufacturing lines committed to them and correspondingly reduce their minimum annual purchase requirements. Additionally, our minimum annual purchase commitments could potentially understate the forecasted net sales that we are likely to generate in a given period or periods if all of our long-term supply agreements remain in place and pricing remains materially unchanged. Such minimum annual purchase requirements could also potentially overstate the forecasted net sales that we are likely to generate in a given period or periods if one or more of our long-term supply agreements were to be terminated by our customers for any reason or due to market conditions our plants are underutilized. As a result, we may not realize the forecasted net sales we expect under our long-term supply agreements or pursuant to our backlog, which we define as the value of purchase orders received less the revenue recognized to date on those purchase orders. In addition, fulfillment of our backlog may not result in profits.

Many of our long-term supply agreements contain liquidated damages provisions, which may require us to make unanticipated payments to our customers.

Many of our long-term supply agreements contain liquidated damages provisions in the event that we fail to perform our obligations thereunder in a timely manner or in accordance with the agreed terms, conditions and standards. Our liquidated damages provisions generally require us to make a payment to the customer if we fail to deliver a product or service on time. For example, we experienced construction and startup delays with respect to our new manufacturing facility in Yangzhou, China and a work stoppage in Matamoros, Mexico during 2019. These delays resulted in us paying liquidated damages of $20.5 million to one of our customers payable in installment payments in 2019 and 2020. We generally try to limit our exposure under any individual long-term supply agreement to a maximum penalty. Nevertheless, if we incur liquidated damages, they may materially harm our business, operating results and financial condition.

Our wind turbine OEM customers are facing increasing competition and pricing pressure due to the increasing prevalence of auction-based tenders in wind energy markets, and correspondingly our margins and results of operations may be adversely affected.

Many governments are shifting from feed-in tariffs to auction-based tenders as a means of promoting the development and growth of renewable energy sources such as wind energy. As a result of this shift, our wind turbine OEM customers are experiencing intense pricing pressure with respect to the sale of their turbines. As a result of this pricing pressure, we will be required to further reduce the costs we incur to manufacture wind blades to remain competitive. We typically share the benefit of cost reductions related to manufacturing wind blades with our customers pursuant to the terms of our long-term supply agreements. If these pricing pressures continue, we may choose to reduce our margins or pass on a greater percentage of the savings to our OEM customers obtained from manufacturing cost reductions than required under our supply agreements to remain competitive, each of which may materially harm our business, financial condition and results of operations.

Although a majority of our manufacturing facilities are located outside the United States, our business is still heavily dependent upon the demand for wind energy in the United States and any downturn in demand for wind energy in the United States could materially harm our business.

We have developed a global footprint to serve the growing wind energy market worldwide and have wind blade manufacturing facilities in the United States, China, Mexico, Turkey and India. Although a majority of our manufacturing facilities are located outside of the United States, historically more than half of the wind blades that we produced were deployed in wind farms located within the United States. Our Iowa and Mexico manufacturing facilities manufacture wind blades that are generally deployed within the United States. In addition, we export wind blades from our China and Turkey manufacturing facilities to the United States and wind blades that will be produced at our India manufacturing facility could be exported by our customers to the United States as well. In addition, tariffs imposed by the current administration on components of wind turbines from China, including wind blades, in 2018 and 2019 could also have a negative impact on demand for our wind blades manufactured in our

Chinese manufacturing facilities. Consequently, demand for wind energy and our wind blade sales in the United States could be adversely affected by a variety of reasons and factors, and any downturn in demand for wind energy and our wind blade sales in the United States could materially harm our business.

We could experience shortages of raw materials or components critical to our manufacturing needs, which may hinder our ability to perform under our supply agreements.

We rely upon third parties for raw materials, such as fiberglass, carbon, resins, foam core and balsa wood, and various components for the wind blades we manufacture. Some of these raw materials and components may only be purchased from a limited number of suppliers. For example, balsa wood is only grown and produced in a limited number of geographies and is only available from a limited number of suppliers. Additionally, our ability to purchase the appropriate quantities of raw materials is constrained by our customers' transitioning wind blade designs and specifications. As a result, we maintain relatively low inventory and acquire raw materials and components as needed. Due to significant international demand for these raw materials from many industries, we may be unable to acquire sufficient quantities or secure a stable supply for our manufacturing needs. For example, in 2019, we experienced shortages in the supply of balsa wood and other core materials which adversely impacted our results of operations. If shortages or delays occur, we may be unable to provide our products to our customers on time, or at all. In some instances, our customers directly control the purchase of certain key raw materials and components and if they are unable to procure and provide us with such raw materials and components, it could cause delays and disruptions with respect to our business and operations. In addition, a disruption in any aspect of our global supply chain caused by transportation delays, customs delays, cost issues or other factors could result in a shortage of raw materials or components critical to our manufacturing needs. Any supply shortages, delays in the shipment of materials or components from third party suppliers, or changes in the terms on which they are available could disrupt or materially harm our business, operating results and financial condition.

The concentration of customers in our wind business could enable one or more of our customers to attempt to substantially influence our policies, business and affairs going forward, or adversely affect our business, financial condition or results of operations if one or more of our customers experience financial difficulties, become insolvent or file for bankruptcy.

Our dependence on five wind blade customers for substantially all of our revenues could encourage these customers to attempt to impose new or additional requirements on us that reduce the profitability of our long-term supply agreements with them or otherwise influence our policies, choice of and arrangements with raw material suppliers and other aspects of our business. Our customers could also attempt to influence the outcome of a corporate transaction if the transaction benefits a customer's competitor or is otherwise perceived as not advantageous to a customer, which could have the effect of delaying, deterring, or preventing a transaction that could benefit us. In addition, consolidation of some of our customers may result in increased customer concentration and the potential loss of customers. For example, Nordex completed its acquisition of Acciona in 2016 and Gamesa completed the merger of Siemens' Wind Power with Gamesa in 2017. Although we are not constrained by any exclusivity agreements with any of our existing wind blade customers, they may resist our development of new customer relationships, which could affect our relationships with them or our ability to secure new customers.

In addition, if one or more of our customers experience financial difficulties, demand for the wind blades we manufacture could decline significantly. In such a circumstance, we could also be at risk of collecting accounts receivable amounts owed from such customers as well as realizing the value of inventory balances for such customers. Similarly, if one or more of our customers becomes insolvent or files for bankruptcy, the demand for the wind blades we manufacture from the affected customers could be eliminated altogether. For example, in 2019, Senvion GmbH entered into a provisional self-administration procedure concerning its assets as ordered by the Local Court of Hamburg, Germany pursuant to the Insolvency Act in Germany. As a result of this event, we reevaluated the outstanding accounts receivables due from Senvion, the revenue recognized under our supply agreement with Senvion as well as the property, plant and equipment at our Taicang Port, China facility where we manufactured blades for Senvion. As a result of that reevaluation, we revised our estimate of consideration to be received under that contract, which reduced the revenue recorded in the year ended December 31, 2019 by $7.8 million. We also revised the useful life of the property, plant and equipment which was being used to fulfill the Senvion supply agreement which does not have an alternative use. The reevaluation and the lost production from Senvion had an adverse impact on our results of operations for the year ended December 31, 2019. If any of our other customers experience financial difficulties, they also may seek pricing concessions, extended payment terms, reduced minimum purchase commitments and other changes to the key terms of our supply agreements that could adversely affect our business, financial condition and results of operations.

Demand for the wind blades we manufacture may fluctuate for a variety of reasons, including the growth of the wind industry, and decreases in demand could materially harm our business and may not be sufficient to support our growth strategy.

Our revenues, business prospects and growth strategy heavily depend on the continued growth of the wind industry and our customers' continuing demand for wind blades. Customer demand could decrease from anticipated levels due to numerous factors outside of our control that may affect the development of the wind energy market generally, portions of the market or individual wind project developments, including:

- general economic conditions;
- the general availability and demand for electricity;
- wind energy market volatility;
- cost-effectiveness, availability and reliability of alternative sources of energy and competing methods of producing electricity, including solar and non-renewable sources such as natural gas;
- foreign, federal and state governmental tariffs, subsidies and tax or regulatory policies;
- delays or cancellations of government tenders or auctions for wind energy projects;
- the availability of financing for wind development projects;
- the development of electrical transmission infrastructure and the ability to implement a proper grid connection for wind development projects;
- foreign, federal and state laws and regulations regarding avian protection plans, noise or turbine setback requirements and other environmental laws and regulations;
- administrative and legal challenges to proposed wind development projects; and
- public perception and localized community responses to wind energy projects.

In addition to factors affecting the wind energy market generally, our customers' demand may also fluctuate based on other factors beyond our control. Any decline in customer demand below anticipated levels could materially harm our revenues and operating results and could delay or impede our growth strategy.

Changes in customers' business focus and strategy could materially harm our business and results of operations.

Changes in our customers' business focus could significantly reduce their demand for wind blades. For instance, GE, the parent corporation of GE Wind, is a highly diversified company that operates in a number of different industries and could decide to devote more resources to operations outside of wind energy or cease selling wind turbines altogether. In addition, we expect that GE Wind will utilize LM for a substantial percentage of its wind blade production in the future. If any of our customers change their business focus, including a strategic shift to insource a material portion of its wind blade production requirements, it could materially harm our business and results of operations.

We have experienced in the past, and our future wind blade production could be affected by, operating problems at our facilities, which may materially harm our operating results and financial condition.

Our wind blade manufacturing processes and production capacity have in the past been, and could in the future be, disrupted by a variety of issues, including:

- production outages to conduct maintenance activities that cannot be performed safely during operations;
- prolonged power failures or reductions;

- breakdowns, failures or substandard performance of machinery and equipment;
- our inability to comply with material environmental requirements or permits;
- inadequate transportation infrastructure, including problems with railroad tracks, bridges, tunnels or roads;
- supply shortages of key raw materials and components;
- damage or production delays caused by earthquakes, fires, floods, tornadoes, hurricanes, extreme weather conditions such as windstorms, hailstorms, drought, temperature extremes, typhoons or other natural disasters or terrorism or health epidemics such as the coronavirus; and
- labor unrest or shortages in skilled labor.

For example, we announced in the first quarter of 2020 that we were shutting down our Newton, Iowa transportation facility due to operational challenges primarily relating to our inability to hire enough skilled personnel to manufacture our transportation products at this facility. In addition, the cost of repeated or prolonged interruptions, reductions in production capacity, or the repair or replacement of complex and sophisticated tooling and equipment may be considerable and could result in damages under or the termination of our long-term supply agreements or penalties for regulatory non-compliance, any of which could materially harm our business, operating results and financial condition.

We operate a substantial portion of our business in international markets and we may be unable to effectively manage a variety of currency, legal, regulatory, economic, social and political risks associated with our global operations and those in developing markets.

We currently operate manufacturing facilities in the United States, China, Mexico and Turkey, and we commenced operations at our manufacturing facility in Chennai, India in the first quarter of 2020. Since the third quarter of 2016, we have commenced operations at four new manufacturing facilities in Mexico, one in Turkey, one in Yangzhou, China, one in Chennai, India and one in Iowa. For the years ended December 31, 2019, 2018 and 2017, approximately 88%, 84% and 80%, respectively, of our net sales were derived from our international operations and we expect that a substantial portion of our projected revenue growth will be derived from those operations. Our overall success depends, in part, upon our ability to succeed in differing legal, regulatory, economic, social and political conditions. The global nature of our operations is subject to a variety of risks, including:

- difficulties in staffing and managing multiple international locations;
- increased exposure to foreign currency exchange rate risk or currency exchange controls imposed by foreign countries;
- the risk of import, export and transportation regulations and tariffs on foreign trade and investment, including boycotts and embargoes;
- taxation and revenue policies or other restrictions, including royalty and tax increases, retroactive tax claims and the imposition of unexpected taxes;
- the imposition of, or rapid or unexpected adverse changes in, foreign laws, regulatory requirements or trade policies;
- restrictions on repatriation of earnings or capital or transfers of funds into or out of foreign countries;
- limited protection for intellectual property rights in some jurisdictions;
- inability to obtain adequate insurance;
- difficulty administering internal controls and legal and compliance practices in countries with different cultural norms and business practices;
- the possibility of being subjected to the jurisdiction of foreign courts in connection with legal disputes and the possible inability to subject foreign persons to the jurisdiction of courts in the United States;

- the misinterpretation of local contractual terms, renegotiation or modification of existing long-term supply agreements and enforcement of contractual terms in disputes before local courts;
- the inability to maintain or enforce legal rights and remedies at a reasonable cost or at all; and
- the potential for political unrest, expropriation, nationalization, revolution, war or acts of terrorism in countries in which we operate.

In particular, our operations in China are subject to a variety of specific risks, which may adversely affect our business, including:

- the imposition by the United States of tariffs on certain wind turbine components, including wind turbine blades, being imported into the United States;
- the deterioration of the diplomatic and political relationships between the United States and China resulting from such factors as the opposition of the United States to censorship and other policies of the Chinese government, China's growing trade surpluses with the United States and the introduction by the United States of trade restrictions that would impact Chinese imports and any retaliatory measures that could ensue;
- the uncertainty of the Chinese legal regime generally, and in particular in protecting intellectual property and contractual rights, in securing future land use rights, and the recent adoption of new labor, environmental and tax laws, the impacts of which are not yet fully understood; and
- various restrictions on our ability to repatriate profits from China to other jurisdictions. See "Risk Factors—Risks Related to our Business as a Whole—We may have difficulty making distributions and repatriating earnings from our Chinese manufacturing operations, which may also occur in some of our other locations."

We also operate in developing markets, which have, in the past, experienced, and may in the future experience, social and political unrest. For example, Turkey has experienced problems with domestic terrorist and ethnic separatist groups and attempted military coups. The issue of civil rights for Kurdish citizens remains a potential source of political instability, which may be exacerbated by continuing instability in the Middle East.

In addition, the locations of our manufacturing facilities in Juárez, Mexico and Matamoros, Mexico are, and have been in the past, subject to violence related to drug trafficking, including kidnappings and killings as well as labor unrest. These factors and events could negatively impact our ability to hire and retain personnel, especially senior U.S. managers, to continue to work at these facilities, or disrupt our operation in other ways, which could materially harm our business.

As we continue to operate our business globally, our success will depend, in part, on our ability to anticipate and effectively manage these and other related risks. We may be unsuccessful in developing and implementing policies and strategies that will be effective in managing these risks in each country where we do business or conduct operations. Our failure to manage these risks successfully could materially harm our business, operating results and financial condition.

We may not achieve the long-term growth we anticipate if wind turbine OEMs do not continue to shift from in-house production of wind blades to outsourced wind blade suppliers and if we do not expand our customer relationships and add new customers.

Many wind turbine OEMs rely on in-house production of wind blades for some or all of their wind turbines. Our growth strategy depends in large part on the continued expansion of our relationships with our current wind blade customers, and the addition of new key customers. All of our customers possess the financial, engineering and technical capabilities to produce their own wind blades and many source wind blades from multiple suppliers. Our existing customers may not expand their wind energy operations or, if they do, they may not choose us to supply them with new or additional quantities of wind blades. Our collaborative dedicated supplier model for the manufacture of wind blades is a significant departure from traditional vertically integrated methods. As is typical for rapidly evolving industries, customer demand for new business models is highly uncertain. Although we have entered into long-term supply agreements with customers that also produce wind blades for their wind turbines in-house, we may not be able to maintain these customer relationships or enter into similar arrangements with new customers that produce wind blades in-house in the future. In addition, although GE Wind historically outsourced all of their wind blade production requirements prior to its acquisition of LM, we expect that GE Wind will continue to utilize LM for a substantial percentage of its wind blade production in the future. Our business and growth strategies depend in large part on the continuation of the trend toward outsourcing manufacturing. If that trend does not continue or we are unsuccessful in persuading wind turbine OEMs to shift from in-house production to the outsourcing of their wind blade manufacturing, we may not achieve the long-term growth we anticipate and our market share could be limited.

A drop in the price of energy sources other than wind energy, or our inability to deliver wind blades that compete with the price of other energy sources, may materially harm our business, financial condition and results of operations.

We believe that the decision to purchase wind energy is, to a significant degree, driven by the relative cost of electricity generated by wind turbines compared to the applicable price of electricity from the utility grid and the cost of traditional and other renewable energy sources. Decreases in the prices of electricity from the relevant utility grid or from renewable energy sources other than wind energy, such as solar, would harm the market for wind energy. In particular, a drop in natural gas prices could lessen the appeal of wind-generated electricity. Technological advancements or the construction of a significant number of power generation plants, including nuclear, coal, natural gas or power plants utilizing other renewable energy technologies, government support for other forms of renewable energy or construction of additional electric transmission and distribution lines could reduce the price of electricity produced by competing methods, thereby making the purchase of wind energy less attractive. For example, in 2017, the current President signed an executive order that is intended to promote the domestic coal industry, which may make the cost of electricity generated from coal more cost competitive. The ability of energy conservation technologies, public initiatives and government incentives to reduce electricity consumption or support other forms of renewable energy could also lead to a reduction in the price of electricity, which would undermine the attractiveness of wind energy and thus wind turbines, and, ultimately wind blades. If prices for electricity generated by wind turbines are not competitive, our business, financial condition and results of operations may be materially harmed.

If any precision molding and assembly systems needed for our manufacturing process contains a defect or is not fabricated and delivered in a timely manner, our ongoing manufacturing operations, business, financial condition and results of operation may be materially harmed.

We custom fabricate many of the precision molding and assembly systems used in our facilities. Our customers also have the option of using third-party manufacturers to produce their custom tooling. If any piece of equipment fails, is determined to produce nonconforming or defective products or is not fabricated and delivered in a timely manner, whether produced by us or a third party, our wind blade production could be interrupted and we could be subject to contractual penalties, warranty claims, loss of revenues and damage to our customer relationships, among other consequences.

The long sales cycle involved in attracting new customers may make the timing of our revenue difficult to predict and may cause our operating results to fluctuate.

The complexity, expense and long-term nature of our supply agreements generally require a lengthy customer education, evaluation and approval process. It can take us from several months to years to identify and attract new customers, if we are successful at all. This long sales cycle for attracting and retaining new customers subjects us to a number of significant risks that may materially harm our business, results of operations and financial condition over which we have limited control, including fluctuations in our quarterly operating results. In addition, we may incur substantial expenses and devote significant management effort to develop potential relationships that do not result in agreements or revenue and may prevent us from pursuing other opportunities.

We encounter intense competition for limited customers from other wind blade manufacturers, as well as in-house production by wind turbine OEMs, which may make it difficult to enter into long-term supply agreements, keep existing customers and potentially get new customers.

We face significant competition from other wind blade manufacturers, and this competition may intensify in the future. The wind turbine market is characterized by a relatively small number of large OEMs. In addition, a significant percentage of wind turbine OEMs, including all of our current customers, produce some of their own wind blades in-house. As a result, we compete for business from a limited number of customers that outsource the production of wind blades. We also compete with a number of wind blade manufacturers in China, who are growing in terms of their technical capability and aspire to expand outside of China. Some of our competitors have more experience in the wind energy industry, as well as greater financial, technical or human resources than we do, which may limit our ability to compete effectively with them and maintain or improve our market share. Additionally, our long-term supply agreements dedicate capacity at our facilities to our customers, which may also limit our ability to compete if our facilities cannot accommodate additional capacity. If we are unable to compete effectively for the limited number of customers that outsource production of wind blades, our ability to enter into long-term supply agreements with potential new and existing customers may be materially harmed.

We could be affected by increasing competition from new and existing industry participants and industry consolidation.

The markets in which we operate are increasingly competitive and any failure on our part to compete effectively on an ongoing basis could materially harm our business, results of operations or financial condition. The key factors affecting competition in the wind energy industry are the capacity and quality of products, technology, price, the ability to fulfill local market requirements and the scope, cost and location of manufacturing facilities.

Competition in the wind energy industry has intensified in recent years as a result of a number of factors, including international expansion by existing industry participants exploiting new markets, particularly as political will around the issues of global warming and the environment become more prominent to the political agenda in those new markets. There has also been increasing pressure from Asian manufacturers improving the quality and reliability of their technologies, and considering moving out of their local markets and into international cross border transactions. Western wind turbine OEMs have now started using Asian manufacturers for a portion of their wind blades. Market entry by certain large industrial groups, including those previously unconnected to the wind energy market, through acquisitions and license agreements and numerous greenfield establishments in certain markets, also poses a competition risk.

The competitive environment in the wind energy industry may become more challenging in the years ahead, particularly in the event of greater consolidation in the industry, leading to greater market power and "economies of scale" by such market players which translate into being able to offer greater "cost of energy" savings to wind power plant customers. For example, GE completed its acquisition of LM in 2017 and also acquired Alstom S.A.'s power business in 2015; Nordex completed its acquisition of Acciona in 2016 and Gamesa merged with Siemens' Wind Power in 2017. These transactions or further consolidation in the wind energy industry may have an adverse impact on our business in the future, including, without limitation, reduced demand for our products and services, product innovation, changes in pricing and similar factors, including any competitor's attempt to duplicate our collaborative dedicated supplier model. Such events could materially harm our business, results of operations, financial condition or prospects.

Significant increases in the prices of raw materials or components that cannot be reflected in the price of our products could negatively affect our operating margins.

The prices of our raw materials and components are subject to price fluctuations resulting from volatility of supply and demand in world markets. Under our long-term supply agreements, our customers generally commit to purchase minimum annual volumes and prices for wind blades are generally set as of the date of our supply agreements and adjusted quarterly, for the cost of raw material and our operating expenses in certain cases. As a result, the competitive nature of the wind blade market and our long-term supply agreements with our customers may delay or prevent us from passing cost increases in raw materials and components on to our customers. Significant increases in the price of raw materials or components used in our manufactured wind blades that cannot be reflected in the price of our products, could negatively affect our operating margins and materially harm our business, operating results or financial condition.

GE's acquisition of LM Wind Power, our largest competitor, may materially harm our business, financial condition and results of operations and may cause the price of our common stock to decline.

In 2017, GE completed its acquisition of LM Wind Power, our largest competitor. By the end of 2016, we had entered into five supply agreements with GE Wind providing for the supply of wind blades from our Iowa, Mexico, Turkey and our Taicang Port, China facilities. In 2016, we entered into (i) an amended and restated supply agreement for the continued supply of wind blades from our Iowa facility through December 31, 2020, (ii) an amendment to our existing supply agreement for the continued supply of wind blades from our original Juárez, Mexico facility through December 31, 2020 and (iii) a new supply agreement with GE Wind for the supply of incremental wind blades from our second manufacturing facility in Juárez, Mexico through December 31, 2020. GE Wind elected not to renew or extend the Turkey and Taicang Port, China supply agreements, which both expired on December 31, 2017. We expect that GE Wind will utilize LM for a substantial percentage of its wind blade production in the future. As such, GE Wind may not continue to purchase wind blades from us at similar volumes or on as favorable terms in the future. In August 2018, GE Wind did agree to extend our existing supply agreement in one of our Mexico plants by two years to 2022 and increased the number of wind blade manufacturing lines in that facility from three to five. In addition, GE Wind has agreed to transition to a larger blade model in our Newton, Iowa plant in early 2019 and to eliminate its option to terminate their supply agreement at this location prior to its December 2020 expiration. Unless otherwise terminated or renewed, our supply agreements with GE Wind are in effect until the end of 2020 for our Iowa and one of our Mexico facilities and until the end of 2022 for our other Mexico facility. GE Wind may terminate the Mexico supply agreements with no advance notice and paying us termination fees as set forth in the applicable agreement. In addition, either party may terminate these supply agreements upon a material breach by the other party which goes uncured for 30 days after written notice has been provided. If GE Wind elects to utilize LM or another supplier for more of its wind blade production, reduce the volumes of wind blades it purchases from us or terminates any of our supply agreements, it may materially harm our business, financial condition and results of operations.

Certain of our long-term supply agreements are highly dependent upon a limited number of suppliers of raw materials.

Our ability to perform under certain of our long-term supply agreements is currently, and may continue to be in the future, highly dependent on a limited number of suppliers of raw materials. For instance, our agreements with certain customers require us or our customers to purchase raw materials from a single supplier unless additional suppliers are evaluated and found to satisfy the requirements set out in those agreements. In 2015, for example, our ability to supply wind blades to one of our customers was constrained because our customer, who under our agreement was required to procure a sufficient supply of a specific type of material, was unable to procure the material from a single source supplier. Should any of these suppliers of raw materials experience production delays or shortages, have their operations interrupted or otherwise cease or curtail their operations, this may disrupt or materially harm our business, operating results and financial condition.

Significant increases in the cost of transporting the wind blades we manufacture could negatively affect the demand for our products.

A significant portion of our customers' costs relate to the costs necessary to transport the wind blades we manufacture to their customers' wind farms. Demand for our products could be negatively affected if the costs our customers bear to transport the wind blades we manufacture materially increase.

The nature of our manufacturing processes and unanticipated changes to those processes could significantly reduce our manufacturing yields and product reliability, which could materially harm our business, operating results and financial condition.

The manufacturing of our wind blades involves highly complex and precise processes which may be dictated by our customers' requests requiring production in highly controlled environments. Changes in our manufacturing processes or that are required by our customers could affect product reliability. Furthermore, many of our processes are manual to facilitate production flexibility and compliance with customer requirements. A manually dependent manufacturing process can limit capacity and increase production costs. In some cases, existing manufacturing techniques may be insufficient to achieve the volume or cost targets of our customers. For example, our manufacturing processes may at times require a quantity of raw materials greater than the quantity for which we have contracted, making it difficult for us to achieve the targeted cost levels negotiated with our customers. In order to achieve targeted volume and cost levels, we may need to increase the quantity of raw materials for which we contract or develop new manufacturing processes and techniques. While we continue to devote substantial efforts to the improvement of our manufacturing techniques and processes, we may not achieve manufacturing volumes and cost levels in our manufacturing activities that will fully satisfy customer demands, which could materially harm our business, operating results and financial condition.

Our reserves for warranty expenses might not be sufficient to cover all future costs.

We provide warranties for all of the wind blades and precision molding and assembly systems we produce, including parts and labor, for periods that typically range from two to five years depending on the product sold. If a wind blade is found to be defective during the warranty period as a result of a defect in workmanship or materials, or if we are required to cover remediation expenses or other potential remedies, in addition to our regular warranty coverage we may need to repair or replace the wind blade (which could include significant transportation, installation and erection costs) at our sole expense. Our estimate of warranty expense requires us to make assumptions about matters that are highly uncertain, including future rates of product failure, repair costs, shipping and handling and de-installation and re-installation costs at customers' sites. Our assumptions could be materially different from the actual performance of our products and these remediation expenses in the future. The expenses associated with wind blade repair and remediation activities can be substantial and may include changes to our manufacturing processes. If our estimates prove materially incorrect, we could incur warranty expenses that exceed our reserves and be required to make material unplanned cash expenditures, which could materially harm our business, operating results and financial condition.

We may not be able to meet our customers' future wind blade supply demands, which may hinder our customer relationships and reputation.

Historically, our existing customers' demand and MW capacity goals have mirrored the anticipated growth of the wind energy industry. Given the importance of wind energy capture, turbine reliability and cost to power producers, the size, quality and performance of wind blades have become highly strategic to our OEM customers. If we are unable to maintain future manufacturing capacity at levels that meet our customers' increasing demands, including with respect to volume, technical specifications, or commercial terms, our existing customers may seek relationships with, or give priority to, other wind blade manufacturers or may use or develop their own internal manufacturing capabilities to meet their increased demand, which could materially harm our business, operating results and financial condition. In addition, our reputation could be materially harmed if we are unable to satisfy the requirements of our customers.

We rely on our research and development efforts to remain competitive, and we may fail to develop on a timely basis new wind blade manufacturing technologies that are commercially attractive or permit us to keep up with customer demands.

The market for wind blades is subject to evolving customer needs and expectations. Our research and development is invested in developing faster and more efficient manufacturing processes in order to build the new wind blades designed by our customers that more effectively capture wind energy and are adaptable to new growth segments of the wind energy market. Research and development activities are inherently uncertain and the results of our in-house research and development may not be successful. In addition, our competition may adopt more advanced technologies or develop wind blades that are more effective or commercially attractive. We believe that our future success will depend in large part upon our ability to be at the forefront of technological innovation in the wind energy industry and to rapidly and cost-effectively adapt our wind blade manufacturing processes to keep pace with changing technologies, new wind blade design and changing customer needs. If we are unable to do so, our business, operating results, financial condition and reputation could be materially harmed.

We depend on third parties for certain construction, maintenance, engineering, transportation, warehousing and logistics services, and failures of those third parties to perform their obligations may in turn impede our ability to perform our obligations.

We contract with third parties for certain services relating to the design, construction and maintenance of various components of our production facilities and other systems. If these third parties fail to comply with their obligations:

- we may experience delays in the completion of new facilities or expansion of existing facilities;
- the facilities may not operate as intended;
- we may be required to recognize impairment charges; or
- we could experience production delays, which could cause us to miss our production capacity targets and breach our long-term supply agreements, which could damage our relationships with our customers and subject us to contractual penalties and contract termination.

Any of these events could have a material adverse effect on our business, operating results or financial condition. Our customers also contract with third parties for the transportation of the products we manufacture. In particular, a significant portion of the goods we manufacture are transported to different countries, which requires customized shipping cradles, sophisticated warehousing, logistics and other resources. If our customers fail to contract with third parties for certain construction, maintenance, engineering, transportation, warehousing and logistics services, or there are any disruptions, delays or failures in these services, this could have a material adverse effect on our business, operating results or financial condition.

Various legislation, regulations and incentives that are expected to support the growth of wind energy in the United States and around the world may not be extended or may be discontinued, phased out or changed, or may not be successfully implemented, which could materially harm wind energy programs and materially decrease demand for the wind blades we manufacture.

The U.S. wind energy industry is dependent in part upon governmental support through certain incentives including federal tax incentives and RPS programs and may not be economically viable absent such incentives. Government-sponsored tax incentive programs including the PTC, and to a lesser extent, the Investment Tax Credit, are expected to support the U.S. growth of wind energy. The PTC provided the owner of a wind turbine placed in operation before January 1, 2015 with a ten year credit against its U.S. federal income tax obligations based on the amount of electricity generated by the wind turbine.

The PTC was extended in 2015 for wind power projects through December 31, 2019, and was phased down over the term of the PTC extension. Specifically, the PTC was kept at the same rate in effect at the end of 2014 for wind power projects that either commenced construction or met certain safe harbor requirements by the end of 2016, and thereafter was reduced by 20% per year in 2017, 2018 and 2019, respectively. In December 2019, Congress extended the PTC through the end of 2020 and increased the rate from 40% to 60% for projects that commenced construction or met certain safe harbor requirements by the end of 2020 and are commissioned by the end of 2024.

In June 2019, the EPA issued the Affordable Clean Energy Rule, which replaced the Clean Power Plan, which was designed to promote renewable energy. The Clean Power Plan, which was established by the EPA in 2015, set national standards for states to reduce carbon emissions from power plants. Specifically, the Clean Power Plan required states to reduce carbon emissions from power plants 32% below 2005 levels by 2030. In general, the Affordable Clean Energy Rule, provides for efficiency improvements at power plants and directs individual States to choose how they want to regulate power plant emissions. Unlike the Clean Power Plan, the Affordable Clean Energy Rule, does not set specific standards or limits for carbon emissions.

In addition, many state governments have adopted measures designed to promote wind energy. For example, according to the American Wind Energy Association (AWEA), at the state level, as of December 31, 2019, 29 states, as well as the District of Columbia and Puerto Rico, have implemented RPS programs that mandate that a specific percentage of electricity sales in a state come from renewable energy within a specified period. However, some RPS programs have been challenged and all of them may not continue going forward. These programs have spurred significant growth in the wind energy industry in the United States and a corresponding increase in the demand for our manufactured wind blades. However, although the U.S. government and several state governments have adopted these various programs that are expected to help drive the growth of wind energy, they may approve new or additional programs that might hinder the wind energy industry and therefore negatively impact our business, operating results or financial condition.

China implemented its 13th 5-Year Plan with a goal of 15% energy from non-fossil fuel sources and targeting 210 GWs of grid-connected wind capacity by 2020, according to its National Development and Reform Commission, and employs preferential feed-in tariff schemes, in addition to local tax-based incentives. Mexico has established strict targets, aiming for 35% renewable energy by 2024 and 50% by 2050, according to WoodMac, which it is facilitating through tax incentives. Large European Union members have renewable energy targets for 2020 of between 10% and 49% of all energy use derived from renewable energy sources, according to the European Commission. Turkey enacted Law No. 5346 in 2005 to promote renewable-based electricity generation within its domestic electricity market by introducing tariffs and purchase obligations for distribution companies requiring purchases from certified renewable energy producers. The World Bank also provided to Turkey an aggregate of $600 million of loan proceeds to encourage investors to construct generation plants with renewable energy resources. These programs have spurred significant growth in the wind energy industry internationally and a corresponding increase in the demand for our manufactured wind blades. However, although foreign governments have adopted various programs that are expected to drive the growth of wind energy, they may approve new or additional programs going forward that might hinder the wind energy industry and therefore negatively impact our business as a result. For example, foreign governments may decide to reduce or eliminate these economic incentives for political, financial or other reasons. They may also favor other forms of energy, including current and new sources of energy such as solar, nuclear and hydropower. Foreign governments may also cancel or delay scheduled tender offers or auctions for wind energy projects. For example, the Mexican government recently canceled the country's fourth energy tender which was in the final stages to contract a minimum 5% of national power by 2021.

Because of the long lead times necessary to develop wind energy projects, any uncertainty or delay in adopting, extending or renewing these incentives beyond their current or future expiration dates could negatively impact potential wind energy installations and result in industry volatility. There can be no assurance that the PTC, tender offers, auctions or other governmental programs or subsidies for renewable energy will remain in effect in their present form or at all, and the elimination, reduction, or modification of these programs or subsidies could materially harm wind energy programs in the United States and international markets and materially decrease demand for the wind blades we manufacture and, in turn, materially harm our business, operating results and financial condition.

We may not be able to obtain, or agree on acceptable terms and conditions for, government tax credits, grants, loans and other incentives for which we have in the past applied or may in the future apply, which may materially harm our business, operating results and financial condition.

We have in the past and may in the future rely, in part, on tax credits, grants, loans and other incentives under U.S. and foreign governmental programs to support the construction of new plants and expansion of existing manufacturing facilities. We may not be successful in obtaining these tax credits, grants, loans and other incentives, and the tax and other incentives that have already been approved may not be continued in the future. Our ability to obtain funds or incentives from government sources is subject to the availability of funds under applicable governmental programs and approval of our applications to participate in these programs. The application process for these funds and other incentives is and will be highly competitive. We may not be able to satisfy the requirements and milestones imposed by the granting authority as conditions to receipt of the funds or other incentives, the timing of the receipt of the funds may not meet our needs, and, even if obtained, we may be unable to successfully execute on our business plan. Moreover, not all of the terms and conditions associated with these incentive funds have been disclosed to us, and once disclosed, there may be terms and conditions with which we are unable to comply or that are commercially unacceptable to us. Further, participation in certain programs may require us to notify the federal government of certain intellectual property we develop and comply with applicable regulations in order to protect our interests in that intellectual property. In addition, these federal governmental programs may require us to spend a portion of our own funds for every incentive dollar we receive or are permitted to borrow from the government and may impose time limits during which we must use the funds awarded to us that we may be unable to achieve. If we are unable to obtain or comply with the terms of these tax credits, grants, loans or other incentives, our business, operating results and financial condition may be harmed.

Adverse weather conditions could impact the wind energy industry in some regions and could materially harm our business, operating results and financial condition.

Our business may be subject to fluctuations in sales volumes due to adverse weather conditions that could delay the erection of wind turbines, the installation of wind blades and the ability of wind turbines to generate electricity efficiently. Moreover, any remediation efforts we could be required to undertake pursuant to wind blade warranties could be delayed or otherwise adversely impacted by poor weather. Although our customer base and manufacturing footprint is geographically diversified, enduring weather patterns or seasonal variations may impact the expansion of the wind energy industry in certain regions. A resulting reduction or delay in demand for the wind blades we manufacture for our customers could materially harm our business, operating results and financial condition.

Our long-term growth and success is dependent upon retaining our senior management and attracting and retaining qualified personnel.

Our growth and success depends to a significant extent on our ability to attract and retain highly qualified research and development, management, manufacturing and other key personnel including engineers in our various locations. In addition, we rely heavily on our management team, including Steven C. Lockard, our Chief Executive Officer; William E. Siwek, our President; Ramesh Gopalakrishnan, our Chief Operating Officer - Wind; Bryan Schumaker, our Chief Financial Officer; and other senior management. Although we have executed an employment agreement with each of these executives, these executives and other senior management can resign with little or no notice to us. The inability to recruit and retain key personnel or the unexpected loss of key personnel may materially harm our business, operating results and financial condition. Hiring those persons may be especially difficult because of the specialized nature of our business and our international operations. If we cannot attract and retain qualified personnel, or if we lose the services of Messrs. Lockard, Siwek, Gopalakrishnan, or Schumaker, other key members of senior management or other key personnel, and we do not have adequate succession plans in place, our ability to successfully execute our business plan, market and develop our products and serve our customers could be materially and adversely affected. In addition, because of our reliance on our management team, our future success depends, in part, on its ability to identify and develop talent to succeed its senior management. The retention of key personnel and appropriate senior management succession planning will continue to be critical to the successful implementation of our future strategies.

Risks Related to our Transportation Business

Our efforts to expand our transportation business and enter into other strategic markets may not be successful.

While our primary focus has been to manufacture composite wind blades, our strategy is to expand our transportation business and to enter into other strategic markets. In 2018, we expanded our relationship with Proterra and began supplying bus bodies from a new manufacturing facility in Newton, Iowa in addition to our manufacturing facility in Warren, Rhode Island. We experienced startup challenges and incurred significant losses in connection with the supply of bus bodies to Proterra from our Newton, Iowa manufacturing facility. As result, we are planning to close our Newton, Iowa bus body manufacturing facility in the first quarter of 2020 and plan to consolidate our bus body manufacturing operation into our Warren, Rhode Island manufacturing facility. The expansion of our transportation business and our entry into other strategic markets will require improved execution in terms of our start up activity and ongoing manufacturing performance as well as significant levels of investment. There can be no assurance that our transportation business or other strategic markets will develop as anticipated or that we will have success in any such markets, and if we do not, we may be unable to recover our investment, which could adversely impact our business, financial condition and results of operations, including potentially impairing the value of our goodwill.

We may incur material losses and costs as a result of product liability and warranty claims, litigation and other disputes and claims.

We are exposed to warranty and product liability claims if our transportation products fail to perform as expected. We may in the future be required to participate in a recall of these products or the vehicles incorporating our products. If public safety concerns are raised, we may have to participate in a recall even if our products are ultimately found not to be defective. Vehicle manufacturers have experienced increasing recall campaigns in recent years. Our customers may look to us for contribution when faced with recalls and product liability claims. If our customers demand higher warranty-related cost recoveries, or if our transportation products fail to perform as expected, our business, financial condition and results of operations could materially suffer.

We may also be exposed to product liability claims, warranty claims and damage to our reputation if our transportation products actually or allegedly fail to perform as expected or the use of our products results, or is alleged to result, in bodily injury or property damage. Recalls may also cause us to lose additional business from our customers. Material product defect issues may subject us to recalls of those products and restrictions on bidding on new customer programs.

Risks Related to Our Business as a Whole

Our facilities or operations could be adversely affected by health epidemics such as the Coronavirus or other events outside of our control.

We may be impacted by health epidemics, such as the Coronavirus, or other events outside of our control, such as wars or natural disasters. For example, as a result of the recent Coronavirus quarantine and movement restrictions being imposed in China, we do not expect our China manufacturing facilities to be back at full production until the second quarter of 2020 and we may not be able to produce the number of wind blade sets in our China manufacturing facilities that we originally projected for calendar year 2020. In addition, our global supply chain may be adversely affected by the Coronavirus epidemic, other health epidemics, wars, natural disasters or other events outside our control. If the Coronavirus epidemic or other events outside of our control persist for an extended period of time, they may have an adverse impact on our business, financial condition and results of operations.

We may not be able to manage our future growth effectively, which may materially harm our business, operating results and financial condition.

We expect to continue to expand our business to meet our current and expected future contractual obligations and to satisfy anticipated increased demand for our products. To manage our anticipated expansion, we believe we must scale our internal infrastructure, including establishing additional facilities, improve our operational systems and procedures and manufacturing capabilities, continue to enhance our compliance and quality assurance systems, train and manage our growing employee base, and retain and add to our current executives and management personnel. Rapid expansion of our operations could place a significant strain on our senior management team, support teams, manufacturing lines, information technology platforms and other resources. Difficulties in effectively managing the budgeting, forecasting and other process control issues presented by any rapid expansion could materially harm our business, prospects, results of operations or financial condition. Our inability to implement operational improvements, generate and sustain increased revenue and manage and control our cost of goods sold and operating expenses could impede our future growth and materially harm our business, operating results and financial condition.

Our financial position, revenue, operating results, profitability and cash flows are difficult to predict and may vary from quarter to quarter, which could cause our share price to decline significantly.

Our quarterly revenue, operating results, profitability and cash flows have varied in the past and are likely to vary significantly from quarter to quarter in the future. For example, our quarterly results have ranged from an operating profit of $21.0 million for the three months ended September 30, 2017 to an operating loss of $11.7 million for the three months ended March 31, 2019. The factors that are likely to cause these variations include:

- operating and startup costs of new manufacturing facilities;
- wind blade model transitions;
- differing quantities of wind blade production;
- unanticipated contract or project delays or terminations;
- changes in the costs of raw materials or disruptions in raw material supply;

- scrap of defective products;
- payment of liquidated damages to our customers for late deliveries of our products;
- warranty expense;
- availability of qualified personnel;
- employee wage levels;
- costs incurred in the expansion of our existing manufacturing capacity;
- volume reduction requests from our customers pursuant to our customer agreements;
- damage or production delays caused by earthquakes, fires, floods, tornadoes, hurricanes, extreme weather conditions such as windstorms, hailstorms, drought, temperature extremes, typhoons or other natural disasters or terrorism or health epidemics such as the coronavirus;
- general economic conditions; and
- the complexity of the financial assumptions we must use for forecasting our revenue, profitability and operating results under ASU 2014-09, *Revenue from Contracts with Customers* (Topic 606) and the impact that unanticipated blade transitions have on those estimates.

As a result, our revenue, operating results, profitability and cash flows for a particular period are difficult to predict and may decline in comparison to corresponding prior periods regardless of the strength of our business. It is also possible that in some future periods our revenue, operating results and profitability may not meet the expectations of securities analysts or investors. If this occurs, the trading price of our common stock could fall substantially, either suddenly or over time, and our business, operating results and financial condition would be materially harmed.

The fluctuation of foreign currency exchange rates could materially harm our financial results.

Since we conduct a significant portion of our operations internationally, our business is subject to foreign currency risks, including currency exchange rate fluctuations. The exchange rates are affected by, among other things, changes in political and economic conditions. For example, an increase in our Turkey sales and operations will result in a larger portion of our net sales and expenditures being denominated in the Euro and Turkish Lira. Significant fluctuations in the exchange rate between the Turkish Lira and the U.S. dollar, the Turkish Lira and the Euro or the Euro and the U.S. dollar may adversely affect our revenue, expenses, as well as the value of our assets and liabilities. Similarly, an increase in our sales within China may result in a larger portion of our net sales and expenditures being denominated in Chinese Renminbi. The Chinese government controls the procedures by which the Chinese Renminbi is converted into other currencies, and conversion of the Chinese Renminbi generally requires government consent. As a result, the Chinese Renminbi may not be freely convertible into other currencies at all times. If the Chinese government institutes changes in currency conversion procedures, or imposes restrictions on currency conversion, those actions may materially harm our business, liquidity, financial condition and operating results. In addition, significant fluctuations in the exchange rate between the Chinese Renminbi and U.S. dollars may adversely affect our revenues, expenses as well as the value of our assets and liabilities. However, in Mexico, since all of our net sales and some of our expenditures are denominated in U.S. dollars, an increase in our Mexico sales and operations will result in a larger portion of our cost of goods sold being denominated in the Mexican Peso. Significant fluctuations in the exchange rate between the Mexican Peso and the U.S. dollar may adversely affect our expenses, as well as the value of our assets and liabilities. To the extent our future revenues and expenses are generated outside of the United States in currencies other than the U.S. dollar, including the Euro, the Turkish Lira, the Chinese Renminbi, Mexican Peso or India Rupee, among others, we will be subject to increased risks relating to foreign currency exchange rate fluctuations which could materially harm our business, financial condition and operating results.

Our manufacturing operations and future growth are dependent upon the availability of capital, which may be insufficient to support our capital expenditures.

Our current wind blade manufacturing activities and future growth will require substantial capital investment. For the years ended December 31, 2019 and 2018, our capital expenditures were $80.3 million and $74.7 million, respectively, including assets acquired under finance leases in 2019 and 2018 of $5.8 million and $22.0 million, respectively. We have recently entered into lease agreements with third parties to lease new manufacturing facilities in China, India and Mexico. Major projects expected to be undertaken include purchasing equipment for our new manufacturing facility in Chennai, India and the continued investment in our Turkey, Mexico and China facilities. Our ability to grow our business is predicated upon us making significant additional capital investments to expand our existing manufacturing facilities and build and operate new manufacturing facilities in existing and new markets. We generally estimate that the startup of a new six-line manufacturing facility requires cash for net operating expenses and working capital of between $20 million to $25 million and additional capital expenditures primarily for machinery and equipment of between $30 million to $35 million. In addition, we estimate our annual maintenance capital expenditures to be between $1 million to $2 million per facility. We may not have the capital to undertake these capital investments. In addition, our capital expenditures may be significantly higher if our estimates of future capital investments are incorrect and may increase substantially if we are required to undertake actions to comply with new regulatory requirements or compete with new technologies. The cost of some projects may also be affected by foreign exchange rates if any raw materials or other goods must be paid for in foreign currency. We cannot assure you that we will be able to raise funds on favorable terms, if at all, or that future financings would not be dilutive to holders of our capital stock. We also cannot assure you that completed capital expenditures will yield the anticipated results. If we raise additional funds by obtaining loans from third parties, the terms of those financing arrangements may include negative covenants, or other restrictions on our business that could impair our operational flexibility, and would require us to fund additional interest expense. If we are unable to obtain sufficient capital at a reasonable cost or at all, we may not be able to expand production sufficiently to take advantage of changes in the marketplace or may be required to delay, reduce or eliminate some or all of our current operations, which could materially harm our business, operating results and financial condition.

As a U.S. corporation with international operations, we are subject to the U.S. Foreign Corrupt Practices Act of 1977, which could impact our ability to compete in certain jurisdictions.

As a U.S. corporation, we are subject to the FCPA, which generally prohibits U.S. companies and their intermediaries from making improper payments to foreign officials for the purpose of obtaining or keeping business. We have manufacturing facilities in China, Mexico, Turkey and India, countries with a fairly high risk of corruption. Those facilities are subject to routine government oversight. In addition, a number of our raw materials and components suppliers are state-owned, particularly in China. Moreover, due to our need to import raw materials across international borders, we also routinely have interactions, directly or indirectly, with customs officials. In many foreign countries, under local custom, businesses engage in practices that may be prohibited by the FCPA or other similar laws and regulations. Additionally, we continue to hire employees around the world as we continue to expand. Although we have implemented certain procedures and controls designed to ensure compliance with the FCPA and similar laws, there can be no guarantee that all of our employees and agents, as well as those companies to which we outsource certain of our business operations, have not taken and will not take actions that violate our policies and the FCPA, which could subject us to fines, penalties, disgorgement, and loss of business, harm our reputation and impact our ability to compete in certain jurisdictions. In addition, these laws are complex and far-reaching in nature, and, as a result, we may be required in the future to alter one or more of our practices to be in compliance with these laws or any changes in these laws or the interpretation thereof. Moreover, our competitors may not be subject to the FCPA or comparable legislation, which could provide them with a competitive advantage in some jurisdictions.

We may have difficulty making distributions and repatriating earnings from our Chinese manufacturing operations, which may also occur in some of our other locations.

A material portion of our business is conducted in China. As of December 31, 2019, our China operations had unrestricted cash of $9.7 million, most of which will be used to fund our future operations in China. Our ability to repatriate funds from China to the United States is subject to a number of restrictions imposed by the Chinese government. We repatriate funds through several technology license contracts and corporate/administrative service agreements. We are compensated quarterly based on agreed upon royalty rates for such intellectual property licenses and quarterly fees for those services. Certain of our subsidiaries are limited in their ability to declare dividends without first meeting statutory restrictions of the People's Republic of China, including retained earnings as determined under Chinese-statutory accounting requirements. Until 50% ($26.5 million) of registered capital is contributed to a surplus reserve, our Chinese operations can only pay dividends equal to 90% of after-tax profits (10% must be contributed to the surplus reserve). Once the surplus reserve fund requirement is met, we can pay dividends equal to 100% of after-tax profit assuming other conditions are met. At December 31, 2019, the amount of the surplus reserve fund was $6.6 million. Any inability to make distributions, repatriate earnings or otherwise access funds from our manufacturing operations in China, if and when needed for use outside of China, could materially harm our liquidity and our business.

Effective internal controls are necessary for us to provide reliable financial reports and effectively address fraud risks.

We maintain a system of internal controls to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with U.S. generally accepted accounting principles (GAAP). The process of designing and implementing effective internal controls is a continuous effort that requires us to anticipate and react to changes in our business and the economic and regulatory environments and to expend significant resources to establish and maintain a system of internal controls that will be adequate to satisfy the reporting obligations of a public company. The effectiveness of our internal controls depends in part on the cooperation of senior managers worldwide.

Any system of controls, however well designed and operated, can provide only reasonable, and not absolute, assurance that the objectives of the system are met. Any failure to maintain that system, or consequent inability to produce accurate financial statements on a timely basis, could increase our operating costs and harm our business, and lead to our becoming subject to litigation, sanctions or investigations by The NASDAQ Global Market (NASDAQ), the SEC or other regulatory governmental agencies and bodies. Furthermore, investors' perceptions that our internal controls are inadequate or that we are unable to produce accurate financial statements on a timely basis may harm our stock price.

The state of financial markets and the economy may materially harm our sources of liquidity and capital.

There has been significant recent turmoil and volatility in worldwide financial markets. These conditions have resulted in a disruption in the liquidity of financial markets, and could directly impact us to the extent we need to access capital markets to raise funds to support our business and overall liquidity position. This situation could affect the cost of such funds or our ability to raise such funds. If we were unable to access any of these funding sources when needed, it could materially harm our business, operating results and financial condition.

Our ability to use our net operating loss carry forwards may be subject to limitation and may result in increased future tax liability.

Sections 382 and 383 of the Internal Revenue Code of 1986, as amended (the Code), contain rules that limit the ability of a company that undergoes an "ownership change" to utilize its net operating loss and tax credit carry forwards and certain built-in losses recognized in years after the "ownership change". An "ownership change" is generally defined as any change in ownership of more than 50% of a corporation's stock over a rolling three-year period by stockholders that own (directly or indirectly) 5% or more of the stock of a corporation, or arising from a new issuance of stock by a corporation. If an ownership change occurs, Section 382 generally imposes an annual limitation on the use of pre-ownership change net operating losses (NOLs), credits and certain other tax attributes to offset taxable income earned after the ownership change. The annual limitation is equal to the product of the applicable long-term tax exempt rate and the value of our common stock immediately before the ownership change. This annual limitation may be adjusted to reflect any unused annual limitation for prior years and certain recognized built-in gains and losses for the year. In addition, Section 383 generally limits the amount of tax liability in any post-ownership change year that can be reduced by pre-ownership change tax credit carryforwards. This could result in increased U.S. federal income tax liability for us if we generate taxable income in a future period. Limitations on the use of NOLs and other tax attributes could also increase our state tax liability. The use of our tax attributes will also be limited to the extent that we do not generate positive taxable income in future tax periods. As a result of these limitations, we may be unable to offset future taxable income (if any) with losses, or our tax liability with credits, before such losses and credits expire. Accordingly, these limitations may increase our federal income tax liability.

We experienced an "ownership change" in June 2018, and it remains possible that future transactions may cause us to undergo one or more ownership changes. As of December 31, 2019, we have U.S. federal NOLs of approximately $20.9 million and state NOLs of approximately $158.0 million. The pre-ownership change NOLs existing at the date of change of $47.7 million are subject to annual limitation. We do not believe that the Section 382 and 383 annual limitation will materially impact our ability to utilize the tax attributes that existed as of the date of the ownership change.

We have U.S. federal and state NOLs. In general, NOLs in one country cannot be used to offset income in any other country and NOLs in one state cannot be used to offset income in any other state. Accordingly, we may be subject to tax in certain jurisdictions even if we have unused NOLs in other jurisdictions. Also, each jurisdiction in which we operate may have its own limitations on our ability to utilize NOLs or tax credit carryovers generated in that jurisdiction. These limitations may increase our federal, state, and/or foreign income tax liability.

Our senior, secured current revolving credit facility contains, and any future loan agreements we may enter into may contain, operating and financial covenants that may restrict our business and financing activities.

As of December 31, 2019, we had a $150.0 million revolving credit facility (the Credit Facility) with JPMorgan Chase Bank, N.A. Wells Fargo Bank, N.A., Capital One, N.A. and Bank of America N.A., consisting of a $125.0 million revolving credit facility and a $25.0 million letter of credit sub-facility. As of December 31, 2019, the aggregate outstanding balance under the Credit Facility was $112.4 million. The Credit Facility is secured by substantially all of our assets. In addition, from time to time, we enter into various loan, working capital and accounts receivable financing facilities to finance the construction and ongoing operations of our advanced manufacturing facilities and other capital expenditures. The Credit Facility contains various financial covenants and restrictions on our and our operating subsidiaries' excess cash flows and ability to make capital expenditures, incur additional indebtedness and pay dividends or make distributions on, or repurchase, our stock. The operating and financial restrictions and covenants of the Credit Facility, as well as our other existing and any future financing agreements that we may enter into, may restrict our ability to finance our operations, engage in business activities or expand or fully pursue our business strategies. Our ability to comply with these covenants may be affected by events beyond our control, and we may not be able to maintain appropriate minimum leverage ratio and fixed charge coverage ratio requirements in the future. A breach of any of these covenants could result in a default under the applicable loan facility, which could cause all of the outstanding indebtedness under such facility to become immediately due and payable by us and/or enable the lender to terminate all commitments to extend further credit. In addition, if we were unable to repay the outstanding indebtedness upon a default, our lenders could proceed against the assets pledged as collateral to secure that indebtedness.

In February 2020, we entered into an Incremental Facility Agreement with the current lenders to our Credit Agreement and an additional lender, pursuant to which the aggregate principal amount of our revolving credit facility under the Credit Agreement was increased from $150.0 million to $205.0 million. All other material terms and conditions of the Credit Agreement remained the same. We did not make any draw downs on the revolving credit facility in connection with the execution of the Incremental Facility Agreement.

Our indebtedness may adversely affect our business, results of operations and financial condition.

Our indebtedness could adversely affect our business, results of operations and financial condition by, among other things:

- requiring us to dedicate a substantial portion of our cash flow from operations to pay principal and interest on our debt, which would reduce the availability of our cash flow to fund working capital, capital expenditures, acquisitions, execution of our growth strategy and other general corporate purposes;
- limiting our ability to borrow additional amounts to fund debt service requirements, working capital, capital expenditures, acquisitions, execution of our growth strategy and other general corporate purposes;
- making us more vulnerable to adverse changes in general economic, industry and regulatory conditions and in our business by limiting our flexibility in planning for, and making it more difficult to react quickly to, changing conditions;
- placing us at a competitive disadvantage compared with those of our competitors that have less debt and lower debt service requirements;
- making us more vulnerable to increases in interest rates since some of our indebtedness is subject to variable rates of interest; and
- making it more difficult for us to satisfy our financial obligations.

In addition, we may not be able to generate sufficient cash flow from our operations to repay our outstanding indebtedness when it becomes due and to meet our other cash needs or to comply with the financial covenants set forth therein. If we are not able to pay our debts as they become due, we could be in default of the Credit Facility or other indebtedness. We might also be required to pursue one or more alternative strategies to repay indebtedness, such as selling assets, refinancing or restructuring our indebtedness or selling additional debt or equity securities. We may not be able to refinance our debt or sell additional debt or equity securities or our assets on favorable terms, if at all, and if we must sell assets, it may negatively affect our ability to generate revenues.

The elimination of LIBOR could adversely affect our business, results of operations or financial condition.

In July 2017, the head of the United Kingdom Financial Conduct Authority announced plans to phase out the use of LIBOR by the end of 2021. Although the impact is uncertain at this time, the elimination of LIBOR could have an adverse impact on our business, results of operations, or financial condition. We may incur significant expenses to amend our LIBOR-indexed loans and other applicable financial or contractual obligations, including our revolving credit facility, to a new reference rate, which may differ significantly from LIBOR. Accordingly, the use of an alternative rate could result in increased costs, including increased interest expense on our revolving credit facility, and increased borrowing costs in the future. At this time, no consensus exists as to what rate or rates may become acceptable alternatives to LIBOR and we are unable to predict the effect of any such alternatives on our business, results of operations or financial condition.

Much of our intellectual property consists of trade secrets and know-how that is very difficult to protect. If we experience loss of protection for our trade secrets or know-how, our business would be substantially harmed.

We have a variety of intellectual property rights, including patents, trademarks and copyrights, but much of our most important intellectual property rights consist of trade secrets and know-how and effective intellectual property protection may be unavailable, limited or outside the scope of the intellectual property rights we pursue in the United States and in foreign countries such as China where we operate. Although we strive to protect our intellectual property rights, there is always a risk that our trade secrets or know-how will be compromised or that a competitor could lawfully reverse-engineer our technology or independently develop similar or more efficient technology. We have confidentiality agreements with each of our customers, suppliers, key employees and independent contractors in place to protect our intellectual property rights, but it is possible that a customer, supplier, employee or contractor might breach the agreement, intentionally or unintentionally. For example, we believe a key former employee may have shared some of our intellectual property with a competitor in China and this former employee or the competitor may use this intellectual property to compete with us in the future. It is also possible that our confidentiality agreements with customers, suppliers, employees and contractors will not be effective in preserving the confidential nature of our intellectual property rights. The patents we own could be challenged, invalidated, narrowed or circumvented by others and may not be of sufficient scope or strength to provide us with any meaningful protection or commercial advantage. Once our patents expire, or if they are invalidated, narrowed or circumvented, our competitors may be able to utilize the inventions protected by our patents. Additionally, the existence of our intellectual property rights does not guarantee that we will be successful in any attempt to enforce these rights against third parties in the event of infringement, misappropriation or other misuse, which may materially and adversely affect our business. Because our ability to effectively compete in our industry depends upon our ability to protect our proprietary technology, we might lose business to competitors and our business, revenue, operating results and prospects could be materially harmed if we suffer loss of trade secret and know-how protection or breach of our confidentiality agreements.

If the transfer pricing arrangements we have among our subsidiaries are determined to be inappropriate in one or more jurisdictions, our tax liability may increase.

In many countries, including the United States, we are subject to transfer pricing and other tax regulations designed to ensure that appropriate levels of income are reported as earned in each jurisdiction in which we operate. These regulations require that any international transaction involving associated enterprises be on substantially the same basis as a transaction between unrelated companies dealing at arms' length and that contemporaneous documentation be maintained to support the transfer prices. We have transfer pricing arrangements among our subsidiaries in relation to various aspects of our business. We consider the transactions among our subsidiaries to be substantially on arm's-length terms. If, however, a tax authority in any jurisdiction reviews any of our tax returns and determines that the transfer prices and terms we have applied are not appropriate, or that other income of our affiliates should be taxed in that jurisdiction, we may incur increased tax liability, including accrued interest and penalties, which would cause our tax provision to increase, possibly materially. In addition, if the jurisdiction from which the income is reallocated does not agree with the reallocation, both jurisdictions could tax the same income, resulting in double taxation. If tax authorities were to allocate income to a higher tax jurisdiction, subject our income to double taxation, or assess interest and penalties, it would increase our consolidated tax liability, which could materially harm our business, operating results and financial condition.

Our insurance coverage may not cover all risks we face and insurance premiums may increase, which may hinder our ability to maintain sufficient coverage to cover losses we may incur.

We are exposed to risks inherent in the manufacturing of wind blades and other composite structures as well as the construction of our facilities, such as natural disasters, breakdowns and manufacturing defects that could harm persons and damage property. We maintain insurance coverage with licensed insurance carriers that limits our aggregate exposure to certain types of catastrophic losses. In addition, we self-insure for a portion of our claims exposure resulting from workers' compensation and certain events of general liability. We accrue currently for estimated incurred losses and expenses, and periodically evaluate and adjust our claims accrued liability amount to reflect our experience. However, our insurance coverage may not be sufficient to cover the full amount of potential losses. In addition, there are some types of losses such as from warranty, hurricanes, terrorism, wars, or earthquakes where insurance is limited and/or not economically justifiable. If we were to sustain a serious uninsured loss or a loss exceeding the limits of our insurance policies, the resulting costs could have a material adverse effect on our business prospects, results of operations and financial condition. Further, our insurance policies provide for our premiums to be adjusted annually. If the premiums we pay for our policies increase significantly, we may be unable to maintain the same level of coverage we currently carry, or we will incur significantly greater costs to maintain the same level of coverage, including through higher deductibles.

We may be subject to significant liabilities and costs relating to environmental and health and safety requirements.

We are subject to various environmental, health and safety laws, regulations and permit requirements in the jurisdictions in which we operate governing, among other things, health, safety, pollution and protection of the environment and natural resources, the handling and use of hazardous substances, the generation, storage, treatment and disposal of wastes, and the cleanup of any contaminated sites. In June 2018, Iowa OSHA, a division of the Iowa Department of Labor, issued a citation and notification of penalty to us alleging that certain of our workplace practices and conditions at our Newton, Iowa wind blade manufacturing facility had violated the Iowa Occupational Safety and Health Act. Specifically, the citation cited us for multiple alleged violations and proposed that we pay an aggregate penalty of $0.2 million. In March 2019, we entered into a settlement agreement with the Iowa Department of Labor pursuant to which we agreed to make a settlement payment of $0.1 million and to implement certain safety enhancements at our Newton, Iowa manufacturing facility to fully resolve this matter.

We have incurred, and expect to continue to incur, capital and operating expenditures to comply with such laws, regulations and permit requirements. While we believe that we currently are in material compliance with all such laws, regulations and permit requirements, any noncompliance may subject us to a range of enforcement measures, including the imposition of monetary fines and penalties, other civil or criminal sanctions, remedial obligations, and the issuance of compliance requirements restricting our operations. In addition, the future adoption of more stringent laws, regulations and permit requirements may require us to make additional capital and operating expenditures. Under certain environmental laws and regulations, liabilities also can be imposed for cleanup of currently and formerly owned, leased or operated properties, or properties to which we sent hazardous substances or wastes, regardless of whether we directly caused the contamination or violated any law. For example, we could have future liability relating to any contamination that remains from historic industrial operations by others at our properties. Additionally, some of our facilities have a long history of industrial operations and, in the past, contaminants have been detected and remediated at one of our facilities in Izmir, Turkey.

There can be no assurance that we will not in the future become subject to compliance requirements, obligations to undertake cleanup or related activities, or claims or proceedings relating to environmental, health or safety matters, hazardous substances or wastes, contaminated sites, or other environmental or natural resource damages, that could impose significant liabilities and costs on us and materially harm our business, operating results or financial condition.

Claims that we infringe, misappropriate or otherwise misuse the intellectual property rights of others could subject us to significant liability and disrupt our business.

Our competitors and third party suppliers of components and raw materials used in our products protect their intellectual property rights by means such as trade secrets and patents. In the future we may be sued for violations of other parties' intellectual property rights, and the risk of this type of lawsuit will likely increase as our size, geographic presence and market share expand and as the number of competitors in our market increases. Any such claims or litigation, whether meritorious or not, could:

- be time-consuming and expensive to defend;
- divert the attention of our technical and managerial resources;
- adversely affect our relationships with current or future customers;
- require us to enter into royalty or licensing agreements with third parties, which may not be available on terms that we deem acceptable;
- prevent us from operating all or a portion of our business or force us to redesign our manufacturing processes or products, which could be difficult, time-consuming and expensive;
- limit the supply or increase the cost of key raw materials and components used in our products;
- subject us to significant liability for damages or result in significant settlement payments; and
- require us to indemnify our customers or suppliers.

Any of the foregoing could disrupt our business and materially harm our operating results and financial condition. In addition, intellectual property disputes have in the past arisen between our customers which negatively affected such customers' demand for wind blades manufactured by us. If such intellectual property disputes involving, or between, one or more of our customers should arise in the future, our business could be materially harmed.

We may form joint ventures, or acquire businesses or assets, in the future, and we may not realize the benefits of those transactions.

We have, in the past, entered into joint ventures with third parties for the manufacture of wind blades. For example, we entered into joint ventures with third parties in both our Mexico and Turkey locations. We may create new or additional joint ventures with third parties, or acquire businesses or assets, in the future that we believe will complement or augment our existing business. We cannot assure you that, following any such joint venture or acquisition, we will achieve the expected synergies to justify the transaction. We may encounter numerous difficulties in manufacturing any new products resulting from a joint venture or acquisition that delay or prevent us from realizing their expected benefits or enhancing our business. If we enter into joint ventures or acquire businesses or assets with respect to promising markets, we may not be able to realize the benefit of those joint ventures or acquired businesses assets if we are unable to successfully integrate them with our existing operations and company culture.

Work disruptions resulting from our collective bargaining agreements could result in increased operating costs and materially harm our business, operating results and financial condition.

Certain of our employees in Turkey and Matamoros, Mexico, which in the aggregate represented approximately 37% of our workforce as of December 31, 2019, are covered by collective bargaining arrangements. Our collective bargaining arrangement for our certain of our Turkish employees are in effect through the end of 2021. In March 2018, we entered into a collective bargaining agreement with a labor union for certain of our employees in our Matamoros, Mexico facility. In January 2019, thousands of workers employed in dozens of manufacturing facilities in Matamoros, Mexico, went on strike. In general, these workers, who were represented by several different labor unions, demanded an increase in their wage rate and an annual bonus. In February 2019, our manufacturing production employees in Matamoros, Mexico, who are represented by a labor union, went on strike also demanding an increase in their hourly wage rate and the payment of an annual bonus. In February 2019, our manufacturing production employees in Matamoros, Mexico, who are represented by a labor union, went on strike also demanding an increase in their hourly wage rate and the payment of an annual bonus. During this strike, our Matamoros manufacturing facility stopped production for several weeks until we reached a revised agreement with our labor union. In the first quarter of 2020, we amended our Matamoros collective bargaining agreement to adjust the salaries and bonuses payable to our associates for calendar year 2020 that are covered by this agreement.

Additionally, our other employees working at other manufacturing facilities may vote to be represented by a labor union in the future. There can be no assurance that we will not experience labor disruptions such as work stoppages or other slowdowns by workers at any of our facilities. Should significant industrial action, threats of strikes or related disturbances occur, we could experience further disruptions of operations and increased labor costs in Turkey, Mexico or other locations, which could materially harm our business, operating results or financial condition. Any such work stoppage or slow-down at any of our facilities could also result in additional expenses and possible loss of revenue for us.

Our information technology infrastructure could experience serious failures or disruptions, the failure of which could materially harm our business, operating results and financial condition.

Information technology is part of our business strategy and operations. It enables us to streamline operation processes, facilitate the collection and reporting of business data, and provide for internal and external communications. There are risks that information technology system failures, network disruptions, breaches of data security and phishing and ransomware attacks could disrupt our operations. Any significant disruption or breach may materially harm our business, operating results or financial condition.

We incur significant increased costs as a result of operating as a public company, and our management devotes substantial time to compliance initiatives.

As a public company, we incur significant legal, accounting and other expenses. In addition, the Sarbanes-Oxley Act, as well as rules subsequently implemented by the SEC and NASDAQ, impose various requirements on public companies, including requiring establishment and maintenance of effective disclosure controls and internal control over financial reporting and changes in corporate governance practices. Our management and other personnel devote a substantial amount of time to these compliance initiatives. Moreover, these rules and regulations will increase our legal and financial compliance costs. We estimate that we incur approximately $2 million to $3 million in expenses annually in response to these requirements.

Section 404(a) of the Sarbanes-Oxley Act requires annual management assessment of the effectiveness of our internal control over financial reporting. Our testing, or the subsequent testing by our independent registered public accounting firm, may reveal deficiencies in our internal control over financial reporting that are deemed to be material weaknesses. Our management and other personnel devote a substantial amount of time to these compliance initiatives, diverting their attention away from the day-to-day management of our business. We may also need to upgrade our financial and operating systems, implement additional financial and management controls, reporting systems and procedures, and add additional accounting, auditing and financial staff with appropriate public company experience and technical accounting knowledge. We have operations in China, Mexico, Turkey and India and may have difficulty hiring and retaining employees in these countries who have the experience necessary to implement the kind of management and financial controls that are expected of a U.S. public company. In this regard, for example, China has only recently begun to adopt management and financial reporting concepts and practices like those in the United States. If we are not able to comply with these requirements in a timely manner or if we or our independent registered public accounting firm identify deficiencies in our internal control over financial reporting that are deemed to be material weaknesses, the market price of our stock could decline, and we could be subject to sanctions or investigations by NASDAQ, the SEC or other regulatory authorities, which would require additional financial and management resources.

We are faced with increasingly complex tax issues in many jurisdictions, and we could be obligated to pay additional taxes in various jurisdictions.

We may be subject to taxation in many jurisdictions in the United States and around the world with increasingly complex tax laws, the application of which can be uncertain. The amount of taxes we pay in these jurisdictions could increase substantially as a result of changes in the applicable tax laws, including increased tax rates or revised interpretations of existing tax laws and precedents, which could harm our liquidity and operating results. In addition, the taxing authorities in these jurisdictions could review our tax returns, or authorities in jurisdictions in which we do not file tax returns could assert that we are subject to tax in those jurisdictions, and in either case could impose additional tax, interest and penalties. Further, the authorities could claim that various withholding requirements apply to us or our subsidiaries or assert that benefits of tax treaties are not available to us or our subsidiaries, any of which could have a material adverse impact on us and the results of our operations.

Risks Related to Ownership of Our Common Stock

The price of our common stock may fluctuate substantially and your investment may decline in value.

The market price of our common stock is likely to be highly volatile and may fluctuate substantially due to many factors, including:

- actual or anticipated fluctuations in our results of operations;
- our ability to provide products due to shipments subject to delayed delivery and deferred revenue arrangements;
- loss of or changes in our relationship with one or more of our customers;
- failure to meet our earnings estimates;
- conditions and trends in the energy and manufacturing markets in which we operate and changes in estimates of the size and growth rate of these markets;
- announcements by us or our competitors of significant contracts, developments, acquisitions, strategic partnerships or divestitures;
- availability of equipment, labor and other items required for the manufacture of wind blades;
- changes in governmental policies;
- additions or departures of members of our senior management or other key personnel;
- changes in market valuation or earnings of our competitors;
- sales of our common stock, including sales of our common stock by our directors and officers or by our other principal stockholders;
- the trading volume of our common stock; and
- general market and economic conditions.

In addition, the stock market in general, including NASDAQ, as well as the market for broader energy and renewable energy companies in particular, have experienced extreme price and volume fluctuations that have often been unrelated or disproportionate to the operating performance of particular companies affected. These broad market and industry factors may materially harm the market price of our common stock, regardless of our operating performance. In the past, securities class-action litigation has often been instituted against a company following periods of volatility in the market price of that company's securities. Securities class-action litigation, if instituted against us, could result in substantial costs or damages and a diversion of management's attention and resources, which could materially harm our business and operating results.

A significant portion of our total outstanding shares may be sold into the public market in future sales, which could cause the market price of our common stock to drop significantly, even if our business is doing well.

Sales of a substantial number of shares of our common stock in the public market can occur at any time. These sales, or the market perception that the holders of a large number of shares intend to sell shares, could reduce the market price of our common stock. As of December 31, 2019, we had 35,180,706 shares of common stock outstanding. All shares can now be sold, subject to any applicable volume limitations under federal securities laws.

In addition, as of December 31, 2019, there were: (i) 2,594,228 shares subject to outstanding options, or 7.4% of our outstanding shares; (ii) 354,427 restricted stock units, or 1.0% of our outstanding shares; (iii) 491,718 performance stock units, or 1.4% of our outstanding shares; and (iv) 6,621,512 shares reserved for future issuance, or 18.8% of our outstanding shares under the Amended and Restated 2015 Stock Option and Incentive Plan (the 2015 Plan) that will become eligible for sale in the public market to the extent permitted by any applicable vesting requirements and Rules 144 and 701 under the Securities Act. We also filed a shelf registration statement in September 2017 for the resale of up to 19,774,751 shares of common stock by certain of our common stockholders. We also have registered all shares of common stock that we may issue under our employee equity incentive plans. These shares can be freely sold in the public market upon issuance and subject to the restrictions imposed on our affiliates under Rule 144.

In the future, we may also issue our securities in connection with investments or acquisitions. The amount of shares of our common stock issued in connection with an investment or acquisition could constitute a material portion of our then-outstanding shares of our common stock. Any issuance of additional securities in connection with investments or acquisitions may result in additional dilution to you and may cause the market price of our common stock to drop significantly.

The exercise of options and warrants and other issuances of shares of common stock or securities convertible into common stock under our equity compensation plans will dilute your interest.

Under our existing equity compensation plans, as of December 31, 2019, we had outstanding options to purchase 2,594,228 shares of our common stock, 354,427 restricted stock units and 491,718 performance stock units to our employees and non-employee directors. From time to time, we expect to grant additional options and other stock awards in accordance with the 2015 Plan. The exercise of options and warrants at prices below the market price of our common stock could adversely affect the price of shares of our common stock. Additionally, any issuance of our common stock that is not made solely to then-existing stockholders proportionate to their interests, such as in the case of a stock dividend or stock split, will result in dilution to each stockholder by reducing their percentage ownership of the total outstanding shares. If we issue options or warrants to purchase our common stock in the future and those options or warrants are exercised or we issue stock, stockholders may experience further dilution.

If equity research analysts issue unfavorable commentary or downgrade our common stock, the price of our common stock could decline.

The trading market for our common stock relies in part on the research and reports that equity research analysts publish about us and our business. We do not control the work performed by these analysts. The demand for our common stock could decline if one or more equity analysts downgrade our stock or if those analysts issue unfavorable or inaccurate commentary. If such analysts cease publishing reports about us or our business, we could lose visibility in the market, which in turn could cause our share price and trading volume to decline.

We do not currently intend to pay dividends on the common stock, which may hinder your ability to achieve a return on your investment.

We have never declared or paid any cash dividends on our common stock. The continued operation and expansion of our business will require substantial funding and thus we currently intend to retain any future earnings and do not expect to pay any dividends in the foreseeable future. Accordingly, you are not likely to receive any dividends on common stock in the foreseeable future, and your ability to achieve a return on your investment will therefore depend on appreciation in the price of the common stock.

Provisions of Delaware law or our charter documents could delay or prevent an acquisition of our company, even if the acquisition would be beneficial to our stockholders, and could make it more difficult for you to change management.

Provisions of Delaware law and our amended and restated certificate of incorporation and amended and restated by-laws may discourage, delay or prevent a merger, acquisition or other change in control that stockholders may consider favorable, including transactions in which stockholders might otherwise receive a premium for their shares. These provisions may also prevent or delay attempts by stockholders to replace or remove our current management or members of our board of directors. These provisions include:

- a classified board of directors;
- limitations on the removal of directors;
- advance notice requirements for stockholder proposals and nominations;
- the inability of stockholders to act by written consent or to call special meetings;
- the ability of our board of directors to make, alter or repeal our amended and restated by-laws; and
- the authority of our board of directors to issue preferred stock with such terms as our board of directors may determine.

The affirmative vote of the holders of at least 75% of our shares of capital stock entitled to vote, and not less than 75% of the outstanding shares of each class entitled to vote thereon as a class, is necessary to amend or repeal the above provisions that are contained in our amended and restated certificate of incorporation. In addition, absent approval of our board of directors, our amended and restated by-laws may only be amended or repealed by the affirmative vote of the holders of at least 75% of our shares of capital stock entitled to vote.

In addition, we are subject to the provisions of Section 203 of the Delaware General Corporation Law, which limits business combination transactions with stockholders of 15% or more of our outstanding voting stock that our board of directors has not approved. These provisions and other similar provisions make it more difficult for stockholders or potential acquirers to acquire us without negotiation. These provisions may apply even if some stockholders may consider the transaction beneficial to them.

As a result, these provisions could limit the price that investors are willing to pay in the future for shares of our common stock. These provisions might also discourage a potential acquisition proposal or tender offer, even if the acquisition proposal or tender offer is at a premium over the then current market price for our common stock.

Item 1B. Unresolved Staff Comments.

None.

Item 2. Properties

Our headquarters is located in Scottsdale, Arizona, and we own or lease various other facilities in the United States, China, Mexico, Turkey, India, Denmark and Germany. We believe that our properties are generally in good condition, are well maintained and are generally suitable and adequate to carry out our business at expected capacity for the foreseeable future. The table below lists the locations and square footage for our facilities as of February 27, 2020:

Location	Year Commenced	Leased or Owned	Approximate Square Footage	Description of Use
Newton, IA, United States	2008	Leased	337,922	Wind Blade Manufacturing Facility
Newton, IA, United States	2018	Leased	114,078	Transportation Manufacturing Facility
Dafeng, China	2013	Leased	381,102	Wind Blade Manufacturing Facility
Dafeng, China	2015	Leased	446,034	Wind Blade Manufacturing Facility
Taicang Port, China	2007	Owned	208,445	Precision Molding Facility
Yangzhou, China	2018	Leased	934,133	Wind Blade Manufacturing Facility
Juárez, Mexico	2013	Leased	345,984	Wind Blade Manufacturing Facility
Juárez, Mexico	2016	Leased	453,096	Wind Blade Manufacturing Facility
Juárez, Mexico	2017	Leased	339,386	Wind Blade Manufacturing Facility
Juárez, Mexico	2018	Leased	300,277	Precision Molding Manufacturing Facility
Matamoros, Mexico	2017	Leased	527,442	Wind Blade Manufacturing Facility
Izmir, Turkey	2012	Leased	343,000	Wind Blade Manufacturing Facility
Izmir, Turkey	2015	Leased	817,078	Wind Blade Manufacturing Facility
Warren, RI, United States	2004	Leased	108,750	Precision Molding Development and Manufacturing and Research and Development Facility, Transportation Manufacturing Facility
Santa Teresa, NM, United States	2014	Leased	503,710	Wind Blade Storage Facility
Scottsdale, AZ, United States	2015	Leased	22,508	Corporate Headquarters
Kolding, Denmark	2018	Leased	2,583	Advanced Engineering Center
Chennai, India	2019	Leased	776,280	Wind Blade Manufacturing Facility
Berlin, Germany	2019	Leased	4,982	Engineering Center

Item 3. Legal Proceedings

From time to time, we are party to various lawsuits, claims, and other legal proceedings that arise in the ordinary course of business, some of which are covered by insurance. Upon resolution of any pending legal matters, we may incur charges in excess of presently established reserves. Our management does not believe that any such charges would, individually or in the aggregate, have a material adverse effect on our financial condition, results of operations or cash flows.

Item 4. Mine Safety Disclosures

Not applicable.

PART II

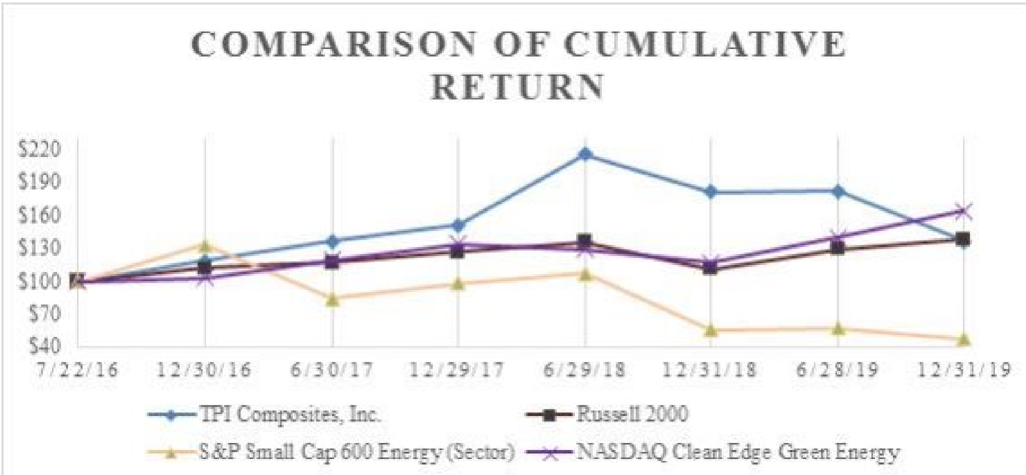
Item 5. Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities

Market Information

On July 22, 2016, our common stock began trading on the NASDAQ Global Market under the symbol "TPIC." Prior to that time, there was no public market for our stock.

Stock Performance Graph

The following graph and table illustrate the total stockholder return from July 22, 2016 through December 31, 2019, on our common stock, the Russell 2000 Index, the S&P Small Cap 600 Energy (Sector) Index and the NASDAQ Clean Edge Green Energy Index, assuming an investment of $100.00 on July 22, 2016 including the reinvestment of dividends.



	Base Period 7/22/16	12/30/16	6/30/17	12/29/17	6/29/18	12/31/18	6/28/19	12/31/19
TPI Composites, Inc.	$ 100.00	$ 118.29	$ 136.28	$ 150.88	$ 215.63	$ 181.27	$ 182.30	$ 136.50
Russell 2000	$ 100.00	$ 111.89	$ 116.69	$ 126.60	$ 135.47	$ 111.19	$ 129.16	$ 137.56
S&P Small Cap 600 Energy (Sector)	$ 100.00	$ 133.11	$ 84.00	$ 97.60	$ 107.35	$ 55.64	$ 57.15	$ 47.19
NASDAQ Clean Edge Green Energy	$ 100.00	$ 102.59	$ 119.52	$ 134.16	$ 128.63	$ 116.50	$ 139.39	$ 163.93

Holders

As of January 31, 2020, there were five stockholders of record of our common stock, although there is a much larger number of beneficial owners.

Dividends

We have never declared or paid any cash dividends on shares of our capital stock. We currently intend to retain earnings, if any, to finance the development and growth of our business and do not anticipate paying cash dividends on the common stock in the future. Any payment of any future dividends will be at the discretion of the board of directors, subject to compliance with certain covenants in our loan agreements, after taking into account various factors, including our financial condition, operating results, capital requirements, restrictions contained in any future financing instruments, growth plans and other factors the board deems relevant. See “Management’s Discussion and Analysis of Financial Condition and Results of Operations – Liquidity and Capital Resources” included in Part II, Item 7.

Certain of our subsidiaries are limited in their ability to declare dividends without first meeting statutory restrictions of the People’s Republic of China, including retained earnings as determined under Chinese-statutory accounting requirements. Until 50% ($26.5 million) of registered capital is contributed to a surplus reserve, our Chinese operations can only pay dividends equal to 90% of after-tax profits (10% must be contributed to the surplus reserve). Once the surplus reserve fund requirement is met, we can pay dividends equal to 100% of after-tax profit assuming other conditions are met. At December 31, 2019, the amount of the surplus reserve fund was $6.6 million. See “Management’s Discussion and Analysis of Financial Condition and Results of Operations— Liquidity and Capital Resources” included in Part II, Item 7.

Securities Authorized for Issuance under Equity Compensation Plans

The information required in response to Item 201(d) of Regulation S-K is set forth in Part III, Item 12 of this Annual Report on Form 10-K which is incorporated herein by reference.

Recent Sales of Unregistered Securities

None.

Use of Proceeds from Registered Securities

None

Issuer Purchases of Equity Securities

None

Item 6. Selected Financial Data

The following selected consolidated financial data should be read in conjunction with the information contained in "Management's Discussion and Analysis of Financial Condition and Results of Operations" included in Part II, Item 7 of this Annual Report on Form 10-K and the consolidated financial statements and related notes included in Part II, Item 8 of this Annual Report on Form 10-K, in order to understand the factors that may affect the comparability of the financial data presented below.

	Year Ended December 31,				
	2019	2018	2017 (1)	2016 (1)	2015
Consolidated Statement of Operations Data:	(in thousands, except per share data)				
Net sales	$ 1,436,500	$ 1,029,624	$ 955,198	$ 769,019	$ 585,852
Cost of sales	1,290,619	882,075	804,099	664,026	528,247
Startup and transition costs	68,033	74,708	40,628	18,127	15,860
Total cost of goods sold	1,358,652	956,783	844,727	682,153	544,107
Gross profit	77,848	72,841	110,471	86,866	41,745
General and administrative expenses	39,916	43,542	40,373	33,892	14,126
Realized loss on sale of assets and asset impairments	18,117	4,581	—	—	—
Restructuring charges, net	3,927	—	—	—	—
Income from operations	15,888	24,718	70,098	52,974	27,619
Other income (expense):					
Interest income	157	181	95	344	161
Interest expense	(8,179)	(10,417)	(12,381)	(17,614)	(14,565)
Loss on extinguishment of debt	—	(3,397)	—	(4,487)	—
Realized loss on foreign currency remeasurement	(4,107)	(13,489)	(4,471)	(757)	(1,802)
Miscellaneous income	3,648	4,650	1,191	238	246
Total other expense	(8,481)	(22,472)	(15,566)	(22,276)	(15,960)
Income before income taxes	7,407	2,246	54,532	30,698	11,659
Income tax benefit (provision)	(23,115)	3,033	(15,798)	(3,654)	(3,977)
Net income (loss)	(15,708)	5,279	38,734	27,044	7,682
Net income attributable to preferred stockholders(2)	—	—	—	5,471	9,423
Net income (loss) attributable to common stockholders	$ (15,708)	$ 5,279	$ 38,734	$ 21,573	$ (1,741)
Weighted-average common shares outstanding:					
Basic(3)	35,062	34,311	33,844	17,530	4,238
Diluted(3)	35,062	36,002	34,862	17,616	4,238
Net income (loss) per common share:					
Basic	$ (0.45)	$ 0.15	$ 1.14	$ 1.23	$ (0.41)
Diluted	$ (0.45)	$ 0.15	$ 1.11	$ 1.22	$ (0.41)

	December 31,				
	2019	2018	2017 (1)	2016 (1)	2015
Consolidated Balance Sheet Data:	(in thousands)				
Cash and cash equivalents	$ 70,282	$ 85,346	$ 148,113	$ 119,066	$ 45,917
Total assets	826,677	604,855	545,737	436,833	329,920
Total debt, net of debt issuance costs and discount	141,389	137,623	121,385	123,155	129,346
Total liabilities	621,627	383,898	325,183	265,433	322,287
Total convertible and senior redeemable preferred shares and warrants	—	—	—	—	198,830
Total stockholders' equity (deficit)	205,050	220,957	220,554	171,400	(191,197)

	Year Ended December 31,				
	2019	2018	2017 (1)	2016 (1)	2015
Other Financial Information:	(in thousands, except other operating information)				
Total billings(4)	$ 1,387,235	$ 1,006,541	$ 941,565	$ 764,424	$ 600,107
EBITDA(4)	$ 54,009	$ 42,308	$ 88,516	$ 65,641	$ 37,479
Adjusted EBITDA(4)	$ 81,914	$ 68,173	$ 100,111	$ 76,300	$ 39,281
Capital expenditures	$ 74,408	$ 52,688	$ 44,828	$ 30,507	$ 26,361
Free cash flow(4)	$ (17,324)	$ (55,946)	$ 29,772	$ 29,335	$ 4,932
Total debt, net of debt issuance costs and discount	$ 141,389	$ 137,623	$ 121,385	$ 123,155	$ 129,346
Net cash (debt)(4)	$ (71,779)	$ (53,155)	$ 24,557	$ (6,379)	$ (90,667)
Other Operating Information:					
Sets(5)	3,178	2,423	2,736	2,154	1,609
Estimated megawatts(6)	9,324	6,560	6,602	4,920	3,595
Dedicated manufacturing lines(7)	52	55	48	44	34
Manufacturing lines installed(8)	48	43	41	33	30
Manufacturing lines in startup(9)	14	16	9	3	10
Manufacturing lines in transition(10)	10	15	—	3	11

(1) Reflects the impact of the adoption of Accounting Standards Update (ASU) 2014-09, *Revenue from Contracts with Customers*, (Topic 606) effective January 1, 2018. See Note 1 - Recently Issued Accounting Pronouncements - Revenue from Contracts with Customers of the Notes to Consolidated Financial Statements included in Part II, Item 8 of this Annual Report on Form 10-K for a further discussion. Prior period information for 2015 has not been restated and is, therefore, not comparable to the 2019, 2018, 2017 and 2016 information.

(2) Represents the accrual of dividends on our convertible and senior redeemable preferred shares, the accretion to redemption amounts on our convertible preferred shares and warrant fair value adjustments. Immediately prior to the closing of the IPO, all preferred shares were converted into shares of our common stock and as a result, the accrual of dividends ceased.

(3) For the years ended December 31, 2017 and 2016, the weighted-average diluted shares outstanding include the conversion on a net issuance basis of our common warrants and the stock options issued under the 2015 Plan and the 2008 Stock Option and Grant Plan. For the year ended December 31, 2015, the weighted-average common shares outstanding are the same under the basic and diluted per share calculations as we incurred a net loss in that year.

(4) See "Management's Discussion and Analysis of Financial Condition and Results of Operations—Key Metrics Used By Management to Measure Performance" included in Part II, Item 7 of this Annual Report on Form 10-K for more information and the reconciliations of total billings, EBITDA, adjusted EBITDA, free cash flow and net cash (debt) to net sales, net income (loss), net income (loss), net cash provided by (used in) operating activities and total debt, net of debt issuance costs and discount, respectively, the most directly comparable financial measures calculated and presented in accordance with GAAP.

(5) Number of wind blade sets (which consist of three wind blades) invoiced worldwide in the period. See "Management's Discussion and Analysis of Financial Condition and Results of Operations—Key Metrics Used By Management to Measure Performance" included in Part II, Item 7 of this Annual Report on Form 10-K for more information.

(6) Estimated megawatts of energy capacity to be generated by wind blade sets invoiced in the period. See "Management's Discussion and Analysis of Financial Condition and Results of Operations—Key Metrics Used By Management to Measure Performance" included in Part II, Item 7 of this Annual Report on Form 10-K for more information.

(7) Number of wind blade manufacturing lines that are dedicated to our customers under long-term supply agreements at the end of the period. For the year ended December 31, 2017, includes seven manufacturing lines for GE Wind that were not extended beyond 2017. Dedicated manufacturing lines may be greater than total manufacturing line capacity in instances where we have signed new supply agreements for manufacturing facilities that are under construction or have not yet been built. See "Management's Discussion and Analysis of Financial Condition and Results of Operations—Key Metrics Used By Management to Measure Performance" included in Part II, Item 7 of this Annual Report on Form 10-K for more information.

(8) Number of wind blade manufacturing lines installed and either in operation, startup or transition at the end of the period. For the year ended December 31, 2017, includes four manufacturing lines for GE Wind that were not extended beyond 2017. See "Management's Discussion and Analysis of Financial Condition and Results of Operations—Key Metrics Used By Management to Measure Performance" included in Part II, Item 7 of this Annual Report on Form 10-K for more information.

(9) Number of wind blade manufacturing lines that were in a startup phase during the pre-production and production ramp-up period. See "Management's Discussion and Analysis of Financial Condition and Results of Operations—Key Metrics Used By Management to Measure Performance" included in Part II, Item 7 of this Annual Report on Form 10-K for more information.

(10) Number of wind blade manufacturing lines that were being transitioned to a new wind blade model during the period. See "Management's Discussion and Analysis of Financial Condition and Results of Operations—Key Metrics Used By Management to Measure Performance" included in Part II, Item 7 of this Annual Report on Form 10-K for more information.

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

You should read the following discussion and analysis of our financial condition and results of operations together with our consolidated financial statements and the related notes included in Part II, Item 8 of this Annual Report on Form 10-K and other financial information appearing elsewhere in this Annual Report on Form 10-K. Some of the information contained in this discussion and analysis or set forth elsewhere in this Annual Report on Form 10-K, including information with respect to plans and strategy for our business and related financing, includes forward-looking statements that involve risks and uncertainties. Our actual results could differ materially from those described in or implied by these forward-looking statements as a result of various factors, including those discussed below and elsewhere in this Annual Report on Form 10-K, particularly those under "Risk Factors" included in Part I, Item 1A of this Annual Report on Form 10-K.

OVERVIEW

Our Company

We are the only independent manufacturer of composite wind blades for the wind energy market with a global manufacturing footprint. We enable many of the industry's leading wind turbine original equipment manufacturers (OEM), who have historically relied on in-house production, to outsource the manufacturing of some of their wind blades through our global footprint of advanced manufacturing facilities strategically located to serve large and growing wind markets in a cost-effective manner. Given the importance of wind energy capture, turbine reliability and cost to power producers, the size, quality and performance of wind blades have become highly strategic to our OEM customers. As a result, we have become a key supplier to our OEM customers in the manufacture of wind blades and related precision molding and assembly systems. We have entered into long-term supply agreements pursuant to which we dedicate capacity at our facilities to our customers in exchange for their commitment to purchase minimum annual volumes of wind blade sets (which consist of three wind blades). This collaborative dedicated supplier model provides us with contracted volumes that generate significant revenue visibility, drive capital efficiency and allow us to produce wind blades at a lower total delivered cost, while ensuring critical dedicated capacity for our customers.

We also leverage our advanced composite technology and history of innovation to supply high strength, lightweight and durable composite products to the transportation market. In November 2017, we signed a five- year supply agreement with Proterra Inc. (Proterra) to supply Proterra Catalyst® composite bus bodies. In February 2018, we entered into an agreement with Navistar, Inc. (Navistar) to design and develop an all composite Class 8 tractor cab. This collaborative development project was entered into in connection with Navistar's recent award under the Department of Energy's (DOE) Super Truck II investment program, which is designed to promote fuel efficiency in commercial vehicles. In 2019, we also agreed to develop prototype composite body delivery vehicles for Workhorse Group. In November 2018, we announced a capital investment of approximately $11.5 million in 2019 to develop a highly automated pilot manufacturing line for the electric vehicle market within our Warren, Rhode Island facility, and we plan to commence operating this pilot line later this year. We expect this investment will enable us to further develop our technology, create defensible product and process IP and demonstrate our capability to manufacture composite components cost effectively at automotive volume rates. We also expect this pilot line will also help our current and potential customers to de-risk the decision-making process to commit to TPI for high-volume manufacturing programs in the future.

Our wind blade and precision molding and assembly systems manufacturing businesses accounted for approximately 96%, 95% and 96% of our total net sales for each of the years ended December 31, 2019, 2018 and 2017, respectively. As of February 27, 2020, our long-term wind and transportation supply agreements provide for minimum aggregate volume commitments from our customers of approximately $2.8 billion and encourage our customers to purchase additional volume up to, in the aggregate, a total contract value of approximately $5.2 billion through the end of 2023. In recent years, we have experienced significant growth in our OEM customer base, as according to data from WoodMac, our OEM customers collectively accounted for approximately 55% of the global onshore wind energy market and approximately 87% of that market excluding China over the three years ended December 31, 2018, based on MWs of energy capacity installed. Additionally, our customers represented 99% of the U.S. onshore wind turbine market over the three years ended December 31, 2018, based on MWs of energy capacity installed. We believe these figures demonstrate the leading position of our existing OEM customers, as well as our opportunity to develop relationships with new OEM customers as additional OEMs seeking to capitalize on the benefits of outsourced wind blade manufacturing while maintaining high quality customization and dedicated capacity. We believe that these trends will help us to strengthen our current customer base, grow our business worldwide, increase our revenue and improve our business prospects.

We divide our business operations into four geographic operating segments—the United States (U.S.), Asia, Mexico and Europe, the Middle East, Africa and India (EMEAI), as follows:

- Our U.S. segment includes (1) the manufacturing of wind blades at our Newton, Iowa plant, (2) the manufacturing of precision molding and assembly systems used to manufacture wind blades at our Warren, Rhode Island facility, (3) the manufacturing of composite solutions for the transportation industry at our Rhode Island facility, (4) wind blade inspection and repair services in North America, (5) our advanced engineering center in Kolding, Denmark, which provides technical and engineering resources to our manufacturing facilities, (6) our engineering center in Berlin, Germany which we purchased in July 2019 and (7) our corporate headquarters, the costs of which are included in general and administrative expenses.
- Our Asia segment includes (1) the manufacturing of wind blades at our facilities in Dafeng, China and Yangzhou, China, the latter of which commenced operations in March 2019, (2) the manufacturing of precision molding and assembly systems at our Taicang Port, China facility and (3) wind blade inspection and repair services.
- Our Mexico segment manufactures wind blades from three facilities in Juárez, Mexico and a facility in Matamoros, Mexico at which we commenced operations in July 2018. In November 2018, we entered into a new lease agreement with a third party for a new precision molding and assembly systems manufacturing facility in Juárez, Mexico and we commenced operations at this facility in March 2019. This segment also performs wind blade inspection and repair services.
- Our EMEAI segment manufactures wind blades from two facilities in Izmir, Turkey and also performs wind blade inspection and repair services. In February 2019, we entered into a new lease agreement with a third party for a new manufacturing facility that was built in Chennai, India and we commenced operations at this facility in the first quarter of 2020. This segment also performs wind blade inspection and repair services.

Key Trends Affecting our Business

We have identified the following material trends affecting our business:

- Our business seeks to capitalize on two major global trends: (i) increasing worldwide demand for renewable energy; and (ii) increasing worldwide demand for electric vehicles.
- The wind power generation industry has grown rapidly and expanded worldwide over the last five years to meet global demand for electricity and the expanded use of renewable energy. Our sales of wind blades to our wind turbine customers have grown rapidly over the last several years in response to these trends. In 2019, our net sales grew to $1.44 billion compared to net sales of $1.03 billion in 2018. We expect our revenue to continue to grow in 2020 but at a slower rate than in 2019.
- During the last several years, wind turbine OEMs generally have increasingly outsourced the production of wind blades and other key components to specialized manufacturers to meet this increasing global demand for wind energy in a cost-effective manner in new and growing markets. That shift, together with the overall expansion of the wind power generation industry, has increased our addressable market. Given our growth in production, we have hired several thousand new employees globally in the past two years. In addition, we have expanded our wind turbine OEM customer base from one to five OEM customers since 2012, capitalizing on the growth and expansion of the wind energy generation industry generally as well as the specific trend of most wind turbine OEMs increasing the outsourcing of the manufacturing of wind blades for growth and diversification.

- Changing customer demands, including shifts to bigger wind turbines with larger wind blades, have driven some of our customers to require us to transition to new wind blade models one or two times during the term of a long-term supply agreement. Although we generally receive transition payments to compensate us for certain costs incurred during these transitions, these payments generally do not fully cover the transition costs and lost margin. In 2019, we had a significant number of our manufacturing lines in transition to larger wind blade models and we also had a significant number of lines starting up in our new manufacturing facilities in Matamoros, Mexico and Yangzhou, China. This large number of transitions and startups had an adverse impact on our results of operations and profitability in 2019. In 2020, we expect to continue to have a significant number of lines in transition and startup which will have an adverse impact on our results of operations for 2020, but we expect this to provide a foundation for longer term revenue growth and profitability as these lines ramp up to full production levels.
- We expect our new manufacturing facilities to generally generate operating losses in their first 18 months of operations due to production and overhead expenses as they initially operate far below capacity during the pre-production and production ramp up periods. As a result, this generally has a negative impact on our results of operations during these ramp-up periods. In addition, construction of new facilities and expansion of existing facilities, including the fabrication of precision molding and assembly systems to outfit those facilities, is complex and involves inherent risks. For planning purposes, we generally estimate that the startup of a new six-line manufacturing facility requires cash for net operating expenses and working capital of between $20 million to $25 million. We also estimate that capital expenditures, primarily for machinery and equipment, of between $30 million to $35 million will be required. We expect to incur significant startup costs and expenses during 2020 in connection with the recent startup of our new manufacturing facility in Chennai, India.
- Many governments are shifting from feed-in tariffs to auction-based tenders as a means of promoting the development and growth of renewable energy sources such as wind energy. As a result of this shift, our wind turbine OEM customers have experienced intense pricing pressure with respect to the sale of their turbines together with increased competitive pricing from solar energy. As a result of these pricing pressures, the financial performance of certain smaller wind turbine OEMs has deteriorated over the last twelve months. In 2019, one of our former customers, Senvion, entered into insolvency proceedings in Germany and Senvion's insolvency had an adverse impact on our results of operations in 2019. In addition, ENERCON, one of our current customers, announced in 2019 that it was entering into financial restructuring discussions with its lenders. To date, our financial performance has not been impacted by ENERCON's announced restructuring although if ENERCON's financial positions deteriorates further in 2020, it could have an adverse impact on our results of operations in 2020.

- The long-term supply agreements we sign with our customers provide us with significant visibility of future production demands due in part to the annual minimum purchase commitments of our customers contained in those agreements. These annual minimum purchase commitments generally require our customers to purchase a negotiated percentage of the manufacturing capacity that we have agreed to dedicate to them. Generally, this percentage begins at 100% of the manufacturing capacity for the first few years of the supply agreement, and the percentage declines over time in subsequent years according to the terms of the agreement, but generally remains above 50%. It is our experience that our customers will generally order wind blades from us in a volume that exceeds (sometimes substantially) the annual minimum purchase commitments contained in our supply agreements, particularly in the later years of a supply agreement when the annual minimum purchase commitment percentage declines. As of February 27, 2020, our long-term wind and transportation supply agreements provide for minimum aggregate volume commitments from our customers of approximately $2.8 billion and encourage our customers to purchase additional volume up to, in the aggregate, a total contract value of approximately $5.2 billion through the end of 2023. As noted elsewhere in this Annual Report on Form 10-K, some of our long-term supply agreements are subject to early termination by our customers if our customers pay an early termination fee. Additionally, some of our contracts allow our customers to reduce the number of lines under contract without penalty, prior to the end of the contact term. We caution investors that the annual minimum purchase commitments in our long-term supply agreements can understate the forecasted net sales that we are likely to generate in a given period or periods if all of our long-term supply agreements remain in place and pricing remains materially unchanged, and they could potentially overstate the forecasted net sales that we are likely to generate in a given period or periods if one or more of our agreements were to be terminated by our customers for any reason due to market conditions our plants are underutilized. See "Business—Wind Blade Long-Term Supply Agreements" included in Part 1, Item 1A of this Annual Report on Form 10-K for additional information.
- As the global vehicle electrification trend continues, reducing the weight of these vehicles is critical to expanding range and/or providing more room for additional batteries or reducing the number of batteries. We believe there is an increasing demand for composites products for electric vehicles. As part of our diversification strategy, we have made significant investments to expand our transportation business during the last several years. In 2018 and 2019, we experienced significant losses relating to our transportation business and experienced operational challenges as we are expanding this business. Specifically, we experienced extended startup delays and challenges with respect to our Newton, Iowa transportation facility, which had an adverse impact on our results of operations in 2019. We plan to cease manufacturing composite bus bodies from our Newton, Iowa manufacturing facility in the first quarter of 2020 and consolidate these operations into our Warren, Rhode Island manufacturing facility. We expect our transportation business results of operations will improve substantially in 2020 compared to 2019 although we expect it will continue to operate at a loss in 2020.
- The Coronavirus will have an adverse impact on our business, particularly our manufacturing facilities in China. We expect that the impact of the Coronavirus will have an adverse impact on our net sales, net income and Adjusted EBITDA for the first quarter of 2020 and also may have an adverse impact on our financial condition and results of operations for the rest of 2020. Although we are currently attempting to take all reasonable steps to mitigate the impact of the Coronavirus, including taking steps to make up the anticipated lost wind blade volume later this year, we currently estimate that the Coronavirus will negatively impact our net income and Adjusted EBITDA in 2020 by up to approximately $10 million. In addition, if we experience any additional unexpected delays in the resumption of our full production capacity at our China manufacturing facilities or incur additional unanticipated costs and expenses as a result of the Coronavirus, such production delays and unanticipated costs and expenses will have a further adverse impact on our business, financial condition and results of operations in 2020.

COMPONENTS OF RESULTS OF OPERATIONS

Net Sales

We recognize revenue from manufacturing services over time as our customers control the product as it is produced, and we may not use or sell the product to fulfill other customers' contracts. Net sales include amounts billed to our customers for our products, including wind blades, precision molding and assembly systems and other products and services, as well as the progress towards the completion of the performance obligation for products in progress, which is determined on a ratio of direct costs incurred to date in fulfillment of the contract to the total estimated direct costs required to complete the performance obligation.

Cost of Goods Sold

Cost of goods sold includes the costs we incur at our production facilities to make products saleable on both products invoiced during the period as well as products in progress towards the completion of each performance obligation. Cost of goods sold includes such items as raw materials, direct and indirect labor and facilities costs, including purchasing and receiving costs, plant management, inspection costs, production process improvement activities, product engineering and internal transfer costs. In addition, all depreciation associated with assets used in the production of our products is also included in cost of goods sold. Direct labor costs consist of salaries, benefits and other personnel related costs for employees engaged in the manufacturing of our products and services.

Startup and transition costs are primarily unallocated fixed overhead costs and underutilized direct labor costs incurred during the period production facilities are transitioning wind blade models and ramping up manufacturing. All direct labor costs are included in the measure of progress towards completion of the relevant performance obligation when determining revenue to be recognized during the period. The cost of sales for the initial wind blades from a new model manufacturing line is generally higher than when the line is operating at optimal production volume levels due to inefficiencies during ramp-up related to labor hours per blade, cycle times per blade and raw material usage. Additionally, these costs as a percentage of net sales are generally higher during the period in which a facility is ramping up to full production capacity due to underutilization of the facility. Manufacturing overhead at each of our facilities includes virtually all indirect costs (including share-based compensation costs) incurred at the plants, including engineering, finance, information technology, human resources and plant management.

General and Administrative Expenses

General and administrative expenses primarily relate to the unallocated portion of costs incurred at our corporate headquarters and our research facilities and include salaries, benefits and other personnel related costs for employees engaged in research and development, engineering, finance, internal audit, information technology, human resources, business development, global operational excellence, global supply chain, in-house legal and executive management. Other costs include outside legal and accounting fees, risk management (insurance), share-based compensation and certain other administrative and global resources costs.

The research and development expenses incurred at our Warren, Rhode Island location as well as at our Kolding, Denmark advanced engineering center and our Berlin, Germany engineering center are also included in general and administrative expenses. For the years ended December 31, 2019, 2018 and 2017, total research and development expenses totaled $1.0 million, $0.8 million and $1.6 million, respectively.

Realized Loss on Sale of Assets and Asset Impairments

Realized loss on sale of assets represents the realized losses on the sale of certain receivables, on a non-recourse basis under supply chain financing arrangements with our customers, to financial institutions and realized losses on the sale of other assets at our corporate and manufacturing facilities. Asset impairments represent the realized losses on the impairment of our assets at our corporate and manufacturing facilities.

Restructuring Charges

Restructuring charges primarily consist of employee severance, one-time termination benefits and ongoing benefits related to the reduction of our workforce and other costs associated with exit activities, which may include costs related to leased facilities to be abandoned and facility and employee relocation costs.

Other Income (Expense)

Other income (expense) consists primarily of interest expense on our debt borrowings and the amortization of deferred financing costs on such borrowings. Other income (expense) also includes realized gains and losses on foreign currency remeasurement, interest income, losses on extinguishment of debt and miscellaneous income and expense.

Income Taxes

Income taxes consists of federal, state, provincial, local and foreign taxes based on income in jurisdictions in which we operate, including in the U.S., China, Mexico, Turkey and India. The composite income tax rate, tax provisions, deferred tax assets and liabilities vary according to the jurisdiction in which the income or loss arises. Tax laws are complex and subject to different interpretations by management and the respective governmental taxing authorities, and require us to exercise judgment in determining our income tax provision, our deferred tax assets and liabilities and the valuation allowance recorded against our net deferred tax assets.

KEY METRICS USED BY MANAGEMENT TO MEASURE PERFORMANCE

In addition to measures of financial performance presented in our consolidated financial statements in accordance with GAAP, we use certain other financial measures and operating metrics to analyze our performance. These “non-GAAP” financial measures consist of total billings, EBITDA, adjusted EBITDA, free cash flow and net cash (debt), which help us evaluate growth trends, establish budgets, assess operational efficiencies, oversee our overall liquidity, and evaluate our overall financial performance. The key operating metrics consist of wind blade sets invoiced, estimated megawatts of energy capacity to be generated by wind blade sets invoiced, utilization, dedicated manufacturing lines, manufacturing lines installed, manufacturing lines in operation, manufacturing lines in startup and manufacturing lines in transition, which help us evaluate our operational performance. We believe that these measures are useful to investors in evaluating our performance.

Key Financial Measures

	Year Ended December 31,		
	2019	2018	2017
	(in thousands)		
Net sales	$ 1,436,500	$ 1,029,624	$ 955,198
Total billings[1]	$ 1,387,235	$ 1,006,541	$ 941,565
Net income	$ (15,708)	$ 5,279	$ 38,734
EBITDA[1]	$ 54,009	$ 42,308	$ 88,516
Adjusted EBITDA[1]	$ 81,914	$ 68,173	$ 100,111
Capital expenditures	$ 74,408	$ 52,688	$ 44,828
Free cash flow[1]	$ (17,324)	$ (55,946)	$ 29,772
Total debt, net of debt issuance costs and discount	$ 141,389	$ 137,623	$ 121,385
Net cash (debt)[1]	$ (71,779)	$ (53,155)	$ 24,557

Key Operating Metrics (2)

	Year Ended December 31,		
	2019	2018	2017
Sets	3,178	2,423	2,736
Estimated megawatts	9,324	6,560	6,602
Utilization	79%	71%	86%
Dedicated manufacturing lines	52	55	48
Manufacturing lines installed	48	43	41
Manufacturing lines in operation	24	12	32
Manufacturing lines in startup	14	16	9
Manufacturing lines in transition	10	15	—

(1) See below for more information and a reconciliation of total billings, EBITDA, adjusted EBITDA, free cash flow and net cash (debt) to net sales, net income (loss), net income (loss), net cash provided by (used in) operating activities and total debt, net of debt issuance costs, respectively, the most directly comparable financial measures calculated and presented in accordance with GAAP.

(2) See below for more information on each of our key operating metrics.

Key Financial Measures

Total billings

We define total billings, a non-GAAP financial measure, as the total amounts we have invoiced our customers for products and services for which we are entitled to payment under the terms of our long-term supply agreements or other contractual agreements. We monitor total billings, and believe it is useful to present to investors as a supplement to our GAAP measures, because we believe it more directly correlates to sales activity and operations based on the timing of actual transactions with our customers, which facilitates comparison of our performance between periods and provides a more timely indication of trends in sales. Under GAAP, total net sales recognized on products in production represents the total amount that we have recognized as revenue under the cost-to-cost method for services performed during the period under our long-term supply agreements. Services performed but unbilled include procurement of raw materials and production of work in process and undelivered finished goods. Under our long-term supply agreements with our customers, we invoice our customers for wind blades once the blades pass certain acceptance procedures and title passes to our customers. Our customers generally pay us for the wind blades between 5 to 25 days after receipt of the invoice based on negotiated payment terms and when considering our supply chain financing arrangements.

Our use of total billings has limitations as an analytical tool, and you should not consider it in isolation or as a substitute for analysis of our results as reported under GAAP. Some of these limitations are:

- Total billings includes wind blades that have not been delivered and for which we are responsible if damage occurs to them while we hold them; and
- Other companies, including companies in our industry, may define total billings differently, which reduces its usefulness as a comparative measure.

EBITDA and adjusted EBITDA

We define EBITDA, a non-GAAP financial measure, as net income or loss plus interest expense (including losses on extinguishment of debt and net of interest income), income taxes and depreciation and amortization. We define adjusted EBITDA as EBITDA plus any share-based compensation expense, plus or minus any realized gains or losses from foreign currency remeasurement, plus or minus any gains or losses from the sale of assets. Adjusted EBITDA is the primary metric used by our management and our board of directors to establish budgets and operational goals for managing our business and evaluating our performance. In addition, our credit agreement (the Credit Agreement) that we entered into in April 2018 contains minimum EBITDA (as defined in the Credit Agreement) covenants with which we must comply. We monitor adjusted EBITDA as a supplement to our GAAP measures, and believe it is useful to present to investors, because we believe that it facilitates evaluation of our period-to-period operating performance by eliminating items that are not operational in nature, allowing comparison of our recurring core business operating results over multiple periods unaffected by differences in capital structure, capital investment cycles and fixed asset base. In addition, we believe adjusted EBITDA and similar measures are widely used by investors, securities analysts, ratings agencies, and other parties in evaluating companies in our industry as a measure of financial performance and debt-service capabilities.

Our use of adjusted EBITDA has limitations as an analytical tool and you should not consider it in isolation or as a substitute for analysis of our results as reported under GAAP. Some of these limitations are:

- adjusted EBITDA does not reflect changes in, or cash requirements for, our working capital needs;
- adjusted EBITDA does not reflect our cash expenditures for capital equipment or other contractual commitments;
- adjusted EBITDA does not reflect the interest expense or the cash requirements necessary to service interest or principal payments on our indebtedness;
- adjusted EBITDA does not reflect losses on extinguishment of debt relating to prepayment penalties, termination fees and the write off of any remaining debt discount and debt issuance costs upon the repayment or refinancing of our debt;
- adjusted EBITDA does not reflect tax payments that may represent a reduction in cash available to us;
- although depreciation and amortization are non-cash charges, the assets being depreciated and amortized may have to be replaced in the future, and adjusted EBITDA does not reflect capital expenditure requirements relating to the future need to augment or replace those assets;
- adjusted EBITDA does not reflect the realized gains or losses from foreign currency remeasurement in our international operations;
- adjusted EBITDA does not reflect share-based compensation expense on equity-based incentive awards to our officers, employees, directors and consultants;
- adjusted EBITDA does not reflect the realized gains or losses on the sale of assets and asset impairments; and
- other companies, including companies in our industry, may calculate EBITDA and adjusted EBITDA differently, which reduces their usefulness as comparative measures.

In evaluating EBITDA and adjusted EBITDA, you should be aware that in the future, we will incur expenses similar to the adjustments noted in this presentation. Our presentations of EBITDA and adjusted EBITDA should not be construed as suggesting that our future results will be unaffected by these expenses or any unusual or non-recurring items. When evaluating our performance, you should consider EBITDA and adjusted EBITDA alongside other financial performance measures, including our net income (loss) and other GAAP measures.

Free cash flow

We define free cash flow as net cash provided by (used in) operating activities less capital expenditures. We believe free cash flow is a useful measure for investors because it portrays our ability to generate cash from our business for purposes such as repaying maturing debt and funding business acquisitions.

Net cash (debt)

We define net cash (debt) as total unrestricted cash and cash equivalents less the total principal amount of debt outstanding. The total principal amount of debt outstanding is comprised of the long-term debt and current maturities of long-term debt as presented in our consolidated balance sheets adding back any debt issuance costs. We believe that the presentation of net cash (debt) provides useful information to investors because our management reviews net cash (debt) as part of our oversight of overall liquidity, financial flexibility and leverage. Net cash (debt) is important when we consider opening new plants and expanding existing plants, as well as for capital expenditure requirements.

The following table reconciles our non-GAAP key financial measures to the most directly comparable GAAP measures:

Total billings, EBITDA and adjusted EBITDA are reconciled as follows:

	Year Ended December 31,		
	2019	2018	2017
		(in thousands)	
Net sales	$ 1,436,500	$ 1,029,624	$ 955,198
Change in gross contract assets	(43,405)	(15,011)	(13,437)
Foreign exchange impact(1)	(5,860)	(8,072)	(196)
Total billings	$ 1,387,235	$ 1,006,541	$ 941,565
Net income (loss)	$ (15,708)	$ 5,279	$ 38,734
Adjustments:			
Depreciation and amortization	38,580	26,429	21,698
Interest expense (net of interest income)	8,022	10,236	12,286
Loss on extinguishment of debt	—	3,397	—
Income tax provision (benefit)	23,115	(3,033)	15,798
EBITDA	54,009	42,308	88,516
Share-based compensation expense	5,681	7,795	7,124
Realized loss on foreign currency remeasurement	4,107	13,489	4,471
Realized loss on sale of assets and asset impairments	18,117	4,581	—
Adjusted EBITDA	$ 81,914	$ 68,173	$ 100,111

(1) Represents the effect of the difference in the exchange rates used by our various foreign subsidiaries when converted to U.S. dollars on the net sales and contract assets as of period-end.

Free cash flow is reconciled as follows:

	Year Ended December 31,		
	2019	2018	2017
		(in thousands)	
Net cash provided by (used in) operating activities	$ 57,084	$ (3,258)	$ 74,600
Less capital expenditures	(74,408)	(52,688)	(44,828)
Free cash flow	$ (17,324)	$ (55,946)	$ 29,772

Net cash (debt) is reconciled as follows:

	December 31,		
	2019	2018	2017
		(in thousands)	
Cash and cash equivalents	$ 70,282	$ 85,346	$ 148,113
Less total debt, net of debt issuance costs	(141,389)	(137,623)	(121,385)
Less debt issuance costs	(672)	(878)	(2,171)
Net cash (debt)	$ (71,779)	$ (53,155)	$ 24,557

Key Operating Metrics

Key operating metrics consist of sets invoiced, estimated megawatts of energy capacity for wind blade sets invoiced, utilization, dedicated manufacturing lines, manufacturing lines installed, manufacturing lines in operation, manufacturing lines in startup and manufacturing lines in transition.

Sets represents the number of wind blade sets (which consist of three wind blades) which we invoiced worldwide during the period. We monitor sets and believe that presenting sets to investors is helpful because we believe that it is the most direct measurement of our manufacturing output during the period. Sets primarily impact net sales and total billings

Estimated megawatts are the energy capacity to be generated by wind blade sets invoiced in the period. Our estimate is based solely on name-plate capacity of the wind turbine on which the wind blades we manufacture are expected to be installed. We monitor estimated megawatts and believe that presenting estimated megawatts to investors is helpful because we believe that it is a commonly followed measurement of energy capacity across our industry and provides an indication of our share of the overall wind blade market.

Utilization represents the percentage of wind blades invoiced during a period compared to the total potential wind blade capacity of the manufacturing lines installed at the end of the period. We monitor utilization because we believe it helps investors to better understand how close we are to operating at maximum production capacity.

Dedicated manufacturing lines are the number of wind blade manufacturing lines that we have dedicated to our customers pursuant to our long-term supply agreements at the end of the period. We monitor dedicated manufacturing lines and believe that presenting this metric to investors is helpful because we believe that the number of dedicated manufacturing lines is the best indicator of demand for the wind blades we manufacture for customers under our long-term supply agreements in any given period. We believe that dedicated manufacturing lines provide an understanding of additional capacity within an existing facility. Dedicated manufacturing lines primarily impacts our net sales and total billings.

Manufacturing lines installed represents the number of wind blade manufacturing lines installed and either in operation, startup or transition at the end of the period. We believe that total manufacturing lines installed provides an understanding of the number of manufacturing lines installed and either in operation, startup or transition.

Manufacturing lines in operation is the number of wind blade manufacturing lines installed less the number of manufacturing lines in startup and in transition. We monitor manufacturing lines in operation because we believe it helps investors understand the number of our manufacturing lines that are operating in a mature state of production.

Manufacturing lines in startup is the number of wind blade manufacturing lines that were in a startup phase during the pre-production and production ramp up period, pursuant to the opening of a new manufacturing facility, the expansion of an existing manufacturing facility or the addition of new manufacturing lines in an existing manufacturing facility. We monitor and present this metric because we believe it helps investors to better understand the impact of the startup phase of our new manufacturing facilities on our gross profit and net income.

Manufacturing lines in transition is the number of wind blade manufacturing lines that were being transitioned to a new wind blade model during the period. We monitor and present this metric because we believe it helps investors to better understand the impact of these transitions on our gross profit and net income.

RESULTS OF OPERATIONS

Year Ended December 31, 2019 Compared to Year Ended December 31, 2018

The following table summarizes certain information relating to our operating results (in thousands) and related percentage of net sales for the years ended December 31 that have been derived from our consolidated financial statements:

	2019		2018	
Net sales	$ 1,436,500	100.0%	$ 1,029,624	100.0%
Cost of sales	1,290,619	89.8%	882,075	85.7%
Startup and transition costs	68,033	4.8%	74,708	7.2%
Total cost of goods sold	1,358,652	94.6%	956,783	92.9%
Gross profit	77,848	5.4%	72,841	7.1%
General and administrative expenses	39,916	2.8%	43,542	4.2%
Realized loss on sale of assets and asset impairments	18,117	1.3%	4,581	0.5%
Restructuring charges, net	3,927	0.2%	—	0.0%
Income from operations	15,888	1.1%	24,718	2.4%
Other expense	(8,481)	(0.6)%	(22,472)	(2.2)%
Income before income taxes	7,407	0.5%	2,246	0.2%
Income tax benefit (provision)	(23,115)	(1.6)%	3,033	0.3%
Net income (loss)	$ (15,708)	(1.1)%	$ 5,279	0.5%

Net sales for the year ended December 31, 2019 increased by $406.9 million or 39.5% to $1,436.5 million compared to $1,029.6 million in the same period in 2018. Net sales of wind blades increased by 42.4% to $1,328.7 million for the year ended December 31, 2019 as compared to $933.3 million in the same period in 2018. The increase was primarily driven by a 31% increase in the number of wind blades produced during the year ended December 31, 2019 compared to the same period in 2018 largely as a result of increased production at our Turkey, Mexico and China facilities. The increase was also due to a higher average sales price due to the mix of wind blade models produced during the year ended December 31, 2019 compared to the same period in 2018. Net sales from the manufacturing of precision molding and assembly systems during the year ended December 31, 2019 were $48.7 million as compared to $48.9 million in the same period in 2018. Additionally, there was a $11.6 million increase in transportation and other sales during the year ended December 31, 2019 as compared to the same period in 2018. The impact of the fluctuating U.S. dollar against the Euro in our Turkey operations and the Chinese Renminbi in our China operations on consolidated net sales and total billings for the year ended December 31, 2019 was a net decrease of 2.1% and 2.2%, respectively, as compared to 2018.

Total cost of goods sold for the year ended December 31, 2019 was $1,358.7 million and included $48.5 million related to 14 lines in startup and $19.5 million related to 10 lines in transition during the period. This compares to total cost of goods sold for the year ended December 31, 2018 of $956.8 million and included $61.9 million related to startup costs and $12.8 million related to transition costs. Cost of goods sold as a percentage of net sales increased by approximately two percentage points during the year ended December 31, 2019 as compared to the same period in 2018, driven primarily by the extended startup of our Newton, Iowa transportation facility, significant underutilization of labor in Matamoros, Mexico due to the strike, partially offset by a $6.7 million decrease in startup and transition costs, the impact of savings in raw material costs and foreign currency fluctuations. The impact of the fluctuating U.S. dollar against the Euro, Turkish Lira, Chinese Renminbi and Mexican Peso decreased consolidated cost of goods sold by 3.1% for the year ended December 31, 2019 as compared to 2018.

General and administrative expenses for the year ended December 31, 2019 totaled $39.9 million, or 2.8% of net sales, compared to $43.5 million, or 4.2% of net sales, for the same period in 2018. The decrease as a percentage of net sales was primarily driven by lower incentive compensation and a reduction in the performance assumptions related to certain of our share-based plans.

Realized loss on sale of assets and asset impairments for the year ended December 31, 2019 totaled $18.1 million, comprised of $8.1 million of realized losses on the sale of receivables under supply chain financing arrangements with our customers, $5.3 million of realized losses on the sale of assets at our corporate and manufacturing facilities and $4.7 million of asset impairment charges primarily related to the shutdown of our second Newton, Iowa Facility. Realized loss on sale of assets and asset impairments for the year ended December 31, 2018 totaled $4.6 million, comprised of $2.5 million of realized losses on the sale of assets at our corporate and manufacturing facilities and $2.1 million of realized losses on the sale of receivables under supply chain financing arrangements with our customers. There were no asset impairment charges for the year ended December 31, 2018.

Restructuring charges, net, for the year ended December 31, 2019 totaled $3.9 million. These charges primarily related to the closing of our Taicang City, China manufacturing facility, comprised of $3.3 million of severance benefits to terminated employees and $0.6 million of other charges, primarily related to exit costs. There were no corresponding charges for the same period in 2018.

Other expense totaled $8.5 million for the year ended December 31, 2019 as compared to $22.5 million for the same period in 2018. The $14.0 million decrease was primarily due to a $9.4 million decrease in realized losses on foreign currency remeasurement and a $5.6 million decrease in interest expense, primarily related to the loss on the extinguishment of debt of $3.4 million in the 2018 period. These decreases were partially offset by a $1.0 million decrease in miscellaneous income.

Income taxes reflected a provision of $23.1 million for the year ended December 31, 2019 as compared to a benefit of $3.0 million for the same period in 2018. The increase in taxes was primarily due to the benefit for the reversal of the valuation allowance related to our U.S. federal deferred tax assets in the three months ended September 30, 2018 and the earnings mix by jurisdiction in the year ended December 31, 2019 as compared to the same period in 2018.

Net loss for the year ended December 31, 2019 was $15.7 million as compared to net income of $5.3 million in the same period in 2018. The decrease was primarily due to the reasons set forth above. The net loss per share was $0.45 for the year ended December 31, 2019, compared to diluted income per share of $0.15 for the year ended December 31, 2018.

Segment Discussion

The following table summarizes our net sales and income (loss) from operations by our four geographic operating segments for the years ended December 31:

	2019	2018
Net Sales	(in thousands)	
U.S.	$ 169,317	$ 163,716
Asia	393,809	306,255
Mexico	435,606	268,756
EMEAI	437,768	290,897
Total net sales	$ 1,436,500	$ 1,029,624

Income (Loss) from Operations	2019	2018
	(in thousands)	
U.S.	$ (78,278)	$ (67,357)
Asia	24,132	28,147
Mexico	3,533	12,154
EMEAI	66,501	51,774
Total income from operations	$ 15,888	$ 24,718

U.S. Segment

Net sales in the year ended December 31, 2019 increased by $5.6 million or 3.4% to $169.3 million compared to $163.7 million in the same period in 2018. Net sales of wind blades decreased to $120.1 million during the year ended December 31, 2019 from $126.3 million in the same period of 2018. The decrease was primarily due to a 19% reduction in the number of wind blades produced in the year ended December 31, 2019 as compared to the same period in 2018 because of wind blade model transitions, partially offset by a higher average sales price due to the mix of wind blade models produced in both periods. Net sales from the manufacturing of precision molding and assembly systems during the year ended December 31, 2019 were $3.8 million compared to $5.0 million during the same period in 2018. Additionally, there was a $13.1 million increase in transportation and other sales during the year ended December 31, 2019 as compared to the same period in 2018.

The loss from operations in the U.S. segment for the year ended December 31, 2019 was $78.3 million as compared to a loss of $67.4 million in the same period in 2018. As previously discussed, the loss amounts include corporate general and administrative costs of $39.9 million and $43.5 million for the years ended December 31, 2019 and 2018, respectively. The 2019 operating results were unfavorably impacted by the extended startup at our Newton, Iowa transportation facility, the asset impairment charges related to the shutdown of our Newton, Iowa transportation facility, the transition costs at our Newton, Iowa blade facility and the lower wind blade volume discussed above.

Asia Segment

Net sales in the year ended December 31, 2019 increased by $87.6 million or 28.6% to $393.8 million compared to $306.3 million in the same period in 2018. Net sales of wind blades were $366.2 million in the year ended December 31, 2019 as compared to $264.4 million in the same period of 2018. The increase in the net sales of wind blades was primarily due to an increase in the year over year number of wind blades still in the production process at the end of the period, an increase in the average sales price of wind blades due to a change in the mix of wind blades between the two periods and a 20% net increase in overall wind blade volume, notwithstanding the reduced production in Taicang, China as a result of Senvion's insolvency. Net sales from the manufacturing of precision molding and assembly systems totaled $25.2 million during the 2019 period compared to $36.6 million during the 2018 period. The impact of the fluctuating U.S. dollar against the Chinese Renminbi had an unfavorable impact of 1.5% on net sales during the year ended December 31, 2019 as compared to the same period in 2018.

Income from operations in the Asia segment for the year ended December 31, 2019 was $24.1 million as compared to $28.1 million in the same period in 2018. This decrease was driven by the insolvency of a customer as noted above and the resultant revenue reduction relating to our contract with that customer and the related restructuring charges in Taicang, partially offset by a decrease in startup and transition costs. This was partially offset by the fluctuating U.S. dollar against the Chinese Renminbi which had a favorable impact of 2.8% on cost of goods sold for the year ended December 31, 2019 as compared to the 2018 period.

Mexico Segment

Net sales in the year ended December 31, 2019 increased by $166.9 million or 62.1% to $435.6 million compared to $268.8 million in the same period in 2018. The increase reflects a 44% net increase in overall wind blade volume, an increase in the average sales price of wind blades due to a change in the mix of wind blades between the two periods and an increase in the year over year number of wind blades still in the production process at the end of the period. Net sales from the manufacturing of precision molding and assembly systems during the year ended December 31, 2019 were $19.7 million compared to $7.2 million during the same period in 2018.

Income from operations in the Mexico segment for the year ended December 31, 2019 was $3.5 million as compared to $12.2 million in the same period in 2018. The decrease was due primarily to a significant underutilization of labor in Matamoros as well as increased startup and transition costs, partially offset by the overall increase in wind blade volume noted above as well as from savings in raw material costs. The fluctuating U.S. dollar relative to the Mexican Peso had a favorable impact of 0.1% on cost of goods sold for the year ended December 31, 2019 as compared to 2018.

EMEAI Segment

Net sales during the year ended December 31, 2019 increased by $146.9 million or 50.5% to $437.8 million compared to $290.9 million in the same period in 2018. The increase was driven by a 70% increase in wind blade production at our two Turkey plants. This increase was partially offset by a decrease in the average sales price of wind blades delivered in the comparative periods. The fluctuating U.S. dollar relative to the Euro had an unfavorable impact of 5.3% on net sales during the year ended December 31, 2019.

Income from operations in the EMEAI segment for the year ended December 31, 2019 was $66.5 million as compared to $51.8 million in the same period in 2018. The increase was primarily driven by the increased wind blade production at our two Turkey plants, lower startup and transition costs at our Turkey plants and the favorable impact on cost of goods sold of the fluctuation of the U.S. dollar relative to the Turkish Lira and Euro of 8.5% for the year ended December 31, 2019 as compared to 2018, partially offset by higher material costs related to a new product at our second Turkey plant and startup costs related to our new plant in India.

Year Ended December 31, 2018 Compared to Year Ended December 31, 2017

For a comparison of our results of operations for the years ended December 31, 2018 and 2017, see “Management’s Discussion and Analysis of Financial Condition and Results of Operations—Results of Operations” included in Part II, Item 7 of our Annual Report on Form 10-K for the year ended December 31, 2018, filed with the SEC on March 5, 2019 incorporated herein by reference.

LIQUIDITY AND CAPITAL RESOURCES

Our primary needs for liquidity have been, and in the future will continue to be, capital expenditures, new facility startup costs, the impact of transitions, working capital and debt service costs. Our capital expenditures have been primarily related to machinery and equipment for new facilities or facility expansions. Historically, we have funded our working capital needs through cash flows from operations, the proceeds received from our credit facilities and from proceeds received from the issuance of stock. During the years ended December 31, 2019, 2018 and 2017, we had net repayments of financing arrangements of $2.1 million, $8.9 million and $8.1 million, respectively. As of December 31, 2019 and 2018, we had $142.1 million and $138.5 million in outstanding indebtedness, excluding debt issuance costs, respectively. As of December 31, 2019, we had an aggregate of $100.4 million of remaining capacity and $40.9 million of remaining availability under our various credit facilities. Working capital requirements have increased as a result of our overall growth and the need to fund higher accounts receivable and inventory levels as our business volumes have increased as well as the increased level of transitions. Based upon current and anticipated levels of operations, we believe that cash on hand, available credit facilities and cash flow from operations will be adequate to fund our working capital and capital expenditure requirements and to make required payments of principal and interest on our indebtedness over the next twelve months.

We anticipate that any new facilities and future facility expansions will be funded through cash flows from operations, the incurrence of other indebtedness and other potential sources of liquidity. At December 31, 2019 and 2018, we had unrestricted cash, cash equivalents and short-term investments totaling $70.3 million and $85.3 million, respectively. The December 31, 2019 balance includes $24.5 million of cash located outside of the United States, including $9.9 million in Turkey, $9.7 million in China, $2.4 million in India, $2.1 million in Mexico and $0.4 million in Denmark. In February 2020, we entered into an Incremental Facility Agreement with the current lenders to our Credit Agreement and an additional lender, pursuant to which the aggregate principal amount of our revolving credit facility under the Credit Agreement was increased from $150.0 million to $205.0 million. Our ability to repatriate funds from China to the United States is subject to a number of restrictions imposed by the Chinese government. We repatriate funds through several technology license and corporate/administrative service agreements. We are compensated quarterly based on agreed upon royalty rates for such intellectual property licenses and quarterly fees for those services. Certain of our subsidiaries are limited in their ability to declare dividends without first meeting statutory restrictions of the People's Republic of China, including retained earnings as determined under Chinese-statutory accounting requirements. Until 50% ($26.5 million) of registered capital is contributed to a surplus reserve, our Chinese operations can only pay dividends equal to 90% of after-tax profits (10% must be contributed to the surplus reserve). Once the surplus reserve fund requirement is met, our Chinese operations can pay dividends equal to 100% of after-tax profit assuming other conditions are met. At December 31, 2019, the amount of the surplus reserve fund was $6.6 million.

Operating Cash Flows

	Year Ended December 31,		
	2019	2018	2017
	(in thousands)		
Net income (loss)	$ (15,708)	$ 5,279	$ 38,734
Depreciation and amortization	38,580	26,429	21,698
Realized loss on sale of assets and asset impairments	18,117	4,581	334
Share-based compensation expense	5,681	7,795	7,124
Restructuring charges, net	3,927	—	—
Other non-cash items	5,157	(11,179)	2,223
Changes in assets and liabilities	1,330	(36,163)	4,487
Net cash provided by (used in) operating activities	$ 57,084	$ (3,258)	$ 74,600

Net cash provided by operating activities totaled $57.1 million for the year ended December 31, 2019 and was primarily the result of the net loss, adjusted for non-cash items (depreciation and amortization, realized loss on the sale of assets and asset impairments, share-based compensation expense, restructuring charges, net and other non-cash items) which generated $55.8 million of operating cash flow and net changes in working capital generated $1.3 million of operating cash flow. The key components of the net change in working capital include a $80.7 million increase in accounts payable and accrued expenses, a $10.9 million increase in accrued warranty, a $7.0 million decrease in operating lease right of use assets and operating lease labilities and a $2.8 million increase in other noncurrent liabilities. This was mostly offset by a $57.6 million increase in contract assets and liabilities, a $19.4 million increase in accounts receivable, a $13.7 million increase in other current assets, a $7.2 million increase in other noncurrent assets, a $1.1 million increase in prepaid expenses and a $1.1 million increase in inventories. The working capital changes in contract assets and liabilities, accounts receivable, accounts payable and accrued expenses and accrued warranty are primarily the result of the timing of production in the year ended December 31, 2019.

Net cash used in operating activities totaled $3.3 million for the year ended December 31, 2018 and was primarily the result of a $36.2 million decrease in working capital and $6.6 million of other non-cash items, mostly offset by non-cash depreciation and amortization charges totaling $26.4 million, share-based compensation costs of $7.8 million and net income of $5.3 million. The key components of the decrease in working capital include a $59.2 million increase in accounts receivable, a $7.9 million increase in contract assets and labilities, a $5.2 million increase in other noncurrent assets, and a $2.0 million decrease in other noncurrent liabilities. This was partially offset by a $32.3 million increase in accounts payable and accrued expenses and a $6.3 million increase in accrued warranty. The working capital changes in contract assets and liabilities, accounts receivable, accounts payable and accrued expenses and accrued warranty are primarily the result of the timing of production in the year ended December 31, 2018.

Investing Cash Flows

	Year Ended December 31,		
	2019	2018	2017
	(in thousands)		
Purchase of property and equipment	$ (74,408)	$ (52,688)	$ (44,828)
Acquisition of a business	(1,102)	—	—
Proceeds from sale of assets	—	—	850
Net cash used in investing activities	$ (75,510)	$ (52,688)	$ (43,978)

Net cash flows used in investing activities totaled $75.5 million and $52.7 million in the years ended December 31, 2019 and 2018, respectively, driven primarily by capital expenditures for new facilities and expansion or improvements at existing facilities. The capital expenditures for the year ended December 31, 2019 primarily related to our new manufacturing facilities in Yangzhou, China and Chennai, India, our second manufacturing facility in Turkey, our new tooling facility and the expansion of one of our blade manufacturing facilities in Juárez, Mexico and continued investments in our other existing facilities. The capital expenditures for the year ended December 31, 2018 primarily related to our new wind blade plants in Matamoros, Mexico and Yangzhou, China, the expansion and improvements at our Taicang, China facility, our second wind blade plant in Turkey, our second facility in Newton, Iowa and costs to enhance our information technology systems. The above capital expenditure amounts do not include the amounts which we financed primarily through finance leases totaling $5.8 million and $22.0 million in the years ended December 31, 2019 and 2018, respectively.

We anticipate fiscal year 2020 capital expenditures of between $80 million to $90 million and we estimate that the cost that we will incur after December 31, 2019 to complete our current projects in process will be approximately $18.3 million. We have used, and will continue to use, cash flows from operations, the proceeds received from our credit facilities and the proceeds received from the issuance of stock for major projects currently being undertaken, which include purchasing equipment for our new manufacturing facility in Chennai, India and the continued investment in our Turkey, Mexico and China facilities.

Financing Cash Flows

	Year Ended December 31,		
	2019	2018	2017
	(in thousands)		
Net proceeds from (repayments of) revolving and term loans	$ 22,000	$ 14,463	$ (3,750)
Net proceeds from (repayments of) accounts receivable financing	(10,719)	424	(1,020)
Net repayments of working capital loans	—	—	(4,638)
Principal repayments of finance leases	(9,128)	—	—
Net proceeds from (repayments of) other debt	(4,286)	(23,763)	1,313
Debt issuance costs	—	(281)	(454)
Proceeds from exercise of stock options	5,223	4,284	1,430
Repurchase of common stock including shares withheld in lieu of income taxes	(2,120)	(2,859)	(1,264)
Net cash provided by (used in) financing activities	$ 970	$ (7,732)	$ (8,383)

Net cash flows provided by financing activities for the year ended December 31, 2019 totaled $1.0 million. The net cash flows used in financing activities totaled $7.7 million for the year ended December 31, 2018. Net cash provided by financing activities for the year ended December 31, 2019 primarily reflects the net proceeds from revolving and term loans and the proceeds from the exercise of stock options, mostly offset by the net repayment of accounts receivable financing and other debt, principal repayments of finance leases and the repurchase of common stock including shares withheld in lieu of income taxes. Net cash used in financing activities for the year ended December 31, 2018 primarily reflects the net repayment of other debt and the repurchase of common stock associated with taxes on the vesting of share-based awards, mostly offset by the net proceeds from revolving and term loans and the proceeds from the exercise of stock options.

Description of Our Indebtedness

Refer to Note 12 - Long-Term Debt, Net of Debt Issuance Costs and Current Maturities of the Notes to Consolidated Financial Statements in Part II, Item 8 of this Annual Report on Form 10-K for a description of our indebtedness.

Other Contingencies

As of December 31, 2019, we were not involved in any material litigation. In the future, however, we may become involved in various claims and legal actions arising in the ordinary course of business which may have a material adverse effect on our consolidated financial position, results of operations or liquidity.

The wind blades and other composite structures that we produce are subject to warranties against defects in workmanship and materials, generally for a period of two to five years. We are not responsible for the fitness for use of the wind blade or the overall wind turbine system. If a wind blade is found to be defective during the warranty period as a result of a defect in workmanship or materials, among other potential remedies, we may need to repair or replace the wind blade (which could include significant transportation and installation costs) at our sole expense. At December 31, 2019 and 2018, we had accrued warranty reserves totaling $47.6 million and $36.8 million, respectively.

As of December 31, 2019, we had no material operating expenditures for environmental matters, including government imposed remedial or corrective actions, during the year ended December 31, 2019.

Off-Balance Sheet Transactions

We are not presently involved in any off-balance sheet arrangements, including transactions with unconsolidated special-purpose or other entities that would materially affect our financial position, results of operations, liquidity or capital resources, other than our accounts receivable assignment agreements described below. Furthermore, we do not have any relationships with special-purpose or other entities that provide off-balance sheet financing; liquidity, market risk or credit risk support; or engage in leasing or other services that may expose us to liability or risks of loss that are not reflected in consolidated financial statements and related notes.

Our Mexico segment has an existing accounts receivable assignment agreement with a financial institution under which the financial institution buys, on a non-recourse basis, the accounts receivable amounts related to one of our Mexico segment's customers at a discount calculated based on an effective annual rate of LIBOR plus 2.75%.

In September 2018, our U.S. and Mexico segments entered into an accounts receivable assignment agreement, as amended, with a financial institution. Under this agreement, the financial institution buys, on a non-recourse basis, the accounts receivable amounts related to one of our U.S. (Iowa location) and Mexico segment's customers at a discount calculated based on LIBOR plus 1.25%.

In the fourth quarter of 2018, our EMEAI segment entered into an accounts receivable assignment agreement with a financial institution. Under this agreement, the financial institution may buy, on a non-recourse revolving basis, up to 15.0 million Euro (approximately $16.8 million as of December 31, 2019) of the accounts receivable amounts related to one of our EMEAI segment's customers at a discount calculated based on EURIBOR plus 2.65%.

In the fourth quarter of 2018, our EMEAI segment entered into an accounts receivable assignment agreement with a financial institution. Under this agreement, the financial institution buys, on a non-recourse basis, the accounts receivable amounts related to one of our EMEAI segment's customers at a discount calculated based on EURIBOR plus 0.75%.

In the first quarter of 2019, our Asia and Mexico segments entered into separate accounts receivable purchase agreements, as amended, with a financial institution. Under these agreements, the financial institution may buy, on a non-recourse basis, and hold outstanding at any time up to $60.0 million of a customer's accounts receivable amounts in our Asia segment and up to $30.0 million of a customer's accounts receivable amounts in our Mexico segment at a discount calculated based on the three month LIBOR plus 1.0% and the number of days from the date of purchase to maturity.

In the second quarter of 2019, our Asia segment entered into an accounts receivable purchase agreement with a financial institution. Under this agreement, the financial institution may buy, on a non-recourse basis, and hold outstanding at any time up to $20.0 million of a customer's accounts receivable amounts in our Asia segment at a discount calculated based on the three month LIBOR plus 1.0% and the number of days from the date of purchase to maturity.

In the fourth quarter of 2019, our Asia segment entered into an accounts receivable purchase agreement with a financial institution. Under this agreement, the financial institution may buy, on a non-recourse basis, and hold outstanding at any time an unlimited amount of a customer's accounts receivable amounts in our Asia segment at a discount calculated based on a fixed rate of 4.2% and the number of days from the date of purchase to maturity.

As the receivables are purchased by the financial institutions under the agreements as described in the preceding paragraphs, the receivables were removed from our consolidated balance sheet. During the years ended December 31, 2019 and 2018, $776.2 million and $214.6 million of receivables were sold under the accounts receivable assignment agreements described above, respectively.

Contractual Obligations

The following table summarizes certain of our contractual obligations as of December 31, 2019:

	Payments Due by Period				
	Less than 1 year	1-3 years	3-5 years	More than 5 years	Total
			(in thousands)		
Long-term debt obligations(1)	$ 13,501	$ 14,649	$ 113,911	$ —	$ 142,061
Operating lease obligations(2)	25,425	44,287	38,497	66,584	174,793
Purchase obligations	2,798	3,668	1,429	—	7,895
Estimated interest payments(3)	4,647	8,006	1,887	—	14,540
Total contractual obligations	$ 46,371	$ 70,610	$ 155,724	$ 66,584	$ 339,289

(1) See "—Description of Our Indebtedness" above.

(2) Our operating lease obligations represent the contractual payments due for the lease of our corporate office in Scottsdale, Arizona in addition to our facilities in Iowa, Rhode Island, New Mexico, China, Mexico, Turkey and Denmark.

(3) Includes interest on variable rate debt based on interest rates as of December 31, 2019. See "—Description of Our Indebtedness" above.

CRITICAL ACCOUNTING POLICIES AND ESTIMATES

Our discussion and analysis of our financial condition and results of operations are based upon our consolidated financial statements, which have been prepared in accordance with GAAP. The preparation of these consolidated financial statements requires us to make estimates and judgments that affect the reported amount of our assets, liabilities, revenue and expenses and related disclosure of contingent assets and liabilities. We evaluate our estimates on an ongoing basis, including those related to income taxes and warranty expense. We base our estimates on our historical experience and on various other assumptions that we believe to be reasonable under the circumstances, the results of which form the basis for making the judgments we make about the carrying values of our assets and liabilities that are not readily apparent from other sources. Because these estimates can vary depending on the situation, actual results may differ from the estimates.

We believe the following critical accounting policies affect our more significant judgments used in the preparation of our consolidated financial statements.

Revenue Recognition. The majority of our revenue is generated from long-term contracts associated with manufacturing of wind blades and related services. We account for a long-term contract when it has the approval from both parties, the rights of the parties are identified, payment terms are established, the contract has commercial substance and the collectability of consideration is probable.

To determine the proper revenue recognition method for each long-term contract, we evaluate whether the original contract should be accounted for as one or more performance obligations. This evaluation requires judgment and the decisions reached could change the amount of revenue and gross profit recorded in a given period. As most of our contracts contain multiple performance obligations, we allocate the total transaction price to each performance obligation based on the estimated relative standalone selling prices of the promised goods or services underlying each performance obligation. Our manufacturing services are customer specific and involve production of items that cannot be sold to other customers due to the customers' protected intellectual property; therefore, we allocate the total transaction price under our contracts with multiple performance obligations using the contractually stated prices, as these prices represent the relative standalone selling price based on an expected cost plus margin model.

Revenue is primarily recognized over time as we have an enforceable right to payment upon termination and we may not use or sell the product to fulfill other customers' contracts. In addition, the customer does not have return or refund rights for items produced that conform to the specifications included in the contract. Because control transfers over time, revenue is recognized based on the extent of progress towards the completion of the performance obligation. We use the cost-to-cost input measure of progress for our contracts as this method provides the best representation of the production progress towards satisfaction of the performance obligation as the materials are distinct to the product being manufactured because of customer specifications provided for in the contract, the costs incurred are proportional to the progress towards completion of the product, and the products do not involve significant pre-fabricated component parts. Under the cost-to-cost method, progress and the related revenue recognition is determined by a ratio of direct costs incurred to date in fulfillment of the performance obligation to the total estimated direct costs required to complete the performance obligation.

Determining the revenue to be recognized for services performed under our manufacturing contracts involves judgments and estimates relating to the total consideration to be received and the expected direct costs to complete the performance obligation. As such, revenue recognized reflects our estimates of future contract volumes and the direct costs to complete the performance obligation. The judgments and estimates relating to the total consideration to be received include the amount of variable consideration as our contracts typically provide the customer with a range of production output options from guaranteed minimum volume obligations to the production capacity of the facility, and customers will provide periodic non-cancellable commitments for the number of wind blades to be produced over the term of the agreement. The total consideration also includes payments expected to be received associated with wind blade model transitions. We use historical experience, customer commitments and forecasted future production based on the capacity of the plant to estimate the total revenue to be received to complete the performance obligation. In addition, the amount of revenue per unit produced may vary based on the costs of production of the wind blades as we may be able to change the price per unit based on changes in the cost of production. Further, some of our contracts provide opportunities for us to share in labor and material cost savings as well as absorb some additional costs as an incentive for more efficient production, both of which impact the margin realized on the contract and ultimately the total amount of revenue to be recognized. Additionally, certain of our customer contracts provide for us to make concessions, such as in the form of liquidated damages, for missed production deadlines which are paid over a negotiated timeline.

We estimate variable consideration at the most likely amount to which we expect to be entitled. We include estimated amounts in the transaction price to the extent it is probable that a significant reversal of cumulative revenue recognized will not occur when the uncertainty associated with the variable consideration is resolved. Our estimates of variable consideration and determination of whether to include estimated amounts in the transaction price are based largely on an assessment of our anticipated performance and all information available to us at the time of the estimate and may materially change as additional information becomes known.

Our contracts may be modified to account for changes in specifications of products and changing requirements. If the contract modifications are for goods or services that are not distinct from the existing contract, they are accounted for as if they were part of the original contract. The effect of a contract modification on the transaction price and the measure of progress for the performance obligation to which it relates is recognized as an adjustment to revenue on a cumulative catch-up basis. If contract modifications are for goods and services that are distinct from the existing contract and increases the amount of consideration reflecting the standalone sale price of the additional goods or services, then the contract modification is accounted for as a separate contract and is evaluated for one or more performance obligations.

Each reporting period, we evaluate the progress towards satisfaction of each performance obligation based on any contract modifications that have occurred, cost incurred to date, and an estimate of the expected future revenue and costs to be incurred to complete the performance obligation. Based on this analysis, any changes in estimates of revenue, cost of sales, contract assets and liabilities and the related impact to operating income are recognized on a cumulative catch-up basis, which recognizes in the current period the cumulative effect of the changes on current and prior periods based on the percentage of completion of the performance obligation.

Wind blade pricing is based on annual commitments of volume as established in our customer contracts and orders less than committed volume may result in a higher price per wind blade to our customers. Orders in excess of annual commitments may result in discounts to our customers from the contracted price for the committed volume. Our customers typically provide periodic purchase orders with the price per wind blade given the current cost of the bill of materials, labor requirements and volume desired. We record an allowance for expected utilization of early payment discounts which are reported as a reduction of the related revenue.

Precision molding and assembly systems included in a customer's contract are based upon the specific engineering requirements and design determined by the customer and are specific to the wind blade design and function desired. From the customer's engineering specifications, a job cost estimate is developed along with a production plan, and the desired margin is applied based on the location the work is to be performed and complexity of the customer's design. Precision molding and assembly systems are generally built to produce wind blades which may be manufactured by us in production runs specified in the customer contract.

Contract assets primarily relate to our rights to consideration for work completed but not billed at the reporting date on manufacturing services contracts. The majority of the contract asset balance relates to materials procured based on customer specifications. The contract assets are transferred to accounts receivable when the rights become unconditional, which generally occurs when customers are invoiced upon the determination that a product conforms to the contract specifications and invoices are due based on each customer's negotiated payment terms, which, when factoring in supply chain financing arrangements, range from 5 to 25 days. We apply the practical expedient that allows us to exclude payment terms under one year from the transfer of a promised good or service from consideration of a significant financing component in its contracts. With regards to the production of precision molding and assembly systems, our contracts generally call for progress payments to be made in advance of production. Generally, payment is made at certain percentage of completion milestones with the final payment due upon delivery to the manufacturing facility. These progress payments are recorded within contract liabilities as current liabilities in the consolidated balance sheets and are reduced as we record revenue over time. We evaluate indications that a customer may not be able to meet the obligations under our long-term supply agreements to determine if an account receivable or contract asset may be impaired.

Our customers may request, in situations where they do not have space available to receive products or do not want to take possession of products immediately for other reasons, that their finished products be stored by us in one of our facilities. Most of our contracts provide for a limited number of wind blades to be stored during the period of the contract with any additional wind blades stored subject to additional storage fees, which are included in the wind blade product revenue.

Revenue related to non-recurring engineering and freight services provided under our customer contracts is recognized at a point in time following the transfer of control of the promised services to the customer. Customers usually pay the carrier directly for the cost of shipping associated with items produced. When we pay the shipping costs, we apply the practical expedient that allows us to account for shipping and handling as a fulfillment costs and include the revenue in the associated performance obligation and the costs are included in cost of goods sold.

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

Income Taxes. In connection with preparing our consolidated financial statements, we are required to estimate our income taxes in each of the jurisdictions in which we operate. This process involves our assessment of any net operating loss carryforwards, as well as estimating our actual current tax liability together with assessing temporary differences resulting from differing treatment of items, such as reserves and accrued liabilities, for tax and accounting purposes. We also have to assess whether any portion of our earnings generated in one taxing jurisdiction might be claimed as earned by income tax authorities in a differing tax jurisdiction. Significant judgment is required in determining our annual tax rate, the allocation of earnings to various jurisdictions and in the evaluation of our tax positions.

Additionally, we record the estimated future tax effects of temporary differences between the tax basis of assets and liabilities and amounts reported in the accompanying consolidated balance sheets, as well as operating loss and tax credit carryforwards. We then assess the likelihood that our deferred income tax assets will be realized by evaluating all available positive and negative evidence in order to determine if it is more-likely-than-not that the deferred tax assets will be realized. To the extent we believe that the realization of our deferred tax assets is not more-likely-than-not, we are required to establish a valuation allowance. In doing so we considered our recent operating history, taxpaying history and future reversals of deferred tax liabilities based upon future operating projections. Historically, as a result of cumulative losses in the United States, we determined that a valuation allowance for all of our U.S. deferred tax assets was appropriate. During the third quarter of 2018, we reversed a portion of the United States valuation allowance, based on the available evidence at that time. During the first quarter of 2019, a full valuation allowance was recorded in Taicang due to cumulative losses in Taicang. We also maintain a full valuation allowance in India due to cumulative losses. We periodically evaluate all available positive and negative evidence regarding the future recoverability of our deferred tax assets and, when we determine that the recoverability of deferred tax assets meets the criteria of more-likely-than-not, we reduce the valuation allowance against our deferred tax assets. The effect of a change in judgment concerning the realizability of deferred tax assets is included in provision for income taxes.

As of December 31, 2019, we have U.S. federal NOLs of approximately $20.9 million, state NOLs of approximately $158.0 million, foreign NOLs of approximately $31.3 million and foreign tax credits of approximately $1.9 million available to offset future taxable income in the U.S., China and India.

On December 22, 2017, the current President signed into law Tax Reform, which significantly revised U.S. tax law by, among other things, lowering the statutory federal corporate income tax rate from 35% to 21% for tax years beginning after December 31, 2017, eliminating certain deductions, imposing a mandatory one-time transition tax, introducing new tax regimes, and changing how foreign earnings are subject to U.S. tax. Tax Reform also includes many new provisions, such as changes to bonus depreciation, changes to deductions for executive compensation, interest expense limitations, net operating loss deduction limitations, tax on GILTI earned by foreign corporate subsidiaries, the BEAT, and a deduction for FDII.

At December 31, 2018, we completed the accounting for the enactment-date income tax effects of Tax Reform, which resulted in an immaterial impact to the financial statements. Upon further analyses of certain aspects of Tax Reform, and refinement of calculations during 2018, we increased our provisional amount of previously untaxed foreign earnings by $13.8 million, to $88.1 million. This resulted in no change to our U.S. federal income tax expense due to the impact of foreign tax credits. In addition, the provisional net tax expense, which was estimated at approximately $0.1 million, primarily attributable to the reduction in the federal tax rate, was unchanged. Additionally, we have made a policy election to account for any impacts of GILTI tax in the period in which it is incurred.

Income tax expense or benefit, deferred tax assets and liabilities, and liabilities for unrecognized tax benefits reflect our best estimate of current and future taxes to be paid. We are subject to income taxes in both the U.S. and numerous foreign jurisdictions in which we operate, principally, China, Mexico, and Turkey. Significant judgements and estimates are required in determining our consolidated income tax expense. The statutory federal corporate income tax rate in the U.S. decreased from 35% to 21% beginning in January 2018, while the tax rates in China and Mexico are 25% and 30%, respectively. During the fourth quarter of 2017, Turkey also modified its statutory corporate income tax rate from 20% to 22% for 2018, 2019, and 2020. Our second Turkey facility is located in a tax-free zone and is not subject to income taxes for its earnings recognized from its manufacturing activities.

Warranty Expense. As discussed above, the wind blades we manufacture are subject to warranties against defects in workmanship and materials, generally for a period of two to five years. We are not responsible for the fitness for use of the wind blade in the overall wind turbine system. If a wind blade is found to be defective during the warranty period as a result of a defect in workmanship or materials, among other potential remedies, we may need to repair or replace the wind blade at our sole expense. We provide warranties for all of our products with terms and conditions that vary depending on the product sold. We record warranty expense based upon our estimate of future repairs using a probability-based methodology that considers previous warranty claims, identified quality issues and industry practices. Once the warranty period has expired, any remaining unused warranty accrual for the specific products is reversed against the current year warranty expense amount.

Our estimate of warranty expense requires us to make assumptions about matters that are highly uncertain, including future rates of product failure, repair costs, availability of materials, shipping and handling, and de-installation and re-installation costs at customers' sites, among others. When a potential or actual warranty claim arises, we may accrue additional warranty reserves for the estimated cost of remediation or proposed settlement. We have not experienced any material warranty expenses beyond the provision described above in the years ended December 31, 2019, 2018 and 2017. However, changes in warranty reserves could have a material effect on our consolidated financial statements.

Recent Accounting Pronouncements

For a discussion of recent accounting pronouncements, see Note 1 – Summary of Significant Accounting Policies of the Notes to Consolidated Financial Statements in Part II, Item 8 of this Annual Report on Form 10-K.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

We are exposed to market risk in the ordinary course of our business. These market risks are principally limited to changes in foreign currency exchange rates and commodity prices.

Foreign Currency Risk. We conduct international operations in China, Mexico, Turkey and India. Our results of operations are subject to both currency transaction risk and currency translation risk. We incur currency transaction risk whenever we enter into either a purchase or sale transaction using a currency other than the local currency of the transacting entity. With respect to currency translation risk, our financial condition and results of operations are measured and recorded in the relevant domestic currency and then translated into U.S. dollars for inclusion in our consolidated financial statements. In recent years, exchange rates between these foreign currencies and the U.S. dollar have fluctuated significantly and may do so in the future. A hypothetical change of 10% in the exchange rates for the countries above would have resulted in a change to income from operations of approximately $10.9 million and $7.4 million for the years ended December 31, 2019 and 2018, respectively.

Commodity Price Risk. We are subject to commodity price risk under agreements for the supply of our raw materials. We have not hedged our commodity price exposure. We generally lock in pricing for our key raw materials for 12 months which protects us from price increases within that period. As many of our raw material supply agreements have meet or release clauses, if raw materials prices go down, we are able to benefit from the reductions in price. We believe that this adequately protects us from increases in raw material prices and also enables us to take full advantage of decreases.

Resin and resin systems are the primary commodities for which we do not have fixed pricing. Approximately 40% of the resin and resin systems we use are purchased under contracts controlled by two of our customers and therefore they receive/bear 100% of any increase or decrease in resin costs further limiting our exposure to price fluctuations. We believe that a 10% change in the price of resin and resin systems for the customers in which we are exposed to fluctuating prices would have had an impact to income from operations of approximately $9.3 million and $7.6 million for the years ended December 31, 2019 and 2018, respectively. Furthermore, this amount does not include the portion of any increase or decrease that would be shared with our customers under our long-term supply agreements, which is generally 70%.

Interest Rate Risk. As of December 31, 2019, our EMEAI segment has one general credit agreement with a Turkish financial institution outstanding which is tied to EURIBOR. This agreement had collateralized financing of capital expenditures outstanding as of December 31, 2019 of $7.9 million. In addition, as of December 31, 2019, our Credit Agreement includes interest on the unhedged principal amount of $37.4 million which is tied to LIBOR. The one EMEAI general credit agreement and our Credit Agreement noted above are the only variable rate debt that we had outstanding as of December 31, 2019 as all remaining working capital loans, accounts receivable, secured and unsecured financing and finance lease obligations are fixed rate instruments and are not subject to fluctuations in interest rates. Due to the relatively low LIBOR and EURIBOR rates in effect as of December 31, 2019, a 10%

change in the LIBOR or EURIBOR rate would not have had a material impact on our future earnings, fair values or cash flows.

Item 8. Financial Statements and Supplementary Data

The financial statements required to be filed pursuant to this Item 8 are appended to this Report. An index of those financial statements is found in Item 15.

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

None

Item 9A. Controls and Procedures

Evaluation of Disclosure Controls and Procedures

We maintain disclosure controls and procedures that are designed to provide reasonable assurance that information required to be disclosed in our reports under the Exchange Act is recorded, processed, summarized, and reported within the time period specified in the SEC's rules and forms and that such information is accumulated and communicated to our management, including our Chief Executive Officer and Chief Financial Officer, as appropriate, to allow timely decisions regarding required disclosure.

As required by Rule 13a-15(b) promulgated under the Exchange Act, our management, with the participation of our Chief Executive Officer and Chief Financial Officer, evaluated the design and operating effectiveness as of December 31, 2019 of our disclosure controls and procedures, as defined in Rule 13a-15(e) promulgated under the Exchange Act. Based on this evaluation, our Chief Executive Officer and Chief Financial Officer concluded that our disclosure controls and procedures were effective as of December 31, 2019.

Management's Report on Internal Control Over Financial Reporting

As required by Rules 13a-15(f) promulgated under the Exchange Act, our management is responsible for establishing and maintaining adequate internal control over financial reporting to provide reasonable assurance regarding the reliability of our financial reporting and the preparation of financial statements for external purposes in accordance with U.S. generally accepted accounting principles. Management assessed the effectiveness of our internal control over financial reporting as of December 31, 2019. Management based its assessment on criteria established in Internal Control-Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). Management's assessment included evaluation of elements such as the design and operating effectiveness of key financial reporting controls, process documentation, accounting policies and our overall control environment. Based on this assessment, management has concluded that our internal control over financial reporting was effective as of December 31, 2019 to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external reporting purposes in accordance with U.S. generally accepted accounting principles. We reviewed the results of management's assessment with the Audit Committee of our Board of Directors.

Our internal control over financial reporting as of December 31, 2019 has been audited by KPMG LLP, an independent registered public accounting firm, as stated in their report which is included herein.

Changes in Internal Control Over Financial Reporting

There have been no changes in our internal control over financial reporting during the three months ended December 31, 2019, that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Item 9B. Other Information

Not applicable.

PART III

Item 10. Directors, Executive Officers and Corporate Governance

The information required by this Item is incorporated by reference to "Business – Information about our Executive Officers" included in Part 1, Item 1 of this Annual Report on Form 10-K and the information that will be contained in our proxy statement related to the 2020 Annual Meeting of Stockholders, which we intend to file with the SEC within 120 days of the fiscal year ended December 31, 2019.

Item 11. Executive Compensation

The information required by this Item is incorporated by reference to the information that will be contained in our proxy statement related to the 2020 Annual Meeting of Stockholders, which we intend to file with the SEC within 120 days of the fiscal year ended December 31, 2019.

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

The information required by this Item is incorporated by reference to the information that will be contained in our proxy statement related to the 2020 Annual Meeting of Stockholders, which we intend to file with the SEC within 120 days of the fiscal year ended December 31, 2019.

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

The information required by this Item is incorporated by reference to the information that will be contained in our proxy statement related to the 2020 Annual Meeting of Stockholders, which we intend to file with the SEC within 120 days of the fiscal year ended December 31, 2019.

Item 14. Principal Accounting Fees and Services

The information required by this Item is incorporated by reference to the information that will be contained in our proxy statement related to the 2020 Annual Meeting of Stockholders, which we intend to file with the SEC within 120 days of the fiscal year ended December 31, 2019.

PART IV

Item 15. Exhibits, Financial Statement Schedules

(a) Financial Statements and Schedules

The financial statements listed in the accompanying Index to Consolidated Financial Statements are filed as part of this Annual Report on Form 10-K.

(b) Exhibits

See Exhibit Index.

Item 16. Form 10-K Summary

Not applicable.

INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

Report of Independent Registered Public Accounting Firm

To the Stockholders and Board of Directors
TPI Composites, Inc.:

Opinions on the Consolidated Financial Statements and Internal Control Over Financial Reporting

We have audited the accompanying consolidated balance sheets of TPI Composites, Inc. and subsidiaries (the Company) as of December 31, 2019 and 2018, the related consolidated statements of operations, comprehensive income (loss), changes in stockholders' equity (deficit), and cash flows for each of the years in the three-year period ended December 31, 2019, and the related notes (collectively, the consolidated financial statements). We also have audited the Company's internal control over financial reporting as of December 31, 2019, based on criteria established in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission.

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of December 31, 2019 and 2018, and the results of its operations and its cash flows for each of the years in the three-year period ended December 31, 2019, in conformity with U.S. generally accepted accounting principles. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2019 based on criteria established in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission.

Adoption of New Accounting Pronouncement

As discussed in Note 1 to the consolidated financial statements, effective January 1, 2019, the Company changed its method of accounting for leases due to the adoption of Financial Accounting Standards Board Accounting Standard Codification Topic 842, *Leases*.

Basis for Opinions

The Company's management is responsible for these consolidated financial statements, 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 Item 9A, *Management's Report on Internal Control Over Financial Reporting*. Our responsibility is to express an opinion on the Company's consolidated financial statements and an opinion on the Company's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (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 audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements included performing procedures to assess the risks of material misstatement of the consolidated 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 consolidated 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 consolidated financial statements. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

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.

Critical Audit Matter

The critical audit matter communicated below is a matter arising from the current period audit of the consolidated financial statements that was communicated or required to be communicated to the audit committee and that: (1) relates to accounts or disclosures that are material to the consolidated financial statements and (2) involved our especially challenging, subjective, or complex judgment. The communication of a critical audit matter 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 matter below, providing a separate opinion on the critical audit matter or on the accounts or disclosures to which it relates.

Evaluation of variable consideration and direct costs to complete performance obligations for wind blade manufacturing revenue

As discussed in Notes 1 and 2 to the consolidated financial statements, the Company generates the majority of its revenue from long-term contracts associated with manufacturing custom wind blades. Revenue from manufacturing wind blades is primarily recognized over time based on progress towards the completion of the performance obligation in the contract. Progress is determined by the ratio of direct costs incurred to date in fulfillment of the performance obligation to the total estimated direct costs required to complete the performance obligation. The Company recognizes variable consideration for wind blade manufacturing revenue that includes estimates of future contract volumes. Wind blade manufacturing revenue under long-term contracts was $1,328,717 thousand compared to consolidated revenue of $1,436,500 thousand in fiscal 2019.

We identified the evaluation of future contract volumes and direct costs to complete performance obligations for wind blade manufacturing revenue as a critical audit matter. Evaluating these estimates requires a high degree of auditor judgment as changes to the inputs can have a significant effect on the Company's revenue. Each wind blade contract contains variable consideration that includes estimates of future contract volumes. Each wind blade contract also requires a measure of progress that includes estimates of direct costs to complete the performance obligations.

The primary procedures we performed to address this critical audit matter included the following. We tested certain internal controls over the Company's revenue recognition process, including controls related to estimates of future contract volumes and direct costs to complete the performance obligation. We read a sample of long-term customer contracts, and observed that terms, conditions, and key elements of the contracts were included in the Company's estimate of future contract volumes. We evaluated the Company's ability to estimate future contract volumes and direct costs to complete the performance obligations by comparing these estimates to historical results. We evaluated estimated future contract volumes by assessing (1) manufacturing plant capacity, (2) historical production volume, and (3) customer purchase commitments. We evaluated estimated direct costs to complete the performance obligations by examining the estimated amounts agreed upon with the customer and comparing them to historical prices. We compared the future direct cost per blade to historical direct costs per blade and assessed future manufacturing efficiencies. Further, we evaluated historical labor utilization and rate per hour by wind blade type and manufacturing plant, and analyzed jurisdiction-specific inflation rates based on publicly available government data. We assessed current period revenue based upon the estimated consideration, the ratio of direct costs incurred to date in fulfillment of the performance obligations to the total estimated direct costs required to complete the performance obligations, and revenue recognized in previous periods for the performance obligations.

/s/ KPMG LLP

We have served as the Company's auditor since 2008.

Phoenix, Arizona
February 28, 2020

TPI COMPOSITES, INC. AND SUBSIDIARIES

Consolidated Balance Sheets
(In thousands, except par value data)

	December 31, 2019	December 31, 2018
Assets		
Current assets:		
Cash and cash equivalents	$ 70,282	$ 85,346
Restricted cash	992	3,555
Accounts receivable	184,012	176,815
Contract assets	166,515	116,708
Prepaid expenses	10,047	9,219
Other current assets	29,843	16,819
Inventories	6,731	5,735
Total current assets	468,422	414,197
Property, plant and equipment, net	205,007	159,423
Operating lease right of use assets	122,351	—
Goodwill	2,807	2,807
Intangible assets and deferred costs, net	4,170	4,458
Other noncurrent assets	23,920	23,970
Total assets	$ 826,677	$ 604,855
Liabilities and Stockholders' Equity		
Current liabilities:		
Accounts payable and accrued expenses	$ 293,104	$ 199,078
Accrued warranty	47,639	36,765
Current maturities of long-term debt	13,501	27,058
Current operating lease liabilities	16,629	—
Contract liabilities	3,008	7,143
Total current liabilities	373,881	270,044
Long-term debt, net of debt issuance costs and current maturities	127,888	110,565
Noncurrent operating lease liabilities	113,883	—
Other noncurrent liabilities	5,975	3,289
Total liabilities	621,627	383,898
Commitments and contingencies		
Stockholders' equity:		
Common shares, $0.01 par value, 100,000 shares authorized and 35,326 shares issued and 35,181 shares outstanding at December 31, 2019; 100,000 shares authorized and 34,745 shares issued and 34,678 shares outstanding at December 31, 2018	353	347
Paid-in capital	322,906	311,771
Accumulated other comprehensive loss	(23,612)	(14,392)
Accumulated deficit	(90,689)	(74,981)
Treasury stock, at cost, 145 shares at December 31, 2019; 67 shares at December 31, 2018	(3,908)	(1,788)
Total stockholders' equity	205,050	220,957
Total liabilities and stockholders' equity	$ 826,677	$ 604,855

See accompanying notes to consolidated financial statements.

TPI COMPOSITES, INC. AND SUBSIDIARIES

Consolidated Statements of Operations
(In thousands, except per share data)

	Year Ended December 31, 2019	2018	2017
Net sales	$ 1,436,500	$ 1,029,624	$ 955,198
Cost of sales	1,290,619	882,075	804,099
Startup and transition costs	68,033	74,708	40,628
Total cost of goods sold	1,358,652	956,783	844,727
Gross profit	77,848	72,841	110,471
General and administrative expenses	39,916	43,542	40,373
Realized loss on sale of assets and asset impairments	18,117	4,581	—
Restructuring charges, net	3,927	—	—
Income from operations	15,888	24,718	70,098
Other income (expense):			
Interest income	157	181	95
Interest expense	(8,179)	(10,417)	(12,381)
Loss on extinguishment of debt	—	(3,397)	—
Realized loss on foreign currency remeasurement	(4,107)	(13,489)	(4,471)
Miscellaneous income	3,648	4,650	1,191
Total other expense	(8,481)	(22,472)	(15,566)
Income before income taxes	7,407	2,246	54,532
Income tax benefit (provision)	(23,115)	3,033	(15,798)
Net income (loss)	$ (15,708)	$ 5,279	$ 38,734
Weighted-average common shares outstanding:			
Basic	35,062	34,311	33,844
Diluted	35,062	36,002	34,862
Net income (loss) per common share:			
Basic	$ (0.45)	$ 0.15	$ 1.14
Diluted	$ (0.45)	$ 0.15	$ 1.11

See accompanying notes to consolidated financial statements.

TPI COMPOSITES, INC. AND SUBSIDIARIES

Consolidated Statements of Comprehensive Income (Loss)
(In thousands)

	Year Ended December 31, 2019	2018	2017
Net income (loss)	$ (15,708)	$ 5,279	$ 38,734
Other comprehensive income (loss):			
Foreign currency translation adjustments	(7,026)	(14,428)	3,304
Unrealized gain (loss) on hedging derivatives, net of taxes of $(585) and $158 for the years ended December 31, 2019 and 2018	(2,194)	594	—
Comprehensive income (loss)	$ (24,928)	$ (8,555)	$ 42,038

See accompanying notes to consolidated financial statements.

TPI COMPOSITES, INC. AND SUBSIDIARIES

Consolidated Statements of Changes in Stockholders' Equity (Deficit)
(In thousands)

	Common Shares	Common Amount	Paid-in capital	Accumulated other comprehensive income (loss)	Accumulated deficit	Treasury stock, at cost	Total stockholders' equity (deficit)
Balance at December 31, 2016	33,737	$ 337	$ 292,833	$ (3,862)	$ (117,908)	$ —	$ 171,400
Cumulative-effect adjustment of the adoption of ASU 2016-09 on January 1, 2017	—	—	1,072	—	(1,086)	—	(14)
Net income	—	—	—	—	38,734	—	38,734
Other comprehensive income	—	—	—	3,304	—	—	3,304
Common stock repurchased	—	—	—	—	—	(1,264)	(1,264)
Issuances under share-based compensation plan	312	3	674	—	—	753	1,430
Share-based compensation expense	—	—	6,964	—	—	—	6,964
Balance at December 31, 2017	34,049	340	301,543	(558)	(80,260)	(511)	220,554
Net income	—	—	—	—	5,279	—	5,279
Other comprehensive loss	—	—	—	(13,834)	—	—	(13,834)
Common stock repurchased	—	—	—	—	—	(2,859)	(2,859)
Issuances under share-based compensation plan	696	7	2,695	—	—	1,582	4,284
Share-based compensation expense	—	—	7,533	—	—	—	7,533
Balance at December 31, 2018	34,745	347	311,771	(14,392)	(74,981)	(1,788)	220,957
Net loss	—	—	—	—	(15,708)	—	(15,708)
Other comprehensive loss	—	—	—	(9,220)	—	—	(9,220)
Common stock repurchased	—	—	—	—	—	(2,120)	(2,120)
Issuances under share-based compensation plan	581	6	5,291	—	—		5,297
Share-based compensation expense	—	—	5,844	—	—	—	5,844
Balance at December 31, 2019	35,326	$ 353	$ 322,906	$ (23,612)	$ (90,689)	$ (3,908)	$ 205,050

See accompanying notes to consolidated financial statements.

TPI COMPOSITES, INC. AND SUBSIDIARIES

Consolidated Statements of Cash Flows
(In thousands)

	Year Ended December 31, 2019	2018	2017
Cash flows from operating activities:			
Net income (loss)	$ (15,708)	$ 5,279	$ 38,734
Adjustments to reconcile net income (loss) to net cash provided by (used in) operating activities:			
Depreciation and amortization	38,580	26,429	21,698
Realized loss on sale of assets and asset impairments	18,117	4,581	334
Restructuring charges, net	3,927	—	—
Share-based compensation expense	5,681	7,795	7,124
Amortization of debt issuance costs	206	336	573
Loss on extinguishment of debt	—	3,397	-
Deferred income taxes	4,951	(14,912)	1,650
Changes in assets and liabilities:			
Accounts receivable	(19,366)	(59,200)	(54,227)
Contract assets and liabilities	(57,583)	(7,898)	(4,423)
Operating lease right of use assets and operating lease liabilities	6,953	—	—
Inventories	(1,145)	(1,685)	964
Prepaid expenses	(1,052)	1,318	(1,724)
Other current assets	(13,692)	(132)	4,874
Other noncurrent assets	(7,177)	(5,167)	2,816
Accounts payable and accrued expenses	80,720	32,263	51,474
Accrued warranty	10,874	6,346	9,330
Other noncurrent liabilities	2,798	(2,008)	(4,597)
Net cash provided by (used in) operating activities	57,084	(3,258)	74,600
Cash flows from investing activities:			
Purchases of property, plant and equipment	(74,408)	(52,688)	(44,828)
Acquisition of a business	(1,102)	—	—
Proceeds from sale of assets	—	—	850
Net cash used in investing activities	(75,510)	(52,688)	(43,978)
Cash flows from financing activities:			
Proceeds from revolving and term loans	22,000	89,435	—
Repayments of revolving and term loans	—	(74,972)	(3,750)
Net proceeds from (repayments of) accounts receivable financing	(10,719)	424	(1,020)
Proceeds from working capital loans	3,535	—	9,936
Repayments of working capital loans	(3,535)	—	(14,574)
Principal repayments of finance leases	(9,128)	—	—
Net proceeds from (repayments of) other debt	(4,286)	(23,763)	1,313
Debt issuance costs	—	(281)	(454)
Proceeds from exercise of stock options	5,223	4,284	1,430
Repurchase of common stock including shares withheld in lieu of income taxes	(2,120)	(2,859)	(1,264)
Net cash provided by (used in) financing activities	970	(7,732)	(8,383)
Impact of foreign exchange rates on cash, cash equivalents and restricted cash	(171)	617	335
Net change in cash, cash equivalents and restricted cash	(17,627)	(63,061)	22,574
Cash, cash equivalents and restricted cash, beginning of year	89,376	152,437	129,863
Cash, cash equivalents and restricted cash, end of year	$ 71,749	$ 89,376	$ 152,437
Supplemental disclosures of cash flow information:			
Cash paid for interest	$ 8,190	$ 9,904	$ 11,803
Cash paid for income taxes, net	18,640	7,246	17,263
Supplemental disclosures of noncash investing and financing activities:			
Accrued capital expenditures in accounts payable	14,644	5,139	5,725

See accompanying notes to consolidated financial statements.

Note 1. Summary of Operations and Significant Accounting Policies

(a) Description of Business

TPI Composites, Inc. is the holding company that conducts substantially all of its business operations through its direct and indirect subsidiaries (collectively, the Company or we). The Company was founded in 1968 and has been producing composite wind blades since 2001. The Company's knowledge and experience of composite materials and manufacturing originates with its predecessor company, Tillotson Pearson Inc., a leading manufacturer of high-performance sail and powerboats along with a wide range of composite structures used in other industrial applications. Following the separation from the boat building business in 2004, the Company reorganized in Delaware as LCSI Holding, Inc. and then changed its corporate name to TPI Composites, Inc. in 2008. Today, the Company is headquartered in Scottsdale, Arizona and has expanded its global footprint to include domestic facilities in Newton, Iowa; Warren, Rhode Island and Santa Teresa, New Mexico and international facilities in Dafeng, China; Taicang Port, China; Yangzhou, China, Juárez, Mexico; Matamoros, Mexico; Izmir, Turkey; Chennai, India, Kolding, Denmark and Berlin, Germany.

(b) Basis of Presentation

We divide our business operations into four geographic operating segments—the United States (U.S.), Asia, Mexico and Europe, the Middle East, Africa and India (EMEAI), as follows:

- Our U.S. segment includes (1) the manufacturing of wind blades at our Newton, Iowa plant, (2) the manufacturing of precision molding and assembly systems used to manufacture wind blades at our Warren, Rhode Island facility, (3) the manufacturing of composite solutions for the transportation industry, which we also conduct at our Rhode Island facility, (4) wind blade inspection and repair services in North America, (5) our advanced engineering center in Kolding, Denmark, which provides technical and engineering resources to our manufacturing facilities, (6) our engineering center in Berlin, Germany which we purchased in July 2019 and (7) our corporate headquarters, the costs of which are included in general and administrative expenses.
- Our Asia segment includes (1) the manufacturing of wind blades at our facilities in Dafeng, China and Yangzhou, China, the latter of which commenced operations in March 2019, (2) the manufacturing of precision molding and assembly systems at our Taicang Port, China facility and (3) wind blade inspection and repair services.
- Our Mexico segment manufactures wind blades from three facilities in Juárez, Mexico and a facility in Matamoros, Mexico at which we commenced operations in July 2018. In November 2018, we entered into a new lease agreement with a third party for a new precision molding and assembly systems manufacturing facility in Juárez, Mexico and we commenced operations at this facility in March 2019. This segment also performs wind blade inspection and repair services.
- Our EMEAI segment manufactures wind blades from two facilities in Izmir, Turkey and also performs wind blade inspection and repair services. In February 2019, we entered into a new lease agreement with a third party for a new manufacturing facility that was built in Chennai, India and we commenced operations at this facility in the first quarter of 2020. This segment also performs wind blade inspection and repair services.

The accompanying consolidated financial statements include the accounts of TPI Composites, Inc. and all majority owned subsidiaries. All significant intercompany transactions and balances have been eliminated. Certain prior period amounts in the consolidated financial statements and accompanying notes have been reclassified to conform to the current period's presentation.

(c) Public Offering

In May 2017, we completed a secondary public offering of 5,075,000 shares of our common stock at a price of $16.35 per share, which included 575,000 shares issued pursuant to the underwriters' option to purchase additional shares. All of the shares were sold by existing stockholders and certain of our executive officers. The selling stockholders received all of the net proceeds of $78.8 million from the secondary public offering. We did not sell any shares and did not receive any of the proceeds from the offering and the costs paid by us in connection with the offering of $0.8 million were recorded in general and administrative costs in the accompanying consolidated statement of operations.

(d) Revenue Recognition

The majority of our revenue is generated from long-term contracts associated with manufacturing of wind blades and related services. We account for a long-term contract when it has the approval from both parties, the rights of the parties are identified, payment terms are established, the contract has commercial substance and the collectability of consideration is probable.

To determine the proper revenue recognition method for each long-term contract, we evaluate whether the original contract should be accounted for as one or more performance obligations. This evaluation requires judgment and the decisions reached could change the amount of revenue and gross profit recorded in a given period. As most of our contracts contain multiple performance obligations, we allocate the total transaction price to each performance obligation based on the estimated relative standalone selling prices of the promised goods or services underlying each performance obligation. Our manufacturing services are customer specific and involve production of items that cannot be sold to other customers due to the customers' protected intellectual property; therefore, we allocate the total transaction price under our contracts with multiple performance obligations using the contractually stated prices, as these prices represent the relative standalone selling price based on an expected cost plus margin model.

Revenue is primarily recognized over time as we have an enforceable right to payment upon termination and we may not use or sell the product to fulfill other customers' contracts. In addition, the customer does not have return or refund rights for items produced that conform to the specifications included in the contract. Because control transfers over time, revenue is recognized based on the extent of progress towards the completion of the performance obligation. We use the cost-to-cost input measure of progress for our contracts as this method provides the best representation of the production progress towards satisfaction of the performance obligation as the materials are distinct to the product being manufactured because of customer specifications provided for in the contract, the costs incurred are proportional to the progress towards completion of the product, and the products do not involve significant pre-fabricated component parts. Under the cost-to-cost method, progress and the related revenue recognition is determined by a ratio of direct costs incurred to date in fulfillment of the performance obligation to the total estimated direct costs required to complete the performance obligation.

Determining the revenue to be recognized for services performed under our manufacturing contracts involves judgments and estimates relating to the total consideration to be received and the expected direct costs to complete the performance obligation. As such, revenue recognized reflects our estimates of future contract volumes and the direct costs to complete the performance obligation. The judgments and estimates relating to the total consideration to be received include the amount of variable consideration as our contracts typically provide the customer with a range of production output options from guaranteed minimum volume obligations to the production capacity of the facility, and customers will provide periodic non-cancellable commitments for the number of wind blades to be produced over the term of the agreement. The total consideration also includes payments expected to be received associated with wind blade model transitions. We use historical experience, customer commitments and forecasted future production based on the capacity of the plant to estimate the total revenue to be received to complete the performance obligation. In addition, the amount of revenue per unit produced may vary based on the costs of production of the wind blades as we may be able to change the price per unit based on changes in the cost of production. Further, some of our contracts provide opportunities for us to share in labor and material cost savings as well as absorb some additional costs as an incentive for more efficient production, both of which impact the margin realized on the contract and ultimately the total amount of revenue to be recognized. Additionally, certain of our customer contracts provide for us to make concessions, such as in the form of liquidated damages, for missed production deadlines which are paid over a negotiated timeline.

We estimate variable consideration at the most likely amount to which we expect to be entitled. We include estimated amounts in the transaction price to the extent it is probable that a significant reversal of cumulative revenue recognized will not occur when the uncertainty associated with the variable consideration is resolved. Our estimates of variable consideration and determination of whether to include estimated amounts in the transaction price are based largely on an assessment of our anticipated performance and all information available to us at the time of the estimate and may materially change as additional information becomes known.

Our contracts may be modified to account for changes in specifications of products and changing requirements. If the contract modifications are for goods or services that are not distinct from the existing contract, they are accounted for as if they were part of the original contract. The effect of a contract modification on the transaction price and the measure of progress for the performance obligation to which it relates is recognized as an adjustment to revenue on a cumulative catch-up basis. If contract modifications are for goods and services that are distinct from the existing contract and increases the amount of consideration reflecting the standalone sale price of the additional goods or services, then the contract modification is accounted for as a separate contract and is evaluated for one or more performance obligations.

Each reporting period, we evaluate the progress towards satisfaction of each performance obligation based on any contract modifications that have occurred, cost incurred to date, and an estimate of the expected future revenue and costs to be incurred to complete the performance obligation. Based on this analysis, any changes in estimates of revenue, cost of sales, contract assets and liabilities and the related impact to operating income are recognized on a cumulative catch-up basis, which recognizes in the current period the cumulative effect of the changes on current and prior periods based on the percentage of completion of the performance obligation.

Wind blade pricing is based on annual commitments of volume as established in our customer contracts and orders less than committed volume may result in a higher price per wind blade to our customers. Orders in excess of annual commitments may result in discounts to our customers from the contracted price for the committed volume. Our customers typically provide periodic purchase orders with the price per wind blade given the current cost of the bill of materials, labor requirements and volume desired. We record an allowance for expected utilization of early payment discounts which are reported as a reduction of the related revenue.

Precision molding and assembly systems included in a customer's contract are based upon the specific engineering requirements and design determined by the customer and are specific to the wind blade design and function desired. From the customer's engineering specifications, a job cost estimate is developed along with a production plan, and the desired margin is applied based on the location the work is to be performed and complexity of the customer's design. Precision molding and assembly systems are generally built to produce wind blades which may be manufactured by us in production runs specified in the customer contract.

Contract assets primarily relate to our rights to consideration for work completed but not billed at the reporting date on manufacturing services contracts. The contract assets are transferred to accounts receivable when the rights become unconditional, which generally occurs when customers are invoiced upon the determination that a product conforms to the contract specifications and invoices are due based on each customer's negotiated payment terms, which, when factoring in supply chain financing arrangements, range from 5 to 25 days. We apply the practical expedient that allows us to exclude payment terms under one year from the transfer of a promised good or service from consideration of a significant financing component in its contracts. With regards to the production of precision molding and assembly systems, our contracts generally call for progress payments to be made in advance of production. Generally, payment is made at certain percentage of completion milestones with the final payment due upon delivery to the manufacturing facility. These progress payments are recorded within contract liabilities as current liabilities in the consolidated balance sheets and are reduced as we record revenue over time. We evaluate indications that a customer may not be able to meet the obligations under our long-term supply agreements to determine if an account receivable or contract asset may be impaired.

Our customers may request, in situations where they do not have space available to receive products or do not want to take possession of products immediately for other reasons, that their finished products be stored by us in one of our facilities. Most of our contracts provide for a limited number of wind blades to be stored during the period of the contract with any additional wind blades stored subject to additional storage fees, which are included in the wind blade product revenue.

Revenue related to non-recurring engineering and freight services provided under our customer contracts is recognized at a point in time following the transfer of control of the promised services to the customer. Customers usually pay the carrier directly for the cost of shipping associated with items produced. When we pay the shipping costs, we apply the practical expedient that allows us to account for shipping and handling as a fulfillment costs and include the revenue in the associated performance obligation and the costs are included in cost of goods sold.

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

(e) Cost of Goods Sold

Cost of goods sold includes the costs we incur at our production facilities to make products saleable on both products invoiced during the period as well as products in progress towards the completion of each performance obligation. Cost of goods sold includes such items as raw materials, direct and indirect labor and facilities costs, including purchasing and receiving costs, plant management, inspection costs, production process improvement activities, product engineering and internal transfer costs. In addition, all depreciation associated with assets used in the production of our products is also included in cost of goods sold. Direct labor costs consist of salaries, benefits and other personnel related costs for employees engaged in the manufacture of our products and services.

Startup and transition costs are primarily unallocated fixed overhead costs and underutilized direct labor costs incurred during the period production facilities are transitioning wind blade models and ramping up manufacturing. All direct labor costs are included in the measure of progress towards completion of the relevant performance obligation when determining revenue to be recognized during the period. The cost of sales for the initial wind blades from a new model manufacturing line is generally higher than when the line is operating at optimal production volume levels due to inefficiencies during ramp-up related to labor hours per blade, cycle times per blade and raw material usage. Additionally, these costs as a percentage of net sales are generally higher during the period in which a facility is ramping up to full production capacity due to underutilization of the facility. Manufacturing overhead at each of our facilities includes virtually all indirect costs (including share-based compensation costs) incurred at the plants, including engineering, finance, information technology, human resources and plant management.

(f) General and Administrative Expenses

General and administrative expenses primarily relate to the unallocated portion of costs incurred at our corporate headquarters and our research facilities and include salaries, benefits and other personnel related costs for employees engaged in research and development, engineering, finance, internal audit, information technology, human resources, business development, global operational excellence, global supply chain, in-house legal and executive management. Other costs include outside legal and accounting fees, risk management (insurance), share-based compensation and certain other administrative and global resources costs.

The research and development expenses incurred at our Warren, Rhode Island location as well as at our Kolding, Denmark advanced engineering center and our Berlin, Germany engineering center are also included in general and administrative expenses. For the years ended December 31, 2019, 2018 and 2017, total research and development expenses totaled $1.0 million, $0.8 million and $1.6 million, respectively.

(g) Realized Loss on Sale of Assets and Asset Impairments

For the year ended December 31, 2019, the realized loss on the sale of certain receivables, on a non-recourse basis under supply chain financing arrangements with our customers, to financial institutions, the realized loss on the sale of other assets at our corporate and manufacturing facilities and asset impairment charges totaled $18.1 million. For the year ended December 31, 2018, the realized loss on the sale of certain receivables, on a non-recourse basis under supply chain financing arrangements with our customers, to financial institutions and the realized loss on the sale of other assets at our manufacturing facilities totaled $4.6 million. There were no asset impairment charges for the year ended December 31, 2018.

(h) Cash and Cash Equivalents and Restricted Cash

Cash and cash equivalents include highly liquid investments that are readily convertible to known amounts of cash with original maturities of three months or less. The carrying value of cash and cash equivalents approximates fair value.

As of December 31, 2019 and 2018, our China locations collectively had unrestricted cash totaling $9.7 million and $28.9 million, respectively, in bank accounts in China. The Chinese government imposes certain restrictions on transferring cash out of China. The local governments in Turkey and Mexico impose no such restrictions on transferring cash out of the respective country.

As of December 31, 2019 and 2018, we had provided for cash deposits for letters of guarantee used for customs clearance related to our China locations totaling $1.0 million and $3.5 million, respectively. These amounts are reported as restricted cash in our consolidated balance sheets.

As of December 31, 2019 and 2018, we maintained a long-term deposit in interest bearing accounts, related to fully cash-collateralized letters of credit in connection an equipment lessor in Iowa, totaling $0.5 million. See Note 9, *Other Noncurrent Assets.*

The following table provides a reconciliation of cash, cash equivalents and restricted cash reported within the consolidated balance sheets which total the same such amounts in the consolidated statements of cash flows:

	December 31,			
	2019	2018	2017	2016
	(in thousands)			
Cash and cash equivalents	$ 70,282	$ 85,346	$ 148,113	$ 119,066
Restricted cash	992	3,555	3,849	2,259
Restricted cash included within other noncurrent assets	475	475	475	8,538
Total cash, cash equivalents and restricted cash shown in the consolidated statements of cash flows	$ 71,749	$ 89,376	$ 152,437	$ 129,863

(i) Accounts Receivable

Trade accounts receivable are recorded at the invoiced amount and generally do not bear interest. We follow the allowance method of recognizing uncollectible accounts receivable, which recognizes bad debt expense based on a review of the individual accounts outstanding and prior history of uncollectible accounts receivable. Credit is extended based on evaluation of each of our customer's financial condition and is generally unsecured. Accounts receivable are generally due within 30 days and are stated net of an allowance for doubtful accounts in the consolidated balance sheets. Accounts are considered past due if outstanding longer than contractual payment terms. We record an allowance based on consideration of a number of factors, including the length of time trade accounts are past due, previous loss history, the credit-worthiness of individual customers, economic conditions affecting specific customer industries, and economic conditions in general. We charge-off accounts receivable after all reasonable collection efforts have been exhausted. We credit payments subsequently received on such receivables to bad debt expense in the period payment is received. We record delinquent finance charges on outstanding accounts receivables only if they are collected. We wrote off no receivables during 2019, $0.2 million during 2018 and $0.2

million during 2017, and do not have any off-balance-sheet credit exposure related to our customers. See Note 5, *Accounts Receivable.*

(j) Inventories

Inventories represent materials purchased that are not restricted to fulfillment of a specific contract and are measured at the lower of cost or net realizable value. Net realizable value is defined as the estimated selling prices in the ordinary course of business, less reasonably predictable costs of completion, disposal, and transportation. Cost is determined using the first-in, first-out method for such raw materials. Write-downs to reduce the carrying cost of obsolete, slow-moving, and unusable inventory to net realizable value are recognized in cost of goods sold. The effect of these write-downs establishes a new cost basis in the related inventory, which is not subsequently written up.

(k) Property, Plant and Equipment

Property, plant and equipment are stated at cost. Depreciation and amortization of property, plant, and equipment is calculated on the straight-line method over the estimated useful lives of the assets. See Note 7, *Property, Plant and Equipment, Net.*

	Estimated useful lives
Machinery and equipment	7–10 years
Buildings	20 years
Leasehold improvements	5 to 10 years, or the term of the lease, if shorter
Office equipment and software	3 to 5 years
Furniture	3 to 5 years
Vehicles	5 years

(l) Recoverability of Long-Lived Assets

We review property, plant and equipment and other long-lived assets in order to assess recoverability based on expected future undiscounted cash flows whenever events or circumstances indicate that the carrying value may not be recoverable. If the sum of the expected future net cash flows is less than the carrying value, an impairment loss is recognized. The impairment loss is measured as the amount by which the carrying value exceeds the fair value of the asset.

(m) Goodwill, Intangible Assets and Deferred Costs

Goodwill represents the excess of the acquisition cost of Composite Solutions, Inc. from True North Partners, LLC in 2004 over the fair value of identifiable assets acquired and liabilities assumed. Goodwill, which is entirely in the U.S. segment, is evaluated for impairment annually on October 31 and whenever events or circumstances make it likely that impairment may have occurred. In determining whether impairment has occurred, one compares the fair value of the related reporting unit (calculated using the discounted cash flow method) to its carrying value. If the carrying value exceeds the fair value, impairment is recognized for the difference. We may first assess qualitative factors to determine whether it is necessary to perform the quantitative goodwill impairment test. We performed our annual goodwill impairment test during 2019 and determined that it is more-likely-than-not that its fair value exceeds its carrying amount.

Our patents, licenses, trademarks and development tools were acquired in business acquisitions and provide contractual or legal rights, or other future benefits that could be separately identified. Our valuation of identified intangible assets was based upon discounted cash flow estimates that require significant management judgment with respect to revenue and expense growth rates, changes in working capital, and the selection and use of the appropriate discount rate. The intangible assets are amortized over their estimated useful life. Intangible assets with indefinite lives are evaluated at least annually for impairment or whenever events or circumstances make it likely that impairment may have occurred.

As a result of our adoption of Accounting Standards Update (ASU) 2014-09, *Revenue from Contracts with Customers*, (Topic 606), we recognized an asset for deferred costs incurred to fulfill a contract when such costs meet certain criteria. These deferred costs are amortized over their estimated useful life. See Note 2, *Revenue From Contracts with Customers* for a further discussion of those deferred costs recognized as a result of the adoption of Topic 606. See Note 8, *Intangible Assets and Deferred Costs, Net.*

(n) Warranty Expense

We provide a limited warranty for our mold and wind blade products, including materials and workmanship, with terms and conditions that vary depending on the product sold, generally for periods that range from two to five years. We also provide a limited warranty for our transportation products, including materials and workmanship, with terms and conditions that vary depending on the product sold, generally for a period of approximately two years. Warranty expense is recorded based upon estimates of future repairs using a probability-based methodology that considers previous warranty claims, identified quality issues and industry practices. Once the warranty period has expired, any remaining unused warranty accrual for the specific products is generally reversed against the current year warranty expense amount. See Note 10, *Accrued Warranty*.

(o) Treasury Stock

Common stock purchased for treasury is recorded at historical cost. Transactions in treasury shares relate to share-based compensation plans and are recorded at weighted-average cost.

(p) Foreign Currency Translation and Remeasurements

Foreign currency-denominated assets and liabilities are translated into U.S. dollars at exchange rates existing at the respective balance sheet dates. Results of operations of our foreign subsidiaries are translated at the average exchange rates during the respective periods. Translation adjustments are reported in accumulated other comprehensive loss in our consolidated balance sheets. Currency translation adjustments for the years ended December 31, 2019, 2018 and 2017 amounted to an other comprehensive loss of $7.0 million, an other comprehensive loss of $14.4 million and an other comprehensive gain of $3.3 million, respectively.

Our reporting currency is the U.S. dollar. However, we have non-U.S. operating subsidiaries in our U.S., Mexico, Turkey, China and India operations.

- The U.S. parent companies of our China and Mexico operations, which are wholly-owned subsidiaries of TPI Composites, Inc., maintain their books and records in U.S. dollars.
- Our Mexico operations maintain their books and records through multiple legal entities that are denominated in the local Mexican currency, the Peso.
- Our Turkey operations maintain their books and records in the local Turkish currency, the Lira.
- Our China operations maintain their books and records in the local Chinese currency, the Renminbi.
- Our Chennai, India operation maintains its books and records in the local India currency, the Rupee.
- Our Kolding, Denmark operation, which is a wholly-owned subsidiary of TPI Composites, Inc., maintains its books and records denominated in the local Danish currency, the Krone.
- Our Berlin, Germany operation, which is a wholly-owned subsidiary of TPI Composites, Inc., maintains its books and records in their official currency, the Euro.

Foreign currency transaction gains and losses are reported in realized loss on foreign currency remeasurement in our consolidated statements of operations.

(q) Share-Based Compensation

We maintain two active incentive compensation plans: the 2008 Stock Option and Grant Plan and the Amended and Restated 2015 Stock Option and Incentive Plan (the 2015 Plan). In May 2015, our board of directors and stockholders adopted and approved the 2015 Plan, which provides for the issuance of incentive stock options, non-qualified stock options, stock appreciation rights, restricted stock units (RSUs), restricted stock awards, unrestricted stock awards, cash-based awards, performance-based restricted stock units (PSUs) and dividend equivalent rights to certain of our employees, non-employee directors and consultants. The term of stock options issued under the 2015 Plan may not exceed ten years from the date of grant. Under the 2015 Plan, incentive stock options and non-qualified stock options are granted at an exercise price that is not to be less than 100% of the fair market value of our common stock on the date of grant, as determined by the Compensation Committee of our board of directors. Stock options become vested and exercisable at such times and under such conditions as determined by the Compensation Committee on the date of grant. Upon approval of the 2015 Plan, no future grants will be made from the 2008 Stock Option and Grant Plan.

We use the Black Scholes valuation model, unless the awards are subject to market conditions, in which case we utilize a binomial-lattice model (i.e., Monte Carlo simulation model), to determine the fair value of stock options and certain PSUs granted pursuant to the 2015 Plan. The Monte Carlo simulation model utilizes multiple input variables to determine the share-based compensation expense. For grants with market conditions made in the year ended December 31, 2019, we utilized a volatility of 28.3%, a 0% dividend yield and a risk-free interest rate of 2.5%. The volatility was based on the most recent comparable period for the Company and the peer group. The stock price projection for the Company and the components of the peer group assumes a 0% dividend yield. This is mathematically equivalent to reinvesting dividends in the issuing entity over the performance period. The risk-free interest rate is equal to the yield, as of the measurement date, of the zero-coupon U.S. Treasury bill that is commensurate with the remaining performance measurement period.

The determination of the grant date fair value using an option-pricing model and simulation model requires judgment as well as assumptions regarding a number of other complex and subjective variables. These variables include our closing market price at the grant date as well as the following assumptions:

Expected Volatility. As our common stock had not been publicly traded prior to July 2016, the expected volatility assumption reflects an average of volatilities of publicly traded peer group companies with a period equal to the expected life of the options.

Expected Life (years). We use the simplified method to estimate the expected term of stock options. The simplified method for estimating expected term is to use the mid-point between the vesting term and the contractual term of the option. We elected to use the simplified method because we did not have historical exercise data to estimate the expected term due to the limited time period our common stock had been publicly traded.

Risk-Free Interest Rate. The risk-free interest rate assumption is based upon the U.S. constant maturity treasury rates as the risk-free rate interpolated between the years commensurate with the expected life of the options.

Dividend Yield. The dividend yield assumption is zero since we do not expect to declare or pay dividends in the foreseeable future.

Forfeitures. Share-based compensation expense is reversed when the service-based award is forfeited.

Expected Vesting Period. We amortize the share-based compensation expense over the requisite service period.

Share-based compensation expense related to RSUs and PSUs are expensed over the vesting period using the straight-line method for our employees and our board of directors. The RSUs and PSUs do not have voting rights. We calculate the fair value of our share-based awards on the date of grant for our employees and directors.

(r) Leases

We determine if an arrangement is a lease at inception. Operating leases are included in operating lease right of use (ROU) assets, current operating lease liabilities, and noncurrent operating lease liabilities in the consolidated balance sheets. Finance leases are included in property, plant and equipment, current maturities of long-term debt, and long-term debt, net of debt issuance costs and current maturities in the consolidated balance sheets.

Operating lease ROU assets and operating lease liabilities are recognized based on the present value of future minimum lease payments over the lease term at commencement date. Variable payments are not included in ROU assets or lease liabilities and can vary from period to period based on asset usage or our proportionate share of common costs. The implicit rate within our leases is generally not determinable and, therefore, the incremental borrowing rate at lease commencement is utilized to determine the present value of lease payments. We estimate our incremental borrowing rate based on third-party lender quotes to obtain secured debt in a like currency for a similar asset over a timeframe similar to the term of the lease. The ROU asset also includes any lease prepayments made and any initial direct costs incurred and excludes lease incentives. Our lease terms may include options to extend or terminate the lease when it is reasonably certain that we will exercise that option. Lease expense for minimum lease payments is recognized on a straight-line basis over the lease term. We have elected not to recognize ROU assets or lease liabilities for leases with a term of 12 months or less.

We have lease agreements with lease and non-lease components. We have elected to apply the practical expedient to account for these components as a single lease component for all classes of underlying assets. See section *(x) Recently Issued Accounting Pronouncements - Accounting Pronouncements Adopted in 2019 – Leases* for more details on leases.

(s) Financial Instruments

Interest Rate Swap

We use interest rate swap contracts to mitigate our exposure to interest rate fluctuations associated with our credit agreement (the Credit Agreement) that we entered into in April 2018. We do not use such swap contracts for speculative or trading purposes.

To offset the variability of future interest payments on the Credit Agreement arising from changes in the London Interbank Offered Rate (LIBOR), in April 2018, we entered into an interest rate swap agreement with a financial institution for a notional amount of $75.0 million with an expiration date of April 2023. This interest rate swap effectively hedges $75.0 million of the future variable rate LIBOR interest expense to a fixed rate interest expense. The derivative instrument qualified for accounting as a cash flow hedge in accordance with Financial Accounting Standards Board (FASB) Accounting Standard Codification (ASC) Topic 815, *Derivatives and Hedging*, and we designated it as such.

The settlement value of the interest rate swap is $2.7 million as of December 31, 2019 and is included in other noncurrent liabilities in the consolidated balance sheet. The unrealized loss on the swap of $2.2 million, net of tax, is included in the consolidated statement of other comprehensive income (loss). The settlement value of the interest rate swap was $0.8 million as of December 31, 2018 and is included in other noncurrent assets in the consolidated balance sheet. The unrealized gain on the swap of $0.6 million, net of tax, was included in the consolidated statement of other comprehensive income (loss).

Foreign Exchange Forward Contracts

We use foreign exchange forward contracts to mitigate our exposure to fluctuations in exchange rates between the functional currencies of our subsidiaries and the other currencies in which they transact. In September 2019, we entered into the first of these foreign exchange forward contracts. We do not use such forward contracts for speculative or trading purposes.

We expect certain of our subsidiaries to have future cash flows that will be denominated in currencies other than the subsidiaries' functional currencies. Changes in the exchange rates between the functional currencies of our subsidiaries and the other currencies in which they transact will cause fluctuations in the cash flows we expect to receive or pay when these cash flows are realized or settled. Accordingly, we enter into foreign exchange forward contracts to hedge a portion of these forecasted cash flows. As of December 31, 2019, these foreign exchange forward contracts hedged our forecasted cash flows for periods up to nine months. These foreign exchange forward contracts qualified for accounting as cash flow hedges in accordance with ASC Topic 815, and we designated them as such.

As of December 31, 2019, the notional values associated with our foreign exchange forward contracts qualifying as cash flow hedges were approximately 1.1 billion Mexican Peso. The fair value of the foreign exchange forward contracts is $0.7 million as of December 31, 2019 and includes $0.8 million in other current assets and $0.1 million in accounts payable and accrued expenses in the consolidated balance sheet. The unrealized gain on the foreign exchange forward contracts of $0.5 million, net of tax, as of December 31, 2019 is included in the consolidated statement of other comprehensive income (loss).

Forward Contract on Intercompany Debt

We use forward contracts to mitigate our exposure associated with fluctuations in foreign currency exchange rates. We do not use such forward contracts for speculative or trading purposes.

In August 2018, we provided a Turkish Lira denominated intercompany loan to an EMEAI subsidiary of $15.0 million converted at the spot rate on the transaction date to 96.6 million Turkish Lira to fund their working capital requirements. We entered into a forward contract, with the same expiration as that of the intercompany loan's maturity in October 2018, for a notional amount of 101.5 million Turkish Lira to reduce our exposure to currency fluctuations from the settlement of this Turkish Lira denominated intercompany loan. The derivative instrument qualifies for accounting as a cash flow hedge in accordance with ASC Topic 815, and we designated it as such. The forward contract was settled in October 2018.

(t) Income Taxes

Income taxes are accounted for under the asset and liability method in accordance with FASB ASC Topic 740, *Income Taxes*. Deferred tax assets and liabilities are measured using enacted tax rates expected to apply to taxable income in the years in which those differences are projected to be recovered or settled. Realization of deferred tax assets is dependent on our ability to generate sufficient taxable income of an appropriate character in future periods. A valuation allowance is established if it is determined to be more-likely-than-not that a deferred tax asset will not be realized.

(u) Net Income (Loss) Per Common Share Calculation

The basic net income (loss) per common share is computed by dividing the net income (loss) by the weighted-average number of common shares outstanding during a period. Diluted net income per common share is computed by dividing the net income by the weighted-average number of common shares outstanding plus potentially dilutive securities using the treasury stock method. The table below reflects the calculation of the weighted-average number of common shares outstanding, using the treasury stock method, used in computing basic and diluted earnings per common share for the years ended December 31:

	2019	2018	2017
		(in thousands)	
Basic weighted-average shares outstanding	35,062	34,311	33,844
Effect of dilutive awards	—	1,691	1,018
Diluted weighted-average shares outstanding	35,062	36,002	34,862

Share-based compensation awards of 28,000 shares were excluded from the computation of net loss per share for the year ended December 31, 2019 because their effect would be anti-dilutive. Further, we had 1,176,000 potentially dilutive shares outstanding for the year ended December 31, 2019 which were excluded due to the net loss for the year. Share-based compensation awards of 30,000 shares were excluded from the computation of diluted net income per share for the year ended December 31, 2018 because their effect would be anti-dilutive. In addition, since 2018, certain performance-based restricted stock units have been excluded from the computation of diluted shares outstanding for the 2019 and 2018 periods presented as the performance conditions had not yet been met. We did not have any potential dilutive securities which were excluded from the computation of diluted net income per share for the year ended December 31, 2017.

(v) Use of Estimates

The preparation of consolidated financial statements in conformity with U.S. generally accepted accounting principles (GAAP) requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the consolidated financial statements and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates. Significant items subject to such estimates and assumptions include the useful lives of property, plant and equipment, realizability of intangible assets, deferred costs and deferred tax assets, standalone selling prices and cost assumptions for revenue recognition, fair value of stock options, performance-based restricted stock units and warrants, warranty reserves and other contingencies.

(w) Fair Value of Financial Instruments

FASB ASC Topic 820, *Fair Value Measurements*, defines fair value as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. Topic 820 also specifies a fair value hierarchy that requires an entity to maximize the use of observable inputs and minimize the use of unobservable inputs when measuring fair value. The standard describes three levels of inputs that may be used to measure fair value is follows:

Level 1: Quoted prices in active markets for identical assets or liabilities;

Level 2: Observable inputs other than Level 1 prices, such as quoted prices for similar assets or liabilities; quoted prices in markets that are not active; or other inputs that are observable or can be corroborated by observable market data for substantially the full term of the assets or liabilities; and

Level 3: Valuation is generated from model-based techniques that use significant assumptions not observable in the market. These unobservable assumptions reflect our own estimate of assumptions that market participants would use in pricing the asset or liability.

The carrying amounts of cash and cash equivalents, trade accounts receivable, income taxes receivable, accounts payable and accrued expenses and income taxes payable approximate fair value because of the short-term nature of these financial instruments. The carrying amount of working capital loans approximates fair value due to their short term nature and the loans carry a current market rate of interest, a level 2 input. The carrying value of long-term debt approximates fair value based on its variable rate index or based upon market interest rates available to us for debt of similar risk and maturities, both of which are level 2 inputs.

(x) Recently Issued Accounting Pronouncements

Accounting Pronouncements Adopted in 2019

Leases

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

We adopted this new standard on January 1, 2019 and used the effective date as our date of initial application. Consequently, we have not provided financial information and the disclosures required under the new standard for periods before January 1, 2019.

The adoption of this standard had a material effect on our financial statements, the most significant of which related to the recognition of ROU assets and lease liabilities on our consolidated balance sheet for our real estate, equipment and auto operating leases and providing significant new disclosures about our leasing activities.

We elected the package of practical expedients, which allowed us to retain conclusions related to lease identification and classification under legacy GAAP. The new standard also provided practical expedients for an entity’s ongoing accounting. We elected the short-term lease recognition exemption for all leases that qualify. Accordingly, for those leases that qualified, we did not recognize ROU assets or lease liabilities, and this includes not recognizing ROU assets or lease liabilities for existing short-term leases. We also elected the practical expedient to not separate lease and non-lease components for all of our leases. See Note 13, *Leases*.

Income Taxes

In February 2018, the FASB issued ASU 2018-02, *Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income*, which allowed a reclassification from accumulated other comprehensive income to retained earnings stranded tax effects resulting from the Tax Reform Act. We adopted this standard on January 1, 2019 and it did not have a material impact on our consolidated financial statements.

Share-Based Compensation

In June 2018, the FASB issued ASU 2018-07, *Improvements to Nonemployee Share-Based Payment Accounting*, which expanded the scope of Topic 718, *Compensation-Stock Compensation*, to include share-based payment transactions for acquiring goods and services from nonemployees. We adopted this standard on January 1, 2019 and it did not have a material impact on our consolidated financial statements.

In July 2018, the FASB issued ASU 2018-09, *Codification Improvements*, which contained amendments that affected a wide variety of Topics in the Codification, including amendment to Subtopic 718-40, *Compensation-Stock Compensation-Income Taxes*, that clarified the timing of when an entity should recognize excess tax benefits. We adopted this standard on January 1, 2019 and it did not have a material impact on our consolidated financial statements.

Internal Use Software

In August 2018, the FASB issued ASU 2018-15, *Intangibles - Goodwill and Other-Internal Use Software (Subtopic 350-40): Customer's Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement That Is a Service Contract*, which allowed for the capitalization of implementation costs incurred to develop or obtain internal-use software (and hosting arrangements that include an internal use software license). We adopted this standard on January 1, 2019 and it did not have a material impact on our consolidated financial statements.

Goodwill

In January 2017, the FASB issued ASU 2017-04, *Intangibles - Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment*, which eliminated Step 2 from the goodwill impairment test. We adopted this standard during 2019 when we performed our annual impairment tests and it did not have a material impact on our consolidated financial statements.

Accounting Pronouncements Not Yet Adopted

Financial Instruments

In June 2016, the FASB issued ASU No. 2016-13, *Financial Instruments – Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments*. The new standard is intended to provide financial statement users with more decision-useful information about the expected credit losses on financial instruments and other commitments to extend credit held at each reporting date.

This standard is effective for all public business entities for annual and interim periods beginning after December 15, 2019, with early adoption permitted. We will adopt this standard as of January 1, 2020 and we do not expect the adoption of this standard to have a material effect on our consolidated financial statements.

Fair Value Measurement

In August 2018, the FASB issued ASU 2018-13, *Fair Value Measurement (Topic 820): Disclosure Framework—Changes to the Disclosure Requirements for Fair Value Measurement*, which modifies the disclosure requirements in Topic 820.

This standard is effective for all public business entities for annual and interim periods beginning after December 15, 2019, with early adoption permitted. We will adopt this standard as of January 1, 2020 and we are currently evaluating the impact of the adoption of this standard on our consolidated financial statements.

Income Taxes

In December 2019, the FASB issued ASU 2019-12, *Income Taxes (Topic 740): Simplifying the Accounting for Income Taxes,* which primarily removes specific exemptions to the general principles in Topic 740 in GAAP and improves the financial statement preparers' application of income tax-related guidance and simplifies GAAP.

This standard is effective for all public business entities for annual and interim periods beginning after December 15, 2020, with early adoption permitted. We will adopt this standard as of January 1, 2021 and we are currently evaluating the impact of the adoption of this standard on our consolidated financial statements.

There have been no other recent accounting pronouncements or changes in accounting pronouncements during the current year that are of significance, or potential significance, to us.

Note 2 – Revenue From Contracts with Customers

The following tables represents the disaggregation of our net sales revenue by product for each of our reportable segments:

	Year Ended December 31, 2019				
	U.S.	Asia	Mexico	EMEAI	Total
	(in thousands)				
Wind blade sales	$ 120,125	$ 366,206	$ 410,337	$ 432,049	$ 1,328,717
Precision molding and assembly systems sales	3,774	25,203	19,703	—	48,680
Transportation sales	28,523	—	347	—	28,870
Other sales	16,895	2,400	5,219	5,719	30,233
Total net sales	$ 169,317	$ 393,809	$ 435,606	$ 437,768	$ 1,436,500

	Year Ended December 31, 2018				
	U.S.	Asia	Mexico	EMEAI	Total
	(in thousands)				
Wind blade sales	$ 126,335	$ 264,417	$ 256,101	$ 286,414	$ 933,267
Precision molding and assembly systems sales	5,034	36,616	7,203	—	48,853
Transportation sales	29,254	—	—	—	29,254
Other sales	3,093	5,222	5,452	4,483	18,250
Total net sales	$ 163,716	$ 306,255	$ 268,756	$ 290,897	$ 1,029,624

	Year Ended December 31, 2017				
	U.S.	Asia	Mexico	EMEAI	Total
	(in thousands)				
Wind blade sales	$ 164,870	$ 346,200	$ 200,355	$ 179,100	$ 890,525
Precision molding and assembly systems sales	8,445	18,408	760	—	27,613
Transportation sales	14,020	—	—	—	14,020
Other sales	3,690	7,912	5,448	5,990	23,040
Total net sales	$ 191,025	$ 372,520	$ 206,563	$ 185,090	$ 955,198

In addition, most of our net sales are made directly to our customers, primarily large multi-national wind turbine manufacturers, under our long-term contracts which are typically five years in length.

Contract Assets and Liabilities

Contract assets consist of the amount of revenue recognized over time for performance obligations in production where control has transferred to the customer but the contract does not yet allow for the customer to be billed. Typically, customers are billed when the product finishes production and meets the technical specifications contained in the contract. The majority of the contract asset balance relates to materials procured based on customer specifications. The contract assets are recorded as current assets in the consolidated balance sheets. Contract liabilities consist of advance payments in excess of revenue earned. These amounts were historically recorded as customer deposits which usually relate to progress payments received as precision molding and assembly systems were being manufactured. The contract liabilities are recorded as current liabilities in the consolidated balance sheets and are reduced as we record revenue over time.

These contract assets and liabilities are reported on the consolidated balance sheets net on a contract-by-contract basis at the end of each reporting period, as demonstrated in the table below.

Contract assets and contract liabilities consisted of the following:

	December 31, 2019	December 31, 2018	$ Change
	(in thousands)		
Gross contract assets	$ 170,973	$ 127,568	$ 43,405
Less: reclassification from contract liabilities	(4,458)	(10,860)	6,402
Contract assets	$ 166,515	$ 116,708	$ 49,807

	December 31, 2019	December 31, 2018	$ Change
	(in thousands)		
Gross contract liabilities	$ 7,466	$ 18,003	$ (10,537)
Less: reclassification to contract assets	(4,458)	(10,860)	6,402
Contract liabilities	$ 3,008	$ 7,143	$ (4,135)

Contracts assets increased by $49.8 million from December 31, 2018 to December 31, 2019 due to incremental unbilled production during the year ended December 31, 2019. Contracts liabilities decreased by $4.1 million from December 31, 2018 to December 31, 2019 due to the revenue earned related to precision molding and assembly systems and wind blades being produced exceeding the amounts billed to customers during the year ended December 31, 2019.

The time it takes to produce a single blade is typically between 5 to 7 days. The time it takes to produce a mold is typically between 3 to 6 months.

For the year ended December 31, 2019, we recognized $7.1 million of revenue which was included in the corresponding contract liability balance at the beginning of the period.

Performance Obligations

Remaining performance obligations represent the transaction price for which work has not been performed and excludes any unexercised contract options. As discussed in Note 1, *Summary of Operations and Significant Accounting Policies*, the transaction price includes estimated variable consideration as determined based on the estimated production output within the range of the contractual guaranteed minimum volume obligations and production capacity.

For the year ended December 31, 2019, net revenue recognized from our performance obligations satisfied in previous periods decreased by $19.3 million. This primarily relates to changes in certain of our estimated total contract values and related percentage of completion estimates.

As of December 31, 2019, the aggregate amount of the transaction price allocated to the remaining performance obligations to be satisfied in future periods was approximately $4.1 billion. We estimate that we will recognize the remaining performance obligations as revenue as follows: 38 percent in 2020, 31 percent in 2021, 18 percent in 2022 and the remaining 13 percent in 2023. The transaction price allocated to the remaining performance obligations excludes approximately $295.5 million of variable consideration over the contractual guaranteed minimum volume obligations under current contracts with customers which has been constrained primarily due to uncertainty associated with production volume during the remaining term of the agreements. We estimate the constraint will be resolved in subsequent periods when our customers provide additional information relevant to forecasted future production.

Pre-Production Investments

We recognize an asset for deferred costs incurred to fulfill a contract when those costs meet all of the following criteria: (a) the costs relate directly to a contract or to an anticipated contract that we can specifically identify; (b) the costs generate or enhance our resources that will be used in satisfying performance obligations in the future; and, (c) the costs are expected to be recovered. We capitalize the costs related to training our workforce to execute the manufacturing services and other facility set-up costs related to preparing for production of a specific contract. We factor these costs into our estimated cost analysis for the overall contract. Costs capitalized are amortized over the number of units produced during the contract term. As of December 31, 2019, the cost and accumulated amortization of such assets totaled $5.6 million and $2.7 million, respectively. As of December 31, 2018, the cost and accumulated amortization of such assets totaled $5.6 million and $2.1 million, respectively. These amounts are included in intangible assets and deferred costs, net in the consolidated balance sheet. See Note 8, *Intangible Assets and Deferred Costs, Net*.

In applying the practical expedient as permitted under Topic 606, we recognize the incremental costs of obtaining contracts as an expense when incurred if the amortization period of the asset that we otherwise would have recognized is one year or less. These costs are included in cost of goods sold.

Note 3. Significant Risks and Uncertainties

Our revenues and receivables are from a small number of customers. As such, our production levels are dependent on these customers' orders. See Note 17, *Concentration of Customers*.

We have experienced extended startup delays and challenges with respect to our Newton, Iowa transportation facility, which had an adverse impact on our results of operations for the year ended December 31, 2019. See Note 20, *Subsequent Events*.

We maintain our U.S. cash in bank deposit accounts that, at times, exceed U.S. federally insured limits. U.S. bank accounts are guaranteed by the Federal Deposit Insurance Corporation (FDIC) in an amount up to $250,000 during 2019 and 2018. At December 31, 2019 and 2018, we had $45.8 million and $53.7 million, respectively, of cash in deposit accounts in high quality U.S. banks, which was in excess of FDIC limits. We have not experienced losses in any such accounts.

We also maintain cash in bank deposit accounts outside the U.S. with no insurance. At December 31, 2019, this includes $9.9 million in Turkey, $9.7 million in China, $2.4 million in India, $2.1 million in Mexico and $0.4 million in Denmark. We have not experienced losses in these accounts. In addition, we have short-term deposits in interest bearing accounts of $1.0 million in China, which are reported as restricted cash in our consolidated balance sheets. We also have long-term deposits in interest bearing accounts of $0.5 million in Iowa. See Note 9, *Other Noncurrent Assets.*

Certain of our debt agreements are either tied to LIBOR or EURIBOR and certain of them have associated interest rate hedges. Due to the relatively low LIBOR and EURIBOR rates in effect as of December 31, 2019, a 10% change in the LIBOR or EURIBOR rate would not have had a material impact on our future earnings, fair values or cash flows.

Note 4. Related-Party Transactions

Related party transactions include transactions between us and certain of our affiliates. The following transactions were in the normal course of operations and were measured at the exchange amount, which is the amount of consideration established and agreed to by the parties.

We have previously entered into several agreements with subsidiaries of General Electric Company and its consolidated affiliates (GE) relating to the operation of its business. As a result of these agreements, GE has been a debtor, creditor and holder of both our preferred and common shares. During the second quarter of 2017, GE reduced its holdings of our common shares to less than five percent of the total shares outstanding and then completely divested of our common shares during the third quarter of 2017. For the six months ended June 30, 2017, we recorded related-party sales with GE of $198.6 million.

We have entered into five separate supply agreements with GE to manufacture wind blades in Newton, Iowa; Taicang Port, China; Juárez, Mexico (2) and Izmir, Turkey. The supply agreements in Taicang Port, China and Izmir, Turkey expired on December 31, 2017.

In connection with our secondary offering in May 2017, certain entities associated with Element Partners, Angeleno Group, Landmark Partners and NGP Energy Technology Partners, L.P, as well as certain of our executive officers sold an aggregate of 5,075,000 shares of our common stock at the public offering price of $16.35 per share.

Note 5. Accounts Receivable

Accounts receivable at December 31 consisted of the following:

	2019	2018
	(in thousands)	
Trade accounts receivable	$ 180,051	$ 172,667
Other accounts receivable	3,961	4,148
Total accounts receivable	$ 184,012	$ 176,815

Note 6. Other Current Assets

Other current assets at December 31 consisted of the following:

	2019	2018
	(in thousands)	
Refundable value-added tax	$ 22,687	$ 11,160
Deposits	6,143	5,659
Other current assets	1,013	—
Total current assets	$ 29,843	$ 16,819

Note 7. Property, Plant and Equipment, Net

Property, plant and equipment, net at December 31 consisted of the following:

	2019	2018
	(in thousands)	
Machinery and equipment	$ 159,176	$ 119,737
Buildings	14,495	15,080
Leasehold improvements	56,414	38,747
Office equipment and software	32,284	26,363
Furniture	22,429	19,579
Vehicles	562	287
Construction in progress	20,677	17,390
Total property, plant and equipment, gross	306,037	237,183
Accumulated depreciation	(101,030)	(77,760)
Total property, plant and equipment, net	$ 205,007	$ 159,423

As of December 31, 2019, the projects in construction in progress included the construction and outfitting of our new manufacturing facility in Chennai, India and continued investments in our other existing manufacturing facilities.

Total depreciation for the years ended December 31, 2019, 2018 and 2017 was $36.7 million, $25.5 million and $20.8 million, respectively.

As of December 31, 2019, the cost and accumulated depreciation of property, plant and equipment that we are leasing under finance lease arrangements is $45.0 million and $17.0 million, respectively. As of December 31, 2018, the cost and accumulated depreciation of property, plant and equipment that we are leasing under finance lease arrangements is $41.3 million and $11.7 million, respectively. See Note 13, *Leases* for more information related to finance leases.

Note 8. Intangible Assets and Deferred Costs, Net

Carrying values and estimated useful lives of intangible assets and deferred costs as of December 31, 2019, consisted of the following:

	Estimated Useful Life	Cost	Accumulated Amortization	Net
			(in thousands)	
Pre-production investments (1)	Various	$ 5,639	$ (2,656)	$ 2,983
Patents	10 years	112	(6)	106
Acquired development tools	10 years	980	(49)	931
Trademarks	Indefinite	150	—	150
Total intangible assets and deferred costs, net		$ 6,881	$ (2,711)	$ 4,170

Carrying values and estimated useful lives of intangible assets and deferred costs as of December 31, 2018, consisted of the following:

	Estimated Useful Life	Cost	Accumulated Amortization	Net
			(in thousands)	
Pre-production investments (1)	Various	$ 5,598	$ (2,111)	$ 3,487
License	5 years	1,000	(179)	821
Trademarks	Indefinite	150	—	150
Total intangible assets and deferred costs, net		$ 6,748	$ (2,290)	$ 4,458

(1) See Note 2, *Revenue From Contracts with Customers,* for a further discussion of these pre-production investments.

During the years ended December 31, 2019, 2018 and 2017, we recorded amortization expense for the intangible assets and deferred costs of $1.9 million, $0.9 million and $0.9 million, respectively.

Note 9. Other Noncurrent Assets

Other noncurrent assets at December 31 consisted of the following:

	2019	2018
	(in thousands)	
Deferred tax assets	$ 11,209	$ 15,296
Deposits	8,437	3,845
Land use right	1,521	2,378
Restricted cash	475	475
Other	2,278	1,976
Total other noncurrent assets	$ 23,920	$ 23,970

The historical land use right asset was purchased during 2007 and permits us to use the land where the Taicang Port, China facility, owned by us, is situated. Amortization of the land use right began upon the opening of the plant in 2008. An additional land use right asset was purchased during 2018 which permits us to use additional land where the Taicang Port, China facility is situated. In the fourth quarter of 2019 we determined that we were not going to utilize this additional land use right asset and wrote off approximately $0.8 million to depreciation expense in our consolidated statement of operations. We are still amortizing the historical land use right asset on a straight-line basis over its 50 year life.

As of December 31, 2019 and 2018, we maintained long-term deposits in interest bearing accounts related to fully cash-collateralized letter of credit in connection with an equipment lessor in Iowa totaling approximately $0.5 million.

Note 10. Accrued Warranty

Warranty accrual at December 31 consisted of the following:

	2019	2018	2017
		(in thousands)	
Warranty accrual at beginning of year	$ 36,765	$ 30,419	$ 21,089
Accrual during the year	22,345	14,605	15,443
Cost of warranty services provided during the year	(6,220)	(4,457)	(1,986)
Reduction of reserves	(5,251)	(3,802)	(4,127)
Warranty accrual at end of year	$ 47,639	$ 36,765	$ 30,419

Note 11. Share-Based Compensation

Since 2015, we have granted awards of stock options, RSUs and PSUs to certain employees and non-employee directors under the 2015 Plan. Each award granted prior to the consummation of our IPO included a performance condition that required the completion of an initial public offering by us and a required vesting period of one to four years commencing upon achievement of the performance condition. As the IPO was consummated in July 2016, we began recording compensation expense in July 2016 for the requisite service period from the grant date through the IPO date with the balance of the share-based compensation to be expensed over the remaining vesting period.

The share-based compensation expense recognized in the consolidated statements of operations for the years ended December 31 was as follows:

	2019	2018	2017
		(in thousands)	
Cost of goods sold	$ 386	$ 1,281	$ 1,070
General and administrative expenses	5,295	6,514	6,054
Total share-based compensation expense	$ 5,681	$ 7,795	$ 7,124

The share-based compensation expense recognized by award type for the years ended December 31 was as follows:

	2019	2018	2017
		(in thousands)	
RSUs	$ 3,658	$ 4,209	$ 2,808
Stock options	1,501	2,463	4,316
PSUs	522	1,123	—
Total share-based compensation expense	$ 5,681	$ 7,795	$ 7,124

The summary of activity for our incentive plans is as follows:

		Stock Options			RSUs		PSUs	
	Shares Available for Grant	Shares	Weighted-Average Exercise Price	Options Exercisable	Shares	Weighted-Average Grant Date Fair Value	Shares	Weighted-Average Grant Date Fair Value
Balance as of December 31, 2016	3,587,692	3,331,418	$ 12.72	25,828	636,120	$ 10.90	—	—
Increase in shares authorized	1,349,475	—	—		—	—	—	—
Granted	(433,700)	213,200	19.70		220,500	22.42	—	—
Exercised/vested	—	(138,878)	10.83		(218,040)	10.95	—	—
Forfeited/cancelled	227,650	(202,450)	11.54		(25,200)	10.87	—	—
Balance as of December 31, 2017	4,731,117	3,203,290	13.34	890,433	613,380	15.02	—	—
Increase in shares authorized	1,360,826	—	—		—	—	—	—
Granted	(451,212)	9,652	22.67		149,012	23.37	292,548	22.67
Exercised/vested	—	(354,153)	12.10		(298,036)	13.03	—	—
Forfeited/cancelled	339,874	(258,095)	14.72		(38,480)	21.51	(43,299)	22.67
Balance as of December 31, 2018	5,980,605	2,600,694	13.41	1,415,948	425,876	18.75	249,249	22.67
Increase in shares authorized	1,387,123	—	—		—	—	—	—
Granted	(875,557)	397,170	20.94		196,418	26.99	281,969	29.25
Exercised/vested	—	(345,475)	15.14		(236,187)	15.42	—	—
Forfeited/cancelled	129,341	(58,161)	15.23		(31,680)	24.91	(39,500)	25.60
Balance as of December 31, 2019	6,621,512	2,594,228	14.29	1,697,272	354,427	24.99	491,718	26.20

The fair value of RSUs which vested during the years ended December 31, 2019 and 2018 was $6.2 million and $8.4 million, respectively. In addition, during 2019 and 2018, we repurchased 79,040 and 100,891 shares for $2.1 million and $2.9 million, respectively, related to tax withholding requirements on vested RSU awards.

The following table summarizes the outstanding and exercisable stock option awards as of December 31, 2019:

	Options Outstanding			Options Exercisable	
Range of Exercise Prices:	Shares	Weighted-Average Remaining Contractual Life (in years)	Weighted-Average Exercise Price	Shares	Weighted-Average Exercise Price
$8.49	16,397	0.6	$ 8.49	16,397	$ 8.49
$10.87	1,470,972	5.4	10.87	1,169,598	10.87
$11.00 to $16.53	320,001	6.1	15.95	249,800	16.02
$18.70	188,560	6.5	18.70	150,081	18.70
$18.77 to $29.26	598,298	8.9	20.59	111,396	19.99
$8.49 to $29.26	2,594,228	6.4	14.29	1,697,272	12.90

The following table contains additional information pertaining to stock options for the years ended December 31:

	2019	2018	2017
		(in thousands)	
Total intrinsic value of stock options outstanding	$ 12,219	$ 29,045	$ 22,804
Total intrinsic value of stock options exercisable	9,718	15,949	6,688
Cash received from the exercise of stock options	5,223	4,284	1,430
Fair value of stock options vested	8,796	4,566	4,931

As of December 31, 2019, the unamortized cost of the outstanding RSUs and PSUs was $4.2 million and $2.4 million, respectively, which we expect to recognize in the consolidated financial statements over weighted-average periods of approximately 1.8 years and 1.9 years, respectively. Additionally, the total unrecognized cost related to non-vested stock option awards was $2.3 million, which we expect to recognize in the consolidated financial statements over a weighted-average period of approximately 1.8 years.

The fair value of the stock options granted during the years ended December 31 were calculated using the Black-Scholes option pricing model with the following assumptions:

	2019	2018	2017
Weighted-average fair value	$ 6.80	$ 10.36	$ 9.10
Expected volatility	28.0%	42.8%	45.0%
Expected life	6.3 years	6.3 years	6.3 years
Risk-free interest rate	1.9%	2.7%	1.5%
Dividend yield	0.0%	0.0%	0.0%

Note 12. Long-Term Debt, Net of Debt Issuance Costs and Current Maturities

Long-term debt, net of debt issuance costs and current maturities, as of December 31 consisted of the following:

	2019	2018
	(in thousands)	
Senior revolving loan—US	$ 112,414	$ 90,414
Accounts receivable financing—EMEAI	3,805	14,524
Equipment financing—EMEAI	7,903	12,197
Equipment finance lease—U.S.	288	111
Equipment finance lease—EMEAI	5,732	6,738
Equipment finance lease—Mexico	11,919	14,517
Total debt - principal	142,061	138,501
Less: Debt issuance costs	(672)	(878)
Total debt, net of debt issuance costs	141,389	137,623
Less: Current maturities of long-term debt	(13,501)	(27,058)
Long-term debt, net of debt issuance costs and current maturities	$ 127,888	$ 110,565

Senior Financing Agreements (U.S.):

In April 2018, we entered into a new credit agreement, the Credit Agreement, with four lenders consisting of a multi-currency, revolving credit facility in an aggregate principal amount of $150.0 million, including a $25.0 million letter of credit sub-facility. On the closing date, we drew down $75.4 million on the revolving credit facility in connection with the closing of the transactions contemplated by the Credit Agreement and used the proceeds to pay all outstanding amounts due and payable under our previous credit agreement, various fees and expenses and accrued interest. All borrowings and amounts outstanding under the Credit Agreement are scheduled to mature in April 2023. In May 2019, the Credit Agreement was further amended to revise the definition of Consolidated EBITDA as utilized in certain of the financial covenants of the Credit Agreement.

In connection with the Credit Agreement, in the second quarter of 2018 we expensed $2.0 million of deferred financing costs associated with the previous credit agreement and a $1.4 million prepayment penalty within the caption “Loss on extinguishment of debt” in the accompanying consolidated statements of operations. In addition, we incurred debt issuance costs related to the Credit Agreement totaling $1.0 million which will be amortized to interest expense over the five-year term of the Credit Agreement using the effective interest method.

Interest accrues at a variable rate equal to LIBOR plus a margin of 1.75% (3.3% as of December 31, 2019), which may vary based on our total net leverage ratio as defined in the Credit Agreement. Interest is paid monthly and we are not obligated to make any principal repayments prior to the maturity date provided we are not in default under the Credit Agreement. We may prepay the borrowings under the Credit Agreement without penalty.

In April 2018, we also entered into an interest rate swap arrangement to fix a notional amount of $75.0 million of the Credit Agreement at an effective interest rate of 4.2% for a period of five years. See Note 1, *Summary of Operations and Significant Accounting Policies - (s) Financial Instruments,* for more details on this interest rate swap arrangement.

As of December 31, 2019 and 2018, there was $112.4 million and $90.4 million outstanding under the Credit Agreement, respectively.

Due to the revolving credit facility's variable interest rate of LIBOR plus a competitive spread, we estimate that fair-value approximates the face value of these notes.

Accounts Receivable, Secured and Unsecured Financing:

EMEAI: During 2014, we renewed a general credit agreement, as amended, with a financial institution in Turkey to provide up to 21.0 million Euro of short-term collateralized financing on invoiced accounts receivable of one of our customers in Turkey. Interest originally accrued annually at a fixed rate of 9.1% and was paid quarterly. In December 2014, and later amended, we obtained an additional $8.0 million of unsecured financing in Turkey under the credit agreement with interest accruing annually at a fixed rate of 2.0% and payable at the end of the term when the loan is repaid. All other credit agreement terms remained the same. The credit agreement does not have a maturity date, however the limits are reviewed in September of each year. During the fourth quarter of 2018, we replaced the accounts receivable financing facility with the accounts receivable assignment agreement discussed below. As of December 31, 2019 and 2018, there were no amounts outstanding under the unsecured financing facility.

In 2014, we entered into a credit agreement with a Turkish financial institution to provide up to $16.0 million of short-term financing of which $10.0 million is collateralized financing on invoiced accounts receivable of one of our customers in Turkey, $5.0 million is unsecured financing and $1.0 million is related to letters of guarantee. Interest accrues at a variable rate of the three month Euro Interbank Offered Rate (EURIBOR) plus 6.5%. During the first quarter of 2018, the collateralized financing on invoiced accounts receivables and unsecured financing facilities were retired and the letters of guarantee limit was adjusted, later amended to 1.4 million Euro (approximately $1.6 million as of December 31, 2019). No amounts were outstanding under this letter of guarantee agreement as of December 31, 2019 or 2018.

In 2016, we entered into a general credit agreement, as amended, with a Turkish financial institution to provide up to 39.0 million Euro (approximately $43.7 million as of December 31, 2019) of short-term financing of which 28.0 million Euro (approximately $31.4 million as of December 31, 2019) is collateralized financing based on invoiced accounts receivables of one of our customers in Turkey, 10.0 million Euro (approximately $11.2 million as of December 31, 2019) for the collateralized financing of capital expenditures and 1.0 million Euro (approximately $1.1 million as of December 31, 2019) related to letters of guarantee. Interest on the collateralized financing based on invoiced accounts receivables of one of our customers in Turkey accrues at a fixed rate of 2.75% as of December 31, 2019 and is paid quarterly with a maturity date equal to four months from the applicable invoice date. Interest on the collateralized capital expenditures financing accrues at the one month EURIBOR plus 6.75% (6.75% as of December 31, 2019) with monthly principal repayments beginning in October 2017 with a final maturity date of December 2021. Interest on the letters of guarantee accrues at 2.00% annually with an amended final maturity date of July 2020. As of December 31, 2019 and 2018, there was $7.9 million and $12.2 million outstanding under the collateralized financing of capital expenditures line, respectively. Additionally, as of December 31, 2019 and 2018, there was $3.8 million and $14.5 million, respectively, outstanding under the collateralized financing based on invoiced accounts receivables.

In the fourth quarter of 2018, we entered into a credit agreement, as amended, with a Turkish financial institution to provide up to 118.6 million Turkish Lira (approximately $20.6 million as of June 30, 2019) of collateralized financing on invoiced accounts receivable of one of our customers in Turkey. Interest accrued at a fixed rate of 3.9% and was to be paid quarterly. The credit agreement did not have a maturity date, however the limit would be reviewed in October of each year. In September 2019 this credit agreement was cancelled. No amounts were outstanding under this agreement as of December 31, 2018.

In the fourth quarter of 2019, we entered into a credit agreement with a Turkish financial institution to provide up to $10.0 million Euro (approximately $11.2 million as of December 31, 2019) of unsecured financing. Interest accrues at a fixed rate of 2.5% and is payable at the end of the term when the loan is repaid. No amounts were outstanding under this agreement as of December 31, 2019.

Due to the short-term nature of the unsecured financings in the EMEAI segment, we estimate that fair-value approximates the face value of the notes.

Asia: In February 2017, we entered into a credit agreement, as amended, with a Chinese financial institution to provide an unsecured credit line of up to 210.0 million Renminbi (approximately $30.5 million as of June 30, 2019) which can be used for the purpose of domestic and foreign currency loans, issuing customs letters of guarantee or other transactions approved by the lender. Interest on the credit line accrues at the Chinese central bank interest rate plus an applicable margin (4.8% as of June 30, 2019) and can be paid monthly, quarterly or at the time of the debt's maturity (extended to January 2020). In August 2019, except as noted below, we replaced this credit agreement with the credit agreement discussed below. In connection with the August 2019 transaction, the financial institution agreed to allow the working capital loans which were then outstanding, totaling 5.0 million Renminbi (or approximately $0.7 million as of September 30, 2019) to be repaid on their due date of October 1, 2019. As of December 31, 2018, there were 92.8 million Renminbi (approximately $13.5 million) of letters of guarantee used for customs clearance outstanding. As of December 31, 2018, there were no working capital loan amounts outstanding.

In August 2019, we entered into a credit agreement with a Chinese financial institution to provide an unsecured credit line of up to 315.0 million Renminbi (approximately $45.2 million as of December 31, 2019) related to two of our China facilities which can be used for the purpose of issuing customs letters of guarantee and covering the related deposits on such letters of guarantee, project financing and certain other transactions approved by the lender. Interest on the credit line accrues at the Chinese central bank interest rate plus an applicable margin (4.8% as of December 31, 2019) and can be paid monthly, quarterly or at the time of the debt's maturity (August 2021). As of December 31, 2019, there were 25.7 million Renminbi (approximately $3.7 million) of letters of guarantee and related deposits used for customs clearance outstanding.

In March 2018, we entered into a credit agreement, as amended, with a Chinese financial institution to provide an unsecured credit line of up to 100.0 million Renminbi (approximately $14.3 million as of December 31, 2019) which can be used as customs letters of guarantee. Interest on the credit line accrues at the Chinese central bank interest rate plus an applicable margin (4.8% at December 31, 2019) and can be paid monthly, quarterly or at the time of the debt's maturity (in March 2023). As of December 31, 2019, there were 71.9 million Renminbi (approximately $10.3 million) of letters of guarantee used for customs clearance outstanding. As of December 31, 2018, there were no amounts outstanding under this credit agreement.

Equipment Leases and Other Arrangements:

U.S.: In 2014, we entered into a lease agreement, as amended, with a leasing company for the lease of up to $5.4 million of machinery and equipment at our Iowa facility. The lease included an implied effective interest rate of 4.3% annually and required monthly payments during each 24 month term. The amounts outstanding under this agreement as of December 31, 2019 and 2018, were $0.1 million and $0.1 million, respectively.

EMEAI: In 2013, we entered into a finance lease agreement with a financial institution in Turkey for the initial lease of up to $4.9 million of machinery, equipment and building improvements at our first Turkey facility. The term of the lease was for four years at an effective interest rate of 6.0%. The loan was to be repaid in monthly installments through 2017. The financing agreement was subsequently amended in 2017 to include our second Turkey facility and increase the amount of machinery, equipment and building improvements available for lease to $10.0 million. As a result of the amendment, and subsequent amendments, the loan is to be repaid in monthly installments through 2023 at an effective interest rate of 8.0%. All other financing agreement terms remained the same. The balance outstanding as of December 31, 2019 and 2018 was $5.6 million and $6.7 million, respectively.

Mexico: In 2016, we entered into a lease agreement, as amended, with a leasing company for the lease of up to $10.0 million of machinery and equipment at our second Mexico facility. The lease includes an implied effective interest rate of 4.3% annually and requires monthly payments during each 24 month term. There were no amounts outstanding under this agreement as of December 31, 2019. The amount outstanding under this agreement as of December 31, 2018 was $0.7 million.

In March 2017, we entered into a sale-lease agreement with a leasing company for the initial lease of up to $12.0 million of machinery and equipment at our third Mexico facility. The lease includes an implied effective interest rate of 4.3% annually and requires monthly payments during each 24 month term. There were no amounts outstanding under this agreement as of December 31, 2019. The amount outstanding under this agreement as of December 31, 2018 was $3.2 million.

In March 2018, we entered into a sale-lease agreement with a leasing company for the initial lease of up to $15.0 million of machinery and equipment at our Matamoros, Mexico facility. The lease includes an implied effective interest rate of 6.7% annually and requires monthly payments during each 48 month term. The amount outstanding under this agreement as of December 31, 2019 and 2018 was $10.9 million and $10.5 million, respectively.

Costs associated with the issuance of debt are presented net of the related debt and are amortized over the term of the debt using the effective interest rate method. For the years ended December 31, 2019, 2018 and 2017, $0.2 million, $0.3 million and $0.6 million of debt issuance costs were amortized to interest expense in our consolidated statements of operations, respectively.

The average interest rate on our short-term borrowings as of December 31, 2019 and 2018 was approximately 5.7% and 7.7%, respectively.

The future aggregate annual principal maturities of debt at December 31, 2019, are as follows (in thousands):

2020	$	13,501
2021		9,519
2022		5,130
2023		113,720
2024		191
Total debt - principal	$	142,061

Note 13. Leases

We have operating and finance leases for our manufacturing facilities, warehouses, offices, automobiles and certain of our machinery and equipment. Our leases have remaining lease terms of between one and 15 years, some of which may include options to extend the leases up to five years.

The components of lease cost were as follows:

		2019 (in thousands)
Operating lease cost	$	30,957
Finance lease cost		
Amortization of assets under finance leases	$	6,351
Interest on finance leases		1,414
Total finance lease cost	$	7,765

Future minimum lease payments under noncancelable leases as of December 31, 2019 were as follows:

	Operating Leases	Finance Leases
	(in thousands)	
Year Ending December 31,		
2020	$ 25,425	$ 6,744
2021	22,669	6,419
2022	21,618	5,653
2023	20,978	822
2024	17,519	200
Thereafter	66,584	—
Total future minimum lease payments	174,793	19,838
Less: interest	(44,281)	(1,900)
Total lease liabilities	$ 130,512	$ 17,938

Total lease liabilities as of December 31, 2019 were as follows:

	Operating Leases	Finance Leases
	(in thousands)	
Current operating lease liabilities	$ 16,629	$ —
Current maturities of long-term debt	—	5,744
Noncurrent operating lease liabilities	113,883	—
Long-term debt, net of debt issuance costs and current maturities	—	12,194
Total lease liabilities	$ 130,512	$ 17,938

See Note 7, *Property, Plant and Equipment, Net* for a discussion of the cost and accumulated depreciation of assets financed through finance leases.

Other information related to leases was as follows:

	2019
	(in thousands)
Supplemental Cash Flow Information	
Cash paid for amounts included in the measurement of lease liabilities:	
Operating cash flows from operating leases	$ 29,845
Operating cash flows from finance leases	1,414
Financing cash flows from finance leases	9,128
Right of use assets obtained in exchange for new lease obligations:	
Operating leases	15,855
Finance leases	5,811

	December 31, 2019
Weighted-Average Remaining Lease Term (In Years):	
Operating leases	7.6
Finance leases	3.2
Weighted-Average Discount Rate:	
Operating leases	7.5%
Finance leases	6.4%

As of December 31, 2019, we have an additional lease related to our new manufacturing facility in Chennai, India of approximately $60 million which has not yet commenced, but which we expect will commence in the first half of 2020 with an initial term of ten years.

Note 14. Commitments and Contingencies

(a) Operating Leases

We lease various facilities and equipment under noncancelable operating leases with terms ranging from 12 months to 120 months. Scheduled rent increases are recorded on a straight-line basis over the entire term of the lease.

Rental expense charged under all operating leases (including leases with terms of less than one year) was $31.0 million, $25.5 million and $19.3 million for the years ended December 31, 2019, 2018 and 2017, respectively. See Note 13, *Leases* for a listing of the future minimum lease payments under noncancelable operating leases with terms of one year or more as of December 31, 2019.

(b) Legal Proceedings

From time to time, we may be involved in disputes or litigation relating to claims arising out of its operations. From time to time, we are party to various lawsuits, claims, and other legal proceedings that arise in the ordinary course of business, some of which are covered by insurance. Upon resolution of any pending legal matters, we may incur charges in excess of presently established reserves. Our management does not believe that any such charges would, individually or in the aggregate, have a material adverse effect on our financial condition, results of operations or cash flows.

(c) Insurance/Self-Insurance

We use a combination of insurance and self-insurance for a number of risks, including claims related to our employee health care, workers' compensation and general liability. Liabilities associated with these risks are estimated based on, among other things, historical claims experience, severity factors, and other actuarial assumptions. Our loss exposure related to self-insurance is limited by stop loss coverage on a per occurrence and aggregate basis. We regularly analyze our reserves for incurred but not reported claims, and for reported but not paid claims related to our self-funded insurance programs. While we believe our reserves are adequate, significant judgment is involved in assessing these reserves such as assessing historical paid claims, average lags between the claims' incurred date, reported dates and paid dates, and the frequency and severity of claims. There may be differences between actual settlement amounts and recorded reserves and any resulting adjustments are included in expense once a probable amount is known.

(d) Dividend Restrictions

Certain of our subsidiaries are limited in their ability to declare dividends without first meeting statutory restrictions of the People's Republic of China, including retained earnings as determined under Chinese-statutory accounting requirements. Until 50% ($26.5 million) of registered capital is contributed to a surplus reserve, our Chinese operations can only pay dividends equal to 90% of after-tax profits (10% must be contributed to the surplus reserve). Once the surplus reserve fund requirement is met, we can pay dividends equal to 100% of after-tax profit assuming other conditions are met. At December 31, 2019, the amount of the surplus reserve fund was $6.6 million.

(e) Collective Bargaining Agreements

In 2016, we entered into a three-year collective bargaining agreement with certain of our employees at our first Turkey facility. The agreement resulted in an average increase in pay of approximately 20% for employees covered by the agreement. In addition, beginning in July 2017, this collective bargaining arrangement also covered similarly situated employees at our second Turkey facility. In 2019, the collective bargaining agreement with the Turkey facilities was renewed. In March 2018, we entered into a collective bargaining agreement with a labor union for certain of our employees at the Matamoros, Mexico facility. In the first quarter of 2020, we amended our

Matamoros collective bargaining agreement to adjust the salaries and bonuses payable to our associates for calendar year 2020 that are covered by this agreement. Currently, there are no other employees covered by collective bargaining agreements. We believe that our relations with employees are generally good.

Note 15. Defined Contribution Plan

We maintain a 401(k) plan for all of our U.S. employees. Under the 401(k) plan, eligible employees may contribute, subject to statutory limitations, a percentage of their salaries. We currently match 50 percent of the participants' contributions up to eight percent of eligible compensation.

Participant vesting occurs in our matching contributions according to the schedule below:

Years of service	Vesting Percentage
1-year anniversary	34%
2-year anniversary	66%
3-year anniversary	100%

Our matching contributions to the 401(k) plan were $0.6 million, $0.6 million and $0.6 million for the years ended December 31, 2019, 2018 and 2017, respectively. Our matching contributions are accrued and recorded as expense during each payroll period. Effective January 1, 2017, we changed the 401(k) plan to include an auto enrollment feature, increased our match from 25% of the first 8% to 50% of the first 8% and reduced the vesting period from six years to three years.

In Mexico, we maintain an annual savings fund, which matches the employee contribution each week, based on the Mexican statutory maximum of 13% of actual minimum salary rates. The savings fund period runs from November to October each year, and is distributed to employees in full, during the first week of November each year. For the years ended December 31, 2019, 2018 and 2017, we incurred matched savings expense of $2.7 million, $1.8 million and $1.3 million, respectively.

In Turkey, we maintain a retirement fund that is based on a formula of annual salary multiplied by the number of years of service with us. We accrue a retirement fund liability for this each month. As of December 31, 2019 and 2018, we accrued $2.0 million and $1.0 million, respectively, based on the service periods of eligible employees greater than one year.

Note 16. Income Taxes

Geographic sources of income (loss) before income taxes are as follows for the years ended December 31:

	2019	2018	2017
		(in thousands)	
United States	$ (41,255)	$ (33,034)	$ 6,272
China	(3,777)	(4)	44,563
Turkey	47,579	31,955	56
Mexico	8,434	3,329	3,641
India	(3,970)	—	—
Other	396	—	—
Total income before income taxes	$ 7,407	$ 2,246	$ 54,532

2017 Tax Reform

During the fourth quarter of 2017, we recorded a net tax expense of $0.1 million (net of valuation allowance) related to the enactment of the Tax Cuts and Jobs Act (Tax Reform). The expense was primarily related to applying the federal income tax rate change to certain of our deferred tax liabilities, and the realization of a benefit from our alternative minimum tax credit carryover. This provisional amount was subject to adjustment during the measurement period of up to one year following the December 2017 enactment of Tax Reform, as provided by SEC guidance.

As of December 31, 2018, we completed the accounting for the enactment-date income tax effects of Tax Reform, which resulted in an immaterial impact to our financial statements. Upon further analyses of certain aspects of Tax Reform, and refinement of calculations during 2018, we increased our provisional amount of previously untaxed foreign earnings by $13.8 million, to $88.1 million. This resulted in no change to our U.S. federal income tax expense due to the impact of foreign tax credits. In addition, the provisional net tax expense discussed above was unchanged.

Tax Reform enacted a new minimum tax on U.S. companies' foreign operations called Global Intangible Low Tax Income (GILTI). Beginning in 2018, GILTI provisions will be applied providing an incremental tax on low taxed foreign income. The GILTI provisions require us to include in our U.S. income tax return foreign subsidiary earnings in excess of an allowable return on the foreign subsidiary's tangible assets. We have made a policy election to account for any ongoing impacts of GILTI tax in the period in which it is incurred. At December 31, 2019, we recorded $15.7 million of federal income tax impacts of GILTI.

Undistributed earnings of certain of our foreign subsidiaries amounted to approximately $181.9 million at December 31, 2019, and we consider those earnings reinvested indefinitely. As a result of the deemed mandatory repatriation provision pursuant to Tax Reform, we included undistributed earnings in income subject to U.S. tax at reduced tax rates in 2017. In addition, we recognized GILTI income reduced by net operating losses in 2018 and 2019 as part of the changes from Tax Reform. As a result, we do not have material basis differences related to cumulative unremitted earnings for U.S. income tax purposes.

The income tax provision includes U.S. federal, state, and local taxes, Turkey, China and Mexico taxes currently payable and those deferred because of temporary differences between the financial statement and the tax bases of assets and liabilities. The components of the income tax provision for the years ended December 31 are as follows:

	2019	2018	2017
		(in thousands)	
Current:			
U.S. federal	$ —	$ —	$ (49)
U.S. state and local taxes	(7)	4	(3)
Foreign	18,171	11,875	14,200
Total current	18,164	11,879	14,148
Deferred:			
U.S. federal	6,277	(7,596)	(20)
U.S. state and local taxes	(950)	(36)	—
Foreign	(376)	(7,280)	1,670
Total deferred	4,951	(14,912)	1,650
Total income tax provision (benefit)	$ 23,115	$ (3,033)	$ 15,798

The following is a reconciliation from the U.S. statutory income tax rate to our effective income tax rate for the years ended December 31:

	2019	2018	2017
United States statutory income tax rate	21.0%	21.0%	35.0%
Foreign rate differential	(40.8)	(14.4)	(7.2)
Foreign permanent differences	2.9	31.7	1.2
Tax rate change	(0.3)	—	10.3
Withholding taxes	24.5	27.3	5.2
Foreign tax credits	—	—	(5.2)
Subpart F / GILTI income	212.3	539.8	—
IRC Section 965 dividend	—	—	21.1
Foreign tax credits - 965 dividend	—	—	(13.7)
Share-based compensation	(9.1)	(89.0)	—
Valuation allowance	115.5	(483.1)	(16.6)
State taxes	(10.2)	(1.7)	—
Deferred tax adjustments	2.1	4.6	3.8
Research and development	(13.4)	(59.8)	(1.2)
Turkey incentive credits	—	—	(5.5)
Foreign currency / inflationary adjustments	(0.5)	(90.6)	—
Other	8.1	(20.8)	1.8
Effective income tax rate	312.1%	(135.0)%	29.0%

The following is a summary of the components of deferred tax assets and liabilities at December 31:

	2019	2018	2017
		(in thousands)	
Deferred tax assets:			
Net operating loss and credit carry forwards	$ 23,065	$ 17,360	$ 18,913
Deferred revenue	1,792	149	178
Non-deductible accruals	16,111	10,850	9,860
Equity compensation	3,274	3,607	3,489
Lease assets and liabilities	1,062	—	—
Equity investment	—	—	390
Amortization of intangible assets	—	—	320
Non-deductible interest	—	1,452	—
Tax credits	1,931	2,212	4,760
Other	4,480	4,548	3,424
Gross deferred tax assets	51,715	40,178	41,334
Valuation allowance	(18,505)	(8,520)	(18,680)
Total deferred tax assets	33,210	31,658	22,654
Deferred tax liabilities:			
Deferred revenue	(17,081)	(13,781)	(15,564)
Depreciation	(4,196)	(2,636)	(3,489)
Lease assets and liabilities	(32)	—	—
Other	(827)	(406)	(1,972)
Total deferred tax liabilities	(22,136)	(16,823)	(21,025)
Net deferred tax assets	$ 11,074	$ 14,835	$ 1,629

The deferred tax valuation allowance at December 31 consisted of the following:

	2019	2018	2017
		(in thousands)	
Allowance at beginning of year	$ (8,520)	$ (18,680)	$ (23,618)
Benefits obtained (costs accumulated)	(9,985)	10,160	4,938
Allowance at end of year	$ (18,505)	$ (8,520)	$ (18,680)

The valuation allowance as of December 31, 2019 primarily relates to certain state and foreign net operating losses (NOLs) that we believe do not meet the more-likely-than-not criteria for recording the related benefits.

During 2018, we released the valuation allowance recorded against deferred tax assets reported in the United States. The release of this valuation allowance resulted in the recognition of a non-cash tax benefit of $10.8 million for the year. Additionally, during 2018, there was an increase in the valuation allowance of $0.6 million primarily related to state NOLs. During 2019, we increased the valuation allowance recorded against deferred tax assets in Taicang, China and India. The increase of this valuation allowance resulted in tax expense of $8.5 million for the year.

We have U.S. federal NOL of approximately $20.9 million, state NOLs of approximately $158.0 million, foreign NOLs of approximately $31.3 million and foreign tax credits of approximately $1.9 million available to offset future U.S., China and India taxable income. The U.S. federal and state net operating loss carryforwards expire in varying amounts through 2039 and the foreign tax credits expire in 2026. We also have foreign NOLs that expire in varying amounts through 2027.

Sections 382 and 383 of the Internal Revenue Code of 1986, contain rules that limit the ability of a company that undergoes an "ownership change" to utilize its net operating loss and tax credit carry forwards and certain built-in losses recognized in years after the "ownership change." An "ownership change" is generally defined as any change in ownership of more than 50% of a corporation's stock over a rolling three-year period by stockholders that own (directly or indirectly) 5% or more of the stock of a corporation, or arising from a new issuance of stock by a corporation. If an ownership change occurs, Section 382 generally imposes an annual limitation on the use of pre-ownership change NOLs to offset taxable income earned after the ownership change. The annual limitation is equal to the product of the applicable long-term tax exempt rate and the value of our stock immediately before the ownership change. This annual limitation may be adjusted to reflect any unused annual limitation for prior years and certain recognized built-in gains and losses for the year. In addition, Section 383 generally limits the amount of tax liability in any post-ownership change year that can be reduced by pre-ownership change tax credit carryforwards.

In June of 2018, we experienced an ownership change. The pre-ownership change NOLs existing at the date of change of $47.7 million are subject to an annual limitation. We do not believe that the Section 382 and 383 annual limitation will materially impact our ability to utilize the tax attributes that existed as of the date of the ownership change. Certain of these NOLs may be at risk of limitation in the event of a future ownership change.

We recognize the impact of a tax position in its financial statements if that position is more-likely-than-not to be sustained on audit, based on the technical merits of the position. We disclose all unrecognized tax benefits, which includes the reserves recorded for uncertain tax positions on filed tax returns and the unrecognized portion of affirmative claims. Our policy regarding uncertain tax positions is to recognize potential accrued interest and penalties related to unrecognized tax benefits as a component of income tax expense. As of December 31, 2019, we had not identified any unrecognized tax benefits.

We operate in and file income tax returns in various jurisdictions in China, Mexico, Turkey, India, U.S., Denmark, Germany and Switzerland, which are subject to examination by tax authorities. In the U.S., the federal tax returns for 2017 and 2018 remain open to examination. For U.S. state and local taxes as well as in non-U.S. jurisdictions, the statute of limitations generally varies between three and ten years. However, to the extent allowable by law, the tax authorities may have a right to examine and make adjustment to prior periods when amended returns have been filed, or when net operating losses or tax credits were generated and carried forward for subsequent utilization.

Note 17. Concentration of Customers

Revenues from certain customers (in thousands) in excess of 10 percent of total consolidated Company revenues for the years ended December 31 are as follows:

Customer	2019 Revenues	2019 % of Total	2018 Revenues	2018 % of Total	2017 Revenues	2017 % of Total
Customer 1 - Vestas	$ 662,302	46.1%	$ 329,472	32.0%	$ 266,276	27.9%
Customer 2 - GE	369,067	25.7%	325,962	31.7%	426,133	44.6%
Customer 3 - Nordex	230,563	16.1%	195,156	19.0%	153,227	16.0%
Customer 4 - Siemens Gamesa	73,426	5.1%	115,779	11.2%	92,394	9.7%

Trade accounts receivable from certain customers in excess of 10 percent of total consolidated Company trade accounts receivable at December 31 are as follows:

Customer	2019 % of Total	2018 % of Total
Customer 1 - Vestas	41.9%	46.7%
Customer 3 - Nordex	31.3%	25.7%

Note 18. Segment Reporting

FASB ASC Topic 280, *Segment Reporting*, establishes standards for the manner in which companies report financial information about operating segments, products, services, geographic areas and major customers. In managing our business, management focuses on growing our revenues and earnings in select geographic areas serving primarily the wind energy market. We have operations in the United States, China, Turkey, Mexico and India. Our operating segments are defined geographically as the United States, Asia, EMEAI and Mexico. Financial results are aggregated into four reportable segments based on quantitative thresholds. All of our segments operate in their local currency except for the Mexico and Asia segments, which both include a U.S. parent company.

The following tables set forth certain information regarding each of our segments for the years ended December 31:

	2019	2018	2017
		(in thousands)	
Net sales by segment:			
U.S.	$ 169,317	$ 163,716	$ 191,025
Asia	393,809	306,255	372,520
Mexico	435,606	268,756	206,563
EMEAI	437,768	290,897	185,090
Total net sales	$ 1,436,500	$ 1,029,624	$ 955,198
Net sales by geographic location(1):			
United States	$ 169,317	$ 163,716	$ 191,025
China	393,809	306,255	372,520
Mexico	435,606	268,756	206,563
Turkey and India	437,768	290,897	185,090
Total net sales	$ 1,436,500	$ 1,029,624	$ 955,198
Depreciation and amortization:			
U.S.	$ 9,223	$ 6,795	$ 4,822
Asia	10,699	6,765	6,272
Mexico	12,577	7,891	5,994
EMEAI	6,081	4,978	4,610
Total depreciation and amortization	$ 38,580	$ 26,429	$ 21,698
Capital expenditures			
U.S.	$ 8,321	$ 21,305	$ 10,575
Asia	22,471	11,218	7,000
Mexico	25,842	18,928	20,033
EMEAI	17,774	1,237	7,220
Total capital expenditures	$ 74,408	$ 52,688	$ 44,828
Income (loss) from operations:			
U.S.	$ (78,278)	$ (67,357)	$ (33,231)
Asia	24,132	28,147	76,332
Mexico	3,533	12,154	14,430
EMEAI	66,501	51,774	12,567
Total income from operations	$ 15,888	$ 24,718	$ 70,098
Tangible long-lived assets:			
U.S.	$ 36,410	$ 34,825	
Asia (China)	50,603	31,924	
Mexico	81,654	65,981	
EMEAI (Turkey and India)	36,340	26,693	
Total tangible long-lived assets	$ 205,007	$ 159,423	
Total assets:			
U.S.	$ 107,918	$ 115,435	
Asia	210,438	194,088	
Mexico	275,646	142,412	
EMEAI	232,675	152,920	
Total assets	$ 826,677	$ 604,855	

(1) Net sales are attributable to countries based on the location where the product is manufactured or the services are performed.

Note 19. Selected Quarterly Financial Data (Unaudited)

The following tables set forth certain unaudited financial information for each quarter of 2019 and 2018. The unaudited quarterly information includes all normal recurring adjustments that, in the opinion of management, are necessary for the fair presentation of the information for the periods presented. The operating results for any quarter are not necessarily indicative of the results for any future period. The unaudited quarterly results are as follows:

	2019			
	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
	(in thousands, except per share data)			
Net sales	$ 299,780	$ 330,771	$ 383,836	$ 422,113
Gross profit (loss)	(1,436)	22,551	25,931	30,802
Net income (loss)	(12,104)	1,828	(4,571)	(861)
Net income (loss) per common share:				
Basic(1)	$ (0.35)	$ 0.05	$ (0.13)	$ (0.02)
Diluted(1)	$ (0.35)	$ 0.05	$ (0.13)	$ (0.02)

	2018			
	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
	(in thousands, except per share data)			
Net sales	$ 253,981	$ 230,610	$ 254,976	$ 290,057
Gross profit	28,258	15,051	16,967	12,565
Net income (loss)	8,648	(4,053)	9,532	(8,848)
Net income (loss) per common share:				
Basic(1)	$ 0.25	$ (0.12)	$ 0.28	$ (0.26)
Diluted(1)	$ 0.24	$ (0.12)	$ 0.26	$ (0.26)

(1) The sum of the quarterly net income (loss) per common share amounts may not equal the annual net income (loss) per common share amount due to rounding.

Note 20 – Subsequent Events

In January 2020, we announced that we are planning to close our Newton, Iowa bus body manufacturing facility and plan to consolidate our bus body manufacturing operations into our Warren, Rhode Island manufacturing facility. In connection with these plans, we assessed the recoverability of the carrying value of assets associated with the Newton, Iowa facility as of December 31, 2019. As a result of this assessment, we recorded $4.4 million in impairment charges for the year ended December 31, 2019 as follows; $1.7 million associated with property, plant and equipment, $1.2 million in impairment of the right of use asset for the manufacturing facility lease and certain leased equipment and a $1.5 million write-off of the pre-production related assets. The impairment charges are included in realized loss on sale of assets and asset impairments within the consolidated statement of operations.

In February 2020, we entered into an Incremental Facility Agreement with the current lenders to our Credit Agreement and an additional lender, pursuant to which the aggregate principal amount of our revolving credit facility under the Credit Agreement was increased from $150.0 million to $205.0 million. All other material terms and conditions of the Credit Agreement remained the same. We did not make any draw downs on the revolving credit facility in connection with the execution of the Incremental Facility Agreement.

Exhibit Index

Number	Description
3.1	Amended and Restated Certificate of Incorporation of the Registrant, as currently in effect (incorporated by reference to Exhibit 3.2 to the Registrant's Registration Statement on Form S-1 (File No. 333-212093) filed on July 11, 2016)
3.2	Second Amended and Restated By-laws of the Registrant, as currently in effect (incorporated by reference to Exhibit 3.4 to the Registrant's Registration Statement on Form S-1 (File No. 333-212093) filed on July 11, 2016)
4.1	Specimen Stock Certificate (incorporated by reference to Exhibit 4.1 to the Registrant's Registration Statement on Form S-1 (File No. 333-212093) filed on July 11, 2016)
4.2	Third Amended and Restated Investor Rights Agreement by and among the Registrant and the investors named therein, dated June 17, 2010, as amended (incorporated by reference to Exhibit 4.2 to the Registrant's Registration Statement on Form S-1 (File No. 333-212093) filed on June 17, 2016)
4.3	Form of senior indenture, to be entered into between the Registrant and the trustee designated therein (incorporated by reference to Exhibit 4.3 to the Registrant's Registration Statement on Form S-3 (File No. 333-220307) filed on September 1, 2017)
4.4	Form of subordinated indenture, to be entered into between the Registrant and the trustee designated therein (incorporated by reference to Exhibit 4.5 to the Registrant's Registration Statement on Form S-3 (File No. 333-220307) filed on September 1, 2017)
4.5*	Description of Registrant's Securities Registered Pursuant to Section 12 of the Securities Act of 1934
10.1‡	2008 Stock Option and Grant Plan, as amended by Amendment No. 1, dated August 14, 2008 and Amendment No. 2, dated December 30, 2008, and forms of award agreements thereunder (incorporated by reference to Exhibit 10.1 to the Registrant's Registration Statement on Form S-1 (File No. 333-212093) filed on June 17, 2016)
10.2‡	Amended and Restated 2015 Stock Option and Incentive Plan and forms of award agreements thereunder (incorporated by reference to Exhibit 10.2 to the Registrant's Registration Statement on Form S-1 (File No. 333-212093) filed on June 17, 2016)
10.3†	Amendment No. 5 to Financing Agreement dated as of August 19, 2014, entered into as of December 30, 2016, by and among the Registrant, certain of its domestic subsidiaries, HPS Investment Partners, LLC as Administrative Agent and Collateral Agent, Capital One, N.A., as Revolving Loan Representative and the lenders from time to time party thereto, as amended (incorporated by reference to Exhibit 10.2 to the Registrant's Current Report on Form 8-K/A (File No. 001-37839) filed on May 5, 2017)
10.4†	Amended and Restated Financing Agreement entered into as of December 30, 2016, by and among the Registrant, certain of its domestic subsidiaries, HPS Investment Partners, LLC as Administrative Agent and Collateral Agent, Capital One, N.A., as Revolving Loan Representative and the lenders from time to time party thereto (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K/A (File No. 001-37839) filed on April 20, 2017)
10.5†	Supply Agreement between General Electric International, Inc. and TPI Mexico III, LLC, entered into as of October 4, 2016 (incorporated by reference to Exhibit 10.3 of the Registrant's Current Report on Form 8-K/A (File No. 001-37839) filed on April 20, 2017)
10.6†	Amended and Restated Supply Agreement between General Electric International, Inc. and TPI Iowa, LLC, entered into as of October 4, 2016 (incorporated by reference to Exhibit 10.1 of the Registrant's Current Report on Form 8-K/A (File No. 001-37839) filed on April 20, 2017)

Number	Description
10.7†	Supply Agreement between General Electric International, Inc. and TPI Mexico, LLC, entered into as of October 18, 2013, as amended (incorporated by reference to Exhibit 10.10 to the Registrant's Registration Statement on Form S-1 (File No. 333-212093) filed on June 17, 2016)
10.8†	First Amendment to Supply Agreement between General Electric International, Inc. and TPI Mexico, LLC, entered into as of October 4, 2016 (incorporated by reference to Exhibit 10.2 of the Registrant's Current Report on Form 8-K/A (File No. 001-37839) filed on April 20, 2017)
10.9	Lease between TPI Iowa, LLC and Opus Northwest L.L.C., dated November 13, 2007, as amended (incorporated by reference to Exhibit 10.11 to the Registrant's Registration Statement on Form S-1 (File No. 333-212093) filed on June 17, 2016)
10.10	Commencement Date Memorandum between TPI Iowa LLC and Opus Northwest, L.L.C., entered into as of July 25, 2008 (incorporated by reference to Exhibit 10.12 to the Registrant's Registration Statement on Form S-1 (File No. 333-212093) filed on June 17, 2016)
10.11	Lease between TPI Kompozit Kanat Sanayi ve Ticaret A.S. and Med Union Containers A.S., dated March 16, 2012 (incorporated by reference to Exhibit 10.13 to the Registrant's Registration Statement on Form S-1 (File No. 333-212093) filed on June 17, 2016)
10.12	Lease between TPI Wind Blade Dafeng Company Limited and Jiangsu Erhuajie Energy Equipment Co., Ltd, dated November 27, 2013, as amended (incorporated by reference to Exhibit 10.14 to the Registrant's Registration Statement on Form S-1 (File No. 333-212093) filed on June 17, 2016)
10.13	Lease between the Registrant (f/k/a LCSI Holding, Inc.) and Gainey Center II LLC, dated June 12, 2007, as amended (incorporated by reference to Exhibit 10.15 to the Registrant's Registration Statement on Form S-1 (File No. 333-212093) filed on June 17, 2016)
10.14	Lease between TPI, Inc. (f/k/a TPI Composites, Inc.) and Borden & Remington Fall River LLC, dated as of December 1, 2008, as superseded by Standard Industrial Lease between TPI, Inc. and Borden & Remington Fall River LLC, dated June 28, 2010, as amended (incorporated by reference to Exhibit 10.16 to the Registrant's Registration Statement on Form S-1 (File No. 333-212093) filed on June 17, 2016)
10.15	Lease between Composite Solutions, Inc. and TN Realty, LLC, dated September 30, 2004, as amended (incorporated by reference to Exhibit 10.17 to the Registrant's Registration Statement on Form S-1 (File No. 333-212093) filed on June 17, 2016)
10.16	Lease between TPI-Composites S. de R.L. de C.V. and Deutsche Bank México, S.A. Institución de Banca Múltiple, Division Fiduciaria, as Trustee of Trust F/1638, dated April 15, 2013, as amended (incorporated by reference to Exhibit 10.18 to the Registrant's Registration Statement on Form S-1 (File No. 333-212093) filed on June 17, 2016)
10.17	Amendment Agreement, among Macquarie Mexico Real Estate Management S.A. de. C.V., TPI-Composites, S. de R.L. de C.V. and TPI Composites, Inc., dated November 27, 2018 (incorporated by reference to Exhibit 10.17 to the Registrant's Annual Report on Form 10-K (File No. 001-37839) filed on March 5, 2019)
10.18	Lease between TPI-Composites S. de R.L. de C.V. and The Bank of New York Mellon, S.A., as Trustee in the Trust F/00335, dated September 25, 2013 (incorporated by reference to Exhibit 10.19 to the Registrant's Registration Statement on Form S-1 (File No. 333-212093) filed on June 17, 2016)
10.19	Lease between TPI Mexico, LLC and Trailer Transfer, Inc., dated October 16, 2013 (incorporated by reference to Exhibit 10.20 to the Registrant's Registration Statement on Form S-1 (File No. 333-212093) filed on June 17, 2016)
10.20	Lease between TPI Mexico, LLC and Lanestone 1, LLC, dated April 14, 2014 (incorporated by reference to Exhibit 10.21 to the Registrant's Registration Statement on Form S-1 (File No. 333-212093) filed on June 17, 2016)

Number	Description
10.21	Plant and Equipment Lease between TPI Composites (Taicang) Co., Ltd. and Suzhou Tianneng Power Wind Mold Co., Ltd. dated May 1, 2014 (incorporated by reference to Exhibit 10.22 to the Registrant's Registration Statement on Form S-1 (File No. 333-212093) filed on June 17, 2016)
10.22‡	Form of Employment Agreement between the Registrant and each of its executive officers (incorporated by reference to Exhibit 10.23 to the Registrant's Registration Statement on Form S-1 (File No. 333-212093) filed on June 17, 2016)
10.23	Form of Indemnification Agreement (incorporated by reference to Exhibit 10.24 to the Registrant's Registration Statement on Form S-1 (File No. 333-212093) filed on June 17, 2016)
10.24	Contract between TPI Composites (Taicang) Co. Ltd. and Mr. Jun Ji, dated August 4, 2015 (incorporated by reference to Exhibit 10.25 to the Registrant's Registration Statement on Form S-1 (File No. 333-212093) filed on June 17, 2016)
10.25	Lease between TPI Composites, S. de R.L. de C.V. and Vesta Baja California, S. de R.L. de C.V., dated November 20, 2015 (incorporated by reference to Exhibit 10.26 to the Registrant's Registration Statement on Form S-1 (File No. 333-212093) filed on June 17, 2016)
10.26	Lease between TPI Turkey IZBAS, LLC and Dere Konstruksiyon Demir Celik Insaat Taahhut Muhendislik Musavirlik Sanayi ve Ticaret Anonim Sirketi, dated December 9, 2015 (incorporated by reference to Exhibit 10.27 to the Registrant's Registration Statement on Form S-1 (File No. 333-212093) filed on June 17, 2016)
10.27	Lease between TPI Composites (Taicang) Co., Ltd. and Suzhou Suchen Chemical & Plastics Co., Ltd., dated August 5, 2014 (incorporated by reference to Exhibit 10.28 to the Registrant's Registration Statement on Form S-1 (File No. 333-212093) filed on June 17, 2016)
10.28	Lease between TPI Wind Blade Dafeng Co., Ltd. and Jiangsu Jianhao Transmission Machinery Co., Ltd., commencing January 1, 2016 (incorporated by reference to Exhibit 10.29 to the Registrant's Registration Statement on Form S-1 (File No. 333-212093) filed on June 17, 2016)
10.29	Lease between TPI Kompozit Kanat San. ve Tic. A.S. and BORO Insaat Yatirim Sanayi ve Ticaret A.S., dated October 16, 2015 (incorporated by reference to Exhibit 10.30 to the Registrant's Registration Statement on Form S-1 (File No. 333-212093) filed on June 17, 2016)
10.30	Sublease between TPI Inc. and Nordex Energy GmbH, dated April 24, 2015 (incorporated by reference to Exhibit 10.31 to the Registrant's Registration Statement on Form S-1 (File No. 333-212093) filed on June 17, 2016)
10.31†	Settlement Agreement and Release between the Registrant and Nordex SE, dated June 3, 2016 (incorporated by reference to Exhibit 10.32 to the Registrant's Registration Statement on Form S-1 (File No. 333-212093) filed on June 17, 2016)
10.32	Senior Executive Cash Incentive Bonus Plan (incorporated by reference to Exhibit 10.34 to the Registrant's Registration Statement on Form S-1 (File No. 333-212093) filed on July 11, 2016)
10.33	Lease between Phoenix Newton LLC and TPI Iowa II, LLC, dated January 5, 2018 (incorporated by reference to Exhibit 10.33 to the Registrant's Annual Report on Form 10-K (File No. 001-37839) filed on March 8, 2018)
10.34	Master Lease Agreement Subject to Condition between TPI Composites II, S. de R.L. de C.V. and QVC II, S. de. R.L. de C.V. dated May 25, 2017, as amended (incorporated by reference to Exhibit 10.34 to the Registrant's Annual Report on Form 10-K (File No. 001-37839) filed on March 8, 2018)
10.35	Amended and Restated Non-Employee Director Compensation Policy (incorporated by reference to Exhibit 10.35 to the Registrant's Annual Report on Form 10-K (File No. 001-37839) filed on March 5, 2019)

Number	Description
10.36	Agreement to Lease between Aarush (Phase III) Logistics Park Private Limited, Aarush (Phase IV) Logistics Parks Private Limited, Aarush (Phase V) Logistics Parks Private Limited, Aarush Logistics Parks Private Limited, Aarush (Phase II) Logistics Parks Private Limited and Prospect One Manufacturing LLP, dated February 4, 2019 (incorporated by reference to Exhibit 10.36 to the Registrant's Annual Report on Form 10-K (File No. 001-37839) filed on March 5, 2019)
10.37	Credit Agreement entered into as of April 6, 2018, by and among the Registrant, JPMorgan Chase Bank, N.A., as Administrative Agent, and Well Fargo Bank, National Association and Capital One National Association, as Co-Syndication Agents, and the lenders from time to time party thereto (incorporated by reference to Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q (File No. 001-37839) filed on May 3, 2018)
10.38	Form of Employee Restricted Stock Unit Award (Time-Based Vesting) under the Amended and Restated 2015 Stock Option And Incentive Plan (incorporated by reference to Exhibit 10.2 to the Registrant's Quarterly Report on Form 10-Q (File No. 001-37839) filed on May 3, 2018)
10.39	Form of Executive Restrictive Stock Unit Award (Time-Based Vesting) under the Amended and Restated 2015 Stock Option And Incentive Plan (incorporated by reference to Exhibit 10.3 to the Registrant's Quarterly Report on Form 10-Q (File No. 001-37839) filed on May 3, 2018)
10.40	Form of Employee Restricted Stock Unit Award (Adjusted EBITDA Performance-Based Vesting) under the Amended and Restated 2015 Stock Option And Incentive Plan (incorporated by reference to Exhibit 10.4 to the Registrant's Quarterly Report on Form 10-Q (File No. 001-37839) filed on May 3, 2018)
10.41	Form of Executive Restricted Stock Unit Award (Adjusted EBITDA Performance-Based Vesting) under the Amended and Restated 2015 Stock Option And Incentive Plan (incorporated by reference to Exhibit 10.5 to the Registrant's Quarterly Report on Form 10-Q (File No. 001-37839) filed on May 3, 2018)
10.42	Form of Employee Restricted Stock Unit Award (Stock Price Performance-Based Vesting) under the Amended and Restated 2015 Stock Option And Incentive Plan (incorporated by reference to Exhibit 10.6 to the Registrant's Quarterly Report on Form 10-Q (File No. 001-37839) filed on May 3, 2018)
10.43	Form of Executive Restricted Stock Unit Award (Stock Price Performance-Based Vesting) under the Amended and Restated 2015 Stock Option And Incentive Plan (incorporated by reference to Exhibit 10.7 to the Registrant's Quarterly Report on Form 10-Q (File No. 001-37839) filed on May 3, 2018)
10.44	Amendment No. 1 dated as of May 24, 2019 to the Credit Agreement entered into as of April 6, 2018, by and among the Registrant, JPMorgan Chase Bank, N.A., as Administrative Agent, and Well Fargo Bank, National Association and the lenders party thereto (incorporated by reference to Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q (File No. 001-37839) filed on August 7, 2019)
21.1*	List of Subsidiaries
23.1*	Consent of KPMG LLP, Independent Registered Public Accounting Firm
24.1	Power of Attorney (incorporated by reference to the signature page of this Annual Report on Form 10-K)
31.1*	Certification of Chief Executive Officer pursuant to Section 302 of the Sarbanes-Oxley Act of 2002
31.2*	Certification of Chief Financial Officer pursuant to Section 302 of the Sarbanes-Oxley Act of 2002
32.1**	Certification of Chief Executive Officer pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
32.2**	Certification of Chief Financial Officer pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
101.INS*	XBRL Instance Document
101.SCH*	XBRL Taxonomy Extension Schema Document
101.CAL*	XBRL Taxonomy Extension Calculation Linkbase Document

Number	Description
101.DEF*	XBRL Taxonomy Extension Definition Linkbase Document
101.LAB*	XBRL Taxonomy Extension Label Linkbase Document
101.PRE*	XBRL Taxonomy Extension Presentation Linkbase Document

* Filed herewith.

** The certifications furnished in Exhibits 32.1 and 32.2 hereto are deemed to accompany this Annual Report on Form 10-K and will not be deemed “filed” for purposes of Section 18 of the Securities Exchange Act of 1934, as amended, except to the extent that the Registrant specifically incorporates it by reference.

† Confidential treatment has been granted for certain provisions of this Exhibit pursuant to Rule 406 promulgated under the Securities Act of 1933.

‡ Indicates compensatory plan or arrangement

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the Registrant has duly caused this Report to be signed on its behalf by the undersigned, thereunto duly authorized.

TPI COMPOSITES, INC.

Date: February 28, 2020

By: /s/ Bryan Schumaker
Bryan Schumaker
Chief Financial Officer
(Principal Financial and Accounting Officer)

We, the undersigned officers and directors of TPI Composites, Inc., hereby severally constitute and appoint Steven C. Lockard and Bryan Schumaker and each of them singly (with full power to each of them to act alone), our true and lawful attorneys-in-fact and agents, with full power of substitution and resubstitution in each of them for him or her and, place and stead, and in any and all capacities, to sign conformed for us and in our names in the capacities indicated below any and all signatures and amendments to this report, and to file the same, with all exhibits thereto, filing date and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite or necessary to be done in and about the premises, as full to all intents and purposes as he or she might or could do in person, hereby ratifying and confirming all that said attorneys-infact and agents or any of them, or their or his substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, as amended, this Report has been signed below by the following persons on behalf of the Registrant in the capacities and on the dates indicated.

Name	Title	Date
/s/ Steven C. Lockard Steven C. Lockard	Chief Executive Officer and Director (Principal Executive Officer)	February 28, 2020
/s/ Bryan Schumaker Bryan Schumaker	Chief Financial Officer (Principal Financial and Accounting Officer)	February 28, 2020
/s/ Stephen B. Bransfield Stephen B. Bransfield	Director	February 28, 2020
/s/ Michael L. DeRosa Michael L. DeRosa	Director	February 28, 2020
/s/ Jayshree S. Desai Jayshree S. Desai	Director	February 28, 2020
/s/ Philip J. Deutch Philip J. Deutch	Director	February 28, 2020
/s/ Paul G. Giovacchini Paul G. Giovacchini	Director and Chairman of the Board	February 28, 2020
/s/ Jack A. Henry Jack A. Henry	Director	February 28, 2020
/s/ James A. Hughes James A. Hughes	Director	February 28, 2020
/s/ Tyrone M. Jordan Tyrone M. Jordan	Director	February 28, 2020
/s/ Daniel G. Weiss Daniel G. Weiss	Director	February 28, 2020

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

TPI Composites, Inc. ("TPI," "Company," "we," "us," and "our*") has one class of securities registered under Section 12 of the Securities Exchange Act of 1934, as amended: our common stock, par value $0.01 per share.*

DESCRIPTION OF CAPITAL STOCK

The following summary of the terms of our capital stock is based upon our Amended and Restated Certificate of Incorporation (the "Certificate of Incorporation") and our Second Amended and Restated Bylaws (the "Bylaws"). The summary is not complete, and is qualified by reference to our Certificate of Incorporation and our Bylaws, which are filed as exhibits to this Annual Report on Form 10-K and are incorporated by reference herein. The terms of our common stock and preferred stock may also be affected by Delaware law. We encourage you to read our Certificate of Incorporation, our Bylaws, and the applicable provisions of the Delaware General Corporation Law for additional information.

Authorized Shares of Capital Stock
Our authorized capital stock consists of 100,000,000 shares of common stock, $0.01 par value per share, and 5,500,000 shares of undesignated preferred stock, $0.01 par value per share. Our board of directors is authorized, subject to limitations prescribed by Delaware law, to issue up to 5,500,000 shares of undesignated preferred stock in one or more series, to establish or change from time to time the number of shares of each such series, and to fix the designations, powers, including voting powers, full or limited, or no voting powers, preferences and the relative, participating, optional or other special rights of the shares of each series and any qualifications, limitations and restrictions, in each case without further vote or action by our stockholders.

As of January 31, 2020, there were 35,184,189 shares of common stock issued and outstanding and no shares of our preferred stock issued and outstanding. All of the outstanding shares of our common stock are fully paid and nonassessable. Our board of directors is authorized, without approval except as required by the listing standards of NASDAQ Global Market, to issue additional shares of our capital stock.

Listing
Our common stock is listed on the NASDAQ Global Market under the symbol "TPIC."

Dividend Rights
Subject to preferences that may apply to any shares of preferred stock outstanding at the time, the holders of our common stock are entitled to receive dividends out of funds legally available if our board of directors, in its discretion, determines to issue dividends and then only at the times and in the amounts that our board of directors may determine.

Voting Rights
Holders of our common stock are entitled to one vote for each share held of record by such holder on the applicable record date on all matters submitted to a vote of stockholders. We have not provided for cumulative voting for the election of directors in our Certificate of Incorporation. Any election of directors by stockholders shall be determined by a plurality of the votes properly cast on the election of directors.

Rights to Receive Liquidation Distributions
If we become subject to a liquidation, dissolution or winding-up, the assets legally available for distribution to our stockholders would be distributable ratably among the holders of our common stock and any participating preferred stock outstanding at that time, subject to prior satisfaction of all outstanding debt and liabilities and the preferential rights of and the payment of liquidation preferences, if any, on any outstanding shares of preferred stock.

No Preemptive or Similar Rights
Our common stock is not entitled to preemptive or exchange rights, and is not subject to conversion, redemption, or sinking fund provisions.

Transfer Agent and Registrar
The transfer agent and registrar for our common stock is American Stock Transfer & Trust Company, LLC.

Anti-Takeover Provisions
The provisions of Delaware law, our Certificate of Incorporation and our Bylaws may have the effect of delaying, deferring or discouraging another person from acquiring control of our company. They are also designed, in part, to encourage persons seeking to acquire control of us to negotiate first with our board of directors. We believe that the benefits of increased protection of our potential ability to negotiate with an unfriendly or unsolicited acquirer outweigh the disadvantages of discouraging a proposal to acquire us because negotiation of these proposals could result in an improvement of their terms.

Delaware Law
We are governed by the provisions of Section 203 of the Delaware General Corporation Law. In general, Section 203 prohibits a public Delaware corporation from engaging in a "business combination" with an "interested stockholder" for a period of three years after the date of the transaction in which the person became an interested stockholder, unless the business combination is approved in a prescribed manner. A "business combination" includes mergers, asset sales or other transactions resulting in a financial benefit to the stockholder. An "interested stockholder" is a person who, together with affiliates and associates, owns, or within three years did own, 15% or more of the corporation's outstanding voting stock. These provisions may have the effect of delaying, deferring or preventing a change in our control.

Certificate of Incorporation and Bylaw Provisions

Our Certificate of Incorporation and our Bylaws provide for the following:

- **Board of Directors Vacancies**. In accordance with our Certificate of Incorporation, our board of directors is divided into three classes serving staggered three-year terms, with one class being elected each year. As a result, approximately one-third of the board of directors is elected each year. Our Certificate of Incorporation also provides that directors may be removed only for cause and then only by the affirmative vote of the holders of 75% or more of the shares then entitled to vote at an election of directors. Furthermore, any vacancy on our board of directors, however occurring, including a vacancy resulting from an increase in the size of our board of directors, may only be filled by the affirmative vote of a majority of our directors then in office even if less than a quorum. These provisions may deter a stockholder from removing incumbent directors and simultaneously gaining control of the board of directors by filling the vacancies created by such removal with its own nominees.

- **Classified Board**. Our Certificate of Incorporation establishes a classified board of directors that is divided into three classes with staggered three-year terms. Only the directors in one class will be subject to election by a plurality of the votes cast at each annual meeting of our stockholders, with the directors in the other classes continuing for the remainder of their respective three-year terms. A third party may be discouraged from making a tender offer or otherwise attempting to obtain control of us as it is more difficult and time consuming for stockholders to replace a majority of the directors on a classified board of directors.

- **Stockholder Action; Special Meeting of Stockholders**. Our Certificate of Incorporation provides that all stockholder actions are required to be taken by a vote of the stockholders at an annual or special meeting and that stockholders may not take any action by written consent in lieu of a meeting. This limit may lengthen the amount of time required to take stockholder actions and would prevent the amendment of our Bylaws or removal of directors by our stockholders without holding a meeting of stockholders. Our Certificate of Incorporation and Bylaws further provide that special meetings of our stockholders may be called only by our board of directors, the Chariman of our board of directors, or our Chief Executive Officer (pursuant to a resolution approved by the affirmative vote of a majority of the directors then in office), therefore prohibiting a stockholder from calling a special meeting. Our Bylaws limit the business that may be conducted at an annual meeting of stockholders to those matters properly brought before the meeting. These provisions might delay the ability of our stockholders to force consideration of a proposal or for stockholders controlling a majority of our capital stock to take any action, including removal of directors.

- **Advance Notice Requirements for Stockholder Proposals and Director Nominations**. Our Bylaws establish advance notice procedures with regard to stockholder proposals relating to the nomination of candidates for election as directors at our annual meeting of stockholders, or new business to be brought before meetings of our stockholders. Our Bylaws also specify certain requirements regarding the form and content of a stockholder's notice. These provisions might preclude our stockholders from bringing matters before our annual meeting of stockholders or from making nominations for directors at our annual meeting of stockholders if the proper procedures are not followed. These provisions may also discourage or deter a potential acquirer from conducting a solicitation of proxies to elect the acquirer's own slate of directors or otherwise attempting to obtain control of our Company. These procedures provide that notice of stockholder proposals must be timely given in writing to our corporate secretary prior to the meeting at which the action is to be taken. Generally, to be timely, notice must be received at our principal executive offices not less than 90 days and not more than 120 days prior to the one year anniversary date of the annual meeting for the preceding year. The notice must contain certain information specified in the Bylaws.

- **No Cumulative Voting**. The Delaware General Corporation Law provides that stockholders are not entitled to cumulate votes in the election of directors unless a corporation's certificate of incorporation provides otherwise. Our Certificate of Incorporation does not provide for cumulative voting.

- **Directors Removed Only for Cause**. Subject to the rights, if any, of any series of undesignated preferred stock to elect directors and to remove any director whom the holders of any such series have the right to elect, our Certificate of Incorporation provides that our directors may be removed from office only for cause and only by the affirmative vote of the holders of 75% or more of the outstanding shares of capital stock entitled to vote at an election of directors. At least 45 days prior to any annual or special meeting of stockholders at which it is proposed that any director be removed from office, written notice of such proposed removal and the alleged grounds thereof shall be sent to the director whose removal will be considered at the meeting.

- **Amendment of Charter Provisions and Bylaws**. Any amendment of our Certificate of Incorporation must first be adopted by a majority of our board of directors and must thereafter be approved by a majority of the outstanding shares entitled to vote on the amendment and a majority of the outstanding shares of each class entitled to vote thereon as a class, except that the amendment of the provisions relating to stockholder action, board composition, limitation of liability, exclusive jurisdiction of Delaware courts, the amendment of our Bylaws, and the amendment of our Certificate of Incorporation must be approved by the holders of not less than 75% of the outstanding shares entitled to vote on the amendment and the holders of not less than 75% of the outstanding shares of each class entitled to vote thereon as a class. Our Bylaws may be amended by the affirmative vote of a majority of the directors then in office, subject to any limitations set forth in our Bylaws, and may also be amended by the affirmative vote of the holders of at least 75% of the outstanding shares entitled to vote on the amendment, or, if our board of directors recommends that the stockholders approve the amendment, by the affirmative vote of the majority of the outstanding shares entitled to vote on the amendment, in each case voting together as a single class.

- **Issuance of Undesignated Preferred Stock**. Our board of directors has the authority, without further action by the stockholders, to issue up to 5,500,000 shares of undesignated preferred stock with rights and preferences, including voting rights, designated from time to time by our board of directors that may be senior to our common stock. The existence of authorized but unissued shares of preferred stock may enable our board of directors to render more difficult or to discourage an attempt to obtain control of us by means of a merger, tender offer, proxy contest or otherwise. The issuance of shares of preferred stock could decrease the amount of earnings and assets available for distribution to holders of shares of common stock. The issuance may also adversely affect the rights and powers, including voting rights, of these holders and may have the effect of delaying, deterring or preventing a change in control of us.

- **Exclusive Jurisdiction for Certain Actions.** Our Certificate of Incorporation provides that unless we consent in writing to the selection of an alternative forum, the Court of Chancery of the State of Delaware shall be the sole and exclusive forum for (A) any derivative action or proceeding brought on our behalf, (B) any action asserting a claim of breach of a fiduciary duty owed by any of our directors, officers or other employees to us or our stockholders, (C) any action asserting a claim arising pursuant to any provision of the Delaware General Corporation Law, our Certificate of Incorporation or our Bylaws, or (D) any action asserting a claim against us governed by the internal affairs doctrine. Although we believe this provision benefits us by providing increased consistency in the application of Delaware law in the types of lawsuits to which it applies, the provision may have the effect of discouraging lawsuits against our directors and officers. The enforceability of similar exclusive forum provisions in other companies' certificates of incorporation has been challenged in legal proceedings, and it is possible that a court could rule that this provision in our Certificate of Incorporation is inapplicable or unenforceable.

Exhibit 21.1

Subsidiaries of Registrant

Name	Jurisdiction of Incorporation/Organization
Composite Solutions, Inc.	Delaware
TPI Inc.	Delaware
TPI Technology, Inc.	Delaware
TPI Arizona, LLC	Delaware
TPI Iowa, LLC	Delaware
TPI China, LLC	Delaware
TPI Composites (Taicang) Company Limited	People’s Republic of China
TPI Wind Blade Dafeng Company Limited	People’s Republic of China
TPI Mexico, LLC	Delaware
TPI Mexico II, LLC	Delaware
TPI Composites S. de R.L. de C.V.	Mexico
TPI Turkey, LLC	Delaware
TPI Kompozit Kanat Sanayi Ve Ticaret A.S.	Turkey
TPI Holdings Switzerland GmbH	Switzerland

Exhibit 23.1

Consent of Independent Registered Public Accounting Firm

The Board of Directors
TPI Composites, Inc.:

We consent to the incorporation by reference in the registration statement Nos. 333-212648, 333-216936, 333-223587 and 333-230203 on Form S-8 and No. 333-220307 on Form S-3/A of TPI Composites, Inc. of our report dated February 27, 2020, with respect to the consolidated balance sheets of TPI Composites, Inc. as of December 31, 2019 and 2018, the related consolidated statements of operations, comprehensive income (loss), changes in stockholders' equity (deficit), and cash flows for each of the years in the three-year period ended December 31, 2019, and the related notes, and the effectiveness of internal control over financial reporting as of December 31, 2019, which report appears in the December 31, 2019 annual report on Form 10-K of TPI Composites, Inc.

Our report contains an explanatory paragraph related to TPI Composites, Inc.'s change in method of accounting for leases as of January 1, 2019 due to the adoption of Accounting Standards Codification Topic 842, *Leases.*

/s/ KPMG LLP

Phoenix, Arizona
February 28, 2020

Exhibit 31.1

CERTIFICATION

I, Steven C. Lockard, certify that:

1. I have reviewed this annual report on Form 10-K of TPI Composites, Inc.;

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

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

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

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

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

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

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

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

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

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

Date: February 28, 2020

By: /s/ Steven C. Lockard
Steven C. Lockard
Chief Executive Officer
(Principal Executive Officer)

Exhibit 31.2

CERTIFICATION

I, Bryan Schumaker, certify that:

1. I have reviewed this annual report on Form 10-K of TPI Composites, Inc.;

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

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

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

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

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

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

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

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

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

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

Date: February 28, 2020

By: /s/ Bryan Schumaker
Bryan Schumaker
Chief Financial Officer
(Principal Financial and Accounting Officer)

Exhibit 32.1

Certification Pursuant To
18 U.S.C. Section 1350,
As Adopted Pursuant To
Section 906 of the Sarbanes-Oxley Act of 2002

I, Steven C. Lockard, Chief Executive Officer of TPI Composites, Inc., certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that:

1. the report on Form 10-K of TPI Composites, Inc. for the fiscal year ended December 31, 2019 (the “Report”) fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. Section 78m or 78o(d)); and

2. the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of TPI Composites, Inc.

Date: February 28, 2020

By: /s/ Steven C. Lockard
Steven C. Lockard
Chief Executive Officer
(Principal Executive Officer)

Exhibit 32.2

Certification Pursuant To
18 U.S.C. Section 1350,
As Adopted Pursuant To
Section 906 of the Sarbanes-Oxley Act of 2002

I, Bryan Schumaker, Chief Financial Officer of TPI Composites, Inc., certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that:

1. the report on Form 10-K of TPI Composites, Inc. for the fiscal year ended December 31, 2019 (the "Report") fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. Section 78m or 78o(d)); and

2. the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of TPI Composites, Inc.

Date: February 28, 2020

By: /s/ Bryan Schumaker
Bryan Schumaker
Chief Financial Officer
(Principal Financial and Accounting Officer)