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: September 30, 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: 0-11412

AMTECH SYSTEMS, INC.

(Exact name of registrant as specified in its charter)

Arizona	**86-0411215**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**
131 South Clark Drive, Tempe, Arizona	**85281**
(Address of principal executive offices)	(Zip Code)

Registrant's telephone number, including area code: **480-967-5146**

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 per share	ASYS	NASDAQ Global Select Market

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

Common Stock, $0.01 Par Value

(Title of Class)

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 (§229.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). ☒ Yes ☐ No

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company or an emerging growth company. See 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 ☒

As of March 31, 2019, the last business day of the registrant's most recently completed second fiscal quarter, the aggregate market value of the voting and non-voting stock held by non-affiliates of the registrant was approximately $62,706,022, based upon the closing sales price reported by the NASDAQ Global Market on that date.

As of November 15, 2019, the registrant had outstanding 14,268,797 shares of Common Stock, $0.01 par value.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the Definitive Proxy Statement related to the registrant's 2020 Annual Meeting of Shareholders, which Proxy Statement will be filed under the Securities Exchange Act of 1934, as amended, within 120 days of the end of the registrant's fiscal year ended September 30, 2019, are incorporated by reference into Items 10-14 of Part III of this Form 10-K.

AMTECH SYSTEMS, INC. AND SUBSIDIARIES

Table of Contents

DEFINITIONS

Acronyms and defined terms used in the text include the following:

Term	Meaning
2007 Plan	The 2007 Employee Stock Incentive Plan
A.I.	artificial intelligence
ALD	atomic layer deposition
Amtech	Amtech Systems, Inc. and Subsidiaries
ASC	Accounting Standard Codification
ASU	Accounting Standard Update
Big Data	an accumulation of data that is too large and complex for processing by traditional database management tools
Board	the Board of Directors of Amtech Systems, Inc.
Bruce Technologies	Bruce Technologies, Inc.
BTU	BTU International, Inc.
CAPM	Capital Asset Pricing Model
CEO	Chief Executive Officer
CFO	Chief Financial Officer
Common Stock	our common stock, par value $0.01 per share
Company	Amtech Systems, Inc. and Subsidiaries
COSO	Committee of Sponsoring Organizations of the Treadway Commission
CVD	chemical vapor deposition
DBC	direct bond copper
Dodd-Frank Act	Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010
ECN	Energy Research Centre of the Netherlands
EBIT	Earnings Before Interest and Taxes
EBITDA	Earnings Before Interest, Taxes, Depreciation, and Amortization
EPS	earnings (loss) per share
ERP	enterprise resource planning
Exchange Act	Securities Exchange Act of 1934, as amended
FASB	Financial Accounting Standards Board
FDIC	Federal Deposit Insurance Corporation
FIFO	first-in, first-out
GAAP	accounting principles generally accepted in the United States of America
HTR	horizontal thermal reactor
IBAL	individual boats with automated loading
IoT	Internet of things
Kingstone	Kingstone Hong Kong, together with Shanghai Kingstone
Kingstone Hong Kong	Kingstone Technology Hong Kong Limited
LED	Light-emitting diode
LPCVD	low-pressure chemical vapor deposition

Term	Meaning
MD&A	Management’s Discussion and Analysis of Financial Condition and Results of Operations
MEMS	microelectromechanical systems
mm	millimeter
NOLs	net operating loss carryforwards
Note __	Note __ to the consolidated financial statements
OCR	Optical Character Recognition
O-S-D	Optoelectronic, Sensors & Discrete
our	Amtech Systems, Inc. and Subsidiaries
PCAOB	Public Company Accounting Oversight Board
PECVD	plasma-enhanced chemical vapor deposition
PMT	multi-employer pension plan Pensioenfonds Metaal en Techniek
PR Hoffman	P.R. Hoffman Machine Products, Inc.
Proxy Statement	Amtech’s Proxy Statement to be filed with the SEC in connection with its 2020 Annual Meeting of Shareholders
PV	photovoltaic
R2D	R2D Automation SAS
RD&E	Research, development and engineering
Registrant	Amtech Systems, Inc.
RF	Radio Frequency
SEC	Securities and Exchange Commission
Securities Act	Securities Act of 1933, as amended
Semi	Semiconductor
SG&A	Selling, general and administrative expenses
SiC	silicon carbide
SiC/LED	our SiC/LED operating segment
SMT	surface-mount technology
SoLayTec	SoLayTec B.V.
SSP	standalone selling price
Subsidiaries	Subsidiaries of Amtech Systems, Inc. listed on Exhibit 21 hereto
The TCJA	The Tax Cuts and Jobs Act
Tempress	Tempress Systems, Inc.
TOPCON	tunnel oxide passivated contact
TTV	total thickness variation
us	Amtech Systems, Inc. and Subsidiaries
U.S.	The United States of America
USA PATRIOT act	the Uniting and Strengthening America by Providing Appropriate Tools to Restrict, Intercept, and Obstruct Terrorism Act of 2001
USTR	United States Trade Representative
we	Amtech Systems, Inc. and Subsidiaries
Yingli	Yingli Green Energy Holding Company Limited

Cautionary Statement about Forward-Looking Statements

Unless otherwise indicated, the terms “Amtech,” the “Company,” “we,” “us” and “our” refer to Amtech Systems, Inc. together with its subsidiaries.

Our discussion and analysis in this Annual Report on Form 10-K, our 2019 Annual Report to Shareholders, our other reports that we file with the SEC, our press releases and in public statements of our officers and corporate spokespersons contain “forward-looking” statements within the meaning of Section 27A of the Securities Act, Section 21E of the Exchange Act, and the Private Securities Litigation Reform Act of 1995. Forward-looking statements give our or our officers’ current expectations or forecasts of future events. You can identify these statements by the fact that they do not relate strictly to historical or current events. We have tried, wherever possible, to identify such statements by using words such as “may,” “plan,” “anticipate,” “seek,” “will,” “expect,” “intend,” “estimate,” “anticipate,” “believe,” “continue,” “predict,” “potential,” “project,” “should,” “would,” “could,” “likely,” “future,” “target,” “forecast,” “goal,” “observe,” and “strategy” or the negative thereof or variations thereon or similar terminology relating to uncertainty of future events or outcomes. Any expectations based on these forward-looking statements are subject to risks and uncertainties and other important factors, including those discussed in the section entitled “Item 1A. Risk Factors.” Some factors that could cause actual results to differ materially from those anticipated include, among others, future economic conditions, including changes in the markets in which we operate; changes in demand for our services and products; our revenue and operating performance; difficulties in successfully executing our growth initiatives; difficulties in executing on our strategic efforts with respect to our silicon carbide/polishing business segment; the effects of competition in the markets in which we operate, including the adverse impact of competitive product announcements or new entrants into our markets and transfers of resources by competitors into our markets; the cyclical nature of the semiconductor industry; pricing and gross profit pressures; control of costs and expenses; risks associated with new technologies and the impact on our business; legislative, regulatory, and competitive developments in markets in which we operate; the outcome of the settlement proceedings with a customer relating to a previously announced turnkey contract; possible future claims, litigation or enforcement actions and the results of any such claim, litigation proceeding, or enforcement action; risks associated with our dispositions, including our ability to realize the anticipated benefits of our dispositions; the risk of unexpected costs, charges or expenses resulting from any dispositions; and other circumstances and risks identified in this Annual Report on Form 10-K or referenced from time to time in our filings with the SEC. The occurrence of the events described, and the achievement of the expected results, depend on many events, some or all of which are not predictable or within our control. These and many other factors could affect Amtech’s future operating results and financial condition and could cause actual results to differ materially from expectations based on forward-looking statements made in this document or elsewhere by Amtech or on its behalf.

Forward-looking statements are neither historical facts nor assurances of future performance. Instead, they are based on our or our officers’ current beliefs, expectations and assumptions regarding the future of our business, future plans and strategies, projections, anticipated events and trends, the economy and other future conditions. Because forward-looking statements relate to the future, they are subject to certain risks and uncertainties. In light of these risks and uncertainties, there can be no assurance that the forward-looking information contained in this Annual Report on Form 10-K will in fact transpire or prove to be accurate. You should not place undue reliance on these forward-looking statements, which speak only as of the date they were made.

The Company undertakes no obligation to update or publicly revise any forward-looking statement whether as a result of new information, future developments or otherwise after the date of this Annual Report on Form 10-K. All subsequent written or oral forward-looking statements attributable to the Company or persons acting on its behalf are expressly qualified in their entirety by this cautionary statement. You are advised, however, to consult any further disclosures we make on related subjects in our subsequently filed Form 10-Q and Form 8-K reports and our other filings with the SEC. Also note that we provide a cautionary discussion of risks, uncertainties and possibly inaccurate assumptions relevant to our business under “Item 1A. Risk Factors” of this Annual Report on Form 10-K. We note these factors for investors as permitted by the Private Securities Litigation Reform Act of 1995. You should understand it is not possible to predict or identify all such factors.

PART I

ITEM 1. BUSINESS

OUR COMPANY

We are a leading, global manufacturer of capital equipment, including thermal processing and wafer polishing, and related consumables used in fabricating semiconductor devices, such as silicon carbide (SiC) and silicon power chips, electronic assemblies and light-emitting diodes (LEDs). We sell these products to semiconductor and automotive component manufacturers worldwide, particularly in Asia, North America and Europe. Our strategic focus is on semiconductor growth opportunities in power electronics, leveraging our strength in our core competencies in thermal and substrate processing. We are a market leader in the high-end power chip market (SiC and 300mm silicon horizontal thermal reactor), developing and supplying essential equipment and consumables used in the semiconductor industry.

We were incorporated in Arizona in October 1981, under the name Quartz Engineering & Materials, Inc. We changed to our present name in 1987. We categorize each of our subsidiaries into one of three operating segments, based primarily on the industry they serve:

Operating Segment	% of 2019 Consolidated Net Revenue
Semiconductor	78 %
SiC/LED	16 %
Automation	6 %

For information regarding net revenue, operating income and identifiable assets attributable to each of our three operating segments, see Note 18 of the Notes to Consolidated Financial Statements included in "Item 8. Financial Statements and Supplementary Data" and "Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations" in this Annual Report. For information on the products of each operating segment, see "Semiconductor and SiC/LED Products" and "Discontinued Solar Operations and Products" within this "Item 1. Business" section. For information regarding risks to our business, see "Item 1A. Risk Factors."

Our fiscal year is from October 1 to September 30. Unless otherwise stated, references to the years 2019, 2018 and 2017 relate to the fiscal years ended September 30, 2019, 2018 and 2017, respectively.

Our operating segments are made up of the following four wholly-owned subsidiaries:

Semiconductor:

- Bruce Technologies, a Massachusetts corporation based in North Billerica, Massachusetts, acquired in July 2004; and
- BTU, a Delaware corporation based in North Billerica, Massachusetts, with operations in China, Malaysia and the United Kingdom, acquired in January 2015.

SiC/LED:

- P.R. Hoffman, an Arizona corporation based in Carlisle, Pennsylvania, acquired in July 1997.

Automation:

- R2D, a French corporation located near Montpellier, France, acquired in October 2007.

Additionally, our discontinued operations are comprised of:

Solar:

- Tempress, a Texas corporation based in Vaassen, the Netherlands, acquired in 1994 and subsequently reincorporated in the Netherlands.

Our previously reported Solar segment also included SoLayTec, a Netherlands Corporation, and R2D. SoLayTec was sold in 2019 (see Notes 2 and 16). R2D became the Automation segment.

In April 2019, we announced that our Board determined that it was in the long-term best interest of Amtech to exit the solar business segment and focus our strategic efforts on our semiconductor and silicon carbide/polishing business segments in order to more fully realize growth opportunities we believe are presented in power semiconductors. After announcing the planned divestiture of our Solar segment, we conducted an evaluation of our organizational structure. Beginning with the second quarter of fiscal 2019, we made changes to our reportable segments as shown above. Prior period amounts have been revised to conform to the current period segment reporting structure.

Our major emphasis in the semiconductor industry is the development of equipment for thermal processing and deposition for semiconductor manufacturing, specifically focusing on substrate, fabrication, packaging and surface-mount technology ("SMT"). The markets we serve are experiencing technological advances and are, historically, cyclical. Therefore, future profitability and growth depend on our ability to invest in, develop and/or acquire and market new technology products and on our ability to adapt to cyclical trends.

Integrated circuits, optoelectronic, sensor, and discrete (O-S-D) components, such as power chips, LEDs, and some MEMS are semiconductor devices fabricated on silicon and compound silicon, such as silicon carbide, wafer substrates. Semiconductor chips are part of the circuitry of many products including inverters, computers, telecommunications devices, automotive electronics and sensors, consumer electronics, and industrial automation and control systems. LEDs manufactured using our equipment are used in industrial, commercial and residential lighting. Our wafer handling, thermal processing and consumable products currently address the diffusion and deposition steps used in the fabrication of semiconductors, LEDs, MEMS and the polishing of newly sliced silicon and compound semiconductor wafers, as well as the packaging and assembly of the electronic components and assemblies. Our reflow ovens provide key thermal processing steps for both semiconductor packaging and electronics assembly. Key end-markets for these packages and assemblies include: communications, automotive electronics and sensors, computing & networking, and consumer and industrial electronics.

Our SiC/LED segment provides solutions to the lapping and polishing marketplace for SiC power chip applications, LED, optics and photonics. Lapping is the process of abrading components with a high degree of precision for flatness, parallelism and surface finish. Common applications for this technology are silicon wafers for semiconductor products, compound substrates, like silicon carbide wafers, for LED and power device applications, sapphire substrates for LED lighting and mobile devices, various glass and silica components for 3D image transmission, quartz and ceramic components for telecommunications devices, medical device components and optical and photonics applications.

We believe our product portfolio, developed through a track record of technological innovation as well as the successful integration of key acquisitions, provides exceptional value to semiconductor manufacturing by increasing yields, efficiency and throughput. We have been providing manufacturing solutions to the semiconductor industry for over 30 years and have leveraged our semiconductor technology and industry presence to capitalize on growth opportunities. Our customers use our equipment to manufacture semiconductor chips, silicon and compound semiconductor wafers and MEMS, which are used in end markets such as telecommunications, consumer and industrial electronics, computers, automotive electronics and sensors, and mobile devices. To complement our research and development efforts, we also sell our equipment to, and coordinate certain development efforts with, research institutes, universities and customers.

The semiconductor industry is cyclical and historically has experienced significant fluctuations. Our revenue is impacted by these broad industry trends.

GROWTH AND INVESTMENT STRATEGY

Our objective is to grow revenue and expand our operations, which we seek to accomplish through the pursuit of the following strategies:

Capitalize on Growth Opportunities in the Semiconductor Industry by Leveraging Our Thermal and Material Processing Expertise, Top-Tier Customer Relationships, Track Record of Technological Innovation and Exceptional Customer Service. We believe that long-term growth in the semiconductor industry will be driven by emerging growth in new compound substrates, such as silicon carbide and gallium nitride, and the growing demand for 5G and mobility, consumer and industrial Internet-of-Things (IoT), A.I., Big Data, accelerated adoption of sensors and electronics in the automotive industry, and China's investment in their domestic semiconductor production capacity. As the semiconductor market continues to develop and evolve, advances in process technology will be vital to remaining competitive. We intend to continue leveraging our market position, relationships with leading global semiconductor customers and demonstrated track record of technical innovation and exceptional customer service to maximize sales of our current and next-generation technology solutions.

Develop Multi-Product Solutions to Expand Our Addressable Market. We are focused on acquiring, developing and licensing new products across our business in response to customer needs in the markets we serve. As we add to our product portfolio, we plan to continue expanding our offerings within the semiconductor and silicon carbide production processes, thus capturing a greater percentage of capital spent on increasing semiconductor and silicon carbide production. We have successfully developed products to expand our addressable market and continue to make evolutionary upgrades to our existing equipment and service offerings across our operating segments. In addition to developing new products, we plan to invest in upgrades to our existing product offerings to stay competitive in the markets we serve. As a result, we expect to increase our capital expenditures and research and development expenses in fiscal 2020 and beyond for these upgrades as well as for the development of specific new products.

Pursue Strategic Acquisitions That Complement Our Strong Platform. Historically, we have developed and implemented an acquisition strategy consistent with our focus of maintaining market leadership and technology innovation that addresses the continued growth in the semiconductor industry. As part of this strategy, we continually evaluate potential technology, product and business acquisitions or joint ventures that we believe will increase our existing market share in the semiconductor and SiC/LED industries and expand our addressable market. In evaluating these opportunities, our objectives include: enhancing our earnings and cash flows, adding complementary product offerings, expanding our geographic footprint, improving our production efficiency and expanding our customer base. As a result, we continue to manage our balance sheet to maintain adequate liquidity in order to react quickly as these opportunities arise.

Invest in Our Infrastructure and Capacity. In July 2019, we announced that we would be moving our SiC/LED segment to a new location in January 2020. This new location allows us to sufficiently increase our manufacturing footprint and position our business to meet the expected longer-term increase in demand for our SiC, optics, and silicon substrate product solutions. We are also assessing the manufacturing space used by our Semiconductor segment for capacity expansion, added efficiencies and cost savings. This assessment could result in a future relocation of a manufacturing facility and/or investments in upgrades to existing facilities. In addition, we are evaluating our ERP systems and needs in order to allow for greater efficiencies and to ensure our infrastructure can support our future growth plans.

SEMICONDUCTOR AND SiC/LED OPERATIONS

We provide diffusion and reflow equipment as well as wafer polishing equipment and related services to leading semiconductor manufacturers. Our products include horizontal diffusion furnaces used to produce semiconductors, silicon wafers and MEMS, as well as double-sided lapping and polishing equipment, double-sided lapping and polishing carriers, single side polishing templates, mass wafer transfer systems, loaders and sorters.

As demand for increasingly sophisticated electronic devices continues, new technologies such as electric and autonomous automobiles, artificial intelligence, advanced power management, advances in consumer electronics, mobile devices and IoT will help to drive future growth. Electronic equipment continues to become more complex, yet end users are still demanding smaller, lighter and less expensive devices. This, in turn, requires increased performance and reduced cost, size, weight and power requirements of electronic assemblies, printed circuit boards and semiconductors. In response to these developments, manufacturers are increasingly employing more sophisticated production and assembly techniques requiring more advanced manufacturing equipment, such as that supplied by our subsidiary, BTU.

Although the semiconductor market has experienced significant growth over the past fifteen years, it remains cyclical by nature. The market is characterized by short-term periods of under or over utilization of capacity for most semiconductors, including microprocessors, memory, power management chips and other logic devices. When capacity utilization decreases due to the addition of excess capacity, semiconductor manufacturers typically slow their purchasing of capital equipment. Conversely, when capacity utilization increases, so does capital spending.

AUTOMATION OPERATIONS

We are a leading supplier of semiconductor and solar automation with in-house design and manufacturing capabilities and offer a full array of single wafer transfer tools as well as batch transfer tools and stocker options. We offer furnace automation and wafer handling systems used within semiconductor wafer and device processing steps. Our automation equipment includes mass wafer transfer systems, sorters, long-boat transfer systems, load station elevators, buffers and conveyers, which we sell both in connection with our diffusion furnaces and on a standalone basis. In November 2019, we completed the sale of our subsidiary, R2D, to certain members of R2D's management team. We will recognize a loss of approximately $3.0 million in the first quarter of 2020 and R2D will no longer be included in our consolidated financial statements.

SEMICONDUCTOR PRODUCTS

Our furnace and automation equipment are manufactured in our facilities in Massachusetts, the Netherlands, France and China. The following paragraphs describe the products that comprise our semiconductor business:

Horizontal Diffusion Furnaces. Through Bruce Technologies, we produce and sell 200mm and 300mm horizontal diffusion and deposition furnaces. Our horizontal furnaces currently address several steps in the semiconductor manufacturing process, including diffusion, LPCVD, high temperature oxidation (used in silicon and silicon carbide power chips), and annealing.

Our horizontal furnaces generally consist of three large modules: the load station, where the loading of the wafers occurs; the furnace section, which is comprised of one to four thermal reactor chambers; and the gas distribution cabinet, where the flow of gases into the reactor chambers is controlled, and is often customized to meet the requirements of our customers' particular processes. The horizontal furnaces utilize a combination of existing industry and proprietary technologies and are sold primarily to semiconductor customers. Our products are capable of processing all currently existing wafer sizes.

Continuous Thermal Processing Systems. Through BTU, we produce and sell thermal processing systems used in the solder reflow and curing stages of printed circuit board assembly as well as systems for the thermal processes used in advanced semiconductor packaging. Our printed circuit board assembly products are used primarily in the advanced, high-density segments of the market that utilize surface mount technology.

Flip-chip reflow provides the physical and electronic bond of the semiconductor device to its package. Our range of convection reflow systems, utilizing patented closed loop convection technology, are rated at up to 400°C and operate in air or nitrogen atmospheres. These products utilize forced impingement convection technology to transfer heat to the substrate. Using thermal power arrays of up to five kilowatts, they can process substrates in dual lane, dual speed configurations, thereby enabling our customers to double production without increasing the machine's footprint. These products are available in four models based on the heated lengths of thermal processing chambers. Heated length is based on the required production rate and loading requirements.

High-Temperature Belt Furnace. We also produce and sell custom, high-temperature belt furnaces, which have been manufactured in Massachusetts for over six decades with ISO 9001:2015 quality certification safeguarding that each unit is subject to exacting build and test criteria.

SiC/LED PRODUCTS

Our SiC/LED segment manufactures the products described below in Pennsylvania and sells them under our PR Hoffman brand name.

Substrate Carriers. We manufacture carriers in a variety of sizes and materials. Sizes range from 3 to 38 inches in diameter using a variety of special steels, laminates and extruded polymer raw materials. Silicon wafers, compound semiconductor wafers, and large optics require special insert carriers. These carriers combine the strength of hardened steel as the processing backbone with a softer plastic material in the work holes known as an insert. Inserts are permanently molded into the work holes in a pressurized process. These inserted work holes provide smoother processing, improved wafer total thickness variation (TTV) and improved wafer edge quality. Insert carriers are available for all wafer sizes from 75mm to 450mm and can be made from hardened and tempered carbon steel or specialized stainless steel when metal contamination is a processing concern. Insert carriers are widely accepted as the industry solution for both prime wafer and reclaim wafer manufacturers when dual sided lapping or polishing are utilized in their front-end wafer process.

Substrate Polishing Templates. Our polishing templates are used to securely hold silicon carbide, silicon, sapphire or other wafer materials in place during single-sided wax-free polishing processes. Polishing templates are customized for specific applications and are manufactured to extremely tight tolerances. We offer a variety of options to provide the best solution for each specific process. Polishing templates are manufactured for all brands of tools and virtually any wax-free customer process. Critical front-end wafer surface specifications are finalized during the polishing process.

Double-Sided Lapping and Polishing Machines. Double-sided lapping and polishing machines are designed to process materials such as silicon wafers, sapphire and other wafer-like materials, precision optics, computer disks, ceramic components, specialty metal products to exact tolerances of thickness, flatness, parallelism and surface finish. On average, we believe that we offer our surface processing systems with a lower cost of ownership than systems offered by our competitors. We target the compound substrate, semiconductor, optical sapphire, glass, quartz, ceramics, medical, computer disk and metal working markets.

AUTOMATION PRODUCTS

Our R2D automation equipment includes batch wafer transfer systems, sorters, long-boat transfer systems, load station elevators, buffers and conveyers. We use vacuum technology in our Standalone and our Full Automation wafer transfer systems designed to ensure high throughput and reduced breakage, resulting in increased yield.

Use of our automation products reduces human handling and, therefore, reduces exposure of wafers to particle sources and breakage during the loading and unloading of the process tubes and protects operators from heat and chemical fumes. The top reactor chamber of a horizontal furnace can be as much as eight feet from the floor on which the operator stands when manually loading wafer boats. Typical boats of 150mm to 300mm wafers weigh three to six pounds. Given these two factors, automating the wafer loading and unloading of a diffusion furnace improves employee safety and ergonomics in silicon wafer and semiconductor manufacturing facilities.

S-300. Our patented S-300 model provides an efficient method of automatically transporting a full batch of up to 300 wafers to the designated tube level and automatically placing them directly onto the cantilever loader of a diffusion furnace. This product is suitable for the production of nearly all semiconductors manufactured using a horizontal furnace. The S-300 can be used in conjunction with all current wafer sizes and is particularly well suited for manufacturers of 300mm wafers.

Comet and Gemini. Our Comet and Gemini series of wafer transfer systems include a wide range of configurations and footprints to meet the needs of our customers who serve the semiconductor industry. Comet Sorter with Optical Character Recognition (OCR) is used in sorting, randomizing, compacting or tracking. The Comet Sorter is cassette to cassette with OCR front and back scribe functions, notch alignment and SECSII Gem communication. Comet ID Readers check tag carriers, then read each wafer scribe. The Comet ID Reader sends the information to the host with SECSII Gem commands.

We also specialize in precision controlled, high-temperature belt furnaces for a wide range of custom applications, such as brazing, direct bond copper (DBC), diffusion, sintering and heat treatment. These controlled atmosphere furnaces are available with temperature ranges up to 1150°C and with various process atmospheres, including hydrogen and nitrogen.

MANUFACTURING, RAW MATERIALS AND SUPPLIES

Our semiconductor manufacturing activities consist primarily of engineering design to meet specific and evolving customer needs and procurement and assembly of various commercial and proprietary components into finished thermal processing systems and related automation in North Billerica, Massachusetts; Shanghai, China; and Clapiers, France.

Our manufacturing activities in the polishing business include laser-cutting and other fabrication steps in producing lapping and polishing consumables, including carriers, templates, gears, wear items and spare parts in Carlisle, Pennsylvania, from raw materials manufactured to our specifications by our suppliers. These products are engineered and designed for specific applications and to meet the increasingly tight tolerances required by our customers. Many items, such as proprietary components for our semiconductor equipment and lapping plates, are purchased from suppliers who manufacture these items to our specifications.

Final assembly and tests of our manufactured equipment and machines are performed within our manufacturing facilities. Quality control is maintained through inspection of incoming materials and components, in-process inspection during equipment assembly, testing of assemblies and final inspection and, when practical, operation of manufactured equipment prior to shipment.

Since much of our polishing supplies know-how relates to the manufacture of these products, our Carlisle facility is equipped to perform a significantly higher percentage of the fabrication steps required in the production of its products. However, injection molding for our insert carriers and the manufacture of raw cast iron plates are subcontracted out to various third parties. Our polishing supplies business relies on key suppliers for certain materials, including two steel mills in Germany and Japan, an injection molder, a single-sourced pad supplier from Japan and an adhesive manufacturer. To minimize the risk of production and service interruptions and/or shortages of key parts, we seek to maintain appropriate inventory levels of key raw materials and parts.

Throughout fiscal 2019, we experienced increased lead times for various parts and services across all our operating segments. The most significant lead times related to silicon carbide and custom-molded parts. As a result of the increases in lead-times for these parts, we have increased the amount of on-hand inventory related to long-lead time items, however, there can be no assurance that we will have enough inventory on-hand at the time we receive orders and that we will not incur delays in production time.

CUSTOMERS AND SEASONALITY

Our customers are primarily manufacturers of integrated circuits. During 2019, 59% of our net revenue from continuing operations came from customers outside of North America. This group represented 76% of revenues in 2018. In 2019, net revenue from continuing operations was distributed among customers in different geographic regions as follows: North/South America 41% (35% of which is in the United States), Asia 41% (including 18% to China, 5% to Malaysia and 10% to Taiwan) and Europe 18%. No individual customer accounted for 10% or more of net revenues from our continuing operations in 2019. In 2018, one Semiconductor customer individually accounted for 14% of our net revenues. In 2017, one Semiconductor customer accounted for 13% of our net revenues. A turnkey customer accounted for 58% and 50% of net revenues at our discontinued operations in 2018 and 2017, respectively.

Our business is not seasonal in nature, but is cyclical based on the capital equipment investment patterns of semiconductor manufacturers. These expenditure patterns are based on many factors, including capacity utilization, anticipated demand, the development of new technologies and global and regional economic conditions.

SALES AND MARKETING

Due to the highly technical nature of our products, we market our products primarily by direct customer contact through our sales personnel and through a network of domestic and international independent sales representatives and distributors that specialize in semiconductor equipment and supplies. Our promotional activities include direct sales contacts, participation in trade shows, an internet website, advertising in trade magazines and the distribution of product brochures.

Sales to distributors are generally on terms comparable to sales to end-user customers, as our distributors generally quote their customers after first obtaining a quote from us and have an order from the end-user before placing an order with us. Our sales to distributors are not contingent on their future sales and do not include a general right of return. Historically, returns have been rare. Distributors of our semiconductor equipment do not stock a significant amount of our products, as the inventory they hold is generally limited to parts needed to provide timely repairs to customers.

RESEARCH, DEVELOPMENT AND ENGINEERING

The markets we serve are characterized by rapidly-evolving industry standards and technological change. To compete effectively, we must continually maintain or exceed the pace of such change by improving our products and our process technologies and by developing new technologies and products that are competitive based on price and performance. To assure that these technologies and products address current and future customer requirements, we obtain as much customer cooperation and input as possible, thus increasing the efficiency and effectiveness of our research and development efforts. In addition, we look for strategic acquisitions, that will provide us with new technologies to compete effectively in the markets in which we operate.

From time to time we add functionality to our products or develop new products during engineering and manufacturing to fulfill specifications in a customer's order, in which case the cost of development, along with other costs of the order, are charged to cost of sales. We periodically receive research grants for research and development of products, which are netted against our research, development and engineering costs. In 2019, 2018 and 2017, we recorded research, development and engineering expense of $3.1 million, $2.9 million and $2.7 million, respectively. We plan to continue to add new products and also to invest in upgrades to existing product offerings to stay competitive in the markets we serve. As a result, we expect to increase our capital expenditures and research and development expenses in fiscal 2020 for these upgrades as well as for the development of specific new products.

COMPETITION

We compete in several distinct equipment markets for semiconductor devices, semiconductor wafers, MEMS, electronics assembly, lapping and polishing machines as well as the markets for supplies used in the LED, mobile devices and semiconductor industries. Each of these markets is highly competitive. Our ability to compete depends on our ability to continually improve our products, processes and services, as well as our ability to develop new products that meet constantly evolving customer requirements. Significant competitive factors for succeeding in these markets include the product's technical capability, productivity, cost-effectiveness, overall reliability, ease of use and maintenance, contamination and defect control and the level of technical service and support.

The Semiconductor Device and MEMS Markets. Equipment and automation produced by our Semiconductor operating segment primarily competes with those produced by other original equipment manufacturers, some of which are well-established firms that are much larger and have substantially greater financial and other resources than we have with which to pursue development, engineering, manufacturing, marketing and distribution of their products and may generally be better situated to withstand adverse economic or market conditions. Competitors of our horizontal diffusion furnaces include Centrotherm GmbH, Sandvik Thermal Process, Inc., a subsidiary of Sandvik AB, CVD Equipment, Inc., Semco Engineering S.A. and Meyer Burger, Ltd.

Our principal competitors for printed circuit board assembly equipment and advanced semiconductor packaging vary by product application. The principal competitors for solder reflow systems are ITW/EAE Vitronics-Soltec, Heller, Folungwin, ERSA, Shenzhen JT Automation Equipment Co., Ltd. and Rehm. The principal competitors for advanced semiconductor packaging are ITW/EAE Vitronics-Soltec and Heller. Our in-line, controlled atmosphere furnaces compete primarily against products offered by Centrotherm and SierraTherm/Schmid Thermal Systems. We also face competition from emerging low-cost Asian manufacturers and other established European manufacturers.

Although price is a factor in buying decisions, we believe that technological leadership, process capability, throughput, safer designs, uptime, mean time-to-repair, cost of ownership and after-sale support have become increasingly important factors to purchasers of our products. As such, we believe we compete primarily on the basis of these criteria, rather than on the basis of price alone.

General Industrial Lapping and Polishing Machines, Supplies and Semiconductor Wafer Markets Our SiC/LED operating segment experiences price competition for wafer carriers from foreign manufacturers for which there is very little publicly available information. As a result, we are intensifying our efforts to reduce the cost of our carriers and will continue to compete with other manufacturers of carriers by continuing to update our product line to keep pace with the rapid changes in our customers' requirements and by providing a high level of quality and customer service. We produce steel carriers, including insert carriers, on an advanced laser-cutting tool, which reduces our costs and lead times and increases our control over quality. Competitors of our lapping and polishing machines and supplies include Lapmaster Wolters, Speedfam Co. Ltd., Hamai Co., Ltd., Onse, Inc. and Eminess Technologies, Inc. Our strategy to enhance our sales of wafer carriers and templates includes developing new applications in close collaboration with our customers, continuous improvement in our products and providing a high level of customer support and products that deliver greater value to our customers.

EMPLOYEES

As of September 30, 2019, we employed 415 people. Of these employees, 12 were based at our corporate offices in Tempe, Arizona, 39 at our manufacturing plant in Carlisle, Pennsylvania, 99 at our manufacturing plant in N. Billerica, Massachusetts, 134 at our facilities in China, 12 at other Asia-Pacific offices, 37 at our facilities in France, 7 at our office in the United Kingdom and 75 at our Solar discontinued operations. Of the 39 people employed at our Carlisle, Pennsylvania facility, 19 were represented by the United Auto Workers Union - Local 1443. We have never experienced a work stoppage or strike, and other than employees at the Carlisle facility, no other employees are represented by a union. Certain of our employees are subject to collective bargaining agreements. We consider our employee relations to be good.

PATENTS

The following table shows our material patents, the patents licensed by us, and the expiration date of each patent and license:

Product	Countries	Expiration Date or Pending Approval
Multiple methods for manufacturing a solar cell and related equipment	Various	Various
Method for manufacturing a solar cell; N-type cells with reverse flow and metal wrap-through	Netherlands	2032
Method for manufacturing a solar cell; N-type cells with reverse flow and metal wrap-through	United States	2033
Wafer boat and use thereof	Netherlands	2034
Wafer boat loader assembly, furnace system, use thereof and method for operating said assembly	Netherlands	2035
IBAL (Individual Boats with Automated Loading) Model S-300	United States	Various
Systems and methods for charging solar cell layers	Various	Various
Ultrafast gas bearing-based reactive ion etching	Europe	2030
Modular furnace system	United States	2021
Convection furnace thermal profile enhancement	United States	2023
Lapping machine adjustable mechanism	Various	2027
RFID-containing carriers used for silicon wafer quality	United States	2027
Polishing machine wafer holder	Taiwan	2037

To our knowledge, there are currently no pending lawsuits against us regarding infringement of any existing patents or other intellectual property rights or any material unresolved claims made by third parties that we are infringing the intellectual property rights of such third parties.

DISCONTINUED SOLAR OPERATIONS AND PRODUCTS

On April 3, 2019, we announced that the Board determined that it was in the long-term best interest of the Company to exit the Solar business segment and to focus our strategic efforts on our semiconductor and silicon carbide/polishing business segments in order to more fully realize the opportunities we believe are presented in those markets. The anticipated divestiture included our Tempress and SoLayTec subsidiaries, which comprised substantially all of our Solar segment.

The Board made its decision after analyzing our past performance, current market conditions and the strategic outlook for our Solar segment, which operates in a highly competitive market among lower cost manufacturers, particularly in China. Historical fluctuations in the solar cell industry combined with downward pricing pressure has negatively affected the Company’s results of operations in recent years. This pricing pressure has contributed to the losses incurred by our Solar segment and overshadowed the revenue growth and profitability of our semiconductor and silicon carbide/polishing segments. While we have in the past and are currently taking actions to reduce headcount and lower our cost structure, the process involved in the Netherlands to accomplish these actions takes significant time, during which losses and cash burn are likely to continue. As previously disclosed in our periodic reports, we had been pursuing strategic alternatives for the continued operation of the Solar segment. After further assessment, however (including input from management of the Solar segment and our professional advisors), the Board determined that the investment required to return our Solar business to profitability would be better utilized to pursue strategic opportunities in the Semiconductor and SiC/LED segments.

On June 7, 2019 (“Sale Date”), we completed the sale of our subsidiary, SoLayTec, to a third party located in the Netherlands. Upon the Sale Date, we recognized a gain of approximately $1.6 million, which we included in loss from discontinued operations reported in our Consolidated Statements of Operations for the year ended September 30, 2019. Also, effective on the Sale Date, SoLayTec is no longer included in our consolidated financial statements. SoLayTec is not material to Amtech’s results of operations or financial position.

Our Solar discontinued operations provide process equipment and related cell manufacturing equipment to many ofthe world's leading solar cell manufacturers.

Our primary process equipment focus is our existing solar diffusion furnace and the development of next-generation diffusion furnaces, including our proprietary N-type systems and our PECVD systems. Additionally, through SoLayTec, we produced, developed, delivered and serviced ultrafast ALD machines used in high efficiency solar cells.

Although the solar market has experienced tremendous growth over the past five years, it is characterized by periods of rapid capacity expansion followed by periods of rapid contraction in our customers' capital spending. When actual and expected end-user demand outstrips available capacity, this triggers the beginning of the next period of expansion.

Solar Cell Markets. Our Solar discontinued operations experiences increased competition from local Chinese equipment manufacturers, including S.C New Energy, 48th Institute and Naura Technology Group Co., which may receive varying levels of financial support from the Chinese government. Our primary competitive advantages over such local manufacturers include our high-throughput equipment platforms, higher-efficiency solar cell production technologies, greater knowledge of the complete cell manufacturing process and advanced automation, which we develop in collaboration with customers and research institutes.

We have developed two applications utilized in solar device technology. Our solar PECVD product applies an anti-reflective coating to solar wafers; a coating critical to the efficiency of solar cells. PECVD layers are also used for passivation of the front and/or back side of the solar cell. We recently introduced TOPCON technology, a new application in solar cell processing offering cell efficiency potentials of greater than 22%. We are exploring next-generation high-efficiency technology and dedicating our efforts to process development.

ACQUISITIONS AND DISPOSITIONS

In September 2015, we sold a portion of our equity interest in Kingstone Hong Kong to a China-based venture capital firm. Kingstone Hong Kong is the parent company of Shanghai Kingstone, a Shanghai-based technology company specializing in ion implant solutions for the solar and semiconductor industries (in which we acquired a 55% ownership in February 2011). Proceeds from this sale were paid to Amtech and used to fund our core strategic initiatives. After giving effect to this sale transaction, we owned 15% of Kingstone Hong Kong, which in turn represented an 8% beneficial ownership interest in Shanghai Kingstone. Effective June 29, 2018, we sold this remaining 15% ownership interest in Kingstone Hong Kong to the majority owner for approximately $5.7 million.

In December 2014, in furtherance of our business model and growth through strategic acquisitions, we expanded our presence in the solar market by acquiring a 51% controlling interest in SoLayTec, which provides ALD systems used in high efficiency solar cells. In July 2017, we acquired the remaining 49% interest in SoLayTec. On June 7, 2019, we completed the sale of SoLayTec to a third party located in the Netherlands. Upon the sale, we recognized a gain of approximately $1.6 million, which we included in loss from discontinued operations reported in our Consolidated Statements of Operations for the year ended September 30, 2019.

AVAILABLE INFORMATION

Our corporate website, *www.amtechsystems.com*, provides materials for investors and information about our products. Through our website, we make available, without charge, our Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q, current reports on Form 8-K and any amendments to those reports, as soon as reasonably practicable after such materials are electronically filed, or furnished to, the SEC. The information found on our website, or information that may be accessed through links on our website, are not part of this or any other report we file with, or furnish to, the SEC. In addition, our SEC filings are available at the SEC's website at *www.sec.gov*.

ITEM 1A. RISK FACTORS

Our business faces significant risks. Because of the following factors, as well as other variables affecting our operating results and financial condition, past performance may not be a reliable indicator of future performance, and historical trends should not be used to anticipate results or trends in future periods. We operate in a continually changing business environment, and new risks and uncertainties emerge from time to time. Management cannot predict such new risks and uncertainties, nor can it assess the extent to which any of the risk factors below or any such new risks and uncertainties, or any combination thereof, may impact our business. The following risk factors should be read in conjunction with the other information and risks set forth herein.

Risks Related to the Semiconductor Industry

There is ongoing volatility in the semiconductor equipment industry.

The semiconductor equipment industry is highly cyclical and volatile. As such, demand for, and the profitability of, our products can change significantly from period to period as a result of numerous factors, including the following:

- changes in global and regional economic conditions;
- the shift of semiconductor production to Asia, where there often is increased price competition;
- tariffs, quotas and international trade barriers;
- changes in capacity utilization and production volume of manufacturers of semiconductors, silicon wafers and MEMS;
- the profitability and capital resources of those manufacturers; and
- challenges associated with marketing and selling manufacturing equipment and services to a diverse and diffuse customer base.

For these and other reasons, our results of operations for past periods may not be indicative of future operating results. In addition, as we announced in April 2019, we are focused on exiting the Solar business segment in order to focus our strategic efforts on our semiconductor and silicon carbide/polishing business segments. While these efforts remain ongoing, we expect our results of operations for past periods related to our Solar business segment will not be indicative of our future operating results.

The purchasing decisions of our customers are highly dependent on their capacity utilization, which changes when new facilities are put into production and with the level of demand for our products, as well as their company's capital expenditure budget. Purchasing decisions are also impacted by changes in the economies of the countries which our customers serve, as well as the state of the worldwide industries in which we operate or expect to operate in the future. The timing, length and severity of the up-and-down cycles in the semiconductor equipment industry are difficult to predict. Additionally, we generally experience a one-to-two quarter lag between upturns/downturns experienced by larger equipment manufacturers. The cyclical nature of our marketplace affects our ability to accurately budget our expense levels, which are based in part on our projections of future revenue.

When cyclical fluctuations result in lower than expected revenue levels, operating results are adversely affected. Cost reduction measures may be necessary in order for us to remain competitive and financially sound. During a down cycle, our operating results may be adversely affected if we are unable to make timely adjustments to our cost and expense structure to correspond to the prevailing market conditions; effectively manage the supply chain; and motivate and retain key employees. In addition, during periods of rapid growth, our operating results may be adversely affected if we are unable to increase manufacturing capacity and personnel to meet customer demand, which may require additional liquidity. We can provide no assurance that we can timely and effectively respond to the industry cycles, and our failure to do so could have a material adverse effect on our business.

The semiconductor equipment industry is highly competitive and, because we are relatively small in size and have fewer financial and other resources compared to our competitors, we may not be able to compete successfully with them.

Our industry includes large manufacturers with substantial resources to support customers worldwide. Our future performance depends, in part, upon our ability to continue to compete successfully in these markets. Some of our competitors are diversified companies with extensive financial resources and research, engineering, manufacturing, marketing and customer service and support capabilities that are greater than ours. We face competition from companies whose strategy is to provide a broad array of products, some of which compete with the products and services we offer. These competitors may bundle their products in a manner that discourages customers from purchasing our products. In addition, we face competition from emerging semiconductor equipment companies whose strategy is to provide a portion of the products and services that we offer often at a lower price than ours and use innovative technology to sell products into specialized markets. We also face competition from Chinese equipment manufacturers that may receive greater support than we do from Chinese customers and governmental agencies because they are locally based. Our local Chinese competitors may offer lower prices and more liberal payment terms than ours. Loss of our competitive position due to any of these factors could impair our prices, customer orders, revenue, gross margin and market share, any of which would negatively affect our financial position and results of operations.

Risks Related to Our Business and Our Operations

We may not be able to generate sufficient cash flows or obtain access to external financing necessary to fund existing operations and planned expansions.

Cash flows may be insufficient to provide adequate working capital in the future and we may require additional financing for further implementation of our growth plans. There is no assurance that any additional financing will be available if and when required, or, even if available, that it would not materially dilute the ownership percentage of our then existing shareholders, result in increased expenses or result in covenants or special rights that would restrict our operations.

We may not be able to find a buyer for our solar assets.

In April 2019, we announced our intent to divest all of our operations in the Netherlands, which comprise the majority of our Solar segment, as we plan to focus on our Semiconductor and SiC/LED operations. There can be no assurances that we will be able to timely complete a sale of our Solar segment or otherwise find a buyer for these assets, or, if we do complete a sale transaction, that it will be on terms acceptable to the Company. If we are unable to locate a buyer, we will have to seek other strategic alternatives, which may include an auction of our solar business assets, suspending or winding down operations or the discontinued operations may file for bankruptcy. It is not possible to predict the outcome of any suspension, winding down or bankruptcy proceeding that may be required.

The failure to successfully implement cost reduction initiatives through our restructuring activities, could materially adversely affect our business and results of operations.

As noted immediately above, in April 2019, we announced our intent to divest all of our operations in the Netherlands, which comprised the majority of our Solar segment. In June 2019, we announced that we had completed the sale of our subsidiary, SoLayTec, to a third party located in the Netherlands. We expect to complete a sale of R2D in the first quarter of fiscal 2020. These restructuring initiatives are being made, in part, in response to significant challenges in the solar industry. We cannot assure you that our restructuring initiatives will be successfully or timely implemented or that they will materially and positively impact our profitability. Because our restructuring activities involve changes to many aspects of our business, the associated cost reductions could materially adversely impact productivity and sales to an extent we have not anticipated. Even if we fully execute and implement these activities and they generate the anticipated cost savings, there may be other unforeseeable and unintended consequences that could materially adversely impact our profitability and business, including unintended employee attrition or harm to our competitive position. To the extent that we do not achieve the profitability enhancement or other benefits of restructuring initiatives that we anticipate, our results of operations may be materially adversely affected.

We may not be able to manage the business successfully through severe business cycles.

We may be unable to successfully expand or contract our business to meet fluctuating demands. Market fluctuations place significant strain on our management, personnel, systems and resources. In fiscal years 2010 and 2011, we purchased additional equipment and real estate to significantly expand our manufacturing capacity and hired additional employees to support an increase in manufacturing, field service, research and development and sales and marketing efforts. Over the past several years, the rapid decline in demand caused us to reduce headcount in manufacturing and field service and to reduce certain research and development costs. To successfully manage our growth through such market fluctuations, we believe we must effectively:

- maintain the appropriate number and mix of permanent, part-time, temporary and contract employees to meet the fluctuating demand for our products;
- train, integrate and manage personnel, particularly process engineers, field service engineers, sales and marketing personnel, and financial and information technology personnel to maintain and improve skills and morale;
- retain key management and augment our management team, particularly if we lose key members;

- continue to enhance our customer resource and manufacturing management systems to maintain high levels of customer satisfaction and efficiencies, including inventory control;
- implement and improve existing and new administrative, financial and operations systems, procedures and controls;
- expand and upgrade our technological capabilities; and
- manage multiple relationships with our customers, suppliers and other third parties.

We may encounter difficulties in effectively managing the budgeting, forecasting and other process control issues presented by rapidly changing business cycles. If we are unable to manage these cycles effectively, we may not be able to take advantage of market opportunities, develop new technologies and other products, satisfy customer requirements, execute our business plan or respond to competitive pressures.

Acquisitions can result in an increase in our operating costs, divert management's attention away from other operational matters and expose us to other risks.

We continually evaluate potential acquisitions and consider acquisitions an important part of our future growth strategy, including, in particular, in connection with our new focus on our silicon carbide business segment. In the past, we have made acquisitions of, or significant investments in, other businesses with synergistic products, services and technologies and plan to continue to do so in the future. Acquisitions involve numerous risks, including, but not limited to:

- difficulties and increased costs in connection with integration of geographically diverse personnel,
- operations, technologies and products;
- diversion of management's attention from other operational matters;
- the potential loss of our key employees and the key employees of acquired companies;
- the potential loss of our key customers and suppliers and the key customers and suppliers of acquired companies;
- disagreement with joint venture or strategic alliance partners;
- failure to comply with laws and regulations as well as industry or technical standards of the overseas markets into which we expand;
- our inability to achieve the intended cost efficiency, level of profitability or other intended strategic goals for the acquisitions, strategic investments, joint ventures or other strategic alliances;
- lack of synergy, or inability to realize expected synergies, resulting from the acquisition;
- the possibility that the issuance of our common stock, if any, in an acquisition or merger could be dilutive to our shareholders;
- impairment of acquired assets as a result of technological advancements or worse-than-expected performance of the acquired company;
- inability to complete proposed transactions as anticipated or at all and any ensuing obligation to pay a termination fee and any other associated transaction expenses;
- the potential impact of the announcement or consummation of a proposed transaction on relationships with third parties;
- potential changes in our credit rating, which could adversely impact our access to and cost of capital;
- potential litigation that may arise in connection with an acquisition;

- reductions in cash balances and/or increases in debt obligations to finance activities associated with a transaction, which reduce the availability of cash flow for general corporate or other purposes;
- inadequacy or ineffectiveness of an acquired company's internal financial controls, disclosure controls and procedures, and/or environmental, health and safety, anti-corruption, human resource or other policies or practices; and
- unknown, underestimated and/or undisclosed commitments or liabilities.

No assurance can be given that we will be able to successfully complete future strategic acquisitions if we cannot reach agreement on acceptable terms or for other reasons. We may have to incur debt or issue equity securities to pay for any future acquisitions, the issuance of which could involve the imposition of restrictive covenants or be dilutive to our existing shareholders.

Our reliance on sales to a few major customers, often on credit terms, places us at financial risk.

We currently sell to a relatively small number of customers and expect to do so for the foreseeable future. Therefore, our operating results depend on the ability of these customers to sell products that require our equipment in their manufacture. Many of our customer relationships have developed over a short period of time and certain ones are in the early stages of development. The loss of sales to any of these customers would have a significant negative impact on our business. Additionally, our customers cancel their agreements with us if we fail to meet certain product specifications, materially breach agreements or encounter insolvency or bankruptcy. They also may seek to renegotiate the terms of current agreements or renewals. We cannot be certain our existing customers will generate significant revenue for us in the future or that these new customer relationships will continue to develop. If we are unable to expand our customer base, we may not be able to maintain or increase our revenue.

As of September 30, 2019, one Semiconductor customer individually represented 15% of our accounts receivable. As of September 30, 2018, one Semiconductor customer individually represented 16% of our accounts receivable. A concentration of our receivables from one or a small number of customers places us at risk. In such a scenario, a significant change in the liquidity or financial position of any of our customers that purchase large systems could have a material impact on the collectability of our accounts receivable and our future operating results. We attempt to manage this credit risk by performing credit checks, by requiring significant partial payments prior to shipment, where appropriate, and by actively monitoring collections. We also require letters of credit from certain customers depending on the size of the order, type of customer or its creditworthiness and its country of domicile. Our major customers may seek and, on occasion, may receive pricing, payment, intellectual property-related or other commercial terms that are less favorable to us than the current terms we customarily obtain. If any one or more of our major customers were to re-negotiate their agreements on more favorable terms, or not pay us or continue business with us, it could adversely affect our financial position and results of operations.

If we are unable to require certain customers to make advance payments when they place orders with us, or if our customers fail to meet their payment obligations, we may experience increased needs to finance our working capital requirements and may be exposed to increased credit risk.

We require many of our customers to make an advance payment representing a percentage of their orders, which is a business practice that helps us manage our accounts receivable, prepay our suppliers and reduce the amount of funds that we need to meet our working capital requirements. We cannot assure that this practice will continue in the future. If this practice ceases, we may not be able to secure additional financing on a timely basis or on terms acceptable to us or at all. Currently, a significant portion of our revenue is derived from credit sales to our customers, generally with payments due within less than three months after shipment. As a result, any future decrease in the use of cash advance payments by our customers may negatively impact our short-term liquidity and expose us to additional and more concentrated credit risk. From time to time, we also may need to commence legal proceedings to recover accounts receivables from customers, which would increase our expenses. Any failure by our customers to settle outstanding accounts receivable in the future could materially and adversely affect our cash flow, financial condition and results of operations.

Our customers could cancel or fail to accept a large system order.

Our backlog includes orders for large systems, such as our diffusion furnaces, with system prices of up to and in excess of $1.0 million, depending on the system configuration, options and any special requirements of the customer. Some orders include multiple systems. Because our orders are typically subject to cancellation or delay by the customer, our backlog at any particular point in time is not necessarily representative of actual sales for succeeding periods, nor is backlog any assurance that we will realize revenue or profit from completing these orders. Our financial position and results of operations could be materially and adversely affected should any large systems order be canceled prior to shipment or not be accepted by the customer. Cancellations may result in inventory that we may not be able to sell or reuse if those products have been tailored for a specific customer's requirements and cannot then be sold without significant incremental cost. We have experienced cancellations in the past. We cannot provide any assurance that we will realize revenue or profit from our backlog.

Manufacturing interruptions or delays could affect our ability to meet customer demand and lead to higher costs.

Our business depends on timely supply of equipment, services and related products that meet the rapidly changing technical and volume requirements of our customers. Some key parts to our products are subject to long lead times and/or are obtainable only from a single supplier or limited group of suppliers. Cyclical industry conditions and the volatility of demand for manufacturing equipment increase capital, technical, operational and other risks for us and for companies throughout our supply chain. Further, these conditions may cause some suppliers to scale back operations, exit businesses, merge with other companies, file for bankruptcy protection or possibly cease operations. We also may experience significant interruptions of our manufacturing operations, delays in our ability to deliver products or services, increased costs or customer order cancellations as a result of any of the following:

- the failure or inability of suppliers to timely deliver sufficient quantities of quality parts on a cost-effective basis;
- volatility in the availability and cost of materials, including rare earth elements;
- difficulties or delays in obtaining required import or export approvals;
- information technology or infrastructure failures; and
- natural disasters or other events beyond our control (such as earthquakes, floods or storms, regional economic downturns, pandemics, social unrest, political instability, terrorism, or acts of war), particularly where we conduct manufacturing operations.

Because we depend on revenue from international customers, our business may be adversely affected by changes in the economies and policies of the countries or regions in which we do business.

During fiscal 2018, 76% of our net revenue came from customers outside of North America. During fiscal 2019,59% of our net revenue came from customers outside of North America as follows:

- Asia - 41% (including China - 18%, Malaysia - 5% and Taiwan - 10%); and
- Europe - 18%

Each geographic region in the markets in which we operate exhibits unique characteristics that can cause capital equipment investment patterns to vary significantly from period to period. Our business and results of operations could be negatively affected by periodic local or international economic downturns, trade balance issues and political, social and military instability in countries such as China, India, South Korea, Taiwan and possibly elsewhere. In addition, we face competition from a number of suppliers based in Asia that have certain advantages over suppliers from outside of Asia. These advantages include lower operating, shipping and regulatory costs, proximity to customers, favorable tariffs and other government policies that favor local suppliers. Additionally, the marketing and sale of our products to international markets expose us to a number of risks, including the following:

- increased costs associated with maintaining the ability to understand the local markets and follow their trends and customs, as well as developing and maintaining an effective marketing and distributing presence;
- limitations on our ability to require advance payments from our customers;
- difficulty in providing customer service and support in local markets;
- difficulty in staffing and managing overseas operations;
- longer sales cycles and time collection periods;
- fewer or weaker legal protections for our intellectual property rights;
- failure to develop appropriate risk management and internal control structures tailored to overseas operations;
- difficulty and costs relating to compliance with the different or changing commercial and legal requirements of our overseas markets;
- fluctuations in foreign currency exchange and interest rates;
- failure to obtain or maintain certifications for our products or services in these markets; and
- international trade barriers such as export requirements, tariffs, taxes and other restrictions and expenses.

Our business may be adversely affected by significant exchange rate fluctuations.

Though our business has not been materially affected in the past by currency fluctuations, there is a risk that it may be materially adversely affected in the future, especially as we continue to expand operations into other countries. Such risk includes possible losses due to currency exchange rate fluctuations, future prohibitions against repatriation of earnings, or proceeds from disposition of investments.

We are exposed to risks associated with an uncertain global economy.

Uncertain global economic conditions and slowing growth in China, Europe and the United States, along with difficulties in the financial markets, national debt concerns and government austerity measures in certain regions, pose challenges to the industries in which we operate. Related factors, including unemployment, inflation and fuel prices, exacerbate negative trends in business and consumer spending and may cause our customers to delay, cancel, or refrain from placing orders for equipment or services. These actions may, in turn, reduce our net sales, reduce backlog, and affect our ability to convert backlog to sales. Uncertain market conditions, difficulties in obtaining capital, or reduced profitability also may cause some customers to scale back operations, exit businesses, merge with other manufacturers, or file for bankruptcy protection and potentially cease operations, which can result in lower sales and/or additional inventory or bad debt expense for us. These conditions may similarly affect key suppliers, impairing their ability to deliver parts and potentially causing delays or added costs for delivery of our products. In addition, these conditions may lead to strategic alliances by, or consolidation of, other equipment manufacturers, which could adversely affect our ability to compete effectively. Uncertainty about future economic and industry conditions also makes it more challenging for us to forecast our operating results, make business decisions, and identify and prioritize the risks that may affect our businesses, sources and uses of cash, financial condition and results of operations. We may be required to implement additional cost reduction efforts, including restructuring activities, and/or modify our business model, which may adversely affect our ability to capitalize on opportunities in a market recovery. If we do not timely and appropriately adapt to changes resulting from these uncertain macroeconomic environment and industry conditions, or to difficulties in the financial markets, our business, financial condition and results of operations may be materially and adversely affected.

We are dependent on key personnel for our business and product development and sales.

Historically, our relationships with key customers and partners have depended on personal relations and other contacts established by certain of our executive officers. Though we cannot assure that such relationships will continue, such cooperation is expected to continue to be a significant element in our future development efforts.

Furthermore, it may not be feasible for any successor to maintain the same business relationships that our executive officers have established. While we are the beneficiary of a life insurance policy on the life of our Executive Chairman and Chief Executive Officer, Mr. Whang, there is no assurance that such insurance will be sufficient to cover the cost of finding and hiring a suitable replacement for Mr. Whang. If we were to lose the services of Mr. Whang for any reason, it could have a material adverse effect on our business.

We also depend on the management efforts of our officers and other key personnel and on our ability to attract and retain key personnel. During times of strong economic growth, competition is intense for highly-skilled employees. There can be no assurance that we will be successful in attracting and retaining such personnel or that we can avoid increased costs in order to do so. There can be no assurance that employees will not leave Amtech or compete against us. Our failure to attract additional qualified employees, or to retain the services of key personnel, could negatively impact our financial position and results of operations.

If we fail to maintain optimal inventory levels, our inventory obsolescence costs could increase, our liquidity could be significantly reduced or our revenue could decrease.

While we must maintain sufficient inventory levels to operate our business successfully and meet our customers' demands, accumulating excess inventory may have a significant unfavorable impact on our operating results and financial condition. Changing customer demands, supplier lead times and uncertainty surrounding new product launches expose us to risks associated with excess inventory or shortages. Our products are manufactured using a wide variety of purchased parts and raw materials and we must maintain sufficient inventory levels to meet the demand for the products we sell, which can change rapidly and unexpectedly. During peak years of our business, increases in demand for capital equipment result in longer lead times for many important system components. Future increases in demand could cause delays in meeting shipments to our customers. Because of the variability and uniqueness of customer orders, we try to avoid maintaining an extensive inventory of materials for manufacturing. However, long lead times for important system components during industry upturns sometimes require us to carry higher levels of inventory and make larger purchase commitments than we otherwise would make. We may be unable to sell sufficient quantities of products in the event that market demand changes, resulting in increased risk of excess inventory that could lead to obsolescence or reduced liquidity as we fulfill our purchase commitments. On the other hand, if we do not have a sufficient inventory of a product to fulfill customer orders, we may lose orders or customers, which may adversely affect our business, financial condition and results of operations. We cannot assure that we can accurately predict market demand and events to avoid inventory shortages or inventories and purchase commitments in excess of our current requirements.

Supplier capacity constraints, supplier production disruptions, supplier quality issues or price increases could increase our operating costs and adversely impact the competitive positions of our products.

We use numerous materials suppliers covering a wide range of materials and services in the production of our products including custom electronic and mechanical components. Key vendors include suppliers of controllers, quartz and silicon carbide for our diffusion systems, two steel mills capable of producing the types of steel to the tolerances needed for our wafer carriers, an injection molder that molds plastic inserts into our steel carriers, an adhesive manufacturer that supplies the critical glue and a pad supplier that produces a unique material used in the manufacture of our polishing templates. We also rely on third parties for certain machined parts, steel frames and metal panels and other components used particularly in the assembly of our production equipment. Although we strive to ensure that parts are available from multiple suppliers, we procure some key parts from a single supplier or a limited group of suppliers. Thus, at times, certain parts may not be available in sufficient quantities, or on a timely and cost-efficient basis, to adequately meet our needs and the needs of our customers.

Further, because the selling price of some of our systems exceeds $1.0 million, the delay in the shipment of even a single system could cause significant variations in our quarterly revenue. In the event of supplier capacity constraints, production disruptions, or failure to meet our requirements concerning quality, cost or performance factors, we may transfer our business to alternative sourcing which could lead to further delays, additional costs or other difficulties. If, in the future, we do not receive, in a timely and cost-effective manner, a sufficient quantity and quality of parts to meet our production requirements, our financial position and results of operations may be materially and adversely affected.

We might fail to develop adequate internal organizational structures, internal controls and risk monitoring and management systems for an organization of our scale.

Our business and operations have expanded rapidly through organic growth and acquisitions, as well as successfully managed frequent cyclical contractions. These periods of growth and contraction require the diversion of significant management resources to develop and implement adequate structures for internal organization and information flow, an effective internal control environment, risk monitoring and management systems in line with the scale of our organization, and the hiring and integration of qualified employees into our organization. In addition, disclosure and other ongoing obligations associated with being a public company further increase the challenges to our finance, legal and accounting teams. Furthermore, if we fail to continue to develop and implement appropriate structures for internal organization and information flow, an effective internal control environment and a risk monitoring and management system, we may not be able to identify unfavorable business trends, administrative oversights or other risks that could materially and adversely affect our business, prospects, financial condition and results of operations.

Unsatisfactory performance of, or defects in, our products may cause us to incur additional warranty expenses, damage our reputation and cause our sales to decline.

As of September 30, 2019 and 2018, our accrued warranty costs at our continuing operations amounted to $0.6 million in each period. Our assumptions regarding the durability and reliability of our products may not be accurate, and because our products have relatively long warranty periods, we cannot assure you that the amount of accrued warranty by us for our products will be adequate in light of the actual performance of our products. If we experience a significant increase in warranty claims, we may incur significant repair and replacement costs associated with such claims. Furthermore, widespread product underperformances or failures will damage our reputation and customer relationships and may cause our sales to decline, which in turn could have a material adverse effect on our financial condition and results of operations.

We may incur impairment charges to goodwill or long-lived assets.

We have acquired, and may acquire in the future, goodwill and other long-lived intangible assets. Goodwill and purchased intangible assets with indefinite useful lives are not amortized, but are reviewed for impairment at least annually, typically during the fourth quarter of each fiscal year, and more frequently when events or changes in circumstances indicate that the carrying value of an asset may not be recoverable. The review compares the fair value for each of our reporting units to its associated carrying value, including goodwill. Factors that could lead to impairment of goodwill and intangible assets include adverse industry or economic trends, reduced estimates of future cash flows, declines in the market price of our common stock, changes in our strategies or product portfolio, and restructuring activities. Our valuation methodology for assessing impairment requires management to make judgments and assumptions based on historical experience and projections of future operating performance. As is the case with our impairment charge in fiscal 2018, we may again be required to record a charge to earnings during the period in which an impairment of goodwill or amortizable intangible assets is determined to exist, which could materially and adversely affect our results of operations.

Our income taxes are subject to variables beyond our control.

Our net income and cash flow may be adversely affected by conditions affecting income taxes which are outside our control. Examples of the potential uncontrollable circumstances that could affect our tax rate are as follows:

- We sell and operate globally in the United States, Europe and Asia. Disagreement could occur on the jurisdiction of income and taxation among different governmental tax authorities. Potential areas of dispute may include transfer pricing, intercompany charges and intercompany balances.
- We are subject to a China withholding tax on certain non-tangible charges made under our transfer pricing agreements. The interpretation of what charges are subject to the tax and when the liability for the tax occurs has varied and could change in the future.
- Tax rates may increase, and, therefore, have a material adverse effect on our earnings and cash flows.

Our officers, directors and largest shareholders could choose to act in their best interests and not necessarily those of our other shareholders.

Our directors, executive officers and holders of five percent or more of our outstanding common stock and their affiliates represent a significant portion of our common stock held as of September 30, 2019, and, therefore, have significant influence over our management and corporate policies. These shareholders have significant influence over all matters submitted to our shareholders, including the election of our directors and approval of business combinations, and could potentially initiate or delay, deter or prevent a change of control. Circumstances may occur in which the interests of these shareholders may conflict with the interests of Amtech or those of our other shareholders, and these shareholders may cause us to take actions that align with their interests. Should conflicts of interest arise, we can provide no assurance that these shareholders would act in the best interests of our other shareholders or that any conflicts of interest would be resolved in a manner favorable to our other shareholders. In addition, involvement of certain activist shareholders may impact our ability to recruit and retain talent or otherwise distract management or make decisions that we believe are in the long-term interest of all shareholders.

Information security breaches or failures of our information technology systems may have a negative impact on our operations and our reputation.

We may be subject to information security breaches or failures of our information technology systems caused by advanced persistent threats, unauthorized access, sabotage, vandalism, terrorism or accident. Compromises and failure to our information technology networks and systems could result in unauthorized release of our confidential or proprietary information, or that of our customers and suppliers, as well as employee personal data. The costs to protect against or alleviate breaches and systems failures require significant human and financial capital expenditures, which in turn could potentially disrupt our continuing operations, increase our liability as a result of compromises to personally identifiable information, and may lead to a material and adverse effect on our financial reporting, reputation and business.

Natural disasters, outbreaks of infectious diseases, terrorist attacks, wars and threats of war may negatively impact our operations, revenue, costs and stock price.

Natural disasters such as earthquakes, floods, severe weather conditions, outbreaks of infectious diseases or other catastrophic events may severely affect our operations or those of our suppliers and customers. Such catastrophic events may have a material adverse effect on our business.

Acts of terrorism, as well as events occurring in response or connection to them, including potential future terrorist attacks, rumors or threats of war, actual military conflicts or trade disruptions impacting our domestic or foreign customers or suppliers, may negatively impact our operations by causing, among other things, delays or losses in the delivery of supplies or finished goods and decreased sales of our products. More generally, any of these events could cause consumer confidence and spending to decrease and/or result in increased volatility in the worldwide financial markets and economy. They also could result in economic recession either globally or in the markets in which we operate. Any of these occurrences could have a significant adverse impact on our financial position and results of operations.

Risks Related to Regulations and Litigation

Our business may be adversely affected by changes in or failure to comply with foreign and domestic laws.

The operations of our companies are subject to numerous foreign and domestic regulatory regimes, including taxation policies, governance and audit requirements, employment and labor laws, transportation regulations, import and export regulations and tariffs, possible foreign exchange restrictions and international monetary fluctuations. Our policies, procedures and internal controls are designed to help us comply with all applicable foreign and domestic laws, accounting and reporting requirements, regulatio ns and tax requirements. We could be subject to legal or regulatory action in the event of our failure to comply, which could be expensive to defend and resolve and be disruptive to our business. Any changes in regulations, the imposition of additional regulations or the enactment of any new legislation that affects us may increase the complexity of the legal and regulatory environment in which we operate and the related costs of compliance.

We are subject to U.S. and certain non-U.S. anti-corruption/anti-bribery, export and import controls, sanctions, embargoes, anti-money laundering, anti-terrorist financing, and other similar laws and regulations. Compliance with these legal standards could impair our ability to compete in domestic and international markets. We can face criminal liability and other serious consequences for violations of these laws and regulations which can harm our business.

We are a U.S.-based multinational company with extensive operations, including manufacturing joint ventures, in Asia and elsewhere. We operate in several high-risk jurisdictions, including, but not limited to China. Various U.S. and certain non-U.S. anti-corruption/anti-bribery and other international trade laws and regulations apply to our company entities and businesses. These laws and regulations may include, among others, the Foreign Corrupt Practices Act of 1977, as amended, the U.S. Travel Act, the U.S. Domestic Bribery Statute contained in 18 U.S.C. §201, the Money Laundering Control Act (1986), the USA PATRIOT Act, the United States Export Administration Act of 1979, the U.S. Export Administration Regulations (15 C.F.R. §§730 et seq.), U.S. sanctions contained in 31 C.F.R. Parts 500-599, the United States International Emergency Economic Powers Act, the United States Trading with the Enemy Act, the International Boycott Provisions of Section 999 of the U.S. Internal Revenue Code of 1986, the UK Bribery Act 2010, the UK Proceeds of Crime Act 2002, and certain other anti-corruption, anti-bribery, anti-kickback, anti-fraud, anti-money laundering, anti-terrorist financing, anti-narcotics, anti-boycott, export control, sanctions, embargo, import control, customs, tax, insider trading, insurance, banking, false claims, anti-racketeering, and other laws, regulations, decrees, government or executive orders, or judicial or administrative decisions or determinations to the extent applicable.

The above-mentioned laws and regulations are interpreted very broadly and will impact and raise legal compliance risks for our business in the various jurisdictions where we operate. Violations of the above-mentioned laws and regulations may result in substantial civil and criminal fines and penalties, imprisonment, the loss of export or import privileges, debarment, tax reassessments, breach of contract and fraud litigation, reputational harm, and other consequences.

Anti-corruption/anti-bribery and the other laws and regulations mentioned above are actively enforced by U.S. and other governments agencies. Among various matters, anti-corruption/anti-bribery laws prohibit our companies, subsidiaries, directors, officers, employees, agents, contractors, vendors, and other business partners from authorizing, promising, offering, providing, soliciting, or accepting directly or indirectly, improper payments or anything else of value to or from recipients in the public or private sector. We may engage vendors and third-party business partners to sell our products or services and/or to obtain necessary permits, licenses, patent registrations, and other regulatory approvals. We have direct or indirect interactions with officials and employees of government agencies or government-affiliated organizations. These factors raise our anti-corruption/anti-bribery risk exposure. We can be held liable for the corrupt or other illegal activities of our employees, agents, contractors, vendors, and other business partners, even if we do not explicitly authorize or have actual knowledge of such activities. The application of these laws to us also may place us at a competitive disadvantage to foreign companies that are not subject to similar regulations.

The United States could withdraw from or materially modify certain international trade agreements, or change tariff, trade, or tax provisions related to the global manufacturing and sales of our products in ways that we currently cannot predict.

A portion of our business activities are conducted in foreign countries, including China, Malaysia, Taiwan, France and the Netherlands. Our business benefits from free trade agreements, and we also rely on various U.S. corporate tax provisions related to international commerce as we build, market and sell our products globally. The current U.S. presidential administration, with support of some members in Congress, has announced trade policy changes, including an intention to impose new tariffs on imported goods, which have created significant uncertainty about the future relationship between the United States and other countries with respect to trade, treaties and tariffs. For example, on June 15, 2018, the Office of the USTR published a list of products covering 818 separate U.S. tariff lines valued at approximately $34 billion in 2018 trade values, imposing an additional duty of 25% on the listed product lines. The list generally focuses on products from industrial sectors that contribute to or benefit from the "Made in China 2025" industrial policy, which include industries such as aerospace, information and communications technology, robotics, industrial machinery, new materials, and automobiles. The USTR also announced a second set of 284 proposed tariff lines, which cover approximately $16 billion worth of imports from China, which will undergo further review in a public notice and comment process, including a public hearing. After completion of this process, USTR stated that it will issue a final determination on the products from this list that would be subject to the additional duties. We are continuing to evaluate the impact of the announced and other proposed tariffs on products that we import from China, and we may experience a material increase in the cost of our products, which may result in our products becoming less attractive relative to products offered by our competitors.

These developments, or the perception that any of them could occur, may have a material adverse effect on global economic conditions and the stability of global financial markets, and may significantly reduce global trade and, in particular, trade between the impacted nations and the United States. Any of these factors, or any changes to U.S. corporate tax policies related to international commerce, could depress economic activity and have a material adverse effect on our business, financial condition and results of operations.

Recent changes to U.S. tax laws may adversely affect our financial condition or results of operation and create the risk that we may need to adjust our accounting for these changes.

The TCJA, enacted on December 22, 2017, makes significant changes to U.S. tax laws and includes numerous provisions that affect businesses, including ours. For instance, as a result of lower corporate tax rates, the TCJA tends to reduce both the value of deferred tax assets and the amount of deferred tax liabilities. It also limits interest rate deductions and the amount of net operating losses that can be used each year and alters the expensing of capital expenditures. Other provisions have international tax consequences for businesses like ours that operate internationally. The TCJA is unclear in certain respects and will require interpretations and implementing regulations by the Internal Revenue Service, as well as state tax authorities, and the TCJA could be subject to amendments and technical corrections, any of which could lessen or increase the adverse (and positive) impacts of the TCJA. The accounting treatment of these tax law changes is complex, and some of the changes may affect both current and future periods. Others will primarily affect future periods. We accounted for the impact of the TCJA on us in fiscal 2018, and, though we believe our analysis and computations of the tax effects of the TCJA on us to be correct, any adjustments to our conclusions or the effects of currently unknown impacts of the TCJA on us could affect our current or future financial statements, or both.

Regulations related to conflict minerals will force us to incur additional expenses, may make our supply chains more complex, and may result in damage to our relationships with customers.

Under the Dodd-Frank Act, the SEC adopted requirements for companies that manufacture products that contain certain minerals and metals known as "conflict minerals". These rules require public companies to perform diligence and to report annually to the SEC whether such minerals originate from the Democratic Republic of Congo and adjoining countries. The implementation of these requirements could adversely affect the sourcing, availability, and pricing of minerals we use in the manufacture of our products. In addition, we have incurred and will continue to incur additional costs to comply with the disclosure requirements, including costs related to determining the source of any of the relevant minerals used in our products. Given the complexity of our supply chain, we may not be able to ascertain the origins of these minerals used in our products through the due diligence procedures that we implement, which may harm our reputation. We may also face difficulties in satisfying customers who may require that our products be certified as conflict mineral free, which could harm our relationships with these customers and lead to a loss of revenue. These requirements could limit the pool of suppliers that can provide conflict-free minerals, and we may be unable to obtain conflict-free minerals at competitive prices, which could increase our costs and adversely affect our manufacturing operations and our profitability.

We are subject to environmental regulations, and our inability or failure to comply with these regulations could result in significant costs or the suspension of our ability to operate portions of our business.

We are subject to environmental regulations in connection with our business operations, including regulations related to manufacturing and our customers' use of our products. From time to time, we receive notices regarding these regulations. It is our policy to respond promptly to these notices and to take any necessary corrective action. Our failure or inability to comply with existing or future environmental regulations could result in significant remediation liabilities, the imposition of fines and/or the suspension or termination of development, manufacturing or use of certain of our products or facilities, each of which could damage our financial position and results of operations.

We face the risk of product liability claims or other litigation, which could be expensive and may divert management's attention from running our business.

Amtech and our subsidiaries are defendants from time to time in actions for matters arising out of our business operations. The manufacture and sale of our products, which, in our customers' operations, involve toxic materials and robotic machinery, involve the risk of product liability claims. In addition, a failure of one of our products at a customer site could interrupt the business operations of our customer. Our existing insurance coverage limits may not be adequate to protect us from all liabilities that we might incur in connection with the manufacture and sale of our products if a successful product liability claim or series of product liability claims were brought against us.

We also may be involved in other legal proceedings or claims and experience threats of legal action from time to time in the ordinary course of our business. For example, securities class action litigation is often brought against companies following periods of volatility in the market price of its securities or in connection with strategic transactions. We may in the future be the target of securities litigation due to volatility in the market price of our common stock or for other reasons. Any securities litigation could result in substantial costs and could divert the attention and resources of our management.

Where appropriate, we intend to vigorously defend all claims. However, any actual or threatened claims, even if not meritorious or material, could result in the expenditure of significant financial and managerial resources. The continued defense of these claims and other types of lawsuits could divert management's attention away from running our business. In addition, required amounts to be paid in settlement of any claims, and the legal fees and other costs associated with their defense or also settlement, cannot be estimated and could, individually or in the aggregate, materially harm our financial condition. We may also experience higher than expected warranty claims.

Risks Related to Our Research and Development and Intellectual Property Activities

We may not be able to keep pace with the rapid change in the technology needed to meet customer requirements.

Success in the solar and semiconductor equipment industries depends, in part, on continual improvement of existing technologies and rapid innovation of new solutions. For example, the solar industry continues to develop new technologies to increase the efficiencies and lower the costs of solar cells. Also, the semiconductor industry continues to shrink the size of semiconductor devices. These and other evolving customer needs require us to continually respond with new product developments.

Technical innovations are inherently complex and require long development cycles and appropriate professional staffing. Our future business success depends on our ability to develop and introduce new products, or new uses for existing products, that successfully address changing customer needs and win market acceptance. We also must manufacture these new products in a timely and cost-effective manner. To realize future growth through technical innovations in the solar and semiconductor industries, we must acquire the technology through product development, merger and acquisition activity or through the licensing of products from our technology partners. Potential disruptive technologies could have a material adverse effect on our business if we do not successfully develop and introduce new products, technologies or uses for existing products in a timely manner and continually find ways of reducing the cost to produce them in response to changing market conditions or customer requirements.

Our research and development investments may not result in timely new products that can be sold at favorable prices and obtain market acceptance.

The rapid change in technology in our industry requires that we continue to make investments in research and development in order to enhance the performance, functionality and cost of ownership of our products to keep pace with competitors' products and to satisfy customer demands for improved performance, features and functionality. We cannot provide assurance that revenue from future products or enhancements will be sufficient to recover the development costs associated with such products or enhancements, or that we will be able to secure the financial resources necessary to fund future development. Research and development costs are typically incurred before we confirm the technical feasibility and commercial viability of a product, and not all development activities result in commercially viable products. We cannot assure that products or enhancements will receive market acceptance, or that we will be able to sell these products at prices that are favorable to us, or at all. In addition, from time to time we receive funding from government agencies for certain strategic development programs to increase our research and development resources and address new market opportunities. As a condition to this government funding, we may be subject to certain record-keeping, audit, intellectual property rights-sharing and/or other obligations. If we do not successfully manage our investments in research and development, our business, financial condition and results of operations could be materially and adversely affected.

Third parties may violate our proprietary rights, in which we have made significant investments, resulting in a loss of value of some of our intellectual property or costly litigation.

Our success is dependent in part on our technology and other proprietary rights. We own various United States and international patents and have additional pending patent applications relating to some of our products and technologies. Protecting and defending our patents domestically, and especially internationally, is costly. In addition, the process of seeking patent protection is lengthy and expensive. Therefore, we cannot be certain that pending or future applications will result in issued patents, or that issued patents will be of sufficient scope or strength to provide meaningful protection or commercial advantage to us. Other companies and individuals, including our larger competitors, may develop technologies that are similar or superior to our technology or design around the patents we own or license. In addition, the patent for the technology that we license and use in our manufacture of insert carriers has expired, which, along with the other risks related to our patents described above, may have the effect of diminishing or eliminating any competitive advantage we may have with respect to our manufacturing process.

We also maintain trademarks on certain of our products and claim copyright protection for certain proprietary software and documentation. We can give no assurance, however, that our trademarks and copyrights will be upheld or will successfully deter infringement by third parties.

We attempt to protect our trade secrets and other proprietary information through confidentiality agreements with our customers, suppliers, employees and consultants and through other security measures. We also maintain exclusive and non-exclusive licenses with third parties for the technology used in certain products. However, these employees, consultants and third parties may breach these agreements, and we may not have adequate remedies for wrongdoing. In addition, the laws of certain territories, such as China, in which we develop, manufacture or sell our products may not protect our intellectual property rights to the same extent as do the laws of the United States.

We may face intellectual property infringement claims that could be time-consuming and costly to defend and could result in our loss of significant rights and the assessment of treble damages.

From time to time, we have received communications from other parties asserting the existence of patent rights or other intellectual property rights that they believe cover certain of our products, processes, technologies or information. Some of these claims may lead to litigation. We cannot assure that we will prevail in these actions, or that other actions alleging misappropriation or misuse by us of third-party trade secrets, infringement by us of third-party patents and trademarks or the validity of our patents, will not be asserted or prosecuted against us. If there is a successful claim of infringement against us, we may be required to pay substantial damages (including treble damages if we were to be found to have willfully infringed a third party's patent) to the party claiming infringement, incur costs to develop non-infringing technology, stop selling or using technology that contains the allegedly infringing intellectual property, or enter into royalty or license agreements that may not be available on acceptable or commercially practical terms, if at all. Intellectual property litigation, regardless of outcome, is expensive and time-consuming, and could divert management's attention from our business. Our failure to successfully defend against infringement claims, or to develop non-infringing technologies or license the proprietary rights on a timely basis, could have a material negative effect on our business, operating results or financial condition.

Risks Related to Our Common Stock

Our results of operations are difficult to predict, and, we have experienced, and may continue to experience, significant volatility in our stock price as a result.

A variety of factors may cause the price of our stock to be volatile. For example, our results of operations are difficult to predict and have fluctuated from time to time in the past. We expect that our results of operations may continue to fluctuate from time to time in the future. It is possible that our results of operations in some reporting periods will be below market expectations. If our results of operations for a particular reporting period are lower than the market expectations for such reporting period, investors may react negatively and, as a result, the price of our stock may materially decline.

Furthermore, the stock market in general, and the market for shares of high-technology companies in particular, including ours, have experienced extreme price fluctuations, which have often been unrelated to the operating performance of affected companies. During the two-year period ended September 30, 2019 the price of our common stock has ranged from $15.45 to $4.03. The price of our stock may be more volatile than the stock of other companies due to, among other factors, the unpredictable, volatile and seasonal nature of the industries in which we operate, our significant customer concentration, intense competition, our fluctuating backlog and our relatively low daily stock trading volume. As a result, the market price of our common stock is likely to continue to fluctuate significantly in the future, including fluctuations related and unrelated to our performance.

Shareholder activists could cause a disruption to our business.

An activist investor may indicate disagreement with our strategic direction or capital allocation policies and may seek representation on our Board of Directors. Our business, operating results or financial condition could be adversely affected and may result in, among other things:

- increased operating costs, including increased legal expenses, insurance, administrative expenses and associated costs incurred in connection with director election contests;
- uncertainties as to our future direction, which could result in the loss of potential business opportunities and could make it more difficult to attract, retain, or motivate qualified personnel, and strain relationships with investors and customers; and
- reduction or delay in our ability to effectively execute our current business strategy and to implement new strategies.

Future sales of our common stock by us or our existing shareholders could depress the market price of our common stock.

If we or our existing shareholders sell a large number of shares of our common stock, the market price of our common stock could decline significantly. Further, even the perception in the public market that we or our existing shareholders might sell shares of common stock could depress the market price of the common stock.

If securities analysts do not publish research or reports about our business or if they downgrade our stock, the price of our stock could decline.

The trading market for our shares of common stock could rely in part on the research and reporting that industry or financial analysts publish about us or our business. We do not control these analysts. Furthermore, if one or more of the analysts who do cover us downgrades our stock, the price of our stock could decline. If one or more of these analysts ceases coverage of our company, we could lose visibility in the market, which in turn could cause our stock price to decline.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

We believe that our properties are adequate for our current needs. In addition, we believe that adequate space can be obtained to meet our foreseeable business needs. The following chart identifies the principal properties which we own or lease.

Location	Use	Own or Lease	Size
Corporate			
Tempe, Arizona	Corporate Headquarters	Own	15,000 sf
Semiconductor Segment			
North Billerica, Massachusetts	Office, Mfg. & Warehouse	Own	150,000 sf
Ashvale, Surrey, United Kingdom	Office	Lease	1,900 sf
Shanghai, China	Office, Mfg. & Warehouse	Lease	49,000 sf
Penang, Malaysia	Office	Lease	1,570 sf
SiC/LED Segment			
Carlisle, Pennsylvania	Office & Mfg.	Lease	22,000 sf
Carlisle, Pennsylvania	Office & Mfg.	Lease	40,500 sf
Automation Segment			
Clapiers, France	Office, Mfg. & Warehouse	Lease	12,000 sf
Clapiers, France	Manufacturing	Lease	6,700 sf
Le Cres, France	Manufacturing	Lease	3,000 sf
Solar Segment			
Vaassen, the Netherlands	Office, Mfg. & Warehouse	Own	54,000 sf

Our building in North Billerica, Massachusetts secures a mortgage note with a remaining balance of $5.5 million as of September 30, 2019 and a maturity date of September 26, 2023. The debt was refinanced in September 2016 with an interest rate of 4.11% through September 26, 2021, at which time the interest rate will be adjusted to a per annum fixed rate equal to the aggregate of the Federal Home Loan Board Five Year Classic Advance Rate plus two hundred forty basis points.

In 2017, Tempress borrowed approximately $0.4 million as part of the construction of a large, bi-facial solar PV park at its headquarters in the Netherlands. The debt is secured by Tempress' real property in Vaassen, the Netherlands, and carries an interest rate equal to the 10-year interest rate swap rate plus a 2.4% premium, reduced by a 1% discount, which at September 30, 2019 was 2.23%. The debt has a 15-year term. As of September 30, 2019, Tempress' remaining debt balance is $0.3 million, which is included in held-for-sale liabilities.

ITEM 3. LEGAL PROCEEDINGS

Amtech and its subsidiaries are defendants from time to time in actions for matters arising out of their business operations. We do not believe that any matters or proceedings presently pending will have a material adverse effect on our consolidated financial position, results of operations or liquidity.

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

Our common stock, par value $0.01 per share (Common Stock), is trading on the NASDAQ Global Select Market, under the symbol "ASYS."

ISSUER PURCHASES OF EQUITY SECURITIES

On November 29, 2018, we announced that the Board approved a stock repurchase program, pursuant to which we may repurchase up to $4 million of our outstanding Common Stock over a one-year period. Repurchases under the program will be made in open market transactions at prevailing market prices, in privately negotiated transactions, or by other means in compliance with the rules and regulations of the SEC; however, we have no obligation to repurchase shares and the timing, actual number, and value of shares to be repurchased is subject to management's discretion and will depend on the Company's stock price and other market conditions. The Board may terminate the repurchase program at any time while it is in effect. We intend to retire any repurchased shares. As of September 30, 2019, there have been no shares repurchased under this repurchase plan.

HOLDERS

As of November 15, 2019, there were394 shareholders of record of our Common Stock. Based upon a recent survey of brokers, we estimate there were approximately an additional 4,949 beneficial shareholders who held shares in brokerage or other investment accounts as of that date.

DIVIDENDS

We have never paid dividends on our Common Stock. Our present policy is to apply cash to investment in product development, acquisition or expansion; consequently, we do not expect to pay dividends on Common Stock in the foreseeable future.

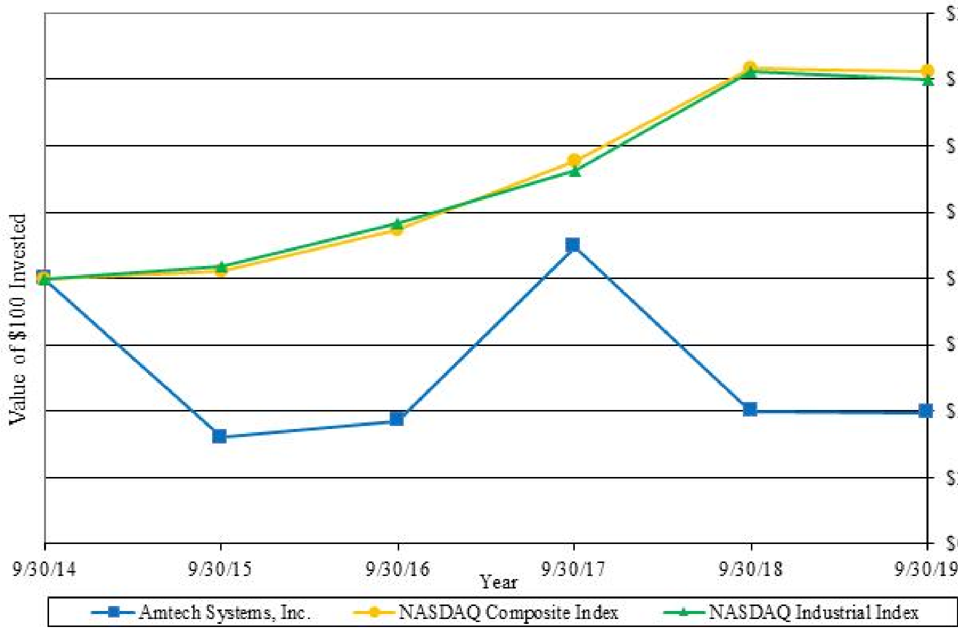
UNREGISTERED SALES OF EQUITY SECURITIES

There were no unregistered sales of equity securities in fiscal 2019.

COMPARISON OF STOCK PERFORMANCE

The following line graph and related information shall not be deemed "soliciting material" or "filed" with the SEC, nor shall such information be incorporated by reference into any future filings under the Securities Act of 1933 or the Exchange Act, each as amended, except to the extent that we specifically incorporated by reference it into such filing.

The following line graph compares cumulative total shareholder return, assuming reinvestment of dividends, for our Common Stock, the NASDAQ Composite Index and the NASDAQ Industrial Index. Because we did not pay dividends on our Common Stock during the measurement period, the calculation of the cumulative total shareholder return on our Common Stock did not include dividends. The following graph assumes that $100 was invested on October 1, 2014.



ITEM 6. SELECTED FINANCIAL DATA

The selected financial data presented below should be read in conjunction with Item 7, "Management's Discussion and Analysis of Financial Condition and Results of Operations," and our consolidated financial statements (including the related notes thereto) contained elsewhere in this report. The selected financial data in the table below excludes results from our discontinued operations.

	Years Ended September 30,				
	2019	2018	2017	2016	2015
Operating Data - Continuing Operations:					
Net revenue	$ 85,035	$ 100,053	$ 83,073	$ 68,120	$ 57,901
Gross profit	$ 33,357	$ 36,918	$ 31,106	$ 23,992	$ 17,950
Gross margin	39 %	37 %	37 %	35 %	31 %
Operating income (loss) (1)	$ 4,916	$ 6,072	$ 3,641	$ (1,692)	$ (6,403)
Income (loss) attributable to continuing operations, net of tax (2)	$ 3,135	$ 6,631	$ 2,194	$ (1,686)	$ (1,308)
Income (loss) per share attributable to continuing operations					
Basic income (loss) per share	$ 0.22	$ 0.45	$ 0.16	$ (0.13)	$ (0.11)
Diluted income (loss) per share	$ 0.22	$ 0.44	$ 0.16	$ (0.13)	$ (0.11)
Backlog:	$ 17,326	$ 26,291	$ 24,742	$ 16,552	$ 15,013
Balance Sheet Data - Continuing Operations:					
Cash, cash equivalents and restricted cash	$ 53,083	$ 45,915	$ 41,005	$ 25,062	$ 20,548
Total assets (3)	$ 103,722	$ 104,084	$ 99,788	$ 81,404	$ 85,630
Total current liabilities (4)	$ 12,101	$ 15,763	$ 15,605	$ 15,577	$ 16,337
Current maturities of long-term debt	$ 371	$ 350	$ 336	$ 414	$ 617
Long-term debt	$ 5,178	$ 5,542	$ 5,892	$ 6,135	$ 6,324

(1) Includes $2.2 million related to long-lived asset impairment charges in 2018.

(2) Includes a pre-tax gain of $2.9 million on the sale of our remaining ownership interest in Kingstone Hong Kong in 2018, a pre-tax gain of $2.6 million on the sale of Kingstone service rights in 2016 and a $8.8 million gain on deconsolidation resulting from the deconsolidation of Kingstone in 2015.

(3) Excludes $22.8 million, $45.3 million, $91.8 million, $37.0 million and $39.8 million in 2019, 2018, 2017, 2016 and 2015, respectively, of Held-For-Sale Assets.

(4) Excludes $18.5 million, $31.8 million, $72.6 million, $25.4 million and $25.2 million in 2019, 2018, 2017, 2016 and 2015, respectively, of Held-For-Sale Liabilities.

ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

The following discussion of our financial condition and results of operations should be read together with our Consolidated Financial Statements and the accompanying notes included in Item 8, "Financial Statements and Supplementary Data" in this Annual Report on Form 10-K. This discussion contains forward-looking statements, which involve risks and uncertainties. Our actual results could differ materially from those anticipated in the forward-looking statements as a result of certain factors including, but not limited to, those described in "Risk Factors" and elsewhere in this Annual Report on Form 10-K. Please refer to page 5 for further information regarding forward-looking statements and "Item 1A. Risk Factors" for a description of our risk factors.

Overview

We are a leading, global manufacturer of capital equipment, including thermal processing and wafer polishing and related consumables used in fabricating semiconductor devices, such as silicon carbide (SiC) and silicon power chips, electronic assemblies and light-emitting diodes (LEDs). We sell these products to semiconductor and automotive component manufacturers worldwide, particularly in Asia, North America and Europe.

We operate in three reportable business segments, based primarily on the industry they serve: (i) Semiconductor, (ii) SiC/LED, and (iii) Automation. In our Semiconductor segment, we supply thermal processing equipment, including solder reflow ovens, diffusion furnaces, and customer high-temp belt furnaces for use by semiconductor and electronics assembly manufacturers. In our SiC/LED segment, we produce substrate consumables and machinery for lapping (fine abrading) and polishing of materials, such as silicon wafers for semiconductor products, sapphire wafers for LED applications, and compound substrates, like silicon carbide wafers, for power device applications. In our Automation segment, we supply semiconductor and solar automation with in-house design and manufacturing capabilities and offer a full array of single wafer transfer tools as well as batch transfer tools and stocker options.

Our semiconductor customers are primarily manufacturers of integrated circuits, optoelectronic, sensors and discrete (O-S-D) components used in analog, power and radio frequency (RF) devices and photovoltaic solar cells. The semiconductor industry is cyclical and historically has experienced fluctuations. Our revenue is impacted by these broad industry trends. Although semiconductor demand for our products may have reached its cyclical peak in our fiscal year ended September 30, 2018, we believe that continued technological advances and emerging industries, such as silicon carbide power devices, will sustain our long-term performance.

As we pivot from our Solar business and refocus on our Semiconductor and SiC/LED businesses, we have focused on our plans to profitably grow our business and have developed a strategic growth plan and a capital allocation plan that support our growth objectives. Our strategic growth plan calls for profitable growth as the semi industry recovers with the following areas of focus:

- Emerging opportunities in the SiC industry – We are well-positioned to take part in this significant growth area. We are working closely with our customers to understand their SiC growth plans and opportunities. We are investing in our capacity, next generation product development, and investing in our people. We believe these investments will help fuel our growth in the SiC industry.
- 300 mm Silicon Horizontal Thermal Reactor – We have a highly successful and proven 300 mm solution for growing power semiconductor applications. We have a strong foundation with a key customer, and, in the second half of fiscal 2019, we announced an order to another industry-leading manufacturer. We believe we have a strong opportunity to expand our customer base and future revenue growth.
- As a major revenue contributor, BTU will continue to track semi industry growth for our semi-packaging and SMT products. We believe that through investments in product innovation, BTU has an opportunity to grow further.

We anticipate that the required investments to achieve our revenue growth targets will be in the range of $6.0 - $8.0 million in research and development and capital expenditures per year. We may also need to make investments in other areas of our business, such as IT systems and capacity expansions at other existing facilities. Additionally, as a capital equipment manufacturer, we will need working capital to support and fuel our future growth.

In addition to these investments in our organic growth, another key aspect of our capital allocation policy is our plan to grow through acquisitions. We have the skillset and track record to identify strong acquisition targets in the semi and SiC growth environment and to execute transactions and integrations to provide for accretive, profitable growth in both the short-term and long-term.

Solar Developments

On April 3, 2019, we announced that the Board determined that it was in the long-term best interest of the Company to exit the Solar business segment and to focus our strategic efforts on our semiconductor and silicon carbide/polishing business segments in order to more fully realize the opportunities we believe are presented in those areas. The anticipated divestiture included our Tempress and SoLayTec subsidiaries, which comprised substantially all of our Solar segment.

The Board made its decision after analyzing our past performance, current market conditions and the strategic outlook for our Solar segment, which operates in a highly competitive market among lower cost manufacturers, particularly in China. Historical fluctuations in the solar cell industry combined with downward pricing pressure has negatively affected the Company's results of operations in recent years. This pricing pressure has contributed to the losses incurred by our Solar segment and overshadowed the revenue growth and profitability of our semiconductor and silicon carbide/polishing segments. While we have in the past and are currently taking actions to reduce headcount and lower our cost structure, the process involved in the Netherlands to accomplish these actions takes significant time, during which losses and cash burn are likely to continue. As previously disclosed in our periodic reports, we had been pursuing strategic alternatives for the continued operations of the Solar segment. After further assessment, however (including input from management of the Solar segment and our professional advisors), the Board determined that the investment required to return our Solar business to profitability would be better utilized to pursue strategic opportunities in the Semiconductor and SiC/LED segments.

On June 7, 2019 ("Sale Date"), we completed the sale of our subsidiary, SoLayTec, to a third party located in the Netherlands. Upon the Sale Date, we recognized a gain of approximately $1.6 million, which we included in loss from discontinued operations reported in our Consolidated Statements of Operations for the year ended September 30, 2019. Also, effective on the Sale Date, SoLayTec is longer included in our consolidated financial statements. SoLayTec is not material to Amtech's results of operations or financial position.

We have engaged an investment advisory firm located in the Netherlands to provide advice with respect to and assist us with our efforts to divest Tempress. The advisory firm is actively engaged in conversations with both private equity and strategic buyers. No assurance can be given as to whether we will be able to secure a buyer for Tempress or, if we do so, it will be at a price that is favorable to us, and we expect to incur a loss on disposal. This division carries a significant balance of Accumulated Other Comprehensive Loss, which will also contribute to the loss realized on disposal.

The portion of our Solar segment not included in discontinued operations is our Automation division, R2D. R2D has historically sold automation products to both solar and semiconductor customers. In November 2019, we completed the sale of our subsidiary, R2D, to certain members of R2D's management team. We will recognize a loss of approximately $3.0 million in the first quarter of 2020 and R2D will no longer be included in our consolidated financial statements.

Segment Reporting Changes

After announcing the planned divestiture of our Solar segment, we conducted an evaluation of our organizational structure. Beginning with the second quarter of fiscal 2019, we made changes to our reportable segments. Prior period amounts have been revised to conform to the current period segment reporting structure.

Industry Fluctuations

Our quarterly and annual operating results have been and will continue to be impacted by the timing of large system orders. Further, the semiconductor equipment industry is highly cyclical, and the conditions of this industry remains volatile. Therefore, our order flow fluctuates quarter to quarter. For additional information regarding the risks related to our business and industry, please refer to Item 1A. Risk Factors within this Form 10-K.

Fiscal Year

Our fiscal year is from October 1 to September 30. Unless otherwise stated, references to the years 2019, 2018 and 2017 relate to the fiscal years ended September 30, 2019, 2018 and 2017, respectively.

Smaller Reporting Company

As a smaller reporting company, as defined by Rule 12b-2 of the Exchange Act and in Item 10(f)(1) of Regulation S-K, we are electing scaled disclosure reporting obligations for this Item, and, therefore, are providing a two-year comparison rather than a three-year comparison.

Results of Operations

The following table sets forth certain financial data as a percentage of net revenue for the periods indicated:

	Years Ended September 30,	
	2019	**2018**
Net revenue	100 %	100 %
Cost of sales	61 %	63 %
Gross margin	39 %	37 %
Selling, general and administrative	28 %	26 %
Research, development and engineering	4 %	3 %
Impairment charges	— %	2 %
Restructuring charges	1 %	— %
Operating income	6 %	6 %
Gain on sale of other assets	— %	3 %
Income (loss) from equity method investment	— %	— %
Interest and other expense, net	1 %	1 %
Income from continuing operations before income taxes	7 %	10 %
Income tax provision	3 %	3 %
Income from continuing operations, net of tax	4 %	7 %
Loss from discontinued operations, net of tax	(10)%	(2)%
Net (loss) income	(6)%	5 %

Fiscal 2019 compared to Fiscal 2018

Net Revenue

Net revenue consists of revenue recognized upon shipment or installation of equipment, with the exception of products using new technology, for which revenue is recognized upon customer acceptance. Spare parts sales are recognized upon shipment and service revenue is recognized upon completion of the service activity, which is generally ratable over the term of the service contract. Since the majority of our revenue is generated from large system sales, revenue and operating income can be significantly impacted by the timing of system shipments and system acceptances. See "Critical Accounting Policies – Revenue Recognition" included in the "Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations".

Our net revenue by operating segment for the years ended September 30, 2019 and 2018 were as follows (dollars in thousands):

Segment	Years Ended September 30, 2019	2018	Increase (Decrease)	% Change
Semiconductor	$ 66,455	$ 80,163	$ (13,708)	(17)%
SiC/LED	13,682	13,761	(79)	(1)%
Automation	4,898	6,129	(1,231)	(20)%
Total net revenue	$ 85,035	$ 100,053	$ (15,018)	(15)%

Net revenue for the years ended September 30, 2019 and 2018 were $85.0 million and $100.1 million, respectively, adecrease of $15.0 million or 15%. Revenue from the Semiconductor segment decreased $13.7 million, or 17%, primarily due to market demand peaking in fiscal 2018 and economic and trade challenges facing the semiconductor industry. Revenue from the SiC/LED segment was relatively flat. Our Automation segment revenues decreased $1.2 million, or 20%, primarily due to lower automation shipments to solar customers.

Backlog and Orders

Our backlog, including deferred revenue, as of September 30, 2019 and 2018 were as follows (dollars in thousands):

Segment	September 30, 2019	September 30, 2018	Increase (Decrease)	% Change
Semiconductor	$ 14,902	$ 21,023	$ (6,121)	(29)%
SiC/LED	966	2,695	(1,729)	(64)%
Automation	1,458	2,573	(1,115)	(43)%
Total backlog	$ 17,326	$ 26,291	$ (8,965)	(34)%

New orders booked in the years ended September 30, 2019 and 2018 were as follows (dollars in thousands):

Segment	Years Ended September 30, 2019	2018	Increase (Decrease)	% Change
Semiconductor	$ 60,625	$ 81,868	$ (21,243)	(26)%
SiC/LED	11,973	14,769	(2,796)	(19)%
Automation	3,962	5,582	(1,620)	(29)%
Total new orders	$ 76,560	$ 102,219	$ (25,659)	(25)%

At the end of 2019, one customer individually accounted for 13% of our total backlog.No other customer accounted for 10% or more of our backlog as of September 30, 2019. The orders included in our backlog are generally credit approved customer purchase orders believed to be firm and are generally expected to ship within the next twelve months. Because our orders are typically subject to cancellation or delay by the customer, our backlog at any particular point in time is not necessarily representative of actual sales for succeeding periods, nor is backlog any assurance that we will realize profit from completing these orders.

Gross Profit and Gross Margin

Gross profit is the difference between net revenue and cost of goods sold. Cost of goods sold consists of purchased material, labor and overhead to manufacture equipment or spare parts and the cost of service and support to customers for installation, warranty and paid service calls. Gross margin is gross profit as a percent of net revenue. Our gross profit and gross margin by operating segment for the years ended September 30, 2019 and 2018 were as follows (dollars in thousands):

	Years Ended September 30,					
Segment	**2019**	**Gross Margin**	**2018**	**Gross Margin**	**Incr (Decr)**	**% Change**
Semiconductor	$ 27,365	41%	$ 30,522	38%	$ (3,157)	(10)%
SiC/LED	5,338	39%	5,284	38%	54	1%
Automation	654	13%	1,112	18%	(458)	(41)%
Total gross profit	$ 33,357	39%	$ 36,918	37%	$ (3,561)	(10)%

Gross profit for the years ended September 30, 2019 and 2018 was $33.4 million and $36.9 million respectively, representing a decrease of $3.6 million or 10%. Gross margin for 2019 and 2018 was 39% and 37%, respectively. Gross margin for the Semiconductor segment increased to 41% in 2019, compared to 38% in 2018, due primarily to product mix, with 2019 bringing in an increased mix of higher margin parts and upgrades. In the SiC/LED segment, gross margin increased slightly to 39% in 2019, compared to 38% in 2018. Gross margin from our Automation segment decreased to 13% from 18% primarily due to fixed costs being spread over reduced sales volumes in fiscal 2019 compared to fiscal 2018.

Selling, General and Administrative Expenses

SG&A expenses consist of the cost of employees, consultants and contractors, facility costs, sales commissions, shipping costs, promotional marketing expenses, legal and accounting expenses and bad debt expense.

Total SG&A expenses for the years ended September 30, 2019 and 2018 were $24.3 million and $25.7 million, respectively. In 2019, SG&A decreased by $1.5 million primarily due to lower employee-related expenses and lower commissions on lower sales, partially offset by increased tariff charges and freight. SG&A expense includes $0.6 million and $0.9 million of stock-based compensation expense for 2019 and 2018, respectively.

Research, Development and Engineering

RD&E expenses consist of the cost of employees, consultants and contractors who design, engineer and develop new products and processes as well as materials and supplies used in producing prototypes. We receive reimbursements through governmental research and development grants which are netted against these expenses when certain conditions have been met.

RD&E expense, net of grants earned, for the years ended September 30, 2019 and 2018 were $3.1 million and $2.9 million, respectively, anincrease of $0.2 million, due primarily to increased R&D spending in our Semiconductor segment, partially offset by lower R&D spending in our Automation segment.

Impairment Charges

Impairment charges at our continuing operations for the year ended September 30, 2018 were $2.2 million. These charges were recorded in our Automation segment. There were no impairment charges at our continuing operations in fiscal 2019.

We conducted our periodic assessment of long-lived assets in the fourth quarter of fiscal 2018. As a result of the decline in demand for our solar technology, management determined that the carrying values of the related assets were not fully recoverable. As a result, we recorded impairment charges related to goodwill and intangible assets in our former Solar segment, part of which is now our Automation segment (see Note 9).

Restructuring Charges

We recorded restructuring charges of $1.1 million in 2019, related to the departure of our former Chief Executive Officer and the consolidation of our satellite offices in Asia. There were no restructuring charges in the corresponding prior-year period.

Gain on Sale of Other Assets

For the year ended September 30, 2018, we recognized a gain of $2.9 million on the sale of our investment in Kingstone Technology Hong Kong Limited, with no comparable items in the 2019 period.

Income Taxes

Our effective tax rate at our continuing operations was45.6% and 33.2% in fiscal 2019 and 2018, respectively. The effective tax rate is the ratio of total income tax expense to pre-tax income. The effective tax rates for 2019 and 2018 were higher than the U.S. statutory rate, due primarily to higher taxes on income in foreign jurisdictions as well as state income taxes.

Generally accepted accounting principles require that a valuation allowance be established when it is "more likely than not" that all or a portion of deferred tax assets will not be realized. A review of all available positive and negative evidence needs to be considered, including a company's performance, the market environment in which the company operates and the length of carryback and carryforward periods. According to those principles, it is difficult to conclude that a valuation allowance is not needed when the negative evidence includes cumulative losses in recent years. Therefore, in 2019, cumulative losses in the Solar segment weighed heavily in the overall assessment. As a result of the review, it was determined that it was appropriate to maintain a full valuation allowance for all net deferred tax assets in the foreign jurisdictions in which the Solar segment has operations, and for the carryforwards of U.S. net operating losses and foreign tax credits, acquired in the merger with BTU, for which there are limitations on their utilization. We continue to monitor our cumulative income and loss positions in the U.S. and foreign jurisdictions to determine whether full valuation allowances on net deferred tax assets are appropriate.

Our future effective income tax rate depends on various factors, such as the amount of income (loss) in each tax jurisdiction, tax regulations governing each region, non-tax deductible expenses incurred as a percent of pre-tax income and the effectiveness of our tax planning strategies.

Liquidity and Capital Resources

Liquidity and Capital Allocation

We maintain a strong focus on liquidity and define our liquidity risk tolerance based on sources and uses to maintain a sufficient liquidity position to meet our obligations through our industry cycles, under both normal and stressed conditions. We manage our liquidity to provide access to sufficient funding to meet our business needs and financial obligations throughout business cycles. We operate in the semiconductor capital equipment industry, which is cyclical, and we must ensure we have sufficient liquidity during the down cycles and varying macroeconomic conditions. Our liquidity plans are established within the context of our financial and strategic planning processes and consider the liquidity necessary to fund our operating commitments, which include purchase obligations for inventory and equipment, payroll and general expenses. We also consider our capital allocation and growth objectives, including investing in research and development, capital expenditures (including capacity assessments and IT systems) and debt payments.

See information below regarding payments we expect to make as a result of contractual obligations. We have never paid dividends on our common stock. Our present policy is to apply cash to investments in product development and upgrades, acquisitions or expansion; consequently, we do not expect to pay dividends on common stock in the foreseeable future. However, once the above priorities have been met, we will evaluate the returning of capital to shareholders, as we have done in the past.

The success of our growth strategy is dependent upon the availability of additional capital resources on terms satisfactory to management. Our sources of capital in the past have included the sale of equity securities, which includes common stock sold in private transactions and public offerings, and cash generated from operations. There can be no assurance that we can raise such additional capital resources when needed or on satisfactory terms. We believe that our principal sources of liquidity discussed above are sufficient to support operations for at least the next twelve months.

Cash and Cash Flow

The following table sets forth for the periods presented certain consolidated cash flow information (in thousands):

	Fiscal Years Ended September 30,		
	2019	2018	2017
Net cash provided by (used in) operating activities	$ 173	$ (13,768)	$ 34,051
Net cash (used in) provided by investing activities	$ (1,826)	$ 4,351	$ (1,216)
Net cash (used in) provided by financing activities	$ (157)	$ (2,476)	$ 12,701
Effect of exchange rate changes on cash	$ (1,552)	$ (1,372)	$ 1,677
Net (decrease) increase in cash, cash equivalents and restricted cash	$ (3,362)	$ (13,265)	$ 47,213
Cash, cash equivalents and restricted cash, beginning of year*	$ 62,496	$ 75,761	$ 28,548
Cash, cash equivalents and restricted cash, end of year*	$ 59,134	$ 62,496	$ 75,761

* Includes Cash, Cash Equivalents and Restricted Cash that are included in Held-For-Sale Assets on the Consolidated Balance Sheets.

As of September 30, 2019 and 2018, cash and cash equivalents at our continuing operations were $53.0 million and $45.9 million, respectively. As of September 30, 2019 and 2018, restricted cash at our continuing operations was $0.1 million and $18,000, respectively. Our working capital was $77.6 million as of September 30, 2019 and $82.7 million as of September 30, 2018. Our ratio of current assets to current liabilities was 3.5:1 as of September 30, 2019, and 2.7:1 as of September 30, 2018. Excluding our held-for-sale assets and liabilities, our ratio of current assets to current liabilities was 7.1:1 as of September 30, 2019, and 5.4:1 as of September 30, 2018.

The $3.4 million decrease in consolidated cash during 2019 was primarily due to $0.1 million of net loss adjusted for non-cash items, offset by $0.7 million used for capital expenditures and a $1.1 million decrease as a result of the sale of SoLayTec. We maintain cash accounts denominated in currencies other than our reporting currency, which expose us to foreign exchange rate fluctuations.

Cash Flows from Operating Activities

Cash provided by operating activities was $0.2 million in 2019 compared to cash used in operating activities of $13.8 million in 2018 and cash provided by operations of $34.1 million in fiscal year 2017. During 2019, cash was primarily generated through net loss adjusted for non-cash items of $0.1 million. During 2018, cash was primarily generated through net income adjusted for non-cash items of $12.8 million and increases in current liabilities, such as customer deposits and accounts payable. These increases were partially offset by a decrease in accounts receivable. During 2017, cash was primarily generated through net income adjusted for non-cash items of $12.3 million and increases in current liabilities, such as customer deposits and accounts payable. These increases were partially offset by an increase in accounts receivable due to the high volumes of shipments during the fourth quarter of 2017 and advances made to vendors.

Cash Flows from Investing Activities

Cash used in investing activities was $1.8 million in 2019, primarily related to the sale of SoLayTec. Cash provided by investing activities was $4.4 million in 2018, primarily related to the sale of our ownership interest in Kingstone Hong Kong of $5.7 million. Cash used in investing activities was $1.2 million in 2017. Investing activities in 2019, 2018 and 2017 included capital expenditures of $0.7 million, $1.5 million and $1.3 million, respectively.

Cash Flows from Financing Activities

In 2019, cash used in financing activities was $0.2 million, primarily consisting of $0.2 million in proceeds from the exercise of stock options offset by payments on long-term debt of $0.4 million. In 2018, cash used in financing activities was $2.5 million, primarily consisting of $4.0 million used for stock repurchases, partially offset by $1.9 million in proceeds from the exercise of stock options. In 2017, cash provided by financing activities was $12.7 million, primarily consisting of $10.6 million of net proceeds from issuance of our common stock and $2.0 million of net proceeds from the exercise of stock options.

Off-Balance Sheet Arrangements

As of September 30, 2019, we had no off-balance sheet arrangements as defined in Item 303(a)(4) of Regulation S-K promulgated by the SEC that have or are reasonably likely to have a current or future effect on financial condition, changes in financial condition, revenues or expenses, results of operations, liquidity, capital expenditures or capital resources that are material to investors.

Contractual Obligations and Commercial Commitments

We had the following contractual obligations and commercial commitments as of September 30, 2019, in thousands:

Contractual obligations	Total	Less than 1 year	1-3 years	3-5 years	More than 5 years
Debt obligations	$ 5,549	$ 371	$ 776	$ 843	$ 3,559
Operating lease obligations:					
Buildings	8,780	471	573	552	7,184
Office equipment	70	34	24	9	3
Vehicles	30	17	13	—	—
Total operating lease obligations	8,880	522	610	561	7,187
Purchase obligations	4,404	4,404	—	—	—
Total	$ 18,833	$ 5,297	$ 1,386	$ 1,404	$ 10,746
Other commercial obligations:					
Bank guarantees	$ 292	$ 292	$ —	$ —	$ —

Critical Accounting Policies

See “Item 7. Management’s Discussion and Analysis of Financial Condition and Results of Operations” for a discussion of our consolidated financial statements that have been prepared in accordance with accounting principles generally accepted in the United States of America. The preparation of these consolidated financial statements requires us to make estimates and assumptions that affect the reported amount of assets and liabilities at the date of the consolidated financial statements, the disclosure of contingent assets and liabilities at the date of the consolidated financial statements and the reported amounts of revenue and expenses during the reporting period.

On an on-going basis, we evaluate our estimates and judgments, including those related to revenue recognition, inventory valuation and inventory purchase commitments, accounts receivable collectability, warranty and impairment of long-lived assets. We base our estimates and judgments on historical experience, expectations regarding the future and on various other factors that we believe to be reasonable under the circumstances. The results of these estimates and judgments form the basis for making conclusions about the carrying value of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions or conditions.

A critical accounting policy is one that is both important to the presentation of our financial position and results of operations, and requires management's most difficult, subjective or complex judgments, often as a result of the need to make estimates about the effect of matters that are inherently uncertain. These uncertainties are discussed in "Item 1A. Risk Factors." We believe the following critical accounting policies affect the more significant judgments and estimates used in the preparation of our consolidated financial statements.

Revenue Recognition. We adopted ASU No. 2014-09, "Revenue from Contracts with Customers," which created FASB Topic 606 ("ASC 606") with a date of initial application of October 1, 2018. Under ASC 606, revenue is recognized when a customer obtains control of promised goods or services in an amount that reflects the consideration expected to be received in exchange for those goods or services. A performance obligation is a promise in a contract to transfer a product or service to the customer. The transaction price of a contract is allocated to each distinct performance obligation based upon the relative standalone selling price for each performance obligation and is recognized as revenue upon satisfaction of the performance obligation. We apply the following five steps:

1) *Identify the contract with the customer*

A contract with a customer exists when (i) the Company enters into an enforceable contract with a customer that defines each party's rights regarding the goods or services to be transferred and identifies the related payment terms, (ii) the contract has commercial substance, and (iii) the Company determines that collection of substantially all consideration for goods and services that are transferred is probable based on the customer's intent and ability to pay the promised consideration.

2) *Identify the performance obligations in the contract*

Performance obligations promised in a contract are identified based on the goods and services that will be transferred to the customer that are both capable of being distinct, whereby the customer can benefit from the good or service either on its own or together with other available resources, and are distinct in the context of the contract, whereby the transfer of the good or service is separately identifiable from other promises to the customer in the contract. To the extent a contract includes multiple promised goods and services, the Company must apply judgment to determine whether promised goods and services are capable of being distinct and distinct in the context of the contract. If these criteria are not met, the promised goods and services are accounted for as a combined performance obligation.

Our equipment sales consist of multiple performance obligations, including the system itself and obligations that are not delivered simultaneously with the system, primarily installation services. Customers who purchase new systems are provided an assurance-type warranty, generally for periods of 12 to 24 months. In accordance with ASC 606, assurance-type warranties are not considered a performance obligation.

3) *Determine the transaction price*

The transaction price is determined based on the consideration to which the Company will be entitled in exchange for transferring goods and services to the customer. The transaction price for equipment sales is adjusted for estimated product returns that we expect to occur under our return policy based upon past return rates, which have historically been immaterial. In rare cases when the transaction price includes variable consideration, the Company estimates the amount of variable consideration that should be included in the transaction price utilizing either the expected value method or the most likely amount method depending on the nature of the variable consideration. Any estimates, including the effect of the constraint on variable consideration, are evaluated at each reporting period for any changes.

The transaction price for all transactions is based on the price reflected in the individual customer's purchase order. Variable consideration has not been identified as a significant component of the transaction price for any of our transactions.

4) *Allocate the transaction price to performance obligations in the contract*

If the contract contains a single performance obligation, the entire transaction price is allocated to the single performance obligation. Contracts that contain multiple distinct performance obligations require an allocation of the transaction price to each distinct performance obligation on a relative standalone selling price basis unless the transaction price is variable and meets the criteria to be allocated entirely to each distinct performance obligation or to a distinct service that forms part of a single performance obligation.

Where required, the Company determines the SSP for each performance obligation based on consideration of both market and Company specific factors, including the selling price and profit margin for similar products.

For those contracts that contain multiple performance obligations (primarily system sales requiring installation services), the Company must determine the SSP. To determine the SSP for labor related performance obligations (such as the labor component of installation), the Company uses directly observable inputs based on the standalone sale prices for these services. The Company uses a cost-plus margin approach in determining the SSP for any materials-related performance obligations (e.g., system add-ons, spare parts, and systems).

5) *Recognize revenue when, or as, the Company satisfies a performance obligation*

The Company satisfies performance obligations either over time or at a point in time. Revenue is recognized over time if either 1) the customer simultaneously receives and consumes the benefits provided by the entity's performance, 2) the entity's performance creates or enhances an asset that the customer controls as the asset is created or enhanced, or 3) the entity's performance does not create an asset with an alternative use to the entity and the entity has an enforceable right to payment for performance completed to date. If the entity does not satisfy a performance obligation over time, the related performance obligation is satisfied at a point in time by transferring the control of a promised good or service to a customer. Examples of control are using the asset to produce goods or services, enhance the value of other assets, settle liabilities, and holding or selling the asset. For over time recognition, ASC 606 requires the Company to select a single revenue recognition method for the performance obligation that faithfully depicts the Company's performance in transferring control of the goods and services. The guidance allows entities to choose between two methods to measure progress toward complete satisfaction of a performance obligation:

Output methods - recognize revenue on the basis of direct measurements of the value to the customer of the goods or services transferred to date relative to the remaining goods or services promised under the contract (e.g., surveys of performance completed to date, appraisals of results achieved, milestones reached, time elapsed, and units of produced or units delivered); and

Input methods - recognize revenue on the basis of the entity's efforts or inputs to the satisfaction of a performance obligation (e.g., resources consumed, labor hours expended, costs incurred, or time elapsed) relative to the total expected inputs to the satisfaction of that performance obligation.

Equipment and related product revenues (e.g., furnace systems, system add-ons, machinery, consumables and spare parts) are recognized at a point in time, when they are shipped or delivered, depending on contractual terms. For products where the customer's defined specifications have not been met with at least two similarly configured systems and processes, the revenue and directly related costs are deferred at the time of shipment and later recognized at the time of customer acceptance or when this criterion has been met.

For installation services, revenue is recognized at a point in time, once the installation of the tool is complete. The nature of the installation services are such that the customer does not simultaneously receive and consume the benefits provided by the entity's performance, nor does performance of installation services create or enhance an asset that the customer controls. Installation services do not create an asset with an alternative use to the entity, and the entity does not have an enforceable right to payment for performance completed to date.

Maintenance and service contracts are recognized over time. Progress in the satisfaction of these performance obligations will be measured using an input method of either time elapsed in the case of fixed period contracts, or labor hours expended, in the case of project-based contracts.

Income Taxes. The calculation of tax liabilities involves significant judgment in identifying uncertain tax positions and estimating the amount of deferred tax assets that will be realized in the future and the impact of uncertainties in the application of complex tax laws. Resolution of these uncertainties in a manner inconsistent with our expectations could have a material impact on our operations and financial condition.

We are required to apply a more-likely-than-not threshold to the recognition and derecognition of uncertain tax positions and in determining whether certain tax benefits will be realized in the future. We are required to recognize the amount of tax benefit that has a greater than 50 percent likelihood of being ultimately realized upon settlement. It further requires that a change in judgment related to the expected ultimate resolution of uncertain tax positions be recognized in earnings in the period of such change.

Inventory Valuation and Inventory Purchase Commitments. We value our inventory at the lower of cost or net realizable value. Costs for over 90% of inventory at our continuing operations as of September 30, 2019 and 2018 are determined on a FIFO basis, with the remainder determined on an average cost basis. We regularly review inventory quantities and record a write-down to net realizable value for excess and obsolete inventory. The write-down is primarily based on historical inventory usage adjusted for expected changes in product demand and production requirements. Our industry is characterized by customers in highly cyclical industries, rapid technological changes, frequent new product developments and rapid product obsolescence. Changes in demand for our products and product mix could result in further write-downs.

We must order components for our products and build inventory in advance of product shipments through issuance of purchase orders based on projected demand. These commitments typically cover our requirements for periods ranging from 30 to 180 days or longer when there is a significant increase in demand or lead-times from suppliers. These purchase commitments may result in accepting delivery of components not needed to meet current demand. We accrue for estimated cancellation fees related to component orders that have been cancelled or are expected to be cancelled, and for excess inventories that will likely result in our taking delivery of ordered inventory items in excess of our projected needs. If there is an abrupt and substantial decline in demand for one or more of our products, an unanticipated change in technological requirements for any of our products, or a change in our suppliers' practice of not enforcing purchase commitments, we may be required to record additional charges for these items. This would negatively impact gross margin in the period when the charges are recorded.

Long-Lived Assets. We periodically evaluate whether events and circumstances have occurred that indicate the estimated useful lives of long-lived assets or intangible assets may warrant revision or that the remaining balance may not be recoverable. Factors that we consider in deciding when to perform an impairment review include significant under-performance of a business or product line in relation to expectations, significant negative industry or economic trends, and significant changes or planned changes in our use of the assets. In accordance with FASB ASC 360, we measure the recoverability of assets that we will continue to use in our operations by comparing the carrying value of the asset grouping to our estimate of the related total future undiscounted net cash flows. If an asset grouping's carrying value is not recoverable through the related undiscounted cash flows, the asset grouping is considered to be impaired. We measure the impairment by comparing the difference between the asset grouping's carrying value and its fair value. The long-lived assets are considered a non-financial asset and are recorded at fair value only if an impairment charge is recognized.

Indefinite-Lived Assets and Goodwill. We perform an annual impairment test in the fourth quarter of each year, or more frequently if indicators of potential impairment exist, to determine whether the fair value of a reporting unit in which goodwill resides is less than its carrying value. In accordance with FASB ASC 350, we perform the first step of the goodwill impairment test, which compares the fair value of the reporting unit to its carrying value. If the fair value of the reporting unit exceeds the carrying value of the net assets assigned to that unit, goodwill is not considered impaired and we are not required to perform additional analysis. If the carrying value of the net assets assigned to the reporting unit exceeds the fair value of the reporting unit, we would recognize an impairment charge for the amount by which the carrying amount exceeds the reporting unit's fair value (although the loss would not exceed the total amount of goodwill allocated to the reporting unit).

Determining the fair value of a reporting unit involves the use of significant estimates and assumptions. Our goodwill impairment test uses a weighting of the income approach and the market approach to estimate a reporting unit's fair value. The income approach is based on a discounted future cash flow analysis that uses certain assumptions including: projections of revenues and expenses and related cash flows based on assumed long-term growth rates and demand trends; expected future investments and working capital requirements to sustain and grow the business; and estimated discount rates based on the reporting unit's weighted average cost of capital as derived by the Capital Asset Pricing Model (CAPM) and other methods, which includes observable market inputs and other data from identified comparable companies. The same estimates are also used internally for our capital budgeting process, and for long-term and short-term business planning and forecasting. We test the reasonableness of the inputs and outcomes of our discounted cash flow analysis against available comparable market data.

The market approach is based on the application of appropriate market-derived multiples selected from (a) comparable publicly-traded companies and/or (b) the implied transaction multiples derived from identified merger and acquisition activity in the market. Multiples are then selected based on a comparison of the reviewed data to that of the reporting unit and applied to relevant historical and forecasted financial parameters such as levels of revenues, EBITDA, EBIT or other metrics.

Allowance for Doubtful Accounts. We maintain an allowance for doubtful accounts for estimated losses resulting from the inability or unwillingness of our customers to make required payments. This allowance is based on historical experience, credit evaluations, specific customer collection history and any customer-specific issues we have identified. Since a significant portion of our revenue is derived from the sale of high-value systems, our accounts receivable are often concentrated in a relatively few number of customers. A significant change in the liquidity or financial position of any one of these customers could have a material adverse impact on the collectability of our accounts receivable and our future operating results.

Impact of Recently Issued Accounting Pronouncements

For discussion of recently issued accounting pronouncements, see "Recently Issued Accounting Pronouncements" within Note 1 "Summary of Operations and Significant Accounting Policies" in "Item 8: Financial Statements and Supplementary Data."

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

As a smaller reporting company, as defined by Rule 12b-2 of the Exchange Act and in Item 10(f)(1) of Regulation S-K, we are electing scaled disclosure reporting obligations and, therefore, are not required to provide the information requested by this Item.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

The following documents are filed as part of this Annual Report on Form 10-K:

Financial Statements

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Board of Directors and
Shareholders of

AMTECH SYSTEMS, INC. AND SUBSIDIARIES

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Amtech Systems, Inc. and Subsidiaries (the "Company") as of September 30, 2019 and 2018, and the related consolidated statements of operations, comprehensive income (loss), shareholders' equity, and cash flows for each of the three years in the period ended September 30, 2019 and the related notes (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of September 30, 2019 and 2018, and the results of its operations and its cash flows for each of the three years in the period ended September 30, 2019, in conformity with accounting principles generally accepted in the United States of America.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States), the Company's internal control over financial reporting as of September 30, 2019, based on criteria established in the 2013 Internal Control - Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) and our report dated November 21, 2019 expressed an unqualified opinion.

Adoption of New Accounting Standard

As discussed in Note 2 to the financial statements, the Company changed its method of accounting for revenue from contracts with customers as a result of the adoption of Accounting Standards Codification Topic 606, Revenue from Contracts with Customers effective October 1, 2018, under the modified retrospective method.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the 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 audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ MAYER HOFFMAN MCCANN P.C.

We have served as the Company's auditor since 2005.

Phoenix, Arizona
November 21, 2019

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Board of Directors and
Shareholders of

AMTECH SYSTEMS, INC. AND SUBSIDIARIES

Opinion on Internal Control over Financial Reporting

We have audited Amtech Systems, Inc. and Subsidiaries' ("Company") internal control over financial reporting as of September 30, 2019, based on criteria established in Internal Control—Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO criteria). In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of September 30, 2019, based on the COSO criteria.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) ("PCAOB"), the consolidated balance sheets of the Company as of September 30, 2019 and 2018, and the related consolidated statements of operations, comprehensive income (loss), shareholders' equity, and cash flows for each of the years in the three-year period ended September 30, 2019 and the related notes (collectively referred to as the "financial statements") of the Company and our report dated November 21, 2019 expressed an unqualified opinion that included an explanatory paragraph regarding the Company's change in method of accounting for revenue from contracts with customers as a result of the adoption of Accounting Standards Codification Topic 606, Revenue from Contracts with Customers, effective October 1, 2018.

Basis for Opinion

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

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit 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 audit also included performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control over Financial Reporting

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

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

/s/ MAYER HOFFMAN MCCANN P.C.

Phoenix, Arizona
November 21, 2019

PART I. FINANCIAL INFORMATION
ITEM 1. Consolidated Financial Statements
AMTECH SYSTEMS, INC. AND SUBSIDIARIES
Consolidated Balance Sheets
(in thousands, except share and per share data)

Assets	September 30, 2019	September 30, 2018
Current Assets		
Cash and cash equivalents	$ 52,982	$ 45,897
Restricted cash	101	18
Accounts receivable		
Trade (less allowance for doubtful accounts of $172 and $454 at September 30, 2019 and September 30, 2018, respectively)	12,873	17,985
Unbilled and other	—	291
Inventory	17,532	17,835
Contract assets	36	—
Held-for-sale assets	22,755	45,322
Other current assets	1,991	2,884
Total current assets	108,270	130,232
Property, Plant and Equipment - Net	10,217	10,509
Intangible Assets - Net	870	1,130
Goodwill - Net	6,633	6,633
Other Assets	487	902
Total Assets	$ 126,477	$ 149,406
Liabilities and Shareholders' Equity		
Current Liabilities		
Accounts payable	$ 4,371	$ 6,867
Accrued compensation and related taxes	2,717	3,359
Accrued warranty expense	556	644
Other accrued liabilities	1,274	667
Current maturities of long-term debt	371	350
Contract liabilities	1,378	1,519
Income taxes payable	1,434	2,357
Held-for-sale liabilities	18,547	31,798
Total current liabilities	30,648	47,561
Long-Term Debt	5,178	5,542
Income Taxes Payable	3,199	3,213
Total Liabilities	39,025	56,316
Commitments and Contingencies		
Shareholders' Equity		
Preferred stock; 100,000,000 shares authorized; none issued	—	—
Common stock; $0.01 par value; 100,000,000 shares authorized; shares issued and outstanding: 14,268,797 and 14,216,596 at September 30, 2019 and September 30, 2018, respectively	143	142
Additional paid-in capital	125,098	124,316
Accumulated other comprehensive loss	(11,233)	(9,974)
Retained deficit	(26,556)	(21,394)
Total Shareholders' Equity	87,452	93,090
Total Liabilities and Shareholders' Equity	$ 126,477	$ 149,406

The accompanying notes are an integral part of these consolidated financial statements.

AMTECH SYSTEMS, INC. AND SUBSIDIARIES
Consolidated Statements of Operations
(in thousands, except per share data)

	Years Ended September 30, 2019	2018	2017
Revenue, net of returns and allowances	$ 85,035	$ 100,053	$ 83,073
Cost of sales	51,678	63,135	51,967
Gross profit	33,357	36,918	31,106
Selling, general and administrative	24,263	25,743	24,727
Research, development and engineering	3,068	2,856	2,738
Impairment charges	—	2,247	—
Restructuring charges	1,110	—	—
Operating income	4,916	6,072	3,641
Gain on sale of other assets	—	2,883	—
Income (loss) from equity method investment	—	234	(417)
Interest and other income, net	852	738	379
Income from continuing operations before income taxes	5,768	9,927	3,603
Income tax provision	2,633	3,296	1,409
Income from continuing operations, net of tax	3,135	6,631	2,194
(Loss) income from discontinued operations, net of tax	(8,297)	(1,326)	5,892
Net (loss) income	(5,162)	5,305	8,086
Net loss attributable to non-controlling interest - discontinued operations	—	—	1,045
Net (loss) income attributable to Amtech Systems, Inc.	$ (5,162)	$ 5,305	$ 9,131
Income (Loss) Per Basic Share:			
Basic income per share from continuing operations	$ 0.22	$ 0.45	$ 0.16
Basic (loss) income per share from discontinued operations	$ (0.58)	$ (0.09)	$ 0.52
Net (loss) income per basic share	$ (0.36)	$ 0.36	$ 0.68
Income (Loss) Per Diluted Share:			
Diluted income per share from continuing operations	$ 0.22	$ 0.44	$ 0.16
Diluted (loss) income per share from discontinued operations	$ (0.58)	$ (0.09)	$ 0.52
Net (loss) income per diluted share	$ (0.36)	$ 0.35	$ 0.68
Weighted average shares outstanding - basic	14,240	14,833	13,378
Weighted average shares outstanding - diluted	14,275	15,065	13,501

The accompanying notes are an integral part of these consolidated financial statements.

AMTECH SYSTEMS, INC. AND SUBSIDIARIES
Consolidated Statements of Comprehensive Income (Loss)
(in thousands)

	Years Ended September 30,		
	2019	2018	2017
Net (loss) income	$ (5,162)	$ 5,305	$ 8,086
Foreign currency translation adjustment	(1,746)	(1,445)	423
Reclassification adjustment for net foreign currency translation losses included in net income	487	—	—
Comprehensive (loss) income	(6,421)	3,860	8,509
Comprehensive loss attributable to non-controlling interest	—	—	969
Comprehensive (loss) income attributable to Amtech Systems, Inc.	$ (6,421)	$ 3,860	$ 9,478

The accompanying notes are an integral part of these consolidated financial statements.

AMTECH SYSTEMS, INC. AND SUBSIDIARIES
Consolidated Statements of Shareholders' Equity
(in thousands)

	Common Stock		Treasury Stock							
	Shares	Par Value	Shares	Cost	Additional Paid-in Capital	Accumulated Other Comprehensive Income (Loss)	Retained Deficit	Total Shareholders' Equity	Non-controlling Interest	Total Equity
Balances at September 30, 2016	13,179	$ 132	—	$ —	$ 111,631	$ (8,876)	$ (35,830)	$ 67,057	$ (1,718)	$ 65,339
Net income	—	—	—	—	—	—	9,131	9,131	(1,045)	8,086
Translation adjustment	—	—	—	—	—	347	—	347	76	423
Acquisition of non-controlling interest	—	—	—	—	—	—	—	—	2,687	2,687
Tax benefit of stock compensation	—	—	—	—	18	—	—	18	—	18
Proceeds from stock offering	1,214	12	—	—	10,620	—	—	10,632	—	10,632
Stock compensation expense	—	—	—	—	1,328	—	—	1,328	—	1,328
Stock options exercised	318	3	—	—	1,967	—	—	1,970	—	1,970
Balances at September 30, 2017	14,711	$ 147	—	$ —	$ 125,564	$ (8,529)	$ (26,699)	$ 90,483	$ —	$ 90,483
Net income	—	—	—	—	—	—	5,305	5,305	—	5,305
Translation adjustment	—	—	—	—	—	(1,445)	—	(1,445)	—	(1,445)
Repurchase of treasury stock	—	—	(771)	(4,000)	—	—	—	(4,000)	—	(4,000)
Retirement of treasury stock	(771)	(8)	771	4,000	(3,992)	—	—	—	—	—
Stock compensation expense	—	—	—	—	855	—	—	855	—	855
Stock options exercised	277	3	—	—	1,889	—	—	1,892	—	1,892
Balances at September 30, 2018	14,217	$ 142	—	$ —	$ 124,316	$ (9,974)	$ (21,394)	$ 93,090	$ —	$ 93,090
Net loss	—	—	—	—	—	—	(5,162)	(5,162)	—	(5,162)
Translation adjustment	—	—	—	—	—	(1,259)	—	(1,259)	—	(1,259)
Stock compensation expense	—	—	—	—	573	—	—	573	—	573
Stock options exercised	52	1	—	—	209	—	—	210	—	210
Balances at September 30, 2019	14,269	$ 143	—	$ —	$ 125,098	$ (11,233)	$ (26,556)	$ 87,452	$ —	$ 87,452

The accompanying notes are an integral part of these consolidated financial statements.

AMTECH SYSTEMS, INC. AND SUBSIDIARIES
Consolidated Statements of Cash Flows
(in thousands)

	Years Ended September 30,		
	2019	2018	2017
Operating Activities			
Net (loss) income	$ (5,162)	$ 5,305	$ 8,086
Adjustments to reconcile net income (loss) to net cash provided by (used in) operating activities:			
Depreciation and amortization	1,690	1,854	2,493
Non-cash impairment charges	—	7,006	—
Write-down of inventory	3,193	542	420
Capitalized interest	106	143	277
Provision for (reversal of) allowance for doubtful accounts	1,074	45	(720)
Deferred income taxes	220	209	(27)
Non-cash share based compensation expense	573	855	1,328
(Gain) loss on sale of property, plant and equipment	(11)	(92)	26
Gain on sale of subsidiary	(1,614)	—	—
Gain on sale of other assets	—	(2,883)	—
(Income) loss from equity method investment	—	(234)	417
Changes in operating assets and liabilities:			
Accounts receivable	299	3,274	(8,655)
Inventory	(435)	3,965	(6,638)
Contract and other assets	12,847	10,649	(8,898)
Accounts payable	(1,787)	(10,164)	5,374
Accrued income taxes	(3,011)	(1,749)	573
Accrued and other liabilities	(6,876)	1,960	1,913
Contract liabilities	(933)	(34,453)	38,082
Net cash provided by (used in) operating activities	173	(13,768)	34,051
Investing Activities			
Purchases of property, plant and equipment	(714)	(1,495)	(1,256)
Proceeds from sale of property, plant and equipment	—	114	40
Net cash disposed of in sale of subsidiary	(1,112)	—	—
Proceeds from sale of other assets	—	5,732	—
Net cash (used in) provided by investing activities	(1,826)	4,351	(1,216)
Financing Activities			
Proceeds from issuance of common stock, net	210	1,892	12,602
Repurchase of common stock	—	(4,000)	—
Payments on long-term debt	(376)	(368)	(674)
Borrowings on long-term debt	9	—	755
Excess tax benefit of stock compensation	—	—	18
Net cash (used in) provided by financing activities	(157)	(2,476)	12,701
Effect of Exchange Rate Changes on Cash, Cash Equivalents and Restricted Cash	(1,552)	(1,372)	1,677
Net (Decrease) Increase in Cash, Cash Equivalents and Restricted Cash	(3,362)	(13,265)	47,213
Cash, Cash Equivalents and Restricted Cash, Beginning of Year*	62,496	75,761	28,548
Cash, Cash Equivalents and Restricted Cash, End of Year*	$ 59,134	$ 62,496	$ 75,761
Supplemental Cash Flow Information:			
Income tax (payments) refunds, net	$ 993	$ (980)	$ 146
Interest paid, net of capitalized interest	262	304	269
Supplemental Non-cash Financing and Investing Activities:			
Transfer inventory to property, plant, and equipment	$ —	$ 902	$ 120
Transfer of property, plant, and equipment to inventory	—	—	22
Net of acquired non-controlling interest over debt forgiveness (See Note 16)	—	—	(332)

* Includes Cash, Cash Equivalents and Restricted Cash that are included in Held-For-Sale Assets on the Consolidated Balance Sheets.

The accompanying notes are an integral part of these consolidated financial statements.

1. Summary of Operations and Significant Accounting Policies

Description of Business – Amtech is a leading, global manufacturer of capital equipment, including thermal processing and wafer polishing, and related consumables used in fabricating semiconductor devices, such as silicon carbide (SiC) and silicon power chips, electronic assemblies and light-emitting diodes (LEDs). We sell these products to semiconductor and automotive component manufacturers worldwide, particularly in Asia, North America and Europe.

We serve niche markets in industries that are experiencing technological advances, and which historically have been very cyclical. Therefore, future profitability and growth depend on our ability to develop or acquire and market profitable new products and on our ability to adapt to cyclical trends.

In the second quarter of fiscal 2019, we began the process to divest our solar business. As such, we have classified substantially all of the Solar segment as held for sale in our Consolidated Balance Sheets and reported its results as discontinued operations in our Consolidated Statements of Operations. For additional information on the divestiture, see Note 16. For additional information on our segments, see Note 18.

Our fiscal year is from October 1 to September 30. Unless otherwise stated, references to the years 2019, 2018 and 2017 relate to the fiscal years ended September 30, 2019, 2018 and 2017, respectively.

Principles of Consolidation – The consolidated financial statements include the accounts of the Company and our wholly-owned subsidiaries and subsidiaries in which we have a controlling interest. We report non-controlling interests in consolidated entities as a component of equity separate from our equity. The equity method of accounting is used for investments over which we have a significant influence but not a controlling financial interest.All material intercompany accounts and transactions have been eliminated in consolidation. Effective July 1, 2017, we purchased the non-controlling interest in SoLayTec, pursuant to which SoLayTec became a wholly-owned subsidiary of Amtech. Beginning July 1, 2017 through the disposal date of SoLayTec (see Note 16), the non-controlling interest is no longer reported. Prior amounts have not been restated.

Use of Estimates – The preparation of consolidated financial statements in conformity with accounting principles generally accepted in the United States of America 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 revenue and expenses during the reporting period. Actual results could differ from those estimates.

Reclassifications – Certain reclassifications have been made to prior year financial statements to conform to the current year presentation, including the addition of restricted cash to cash and cash equivalents on our consolidated statements of cash flows as a result of the adoption of new accounting guidance. Results for all periods presented in this report have been reclassified for discontinued operations (Note 2) and for changes to our reportable segments (Note 18). These reclassifications had no effect on the previously reported Consolidated Financial Statements for any period.

Divestitures – Significant accounting policies associated with a decision to dispose of a business are discussed below:

Discontinued Operations – A business is classified as discontinued operations if the disposal represents a strategic shift that will have a major effect on operations or financial results and meets the criteria to be classified as held for sale or is disposed of by sale or otherwise. Significant judgments are involved in determining whether a business meets the criteria for discontinued operations reporting and the period in which these criteria are met. If a business is reported as a discontinued operation, the results of operations through the date of sale, including any gain or loss recognized on the disposition, are presented on a separate line of the Consolidated Statement of Operations. Interest on debt directly attributable to the discontinued operation is allocated to discontinued operations.

Assets Held for Sale– An asset or business is classified as held for sale when (i) management commits to a plan to sell and it is actively marketed; (ii) it is available for immediate sale and the sale is expected to be completed withinone year; and (iii) it is unlikely significant changes to the plan will be made or that the plan will be withdrawn. In isolated instances, assets held for sale may exceed one year due to events or circumstances beyond our control. The assets and related liabilities are aggregated and reported on separate lines of the Consolidated Balance Sheets.

Cash and Cash Equivalents – We consider all highly liquid investments with a maturity of three months or less when purchased to be cash equivalents. Our cash and cash equivalents consist of amounts invested in U.S. money market funds and various U.S. and foreign bank operating and time deposit accounts.

Restricted Cash – Restricted cash includes collateral for bank guarantees required by certain customers from whom deposits have been received in advance of shipment.

Accounts Receivable and Allowance for Doubtful Accounts – Accounts receivable are recorded at the sales price of products sold to customers on trade credit terms. Accounts receivable are considered past due when payment has not been received from the customer within the normal credit terms extended to that customer. A valuation allowance is established for accounts when collection is no longer probable. Accounts are written off against the allowance when the probability of collection is remote.

Inventory – We value our inventory at the lower of cost or net realizable value. Costs for over 90% of inventory at our continuing operations as of September 30, 2019 and 2018 are determined on a FIFO basis, with the remainder determined on an average cost basis. We regularly review inventory quantities and record a write-down to net realizable value for excess and obsolete inventory. The write-down is primarily based on historical inventory usage adjusted for expected changes in product demand and production requirements. Our industry is characterized by customers in highly cyclical industries, rapid technological changes, frequent new product developments and rapid product obsolescence. Changes in demand for our products and product mix could result in further write-downs.

We must order components for our products and build inventory in advance of product shipments through issuance of purchase orders based on projected demand. These commitments typically cover our requirements for periods ranging from 30 to 180 days or longer when there is a significant increase in demand or lead-times from suppliers. These purchase commitments may result in accepting delivery of components not needed to meet current demand. We accrue for estimated cancellation fees related to component orders that have been cancelled or are expected to be cancelled, and for excess inventories that will likely result in our taking delivery of ordered inventory items in excess of our projected needs. If there is an abrupt and substantial decline in demand for one or more of our products, an unanticipated change in technological requirements for any of our products, or a change in our suppliers' practice of not enforcing purchase commitments, we may be required to record additional charges for these items. This would negatively impact gross margin in the period when the charges are recorded.

Property, Plant and Equipment – Property plant, and equipment are recorded at cost. Maintenance and repairs are charged to expense as incurred. The cost of property retired or sold and the related accumulated depreciation and amortization are removed from the applicable accounts when disposition occurs and any gain or loss is recognized. Depreciation and amortization are computed using the straight-line method over the estimated useful life of the asset. Useful lives for equipment, machinery and leasehold improvements range from three to seven years; for furniture and fixtures from five to ten years; and for buildings from 20 to 30 years.

Reviews are regularly performed to determine whether facts and circumstances exist which indicate that the useful life is shorter than originally estimated or the carrying amount of assets may not be recoverable. When an indication exists that the carrying amount of long-lived assets may not be recoverable, we assess the recoverability of our assets by comparing the projected undiscounted net cash flows associated with the related asset or group of assets over their remaining lives against their respective carrying amounts. Such impairment test is based on the lowest level for which identifiable cash flows are largely independent of the cash flows of other groups of assets and liabilities. Impairment, if any, is based on the excess of the carrying amount over the estimated fair value of those assets.

Intangible Assets – Intangible assets are capitalized and amortized on a straight-line basis over their estimated useful life, if the life is determinable. If the life is not determinable, amortization is not recorded. We regularly perform reviews to determine if facts and circumstances exist which indicate that the useful lives of our intangible assets are shorter than originally estimated or the carrying amount of these assets may not be recoverable. When an indication exists that the carrying amount of intangible assets may not be recoverable, we assess the recoverability of our assets by comparing the projected undiscounted net cash flows associated with the related asset or group of assets over their remaining lives against their respective carrying amounts. Such impairment test is based on the lowest level for which identifiable cash flows are largely independent of the cash flows of other groups of assets and liabilities. Impairment, if any, is based on the excess of the carrying amount over the estimated fair value of those assets. Patent costs consist primarily of legal and filing fees incurred to file patents on proprietary methods and technology developed by the Company. Patent costs are expensed when incurred as they are insignificant.

In the fourth quarter of fiscal 2018, we recorded a charge for impairment of intangible assets in our former Solar segment. See Note 9 for a description of the facts and circumstances leading to the intangible asset impairment charge.

Goodwill - Goodwill is recorded when the purchase price paid for an acquisition exceeds the estimated fair value of net identified tangible and intangible assets acquired. Goodwill is not subject to amortization but are tested for impairment when it is determined that it is more likely than not that the fair value of a reporting unit is less than its carrying amount, typically at the end of the fiscal year, or more frequently if circumstances dictate. If it is concluded that there is a potential impairment, we would recognize an impairment charge for the amount by which the carrying amount exceeds the reporting unit's fair value (although the loss would not exceed the total amount of goodwill allocated to the reporting unit). Impairment tests include the use of estimates and assumptions that are inherently uncertain. Changes in these estimates and assumptions could materially affect the determination of fair value or goodwill impairment, or both.

In the fourth quarter of fiscal 2018, we recorded a charge for impairment of goodwill in our former Solar segment. See Note 10 for a description of the facts and circumstances leading to the goodwill impairment charge.

Revenue Recognition – We adopted ASU No. 2014-09, "Revenue from Contracts with Customers," which created FASB Topic 606 ("ASC 606") with a date of initial application of October 1, 2018. Under ASC 606, revenue is recognized when a customer obtains control of promised goods or services in an amount that reflects the consideration expected to be received in exchange for those goods or services. A performance obligation is a promise in a contract to transfer a product or service to the customer. The transaction price of a contract is allocated to each distinct performance obligation based upon the relative standalone selling price for each performance obligation and is recognized as revenue upon satisfaction of the performance obligation.

We implemented ASC 606 using the modified retrospective approach with no cumulative effect adjustment recorded to the opening balance of retained deficit. Prior period amounts have not been restated and continue to be reported under the accounting standards in effect for those periods. Upon adoption of ASC 606, we changed our accounting policy for the installation performance obligation included in all solar system sales (now part of discontinued operations). Previously under ASC 605, we deferred revenue for the fair value of the installation and recognized it when earned. Under ASC 606, we no longer record a deferral but will continue to recognize the revenue when earned. This change in policy does not result in a change in the amount of revenue recorded; instead, it removes the installation liability from our balance sheet.

To achieve the core principle of the standard, we apply the following five steps:

1) *Identify the contract with the customer*

A contract with a customer exists when (i) the Company enters into an enforceable contract with a customer that defines each party's rights regarding the goods or services to be transferred and identifies the related payment terms, (ii) the contract has commercial substance, and (iii) the Company determines that collection of substantially all consideration for goods and services that are transferred is probable based on the customer's intent and ability to pay the promised consideration.

2) *Identify the performance obligations in the contract*

Performance obligations promised in a contract are identified based on the goods and services that will be transferred to the customer that are both capable of being distinct, whereby the customer can benefit from the good or service either on its own or together with other available resources, and are distinct in the context of the contract, whereby the transfer of the good or service is separately identifiable from other promises to the customer in the contract. To the extent a contract includes multiple promised goods and services, the Company must apply judgment to determine whether promised goods and services are capable of being distinct and distinct in the context of the contract. If these criteria are not met, the promised goods and services are accounted for as a combined performance obligation.

Our equipment sales consist of multiple performance obligations, including the system itself and obligations that are not delivered simultaneously with the system, primarily installation services. Customers who purchase new systems are provided an assurance-type warranty, generally for periods of 12 to 24 months. In accordance with ASC 606, assurance-type warranties are not considered a performance obligation.

3) *Determine the transaction price*

The transaction price is determined based on the consideration to which the Company will be entitled in exchange for transferring goods and services to the customer. The transaction price for equipment sales is adjusted for estimated product returns that we expect to occur under our return policy based upon past return rates, which have historically been immaterial. In rare cases when the transaction price includes variable consideration, the Company estimates the amount of variable consideration that should be included in the transaction price utilizing either the expected value method or the most likely amount method depending on the nature of the variable consideration. Any estimates, including the effect of the constraint on variable consideration, are evaluated at each reporting period for any changes.

The transaction price for all transactions is based on the price reflected in the individual customer’s purchase order. Variable consideration has not been identified as a significant component of the transaction price for any of our transactions.

The Company has determined that most contracts will be completed in less than one year. For those transactions where all performance obligations will be satisfied within one year or less, the Company is applying the practical expedient outlined in ASC 606-10-32-18. This practical expedient allows the Company not to adjust promised consideration for the effects of a significant financing component if the Company expects at contract inception the period between when the Company transfers the promised good or service to a customer and when the customer pays for that good or service will be one year or less. For those transactions that are expected to be completed after one year, the Company has assessed that there are no significant financing components because any difference between the promised consideration and the cash selling price of the good or service is for reasons other than the provision of financing.

The Company excludes from the transaction price all sales taxes that are assessed by a governmental authority and that are imposed on and concurrent with a specific revenue-producing transaction and collected from a customer (for example, sales, use, value added, and some excise taxes). This employs the practical expedient under ASC 606-10-32-2A. Sales taxes are presented on a net basis (excluded from revenues) in the Company's consolidated statements of operations.

4) *Allocate the transaction price to performance obligations in the contract*

If the contract contains a single performance obligation, the entire transaction price is allocated to the single performance obligation. Contracts that contain multiple distinct performance obligations require an allocation of the transaction price to each distinct performance obligation on a relative standalone selling price basis unless the transaction price is variable and meets the criteria to be allocated entirely to each distinct performance obligation or to a distinct service that forms part of a single performance obligation.

Where required, the Company determines the SSP for each performance obligation based on consideration of both market and Company specific factors, including the selling price and profit margin for similar products.

For those contracts that contain multiple performance obligations (primarily system sales requiring installation services), the Company must determine the SSP. To determine the SSP for labor related performance obligations (such as the labor component of installation), the Company uses directly observable inputs based on the standalone sale prices for these services. The Company uses a cost-plus margin approach in determining the SSP for any materials-related performance obligations (e.g., system add-ons, spare parts, and systems).

5) *Recognize revenue when, or as, the Company satisfies a performance obligation*

The Company satisfies performance obligations either over time or at a point in time. Revenue is recognized over time if either 1) the customer simultaneously receives and consumes the benefits provided by the entity's performance, 2) the entity's performance creates or enhances an asset that the customer controls as the asset is created or enhanced, or 3) the entity's performance does not create an asset with an alternative use to the entity and the entity has an enforceable right to payment for performance completed to date. If the entity does not satisfy a performance obligation over time, the related performance obligation is satisfied at a point in time by transferring the control of a promised good or service to a customer. Examples of control are using the asset to produce goods or services, enhance the value of other assets, settle liabilities, and holding or selling the asset. For over time recognition, ASC 606 requires the Company to select a single revenue recognition method for the performance obligation that faithfully depicts the Company's performance in transferring control of the goods and services. The guidance allows entities to choose between two methods to measure progress toward complete satisfaction of a performance obligation:

Output methods - recognize revenue on the basis of direct measurements of the value to the customer of the goods or services transferred to date relative to the remaining goods or services promised under the contract (e.g., surveys of performance completed to date, appraisals of results achieved, milestones reached, time elapsed, and units of produced or units delivered); and

Input methods - recognize revenue on the basis of the entity's efforts or inputs to the satisfaction of a performance obligation (e.g., resources consumed, labor hours expended, costs incurred, or time elapsed) relative to the total expected inputs to the satisfaction of that performance obligation.

Equipment and related product revenues (e.g., furnace systems, system add-ons, machinery, consumables and spare parts) are recognized at a point in time, when they are shipped or delivered, depending on contractual terms. For products where the customer's defined specifications have not been met with at least two similarly configured systems and processes, the revenue and directly related costs are deferred at the time of shipment and later recognized at the time of customer acceptance or when this criterion has been met.

For installation services, revenue is recognized at a point in time, once the installation of the tool is complete. The nature of the installation services are such that the customer does not simultaneously receive and consume the benefits provided by the entity's performance, nor does performance of installation services create or enhance an asset that the customer controls. Installation services do not create an asset with an alternative use to the entity, and the entity does not have an enforceable right to payment for performance completed to date.

Maintenance and service contracts are recognized over time. Progress in the satisfaction of these performance obligations will be measured using an input method of either time elapsed in the case of fixed period contracts, or labor hours expended, in the case of project-based contracts.

Cost to Obtain and Fulfill a Contract with a Customer

The Company recognizes an asset related to incremental costs of obtaining a contract with a customer if the Company expects to recover those costs. The Company will recognize an asset from costs incurred to fulfill a contract only if such costs relate directly to a contract that the entity can specifically identify, the costs generate or enhance resources of the Company that will be used in satisfying performance obligations in the future, and the costs are expected to be recovered. Any assets recognized related to costs to obtain or fulfill a contract are amortized to selling, general and administrative expense on a systematic basis that is consistent with the transfer to the customer of the goods or services to which the asset relates.

In substantially all of our business transactions, we incur incremental costs to obtain contracts with customers, in the form of sales commissions. We maintain a commission program which rewards our sales representatives for system sales and our employees for system sales and other individual goals. Under ASC 606, an asset shall be amortized on a systematic basis that is consistent with the transfer to the customer of the goods or services to which the asset relates. However, ASC 606 provides a practical expedient to allow for the recognition of commission expense when incurred if the amortization period of the asset that the entity otherwise would have recognized is one year or less. Based on the nature of the Company's contracts with customers, we have elected this practical expedient and expense all commissions as incurred based upon the expectation that the amortization period would be one year or less.

The Company has also elected to adopt the practical expedient related to shipping and handling fees which allows the Company to account for shipping and handling activities that occur after control of the related good transfers as fulfillment activities instead of assessing such activities as performance obligations.

Revenue Categories used by Management

Management reviews disaggregated revenue at the operating segment level. Revenue-generating transactions vary between our operating segments due to several factors. For example, lead times vary among our operating segments and among our products. Most of the revenue for our SiC/LED segment results from the sale of consumables, rather than equipment sales. These consumables have a much shorter production period than equipment produced by our other operating segments. Due to these variations between operating segments, management determined that disaggregated revenue by segment sufficiently depicts how economic factors affect the nature, amount, timing and uncertainty of our revenue and cash flows. See Note 18 for additional information on our reportable business segments.

Contract Assets – Contract assets consist of amounts the Company is not legally able to invoice but has completed the related performance obligation. These amounts generally arise from variances between the contractual payment terms and the transaction price assigned to the open performance obligations (e.g., the Company has recognized revenue in an amount greater than the amount that is billable under the contract). Contract assets are reflected in current assets on the consolidated balance sheets.

Contract Liabilities – Contract liabilities are reflected in current liabilities on the consolidated balance sheets as all performance obligations are expected to be satisfied within the next 12 months. Contract liabilities include customer deposits and deferred profit. Contract liabilities relate to payments invoiced or received in advance of completion of performance obligations under a contract. Contract liabilities are recognized as revenue upon the fulfillment of performance obligations. This amount relates primarily to prepayments for system sales and installation services.

Semiconductor system transactions have payment terms that generally require a payment due upon shipment of the system and a final payment due upon installation or acceptance. Automation transactions have payment terms that generally require a payment due upon shipment of the system, with a final payment due upon acceptance of the installation.

Warranty – A limited warranty is provided free of charge, generally for periods of 12 to 24 monthsto all purchasers of our new products and systems. Accruals are recorded for estimated warranty costs at the time revenue is recognized, generally upon shipment or acceptance, as determined under the revenue recognition policy above. On occasion, we have been required and may be required in the future to provide additional warranty coverage to ensure that the systems are ultimately accepted or to maintain customer goodwill. While our warranty costs have historically been within our expectations and we believe that the amounts accrued for warranty expenditures are sufficient for all systems sold through September 30, 2019, we cannot guarantee that we will continue to experience a similar level of predictability with regard to warranty costs. In addition, technological changes or previously unknown defects in raw materials or components may result in more extensive and frequent warranty service than anticipated, which could result in an increase in our warranty expense.

The following is a summary of activity in accrued warranty expense at our continuing operations (in thousands):

	Years Ended September 30,		
	2019	2018	2017
Beginning balance	$ 644	$ 710	$ 417
Additions for warranties issued during the period	785	966	965
Reductions in the liability for payments made under the warranty	(693)	(782)	(429)
Changes related to pre-existing warranties	(179)	(250)	(244)
Currency translation adjustment	(1)	—	1
Ending balance	$ 556	$ 644	$ 710

Shipping Expense – Shipping expenses at our continuing operations of$0.7 million in each of the years 2019, 2018 and 2017 are included in selling, general and administrative expenses.

Advertising Expense – Advertising costs are expensed as incurred. Advertising expenses at our continuing operations of$0.4 million, $0.5 million and $0.3 million for 2019, 2018 and 2017, respectively, are included in selling, general and administrative expenses.

Stock-Based Compensation – We measure compensation costs relating to share-based payment transactions based upon the grant-date fair value of the award. Those costs are recognized as expense over the requisite service period, which is generally the vesting period, with forfeitures recognized as they occur. Prior to 2018, the expense recognized included an estimate for expected forfeitures, which was based upon historical experience.

We estimate the fair value of stock option awards on the date of grant using the Black-Scholes option-pricing model. The Black-Scholes model requires us to apply highly subjective assumptions, including expected stock price volatility, expected life of the option and the risk-free interest rate. A change in one or more of the assumptions used in the model may result in a material change to the estimated fair value of the stock-based compensation.

Research, Development and Engineering Expenses – RD&E expenses consist of the cost of employees, consultants and contractors who design, engineer and develop new products and processes as well as materials, supplies and facilities used in producing prototypes. Payments received for research and development grants prior to the meeting of milestones are recorded as unearned research and development grant liabilities and included in other accrued liabilities on the balance sheet. When certain contract requirements are met, governmental research and development grants are netted against research, development and engineering expenses. The following is a summary of our research, development and engineering expense (in thousands):

	Years Ended September 30,		
	2019	2018	2017
Research, development and engineering	$ 3,112	$ 2,868	$ 3,037
Grants earned	(44)	(12)	(299)
Net research, development and engineering	$ 3,068	$ 2,856	$ 2,738

Foreign Currency Transactions and Translation – We use the U.S. dollar as our reporting currency. Our operations in Europe, China and other countries are primarily conducted in their functional currencies, the Euro, Renminbi, or the local country currency, respectively. Accordingly, assets and liabilities of the subsidiaries are translated into U.S. dollars at the exchange rate in effect at the balance sheet dates. Income and expense items are translated at the average exchange rate for each month within the year. The resulting translation adjustments are recorded directly in accumulated other comprehensive income (loss), net of tax - foreign currency translation adjustments as a separate component of shareholders' equity. Net foreign currency transaction gains/losses, including transaction gains/losses on intercompany balances that are not of a long-term investment nature and non-functional currency cash balances, are reported as a separate component of non-operating (income) expense in our consolidated statements of operations.

Income Taxes – We file consolidated federal income tax returns in the United States for all subsidiaries except those in the Netherlands, France, Hong Kong and China, where separate returns are filed. We compute deferred income tax assets and liabilities based upon cumulative temporary differences between financial reporting and taxable income, carryforwards available and enacted tax laws. We also accrue a liability for uncertain tax positions when it is more likely than not that such tax will be incurred.

Deferred tax assets reflect the tax effects of temporary differences between the carrying value of assets and liabilities for financial reporting purposes and the amounts used for income tax purposes. Deferred tax assets are reduced by a valuation allowance when, in the opinion of management and based on the weight of available evidence, it is more likely than not that all or a portion of the deferred tax asset will not be realized. Each quarter, the valuation allowance is re-evaluated. In 2019, 2018 and 2017, we reversed a portion of the valuation allowance related to net operating loss carryforwards which we have determined will be utilized against net operating income in the current year. We will continue to monitor our cumulative income and loss positions in the U.S. and foreign jurisdictions to determine whether full valuation allowances on net deferred tax assets are appropriate.

Concentrations of Credit Risk – Our customers consist of semiconductor and solar cell manufacturers worldwide, as well as the lapping and polishing marketplace. Financial instruments that potentially subject us to significant concentrations of credit risk consist principally of cash and trade accounts receivable. Credit risk is managed by performing ongoing credit evaluations of the customers' financial condition, by requiring significant deposits where appropriate, and by actively monitoring collections. Letters of credit are required of certain customers depending on the size of the order, type of customer or its creditworthiness, and country of domicile.

As of September 30, 2019, one Semiconductor customer individually represented 15% of accounts receivable. As of September 30, 2018, one Semiconductor customer individually represented 16% of accounts receivable.

We maintain our cash, cash equivalents and restricted cash in multiple financial institutions. Balances in the United States, which account for approximately 79% and 88% of total cash balances at our continuing operations as of September 30, 2019 and 2018, respectively, are primarily invested in U.S. Treasuries or are in financial institutions insured by the FDIC. The remainder of our cash is maintained with financial institutions with reputable credit in the Netherlands, China, France, the United Kingdom, Singapore and Malaysia. We maintain cash in bank accounts in amounts which at times may exceed federally insured limits. We have not experienced any losses on such accounts.

Refer to Note 20 for information regarding revenue and assets in other countries subject to fluctuation in foreign currency exchange rates.

Fair Value of Financial Instruments – In accordance with the requirements of the Fair Value Measurements and Disclosures Topic of the FASB ASC, we group our financial assets and liabilities measured at fair value on a recurring basis in three levels, based on the markets in which the assets and liabilities are traded and the reliability of the assumptions used to determine fair value. These levels are:

Level 1 – Valuation is based upon quoted market price for identical instruments traded in active markets.

Level 2 – Valuation is based on quoted market prices for similar instruments in active markets, quoted prices for identical or similar instruments in markets that are not active, and model-based valuation techniques for which all significant assumptions are observable in the market.

Level 3 – Valuation is generated from model-based techniques that use significant assumptions not observable in the market. Valuation techniques include use of discounted cash flow models and similar techniques.

In accordance with the requirements of the Fair Value Measurements and Disclosures Topic of the FASB ASC, it is our policy to use observable inputs whenever reasonably practicable in order to minimize the use of unobservable inputs when developing fair value measurements. When available, we use quoted market prices to measure fair value. If market prices are not available, the fair value measurement is based on models that use primarilymarket-based parameters including interest rate yield curves, option volatilities and currency rates. In certain cases, where market rate assumptions are not available, we are required to make judgments about assumptions market participants would use to estimate the fair value of a financial instrument. Changes in the underlying assumptions used, including discount rates and estimates of future cash flows, could significantly affect the results of current or future values.

Cash, Cash Equivalents and Restricted Cash – Included in Cash and Cash Equivalents and Restricted Cash in the Consolidated Balance Sheets are money market funds invested in treasury bills, notes and other direct obligations of the U.S. Treasury and foreign bank operating and time deposit accounts. The fair value of these accounts are based on Level 1 inputs in the fair value hierarchy.

Receivables and Payables – The recorded amounts of these financial instruments, including accounts receivable and accounts payable, approximate their fair value because of the short maturities of these instruments. If measured at fair value in the financial statements, these financial instruments would be classified as Level 2 in the fair value hierarchy.

Debt – The recorded amounts of these financial instruments, including long-term debt and current maturities of long-term debt, approximate fair value and are considered Level 2 in the fair value hierarchy.

Recently Issued Accounting Pronouncements

See Note 4 for information on our adoption of ASC 606, which amends the existing accounting standards for revenue recognition. The adoption of ASC 606 did not have a material effect on our results of operations.

In November 2016, the FASB issued ASU 2016-18, "Statement of Cash Flows: Restricted Cash." The amendments address diversity in practice that exists in the classification and presentation of changes in restricted cash and require that a statement of cash flows explain the change during the period in the total of cash, cash equivalents and amounts generally described as restricted cash or restricted cash equivalents. We adopted this standard retrospectively effective October 1, 2018, and, accordingly, to conform to the current period presentation, we reclassified our restricted cash to be included in the total of cash and cash equivalents presented at the bottom of our consolidated statements of cash flows for both the beginning and ending periods for fiscal years 2018 and 2017. As a result, the amount of the change in our net cash provided by operating activities no longer separately shows the change in restricted cash for either period.

The following table summarizes the effects related to the adoption of ASU 2016-18 for the years ended September 30, 2018 and 2017:

	September 30, 2018		September 30, 2017	
	As reported	As adjusted	As reported	As adjusted
Net cash provided by (used in) operating activities	$ 6,790	$ (13,768)	$ 11,789	$ 34,051
Effect of Exchange Rate Changes on Cash, Cash Equivalents and Restricted Cash	$ (1,455)	$ (1,372)	$ 192	$ 1,677
Net Increase (Decrease) in Cash, Cash Equivalents and Restricted Cash	$ 7,210	$ (13,265)	$ 23,466	$ 47,213
Cash, Cash Equivalents and Restricted Cash, Beginning of Period	$ 51,121	$ 75,761	$ 27,655	$ 28,548
Cash, Cash Equivalents and Restricted Cash, End of Period	$ 58,331	$ 62,496	$ 51,121	$ 75,761

In February 2016, the FASB issued ASU 2016-02, "Leases," which requires companies to generally recognize on the balance sheet operating and financing lease liabilities and corresponding right-of-use-assets ("ROU assets"). ASU 2016-02 also requires improved disclosures to help users of financial statements better understand the amount, timing and uncertainty of cash flows arising from leases. This ASU is effective for fiscal years beginning after December 15, 2018 and early adoption is permitted. We will adopt the standard as of October 1, 2019, the start of our fiscal 2020, and plan to utilize the retrospective cumulative effect adjustment transition method with a cumulative effect adjustment being recorded as of the adoption date. We expect to elect certain available practical expedients including the package of practical expedients permitted under the transition guidance within the new standard, which among other things, will allow us to carry forward the historical lease classification. Additionally, we will make an accounting policy election to not record ROU assets and lease liabilities for leases with a term of twelve months or less on our consolidated balance sheet.

We are in the process of finalizing the scope of arrangements that will be subject to this standard as well as assessing the impact to our systems, processes, and internal controls over financial reporting. While we are still evaluating the impact of adopting ASU 2016-02, we anticipate this standard will not have a material impact on our other assets and other liabilities balances until the effective date of our new lease at our SiC/LED segment. The primary impact will be to record ROU assets and lease liabilities for existing operating leases on our consolidated balance sheets. Currently, we estimate adoption of the standard will result in recognition of additional ROU assets and lease liabilities of approximately $0.3 million and $0.4 million, respectively, as of October 1, 2019. However, within the first quarter of fiscal 2020, we will record an additional $5.0 million of ROU assets and lease liabilities due to the commencement of our new SiC/LED building lease.

We do not expect the adoption to have a material impact on our consolidated statements of operations or our consolidated statements of cash flows. We do not believe the standard will have a notable impact on our liquidity. The standard will have no impact on our debt-covenant compliance under our current agreements. Our analysis and evaluation of the new standard will continue through its effective date in the first quarter of 2020, including continuing to monitor any potential changes in the standard proposed by the FASB.

2. Assets Held for Sale and Discontinued Operations

In April 2019, we announced that the Board determined that it was in the long-term best interest of the Company to exit the solar business segment and focus our strategic efforts on our semiconductor and silicon carbide/polishing business segments in order to more fully realize the opportunities the Company believes are presented in those areas.

The Board made its decision, effective March 28, 2019, after analyzing current market conditions and the strategic outlook for its Solar segment, which operates in a highly competitive market among lower cost manufacturers, particularly in China. Historical fluctuations in the solar cell industry combined with downward pricing pressure has negatively affected the Company's results of operations in recent years. In response, we had been pursuing strategic alternatives for the continued operations of the Solar segment, including the possibility of restructuring the Solar segment to achieve profitability and compete more effectively. After further assessment, however (including input from management of the Solar segment and our external advisors), the Board determined that the investment required to return our solar business to profitability would be better utilized to pursue strategic opportunities in the Semiconductor and SiC/LED segments.

The anticipated divestiture of our solar business included our Tempress and SoLayTec subsidiaries, which comprised substantially all of our Solar segment. We adopted a plan to sell our Solar operations on or before March 31, 2020. As such, we classified substantially all of the Solar segment as held for sale in our Consolidated Balance Sheets and reported its results as discontinued operations in our Consolidated Statements of Operations. We expect to incur one-time costs to sell Tempress of approximately $750,000, which includes $500,000 in broker fees and $250,000 in legal fees, although the final amount could be greater if certain timing and/or price targets are met.

On June 7, 2019 ("Sale Date"), we completed the sale of our subsidiary, SoLayTec, to a third party located in the Netherlands. Upon the Sale Date, we recognized a gain of approximately $1.6 million, which we included in loss from discontinued operations reportedin our Consolidated Statements of Operations for the year ended September 30, 2019. Also, effective on the Sale Date, SoLayTec is no longer included in our consolidated financial statements. SoLayTec is not material to Amtech's results of operations or financial position.

Operating results of our discontinued solar operations were as follows, in thousands:

	Years Ended September 30,		
	2019	2018	2017
Revenues, net of returns and allowances	$ 25,139	$ 76,395	$ 81,443
Cost of sales	23,669	58,156	60,617
Gross profit	1,470	18,239	20,826
Selling, general and administrative	8,857	11,792	10,408
Research, development and engineering	3,039	4,944	3,634
Restructuring charges	567	897	—
Impairment charges	—	4,759	—
Operating (loss) income	(10,993)	(4,153)	6,784
Gain on sale of subsidiary	1,614	—	—
Interest expense and other, net	(121)	(249)	(557)
(Loss) income from discontinued operations before income taxes	(9,500)	(4,402)	6,227
Income tax (benefit) provision	(1,203)	(3,076)	335
Net (loss) income	(8,297)	(1,326)	5,892
Net loss attributable to non-controlling interest	—	—	1,045
Net (loss) income attributable to discontinued operations	$ (8,297)	$ (1,326)	$ 6,937

The following table presents a summary of the solar assets and liabilities held for sale included in our Consolidated Balance Sheets, in thousands:

	September 30, 2019	September 30, 2018
Assets		
Total current assets	$ 17,591	$ 39,379
Property, plant and equipment - net	5,164	5,943
Total assets included in the disposal group	22,755	45,322
Total current liabilities	18,272	29,380
Long-term debt	275	2,418
Total liabilities included in the disposal group	18,547	31,798
Net assets included in the disposal group	$ 4,208	$ 13,524

Amtech's Consolidated Statement of Cash flows combines cash flows from discontinued operations with cash flows from continuing operations within each cash flow statement category. The following table summarizes selected cash flow information for discontinued operations, in thousands:

	Years Ended September 30, 2019	2018	2017
(Loss) income from discontinued operations, net of tax	$ (8,297)	$ (1,326)	$ 6,937
Non-cash impairment charges	$ —	$ 4,759	$ —
Depreciation and amortization	$ 562	$ 801	$ 1,120
Provision for (reversal of) allowance for doubtful accounts, net	$ 874	$ (56)	$ (837)
Gain on sale of subsidiary	$ 1,614	$ —	$ —
Purchases of property, plant and equipment	$ 131	$ 1,403	$ 838

3. Earnings Per Share & Diluted Earnings Per Share

Basic EPS is computed by dividing net income (loss) available to common shareholders by the weighted average number of common shares outstanding for the period. Diluted EPS is computed similarly to basic EPS except that the denominator is increased to include the number of additional common shares that would have been outstanding if potentially dilutive common shares had been issued, and the numerator is based on net income. In the case of a net loss, diluted EPS is calculated in the same manner as basic EPS.

For the years 2019, 2018 and 2017, options for978,000, 434,000 and 1,364,000 weighted average shares, respectively, were excluded from the diluted EPS calculations because they were anti-dilutive. These shares could become dilutive in the future.

A reconciliation of the denominators of the basic and diluted EPS calculations follows (in thousands, except per share amounts):

	Years Ended September 30, 2019	2018	2017
Numerator:			
Net income from continuing operations	$ 3,135	$ 6,631	$ 2,194
Net (loss) income from discontinued operations	$ (8,297)	$ (1,326)	$ 5,892
Net loss from non-controlling interest - discontinued operations	$ —	$ —	$ 1,045
Net (loss) income	$ (5,162)	$ 5,305	$ 9,131
Denominator:			
Weighted-average shares used to compute basic EPS	14,240	14,833	13,378
Common stock equivalents (1)	35	232	123
Weighted-average shares used to compute diluted EPS	14,275	15,065	13,501
Basic income per share from continuing operations	$ 0.22	$ 0.45	$ 0.16
Basic (loss) income per share from discontinued operations	$ (0.58)	$ (0.09)	$ 0.52
Net (loss) income per basic share	$ (0.36)	$ 0.36	$ 0.68
Diluted income per share from continuing operations	$ 0.22	$ 0.44	$ 0.16
Diluted (loss) income per share from discontinued operations	$ (0.58)	$ (0.09)	$ 0.52
Net (loss) income per diluted share	$ (0.36)	$ 0.35	$ 0.68

(1) The number of common stock equivalents is calculated using the treasury stock method and the average market price during the period.

4. Contracts with Customers

We adopted ASC 606 with a date of initial application of October 1, 2018. See Note 1 for additional detail on our revenue recognition policies.

The components of contract assets are as follows, in thousands:

	September 30, 2019
Unbilled accounts receivable	$ 36
Contract assets	$ 36

The components of contract liabilities are as follows, in thousands:

	September 30, 2019	September 30, 2018
Customer deposits	$ 1,378	$ 1,519
Contract liabilities	$ 1,378	$ 1,519

5. Operating Leases

We have non-cancelable leases with third parties, primarily for administrative and manufacturing space, vehicles and equipment. Our facilities leases generally provide for periodic rent increases and many contain renewal options. We recognize rent expense on a straight-line basis over the lease term. Rental expense under such operating leases at our continuing operations was $0.5 million, $0.6 million, and $0.8 million in 2019, 2018 and 2017, respectively, and is included in either selling, general and administrative expenses or cost of goods sold, depending on the nature of the item under lease.

As of September 30, 2019, future minimum rental commitments under non-cancelable operating leases with initial or remaining terms of one year or more at our continuing operations are as follows, in thousands:

Years Ending September 30,	Minimum Lease Payments
2020	$ 522
2021	322
2022	288
2023	282
2024	279
Thereafter	7,187
Total	$ 8,880

6. Restructuring Plans

The Company and its former Chief Executive Officer and President, Fokko Pentinga, agreed on a transition of leadership, pursuant to which Mr. Pentinga stepped down as the Chief Executive Officer, President and a director of the Company effective December 6, 2018 (the “Effective Date”). In connection with his departure, Mr. Pentinga and the Company entered into a Separation Agreement and General Release of all Claims, dated November 28, 2018 (the “Separation Agreement”). Pursuant to the Separation Agreement, Mr. Pentinga received the following benefits:

- a severance payment of $864,000 in gross, less all customary and appropriate income and employment taxes;
- a payment of $458,500 for all other amounts due him;

- all of his time-based stock options (the "Options") became fully vested and immediately exercisable. Mr. Pentinga has the right to exercise Options with an exercise price of $7.01 or less until December 31, 2019. The remaining Options were exercisable during the 90-day period following the Effective Date, which resulted in an additional $108,000 in stock-based compensation expense; and
- certain other benefits as set forth in the Separation Agreement.

The table below details the restructuring activity at our continuing operations for the year ended September 30, 2019. This activity is primarily related to the departure of our former CEO as well as additional headcount reductions as we consolidated satellite offices in our Semiconductor segment. The outstanding obligations as of September 30, 2019, are as follows, in thousands:

	Year Ended September 30,
Balance at September 30, 2018	$ —
Severance expense, net of adjustments	1,110
Cash payments	(1,070)
Balance at September 30, 2019	$ 40

7. Inventory

The components of inventory are as follows (in thousands):

	September 30, 2019	September 30, 2018
Purchased parts and raw materials	$ 15,192	$ 15,907
Work-in-process	4,215	4,159
Finished goods	3,183	3,072
	22,590	23,138
Excess and obsolete reserves	(5,058)	(5,303)
	$ 17,532	$ 17,835

8. Property, Plant and Equipment

The following is a summary of property, plant and equipment (in thousands):

	September 30, 2019	September 30, 2018
Land	$ 3,240	$ 3,240
Buildings	5,396	5,396
Building and leasehold improvements	2,930	2,902
Equipment and machinery	5,488	5,383
Furniture and fixtures	1,312	1,317
	18,366	18,238
Accumulated depreciation and amortization	(8,149)	(7,729)
	$ 10,217	$ 10,509

Depreciation and capital lease amortization expense was $0.9 million, $1.1 million and $0.8 million in 2019, 2018 and 2017, respectively.

9. Intangible Assets

Intangible assets consist of the following (in thousands):

		September 30, 2019			September 30, 2018		
	Useful Life	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount
Customer lists	6-10 years	$ 1,219	$ (948)	$ 271	$ 1,219	$ (745)	$ 474
Trade names	10-15 Years	869	(270)	599	869	(213)	656
		$ 2,088	$ (1,218)	$ 870	$ 2,088	$ (958)	$ 1,130

In 2018, we conducted our periodic assessment of long-lived assets and identified the need for an intangible asset impairment charge in our Solar segment of $1.3 million due primarily to the decline in our expected performance of that segment. All remaining intangible assets are included in our Semiconductor segment. During 2019, we periodically assessed whether any indicators of impairment existed related to our intangible assets. As of each interim period end during the year, we concluded that a triggering event had not occurred that would more likely than not reduce the fair value of intangible assets below their carrying value.

Amortization expense related to intangible assets at our continuing operations was$0.3 million, $(20,000) and $0.6 million in 2019, 2018 and 2017, respectively. The credit in 2018 was due to a one-time correction of previously recorded amortization expense. Future amortization expense for the remaining unamortized balance as of September 30, 2019, is estimated as follows:

Years Ending September 30,	Amortization Expense
2020	$ 261
2021	126
2022	58
2023	58
2024	58
Thereafter	309
Total	$ 870

10. Goodwill

The changes in the carrying amount of goodwill for the year ended September 30, 2019 are as follows (in thousands):

	Semiconductor	SiC/LED	Automation	Net Goodwill - Continuing Operations	Discontinued Operations	Net Goodwill
Goodwill	$ 5,905	$ 728	$ 3,595	$ 10,228	$ 3,367	$ 13,595
Accumulated impairment losses	—	—	(3,595)	(3,595)	(3,367)	(6,962)
Balance at September 30, 2018	5,905	728	—	6,633	—	6,633
Impairment of goodwill	—	—	—	—	—	—
Net exchange differences	—	—	—	—	—	—
Balance at September 30, 2019	$ 5,905	$ 728	$ —	$ 6,633	$ —	$ 6,633
Goodwill	$ 5,905	$ 728	$ 3,595	$ 10,228	$ 3,367	$ 13,595
Accumulated impairment losses	—	—	(3,595)	(3,595)	(3,367)	(6,962)
Balance at September 30, 2019	$ 5,905	$ 728	$ —	$ 6,633	$ —	$ 6,633

During 2019, we periodically assessed whether any indicators of impairment existed which would require us to perform an interim impairment review. As of each interim period end during the year, we concluded that a triggering event had not occurred that would more likely than not reduce the fair value of our reporting units below their carrying values. We performed our annual test of goodwill for impairment during the fourth quarter of 2019. The results of the first step of the goodwill impairment test indicated that the fair value of our Semiconductor reporting unit was in excess of its carrying value, and, thus, we did not require an impairment charge. While the quantitative analysis indicated no impairment of Semiconductor segment goodwill existed as of September 30, 2019, if the future performance of this reporting unit falls short of our expectations or if there are significant changes in operations due to changes in market conditions, we could be required to recognize material impairment charges in future periods. We performed a qualitative analysis of our SiC/LED segment, which indicted no impairment of SiC/LED segment goodwill existed as of September 30, 2019.

In 2018, we identified the need for a goodwill impairment charge in our former Solar segment of $5.7 million, due primarily to the decline in our expected performance of that segment. In 2019, we realigned our segments (see Note 18).

11. Income Taxes

The following note related to income taxes includes both continuing and discontinued operations. The components of income (loss) before provision for income taxes are as follows (in thousands):

	Years Ended September 30,		
	2019	2018	2017
Domestic	$ 916	$ 7,845	$ 1,900
Foreign	(4,648)	(2,320)	7,930
	$ (3,732)	$ 5,525	$ 9,830

The components of the provision for income taxes are as follows (in thousands):

	Years Ended September 30,		
	2019	2018	2017
Current:			
Domestic federal	$ —	$ 1,167	$ 54
Foreign	1,278	(1,404)	1,330
Foreign withholding taxes	94	356	240
Domestic state	58	101	120
Total current	1,430	220	1,744
Deferred:			
Domestic federal	—	—	—
Total deferred	—	—	—
Total provision	$ 1,430	$ 220	$ 1,744

On June 7, 2019, we completed the sale of SoLayTec to a third party located in the Netherlands. Due to the tax treatment relating to the sale, we realized an income tax benefit of $1.3 million in our discontinued operations for the year ended September 30, 2019.

The TCJA was enacted on December 22, 2017, and permanently reduces the U.S. federal corporate tax rate from 35% to 21%, eliminated corporate Alternative Minimum Tax, modified rules for expensing capital investment, and limits the deduction of interest expense for certain companies. The TCJA is a fundamental change to the taxation of multinational companies, including a shift from a system of worldwide taxation with some deferral elements to a territorial system, current taxation of certain foreign income, a minimum tax on low-tax foreign earnings, and new measures to curtail base erosion and promote U.S. production.

As a result of the TCJA, the statutory rate applicable to our fiscal year ended September 30, 2018 was 24.3%, based on a fiscal year blended rate calculation. ASC 740 requires filers to record the effect of tax law changes in the period enacted. In the first quarter of fiscal 2018, we re-measured the applicable deferred tax assets based on the rates at which they are expected to reverse. We adjusted our gross deferred tax assets and liabilities and recorded a corresponding offset to our full valuation allowance against our net deferred tax assets, which resulted in minimal net effect to our provision for income taxes and effective tax rate.

The TCJA includes a one-time mandatory repatriation transition tax on certain net accumulated earnings and profits of our foreign subsidiaries. We have analyzed the earnings and profits of our foreign subsidiaries and determined that no transition taxes are due or expected. The other provisions of TCJA are either immaterial or not applicable for the year ended September 30, 2018.

A reconciliation of actual income taxes to income taxes at the expected United States federal corporate income tax rate is as follows (in thousands, except percentages):

	Years Ended September 30, 2019	2018	2017
Federal statutory rate	21.0%	24.3%	34.0%
Tax (benefit) expense at the federal statutory rate	$ (784)	$ 1,342	$ 3,340
Effect of permanent book-tax differences	272	75	340
State tax provision	31	76	100
Valuation allowance for net deferred tax assets	1,682	617	(1,610)
Uncertain tax items	74	(3,013)	350
Tax rate differential	150	1,107	(776)
Other items	5	16	—
	$ 1,430	$ 220	$ 1,744

Deferred income taxes reflect the tax effects of temporary differences between the carrying value of assets and liabilities for financial reporting purposes and the amounts used for income tax purposes. The components of deferred tax assets and deferred tax liabilities are as follows (in thousands):

	September 30, 2019	September 30, 2018
Deferred tax assets (liabilities):		
Capitalized inventory costs	$ 168	$ 193
Inventory write-downs	2,856	1,333
Accrued warranty	161	204
Deferred profits	346	1,006
Accruals and reserves not currently deductible	3,531	5,017
Stock option expense	849	738
Federal net operating loss carryforwards	6,979	2,922
Foreign and state net operating losses	10,481	13,860
Book vs. tax depreciation and amortization	(1,546)	(1,667)
Other deferred tax assets	75	163
Total deferred tax assets	23,900	23,769
Valuation allowance	(23,900)	(23,769)
Deferred tax assets, net of valuation allowance	$ —	$ —

Changes in the deferred tax valuation allowance are as follows (in thousands):

	Years Ended September 30, 2019	2018
Balance at the beginning of the year	$ 23,769	$ 22,930
Additions to valuation allowance	131	839
Balance at the end of the year	$ 23,900	$ 23,769

The deferred tax valuation allowance increased by $0.1 million and $0.8 million for the years ended September 30, 2019 and 2018, respectively. In assessing the realizability of deferred tax assets, we consider whether it is more likely than not that some portion or all of the deferred tax assets will be realized. The ultimate realization of deferred tax assets is dependent upon the generation of future taxable income during the periods in which those temporary differences become deductible. We consider the scheduled reversal of deferred tax liabilities, projected future income and tax planning strategies in making this assessment. We have established valuation allowances on substantially all net deferred tax assets, after considering all of the available objective evidence, both positive and negative, historical and prospective, with greater weight given to historical evidence, and determined it is not more likely than not that these assets will be realized. In 2017, 2018 and 2019, we reversed a portion of the valuation allowance related to net operating loss carryforwards which we have determined will be utilized against net operating income in the current year. Additionally, as of September 30, 2017, the deferred tax assets related to acquired foreign tax credits and the related valuation allowance were reduced due to our inability to use them prior to expiration. We will continue to monitor our cumulative income and loss positions in the U.S. and foreign jurisdictions to determine whether full valuation allowances on net deferred tax assets are appropriate.

As of September 30, 2019, we have federal net operating loss carryforwards of approximately$13.8 million that expire at various times between2028 and 2035. The utilization of those federal net operating losses are limited to approximately $0.8 million per year. Additionally, we have federal net operating loss carryforwards of approximately $19.5 million that have an indefinite carryforward period. The utilization of those federal net operating losses are limited to 80% of taxable income. We have foreign net operating loss carryforwards of approximately $38.4 million which expire at various times through2025. We have approximately $12.6 million of state net operating loss carryforwards.

We apply the accounting guidance for uncertainty in income taxes using the provisions of ASC 740. In this regard, an uncertain tax position represents our expected treatment of a tax position taken in a filed tax return or planned to be taken in a future tax return, that has not been reflected in measuring income tax expense for financial reporting purposes. Approximately $0.6 million of this total represents the amount that, if recognized, would favorably affect our effective income tax rate in future periods.

A reconciliation of the beginning and ending amount of our unrecognized tax benefits is summarized as follows (in thousands):

	Years Ended September 30,		
	2019	2018	2017
Balance at beginning of the year	$ 1,198	$ 4,210	$ 3,860
Additions related to tax positions taken in prior years	74	155	350
Reductions due to resolution of uncertain tax position	—	(3,167)	—
Balance at the end of the year	$ 1,272	$ 1,198	$ 4,210

We have classified all of our liabilities for uncertain tax positions as income taxes payable long-term. Income taxes long-term also includes other items, primarily withholding taxes that are not due until the related intercompany service fees are paid.

We report accrued interest and penalties related to unrecognized tax benefits in income tax expense. We recognized a net expense (benefit) for interest and penalties of $0.1 million, $(2.0) million and $0.4 million for 2019, 2018 and 2017, respectively. Income taxes payable long-term on the Consolidated Balance Sheets includes a cumulative accrual for potential interest and penalties of $0.8 million and $0.7 million as of September 30, 2019 and 2018, respectively.

We do not expect that the amount of our tax reserves for uncertain tax positions will materially change in the next 12 months other than the continued accrual of interest and penalties.

Amtech and one or more of our subsidiaries file income tax returns in the Netherlands, Germany, France, China and other foreign jurisdictions, as well as the U.S. and various states in the U.S. We have not signed any agreements with the Internal Revenue Service, any state or foreign jurisdiction to extend the statute of limitations for any fiscal year. As such, the number of open years is the number of years dictated by statute in each of the respective taxing jurisdictions, but generally is from 3 to 5 years.

These open years contain certain matters that could be subject to differing interpretations of applicable tax laws and regulations as they relate to the amount, timing, or inclusion of revenues and expenses, or the sustainability of income tax positions of Amtech and our subsidiaries.

12. Long-Term Debt

Continuing Operations

We have a mortgage note secured by BTU's real property in Billerica, Massachusetts. The note has a remaining balance of $5.5 million as of September 30, 2019 and a maturity date of September 26, 2023. The debt was refinanced in September 2016 with an interest rate of 4.11% through September 26, 2021, at which time the interest rate will be adjusted to a per annum fixed rate equal to the aggregate of the Federal Home Loan Board Five Year Classic Advance Rate plus two hundred forty basis points.

From time to time, we enter into capital leases for certain manufacturing or IT equipment. Our obligations under capitalized leases are included in long-term debt in the accompanying Consolidated Balance Sheets as of September 30, 2019 and 2018. The current and long-term portion of the obligations are included in the table below.

Annual maturities relating to our long-term debt at continuing operations as of September 30, 2019 are as follows (in thousands):

	Annual Maturities
2020	$ 371
2021	380
2022	396
2023	413
2024	430
Thereafter	3,559
Total	$ 5,549

Discontinued Operations

In 2017, Tempress borrowed approximately $0.4 million as part of the construction of a large, bi-facial solar PV park at its headquarters in the Netherlands. The debt is secured by Tempress' real property in Vaassen, the Netherlands, and carries an interest rate equal to the 10-year interest rate swap rate plus a 2.4% premium, reduced by a 1% discount, which at September 30, 2019 was 2.23%. The debt has a 15-year term. As of September 30, 2019, Tempress' remaining debt balance is $0.3 million.

13. Equity and Stock-Based Compensation

2017 Equity Offering

On August 18, 2017, we entered into an Underwriting Agreement with Roth Capital Partners, LLC, as underwriter (the "Underwriter"), relating to a firm commitment underwritten offering (the "Offering") of 1,055,000 shares of our common stock at a price of $9.50 per share, and granted the Underwriter an option to purchase up to 158,250 additional shares (the "Over-Allotment Option") of our common stock to cover over-allotments, if any. On August 23, 2017, we and the Underwriter closed the Offering and the Underwriter exercised its Over-Allotment Option at the closing. As a result, we issued a total of 1,213,250 shares of our common stock at a price of $9.50 per share. We received net proceeds of approximately $10.6 million from the Offering. We plan to use the net proceeds of the Offering for general corporate purposes, which may include working capital, capital expenditures and potential acquisitions.

2018 Stock Repurchase Plan

On March 28, 2018, we announced that our Board approved a stock repurchase program, pursuant to which we may repurchase up to $4 million of our outstanding common stock, par value $0.01, over a one-year period, commencing on April 2, 2018. During the year ended September 30, 2018, we completed our repurchase program and repurchased 771,149 shares of our common stock on the open market at a total cost of approximately $4.0 million (an average price of $5.19 per share). All shares repurchased during the year ended September 30, 2018, have been retired.

2019 Stock Repurchase Plan

On November 29, 2018, we announced that our Board of Directors approved a stock repurchase program, pursuant to which we may repurchase up to $4 million of our outstanding common stock, par value $0.01 per share, over a one-year period. Repurchases under the program will be made in open market transactions at prevailing market prices, in privately negotiated transactions, or by other means in compliance with the rules and regulations of the SEC; however, we have no obligation to repurchase shares and the timing, actual number, and value of shares to be repurchased is subject to management's discretion and will depend on the Company's stock price and other market conditions. Our Board may terminate the repurchase program at any time while it is in effect. We intend to retire any repurchased shares. As of September 30, 2019, there have been no shares repurchased under this repurchase plan.

Stock-Based Compensation Expense

Stock-based compensation expenses of $0.6 million, $0.9 million and $1.3 million for 2019, 2018 and 2017, respectively, are included in selling, general and administrative expenses. As of September 30, 2019, total compensation cost related to non-vested stock options not yet recognized is $0.4 million, which is expected to be recognized over the next 1.64 years on a weighted-average basis.

Amtech Equity Compensation Plans

The 2007 Employee Stock Incentive Plan (the "2007 Plan"), under which 500,000 shares could be granted, was adopted by our Board of Directors in April 2007, and approved by the shareholders in May 2007. The 2007 Plan was amended in 2009, 2014 and 2015 to add 2,500,000 shares. The plan was also amended in 2019 to extend the term of the plan and allow for the grant of restricted stock units.

The Non-Employee Directors Stock Option Plan was approved by the shareholders in 1996 for issuance of up to 100,000 shares of common stock to directors. The Non-Employee Directors Stock Option Plan was amended in 2005, 2009 and 2014 to add 400,000 shares.

Equity compensation plans as of September 30, 2019 are summarized in the table below:

Name of Plan	Shares Authorized	Shares Available for Grant	Options Outstanding	Plan Expiration
2007 Employee Stock Incentive Plan	3,000,000	856,453	879,314	Mar. 2024
Non-Employee Directors Stock Option Plan	500,000	99,600	189,351	Mar. 2020
		956,053	1,068,665	

Stock Options

Stock options issued under the terms of the plans have, or will have, an exercise price equal to or greater than the fair market value of the common stock at the date of the option grant and expire no later than 10 years from the date of grant. Options issued under the plans vest over 6 months to 4 years. We estimate the fair value of stock option awards on the date of grant using the Black-Scholes option pricing model using the following assumptions:

	Years Ended September 30,		
	2019	2018	2017
Risk free interest rate	3%	3%	2%
Expected life	6 years	6 years	6 years
Dividend rate	0%	0%	0%
Volatility	60%	59%	63%

Stock option transactions and the options outstanding are summarized as follows:

	Years Ended September 30,					
	2019		2018		2017	
	Options	Weighted Average Exercise Price	Options	Weighted Average Exercise Price	Options	Weighted Average Exercise Price
Outstanding at beginning of period	1,248,758	$ 7.69	1,560,441	$ 7.95	1,841,567	$ 8.15
Granted	198,850	5.35	44,000	7.40	145,000	5.23
Exercised	(52,201)	4.02	(277,154)	6.71	(317,986)	6.30
Forfeited/expired	(326,742)	9.00	(78,529)	16.12	(108,140)	12.71
Outstanding at end of period	1,068,665	$ 7.04	1,248,758	$ 7.69	1,560,441	$ 7.95
Exercisable at end of period	842,083	$ 7.45	1,014,300	$ 7.93	1,055,865	$ 8.58
Weighted average grant-date fair value of options granted during the period	$ 3.08		$ 4.20		$ 3.04	

The following table summarizes information for stock options outstanding and exercisable as of September 30, 2019:

	Options Outstanding			Options Exercisable	
Range of Exercise Prices	Number Outstanding	Remaining Contractual Life (in years)	Weighted Average Exercise Price Per Share	Number Exercisable	Weighted Average Exercise Price Per Share
2.95-4.85	116,430	6.22	$ 3.95	91,430	$ 3.73
4.87-5.07	60,750	6.94	5.02	45,750	5.00
5.25-5.25	168,674	4.12	5.25	147,424	5.25
5.40-5.40	6,000	6.29	5.40	6,000	5.40
5.52-5.52	152,000	9.16	5.52	—	—
5.75-6.15	68,469	3.50	5.96	68,469	5.96
7.01-7.01	133,250	2.72	7.01	133,250	7.01
7.15-7.98	143,976	4.09	7.75	130,644	7.79
8.20-9.94	18,428	2.59	9.33	18,428	9.33
9.98-22.26	200,688	3.44	11.79	200,688	11.79
	1,068,665	4.87	$ 7.04	842,083	$ 7.45

The aggregate intrinsic values of options outstanding and options exercisable as of September 30, 2019 were $182,000 and $164,000, respectively, which represents the total pretax intrinsic value, based on our closing stock price of $5.30 per share as of September 30, 2019, the last business day of our fiscal year, which would have been received by the option holders had all option holders exercised their options as of that date. The total intrinsic value of stock options exercised during the fiscal years ended September 30, 2019, 2018 and 2017 was $0.1 million, $1.2 million and $1.1 million, respectively.

14. Benefit Plans

We have retirement plans covering substantially all employees. The principal plans are the multi-employer defined benefit pension plans of our operations in the Netherlands and France, the multi-employer plan for hourly union employees in Pennsylvania and our defined contribution plan that covers substantially all of our employees in the United States. The multi-employer plans in the United States and France as well as the defined contribution plan are insignificant.

Pensions – Our employees in the Netherlands, 75 at September 30, 2019, participate in a multi-employer pension plan Pensioenfonds Metaal en Techniek ("PMT"), determined in accordance with the collective bargaining agreements effective for the industry in the Netherlands. The collective bargaining agreement has no expiration date. This multi-employer pension plan covers approximately 34,000 companies and 1.4 million participants. Amtech's contribution to the multi-employer pension plan is less than 5.0% of the total contributions to the plan. The plan monitors its risks on a global basis, not by company or employee, and is subject to regulation by Dutch governmental authorities. By law (the Dutch Pension Act), a multi-employer pension plan must be monitored against specific criteria, including the coverage ratio of the plan assets to its obligations. This coverage ratio must exceed 104.3% for the total plan. Every company participating in a Dutch multi-employer union plan contributes a premium calculated as a percentage of its total pensionable salaries, with each company subject to the same percentage contribution rate. The premium can fluctuate yearly based on the coverage ratio of the multi-employer union plan. The pension rights of each employee are based upon the employee's average salary during employment, the years of service, and the participant's age at the time of retirement.

Our net periodic pension cost for this multi-employer pension plan for any period is the amount of the required contribution for that period. A contingent liability may arise from, for example, possible actuarial losses relating to other participating entities because each entity that participates in a multi-employer union plan shares in the actuarial risks of every other participating entity or any responsibility under the terms of a plan to finance any shortfall in the plan if other entities cease to participate

The coverage ratio of the Dutch multi-employer union plan is 94.6% as of September 30, 2019. In 2013, PMT prepared and executed a "Recovery Plan" which was approved by De Nederlandsche Bank, the Dutch central bank, which is the supervisor of all pension companies in the Netherlands. As a result of the Recovery Plan, the pension rights decreased 6.3% in April 2013 and the employer's premium percentage increased to 16.6% of pensionable wages. The coverage ratio is calculated by dividing the plan assets by the total sum of pension liabilities and is based on actual market interest. The coverage ratio of PMT fluctuates during a year due to the changes in the value of the assets and the present value of the liabilities. During the fiscal year 2019, the coverage ratio was as high as 101.9% in the first quarter and as low as 92.6% in the fourth quarter. The fluctuations are due to the reduction in the ultimate forward rate (which increases the present value of the liabilities) and a decrease in the value of global equities. As of September 30, 2019, PMT's total plan assets were $94.2 billion and the actuarial present value of accumulated plan benefits was $99.7 billion.

Below is a table of our contributions to multi-employer pension plans (in thousands):

	Years Ended September 30,		
	2019	2018	2017
Pensioenfonds Metaal en Techniek	$ 658	$ 897	$ 805
Other plans	158	188	188
Total	$ 816	$ 1,085	$ 993

Defined Contribution Plans – We match employee contributions to our defined contribution plans on a discretionary basis. The match was $0.3 million, $0.4 million and $0.3 million in 2019, 2018 and 2017, respectively.

15. Commitments and Contingencies

Purchase Obligations – As of September 30, 2019, we had unrecorded purchase obligations at our continuing operations in the amount of $4.4 million. These purchase obligations consist of outstanding purchase orders for goods and services. While the amount represents purchase agreements, the actual amounts to be paid may be less in the event that any agreements are renegotiated, canceled or terminated.

Legal Proceedings and Other Claims – From time to time, we are a party to claims and actions for matters arising out of our business operations. We regularly evaluate the status of the legal proceedings and other claims in which we are involved to assess whether a loss is probable or there is a reasonable possibility that a loss, or an additional loss, may have been incurred and determine if accruals are appropriate. If accruals are not appropriate, we further evaluate each legal proceeding to assess whether an estimate of possible loss or range of possible loss can be made for disclosure. Although the outcome of claims and litigation is inherently unpredictable, we believe that we have adequate provisions for any probable and estimable losses. It is possible, nevertheless, that our consolidated financial position, results of operations or liquidity could be materially and adversely affected in any particular period by the resolution of a claim or legal proceeding. Legal expenses related to defense, negotiations, settlements, rulings and advice of outside legal counsel are expensed as incurred.

In December 2018, we were notified by our customer that the turnkey contract for Phase II has been terminated. As a result, we will not perform the final installation and integration of our equipment under such contract. Negotiations did not result in a final settlement, and the customer has notified us of their intention to pursue arbitration. We have removed the value of this remaining work from our backlog with no material effect on financial condition and results of operations.

Employment Contracts – We have employment contracts with, and severance plans covering, certain officers and management employees under which severance payments would become payable in the event of specified terminations without cause or terminations under certain circumstances after a change in control. If severance payments under the current employment agreements or plan payments were to become payable, the severance payments would generally range from twelve to thirty-six months of salary.

16. Divestitures

SoLayTec

On December 24, 2014, we acquired a 51% controlling interest in SoLayTec, which provides ALD systems used in high efficiency solar cells, for a total purchase price consideration of $1.9 million. On July 31, 2017, Tempress entered into an Exit Agreement (the “Agreement”) with the two minority owners of SoLayTec (“Minority Owners”) to acquire their remaining shares of SoLayTec, resulting in Tempress becoming the sole owner of SoLayTec. The terms of the Agreement, which was effective as of July 1, 2017, state that the Minority Owners will sell all of their SoLayTec shares to Tempress for a nominal fee and waive all right to future repayment of principal and interest on loans payable to the Minority Owners. As a result of the effectiveness of the Agreement, SoLayTec has no further liability under the loans. The amount of principal and interest forgiven was approximately $2.4 million, which was recorded as a capital contribution, with no impact on the Consolidated Statement of Operations. The carrying value of the non-controlling interest at the date of the Agreement was $2.7 million. Under our previously announced plan to exit our solar business (see Note 2), on June 7, 2019 (“Sale Date”), we completed the sale of SoLayTec to a third party located in the Netherlands. Upon the Sale Date, we recognized a gain of approximately $1.6 million, which we included in loss from discontinued operations reported in our Consolidated Statements of Operations for the year ended September 30, 2019. Effective on the Sale Date, SoLayTec is no longer included in our consolidated financial statements. SoLayTec is not material to Amtech’s results of operations or financial position.

Kingstone

On September 16, 2015, we reduced our ownership to 15% in Kingstone Hong Kong. Our investment in Kingstone Hong Kong was accounted for using the equity method for periods subsequent to the deconsolidation due to our ability to exert significant influence over the financial and operating policies of Kingstone Hong Kong, primarily through our representation on the board of directors. The resulting equity method investment was initially recorded at fair value at $2.7 million using the value the third-party purchaser placed on their investment in Kingstone Shanghai. The carrying value of the equity method investment in Kingstone Hong Kong was $2.6 million as of September 30, 2017.

Effective June 29, 2018, we sold our remaining ownership interest in Kingstone Hong Kong to the majority owner for approximately $5.7 million, which was received in August 2018. We recognized a pre-tax gain of approximately $2.9 million, which is reported as gain on sale of other assets in our Consolidated Statements of Operations for the year ended September 30, 2018.

17. Related Party Transactions

Parties are considered to be related if one party has the ability, directly or indirectly, to control the other party or exercise significant influence over the other party in making financial and operating decisions. Parties are also considered to be related if they are subject to common control or significant influence, such as a family member or relative, shareholder, or a related corporation.

In 2015, we deconsolidated Kingstone, reducing our ownership to 15% of Kingstone Hong Kong. Effective June 29, 2018, we sold our remaining 15% ownership interest in Kingstone Hong Kong to the majority owner for approximately $5.7 million. We recognized a pre-tax gain on the sale of approximately $2.9 million. The 2018 gain is reported as a gain on sale of other assets in our Consolidated Statements of Operations. Kingstone Hong Kong and its owners are no longer related parties of Amtech.

As of June 30, 2017, SoLayTec had borrowed approximately $2.4 million, including accrued interest, from its minority shareholders. These loans were forgiven as part of the Exit Agreement entered into in July 2017. See Note 16 for additional information. SoLayTec and its owners are no longer related parties of Amtech.

18. Business Segments

After announcing the planned divestiture of our Solar segment (see Note 2), we conducted an evaluation of our organizational structure. Beginning with the second quarter of fiscal 2019, we made changes to our reportable segments. Prior period amounts have been revised to conform to the current period segment reporting structure.

Our three reportable segments are as follows:

Semiconductor–We design, manufacture, sell and service thermal processing equipment and related controls for use by leading semiconductor manufacturers, and in electronics, automotive and other industries.

SiC/LED–We produce consumables and machinery for lapping (fine abrading) and polishing of materials, such as sapphire substrates, optical components, silicon wafers, numerous types of crystal materials, ceramics and metal components. We formerly referred to our SiC/LED segment as “Polishing.”

Automation–We are a leading supplier of solar and semiconductor automation with in-house design and manufacturing capabilities and offer a full array of single wafer transfer tools as well as batch transfer tools and stocker options.

Information concerning our business segments is as follows (in thousands):

	Years Ended September 30,		
	2019	2018	2017
Net revenue:			
Semiconductor	$ 66,455	$ 80,163	$ 67,237
SiC/LED	13,682	13,761	10,248
Automation	4,898	6,129	5,588
	$ 85,035	$ 100,053	$ 83,073
Operating income (loss):			
Semiconductor	$ 8,744	$ 11,848	$ 9,538
SiC/LED	3,641	3,672	2,617
Automation	(786)	(2,897)	(724)
Non-segment related	(6,683)	(6,551)	(7,790)
	$ 4,916	$ 6,072	$ 3,641

	Years Ended September 30,		
	2019	2018	2017
Capital expenditures:			
Semiconductor	$ 379	$ 352	$ 236
SiC/LED	171	603	12
Automation	22	25	148
Non-segment related	11	14	22
	$ 583	$ 994	$ 418
Depreciation and amortization expense:			
Semiconductor	$ 828	$ 715	$ 876
SiC/LED	136	136	73
Automation	103	135	325
Non-segment related	58	67	99
	$ 1,125	$ 1,053	$ 1,373

	September 30, 2019	September 30, 2018
Identifiable assets:		
Semiconductor	$ 56,855	$ 59,744
SiC/LED	7,779	6,545
Automation	2,661	3,586
Non-segment related*	36,427	34,209
Held-for-sale assets**	22,755	45,322
	$ 126,477	$ 149,406

* Non-segment related assets include cash, property and other assets.
** See Note 2 for additional information on held-for-sale assets.

19. Major Customers and Sales by Country

In 2019, no individual customer accounted for 10% or more of net revenues. In 2018, one Semiconductor customer individually accounted for 14% of net revenues. In 2017, one Semiconductor customer accounted for 13% of net revenues.

Our net revenues for 2019, 2018 and 2017 were to customers in the following geographic regions:

	Years Ended September 30,		
	2019	2018	2017
United States	35 %	21 %	22 %
Other	6 %	3 %	3 %
Total Americas	**41 %**	**24 %**	**25 %**
China	18 %	30 %	23 %
Malaysia	5 %	8 %	8 %
Taiwan	10 %	9 %	10 %
Other	8 %	5 %	9 %
Total Asia	**41 %**	**52 %**	**50 %**
Germany	8 %	10 %	9 %
Other	10 %	14 %	16 %
Total Europe	**18 %**	**24 %**	**25 %**
	100 %	**100 %**	**100 %**

20. Geographic Regions

We have continuing operations in the United States, China and France, as well as satellite offices in Europe and Asia. Revenues, operating income (loss) and identifiable assets by geographic region are as follows (in thousands):

	Years Ended September 30,		
	2019	2018	2017
Net revenue:			
United States	$ 65,942	$ 72,753	$ 60,952
China	9,500	17,634	12,673
France	4,898	6,129	5,588
Other	4,695	3,537	3,860
	$ 85,035	$ 100,053	$ 83,073
Operating income (loss):			
United States	$ 726	$ 2,755	$ (51)
China	3,686	5,445	3,647
France	(786)	(3,058)	(1,000)
Other	1,290	930	1,045
	$ 4,916	$ 6,072	$ 3,641

	As of September 30,	
	2019	2018
Net property, plant and equipment:		
United States	$ 9,893	$ 10,039
China	236	293
France	88	177
	$ 10,217	$ 10,509

21. Supplementary Financial Information

The following is a summary of the activity in our allowance for doubtful accounts (in thousands):

	Years Ended September 30, 2019	2018	2017
Balance at beginning of year	$ 454	$ 356	$ 1,431
Provision	200	102	117
Write offs	(402)	(9)	(1,171)
Adjustment (1)	(80)	5	(21)
Balance at end of year	$ 172	$ 454	$ 356

(1) Primarily foreign currency translation adjustments.

22. Selected Quarterly Data (Unaudited)

The following table sets forth selected unaudited consolidated quarterly financial information for the years ended September 30, 2019 and 2018 (in thousands, except percents and per share amounts):

	Fiscal Year 2019 First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Revenue, net of returns and allowances	$ 23,225	$ 20,633	$ 21,003	$ 20,174
Cost of sales	14,205	12,706	13,153	11,614
Gross profit	9,020	7,927	7,850	8,560
Selling, general and administrative	6,626	5,793	5,718	6,126
Research, development and engineering	866	713	746	743
Restructuring charges	864	173	35	38
Operating income	664	1,248	1,351	1,653
Interest and other income, net	166	96	249	341
Income from continuing operations before income taxes	830	1,344	1,600	1,994
Income tax provision	582	332	707	1,012
Income from continuing operations, net of tax	248	1,012	893	982
(Loss) income from discontinued operations, net of tax	(2,620)	(6,647)	1,154	(184)
Net (loss) income	$ (2,372)	$ (5,635)	$ 2,047	$ 798
Gross margin	38.8%	38.4%	37.4%	42.4%
Operating margin	2.9%	6.0%	6.4%	8.2%
Income (Loss) Per Basic Share:				
Basic income per share from continuing operations	$ 0.02	$ 0.07	$ 0.06	$ 0.07
Basic (loss) income per share from discontinued operations	$ (0.18)	$ (0.47)	$ 0.08	$ (0.01)
Net (loss) income per basic share	$ (0.16)	$ (0.40)	$ 0.14	$ 0.06
Income (Loss) Per Diluted Share:				
Diluted income per share from continuing operations	$ 0.02	$ 0.07	$ 0.06	$ 0.07
Diluted (loss) income per share from discontinued operations	$ (0.18)	$ (0.47)	$ 0.08	$ (0.01)
Net (loss) income per diluted share	$ (0.16)	$ (0.40)	$ 0.14	$ 0.06
Weighted average shares outstanding - basic	14,220	14,228	14,245	14,266
Weighted average shares outstanding - diluted	14,252	14,258	14,316	14,304

	Fiscal Year 2018			
	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Revenue, net of returns and allowances	$ 27,116	$ 21,115	$ 28,743	$ 23,079
Cost of sales	17,156	12,533	18,560	14,886
Gross profit	9,960	8,582	10,183	8,193
Selling, general and administrative	6,424	6,319	6,775	6,225
Research, development and engineering	675	778	582	821
Impairment charges	—	—	—	2,247
Operating income (loss)	2,861	1,485	2,826	(1,100)
Gain on sale of other assets	—	—	2,883	—
(Loss) income from equity method investment	(26)	28	232	—
Interest and other income (expense), net	18	(32)	410	342
Income (loss) from continuing operations before income taxes	2,853	1,481	6,351	(758)
Income tax provision	1,152	420	1,372	352
Income (loss) from continuing operations, net of tax	1,701	1,061	4,979	(1,110)
Income (loss) from discontinued operations, net of tax	4,751	1,774	(8)	(7,843)
Net income (loss)	$ 6,452	$ 2,835	$ 4,971	$ (8,953)
Gross margin	36.7%	40.6%	35.4%	35.5%
Operating margin	10.6%	7.0%	9.8%	(4.8)%
Income (Loss) Per Basic Share:				
Basic income (loss) per share from continuing operations	$ 0.12	$ 0.07	$ 0.33	$ (0.08)
Basic income (loss) per share from discontinued operations	$ 0.32	$ 0.12	$ (0.00)	$ (0.53)
Net income (loss) per basic share	$ 0.44	$ 0.19	$ 0.33	$ (0.61)
Income (Loss) Per Diluted Share:				
Diluted income (loss) per share from continuing operations	$ 0.11	$ 0.07	$ 0.33	$ (0.08)
Diluted income (loss) per share from discontinued operations	$ 0.31	$ 0.12	$ (0.00)	$ (0.53)
Net income (loss) per diluted share	$ 0.42	$ 0.19	$ 0.33	$ (0.61)
Weighted average shares outstanding - basic	14,781	14,891	14,925	14,730
Weighted average shares outstanding - diluted	15,298	15,154	15,091	14,730

23. Subsequent Events

In November 2019, we completed the sale of our subsidiary, R2D, to certain members of R2D's management team. We will recognize a loss of approximately $3.0 million in the first quarter of 2020 and R2D will no longer be included in our consolidated financial statements.

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

None.

ITEM 9A. CONTROLS AND PROCEDURES

Conclusion Regarding the Effectiveness of Disclosure Controls and Procedures

Our management, including our Chief Executive Officer (“CEO”) and Chief Financial Officer (“CFO”), has carried out an evaluation of the effectiveness of our disclosure controls and procedures as defined in Exchange Act Rules 13a-15(e) and 15(d)-15(e). Based upon that evaluation, our CEO and CFO have concluded that our disclosure controls and procedures in place were effective as of September 30, 2019.

Management’s Report on Internal Control Over Financial Reporting

To the Shareholders of Amtech Systems, Inc.

The management of Amtech Systems, Inc. is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Exchange Act Rules 13a-15(f) and 15d-15(f). 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.

Because of its inherent limitations, our controls and procedures may not prevent or detect misstatements. A control system, no matter how well conceived and operated, can provide only reasonable, not absolute, assurance that the objectives of the controls system are met. Because of the inherent limitations in all controls systems, no evaluation of controls can provide absolute assurance that all control issues and instances of fraud, if any, have been detected.

Our management evaluated the effectiveness of our internal control over financial reporting as of September 30, 2019. In making this evaluation, we used the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) in *Internal Control - Integrated Framework (2013).* Based on our evaluation we believe that, as of September 30, 2019, our internal control over financial reporting was effective based on those criteria.

Our independent registered public accounting firm, Mayer Hoffman McCann P.C., has issued a Report of Independent Registered Public Accounting Firm related to our internal control over financial reporting, which can be found in Item 8 of this Annual Report on Form 10-K.

ITEM 9B. OTHER INFORMATION

None.

PART III

Pursuant to Paragraph G(3) of the General Instructions to Form 10-K, the information required by Part III of Form 10-K is incorporated by reference to the Proxy Statement to be filed within 120 days of September 30, 2019, our fiscal year end. In the event the Proxy Statement is not filed within 120 days, the information required by Part III of this Form 10-K will be filed pursuant to an amendment to this Annual Report on Form 10-K within the 120-day period.

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND GOVERNANCE

The information required by this item (i) is incorporated herein by reference to the Proxy Statement or (ii) will be filed pursuant to an amendment to this Annual Report on Form 10-K, in each case, within 120 days of September 30, 2019, our fiscal year end.

ITEM 11. EXECUTIVE COMPENSATION

The information required by this item (i) is incorporated herein by reference to the Proxy Statement or (ii) will be filed pursuant to an amendment to this Annual Report on Form 10-K, in each case, within 120 days of September 30, 2019, our fiscal year end.

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

The information required by this item (i) is incorporated herein by reference to the Proxy Statement or (ii) will be filed pursuant to an amendment to this Annual Report on Form 10-K, in each case, within 120 days of September 30, 2019, our fiscal year end.

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

The information required by this item (i) is incorporated herein by reference to the Proxy Statement or (ii) will be filed pursuant to an amendment to this Annual Report on Form 10-K, in each case, within 120 days of September 30, 2019, our fiscal year end.

ITEM 14. PRINCIPAL ACCOUNTING FEES AND SERVICES

The information required by this item (i) is incorporated herein by reference to the Proxy Statement or (ii) will be filed pursuant to an amendment to this Annual Report on Form 10-K, in each case, within 120 days of September 30, 2019, our fiscal year end.

PART IV

ITEM 15. EXHIBITS AND FINANCIAL STATEMENT SCHEDULES

(a) Financial Statements and Schedules

The consolidated financial statements required by this item are set forth on the pages indicated in Item 8.

All financial statement schedules are omitted because they are either not applicable or because the required information is shown in the consolidated financial statements or notes thereto.

(b) Exhibits

The exhibits filed as part of this Annual Report on Form 10-K are listed on the Exhibit Index immediately preceding the signature page hereto, which is incorporated herein by reference.

ITEM 16. FORM 10-K SUMMARY

None.

EXHIBIT INDEX

EXHIBIT NO.	EXHIBIT DESCRIPTION	INCORPORATED BY REFERENCE FORM	FILE NO.	EXHIBIT NO.	FILING DATE	FILED HEREWITH
3.1	Amended and Restated Articles of Incorporation, as amended through February 6, 2012.	10-Q	000-11412	3.1	February 9, 2012	
3.2	Certificate of Designations, Preferences and Privileges of the Series A Convertible Preferred Stock (Par Value $.01 Per Share) of Amtech Systems, Inc., dated as of April 21, 2005.	8-K	000-11412	3.1	April 28, 2005	
3.3	Amended and Restated Bylaws of Amtech Systems, Inc., dated as of January 4, 2008.	8-K	000-11412	3.1	January 8, 2008	
3.4	First Amendment to the Company's Amended and Restated Bylaws, dated January 30, 2015.	8-K	000-11412	3.1	February 2, 2015	
4.1	Form of Accredited Investor Subscription Agreement for the Series A Convertible Preferred Stock.	8-K	000-11412	4.1	April 28, 2005	
4.2	Description of Capital Stock					X
10.1	Non-Employee Directors Stock Option Plan, effective July 8, 2005 as amended through May 8, 2014.	8-K	000-11412	10.1	May 14, 2014	
10.2	2007 Employee Stock Incentive Plan of Amtech Systems, Inc., as amended, effective April 9, 2015.	8-K	000-11412	10.4	April 10, 2015	
10.3	Second Amended and Restated Employment Agreement between Amtech Systems, Inc. and Jong S. Whang, dated February 9, 2012.	10-Q	000-11412	10.1	February 9, 2012	
10.4	Amendment, dated as of July 1, 2012, to the Second Amended and Restated Employment Agreement between Amtech Systems, Inc. and Jong S. Whang, dated as of February 9, 2012.	10-Q	000-11412	10.2	August 9, 2012	
10.5	Second Amendment, dated June 28, 2013, to the Second Amended and Restated Employment Agreement between Amtech Systems, Inc. and Jong S. Whang, dated as of February 9, 2012.	10-Q	000-11412	10.15	August 8, 2013	
10.6	Fourth Amendment to Employment Agreement between Amtech Systems, Inc. and Jong S. Whang, dated April 9, 2015.	8-K	000-11412	10.1	April 10, 2015	

10.7	Fifth Amendment to Employment Agreement, dated November 19, 2015, by and between the Company and Jong S. Whang.	8-K	000-11412	10.1	November 19, 2015	
10.8	Key Terms for Robert Hass Employment Agreement, dated February 22, 2016, by and between Amtech Systems, Inc. and Robert T. Hass.	10-Q	000-11412	10.2	May 5, 2016	
10.9	Terms of Employment for Robert T. Hass, dated November 10, 2016, between Amtech Systems, Inc. and Robert T. Hass.	8-K	000-11412	10.2	November 16, 2016	
10.10	Change of Control and Severance Agreement dated November 10, 2016, between Amtech Systems, Inc. and Robert T. Hass.	8-K	000-11412	10.3	November 16, 2016	
21.1	Subsidiaries of the Registrant					X
23.1	Consent of Independent Registered Public Accounting Firm - Mayer Hoffman McCann P.C.					X
24	Powers of Attorney					X
31.1	Certification Pursuant to Rule 13a-14(a)/15d-14(a) of the Securities Exchange Act of 1934, as Amended					X
31.2	Certification Pursuant to Rule 13a-14(a)/15d-14(a) of the Securities Exchange Act of 1934, as Amended					X
32.1	Certification Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002					X
32.2	Certification Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002					X
101.INS	XBRL Instance Document					X
101.SCH	XBRL Taxonomy Extension Schema Document					X
101.PRE	Taxonomy Presentation Linkbase Document					X
101.CAL	XBRL Taxonomy Calculation Linkbase Document					X
101.LAB	XBRL Taxonomy Label Linkbase Document					X
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document					X

SIGNATURES

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

AMTECH SYSTEMS, INC.

November 21, 2019

By: /s/ Lisa D. Gibbs
Lisa D. Gibbs, Vice President - Chief Financial Officer
(Principal Financial Officer and Duly Authorized Officer)

Pursuant to the requirements of the Securities Exchange Act of 1934, as amended, this report on Form 10-K has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated:

SIGNATURE	TITLE	DATE
* Jong S. Whang	Executive Chairman and Chairman of the Board (Principal Executive Officer)	November 21, 2019
/s/ Lisa D. Gibbs Lisa D. Gibbs	Vice President – Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer)	November 21, 2019
* Robert M. Averick	Director	November 21, 2019
* Michael Garnreiter	Director	November 21, 2019
* Robert F. King	Director	November 21, 2019
* Sukesh Mohan	Director	November 21, 2019

*By: /s/ Lisa D. Gibbs
Lisa D. Gibbs, Attorney-In-Fact**

** By authority of the power of attorney filed as Exhibit 24 hereto.

Exhibit 21.1

AMTECH SYSTEMS, INC. AND ITS SUBSIDIARIES

SUBSIDIARIES OF THE REGISTRANT

Name	Jurisdiction in which incorporated
Bruce Technologies, Inc	State of Massachusetts
Bruce Technologies Europe GmbH	Federal Republic of Germany
BTU Europe Ltd.	State of Delaware
BTU International, Inc.	State of Delaware
BTU Ltd. (Shanghai)	State of Delaware
BTU Overseas, Ltd.	State of Delaware
BTU Overseas (Shanghai) Co., Ltd	State of Delaware
P.R. Hoffman Machine Products, Inc	State of Arizona
R2D Automation SAS	France
Amtech Tempress New Energy Technologies Limited	China
Kunshan Amtech Tempress Machinery Equipment Co., Ltd.	China
Tempress Asia Holding BV	The Netherlands
Tempress Engineering BV	The Netherlands
Tempress Group Holding BV	The Netherlands
Tempress Holdings BV	The Netherlands
Tempress Hong Kong Limited	Hong Kong
Tempress IP BV	The Netherlands
Tempress Manufacturing BV	The Netherlands
Tempress Onroerend Goed BV	The Netherlands
Tempress PV-Park BV	The Netherlands
Tempress Systems, Inc.	State of Texas
Tempress Systems BV	The Netherlands

Exhibit 23.1

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

As an independent registered public accounting firm we hereby consent to the incorporation by reference in Registration Statement on Forms S-1 (Nos. 333-139592, 333-146856, and 333-147440), Form S-3 (No. 333-215604), and Forms S-8 (Nos. 333-09911, 333-131051, 333-145454, 333-168606, 333-168607, 333-196937, 333-196940 and 333-204431) of our report dated November 21, 2019, with respect to the consolidated financial statements of Amtech Systems, Inc., as of September 30, 2019 and 2018 and for each of the three years in the period ended September 30, 2019, and our report dated November 21, 2019 relating to the effectiveness of Amtech Systems, Inc.'s internal controls over financial reporting as of September 30, 2019, included in this Annual Report on Form 10-K of Amtech Systems, Inc. for the year ended September 30, 2019.

/s/ MAYER HOFFMAN MCCANN P.C.

Phoenix, Arizona
November 21, 2019

Exhibit 24

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS, THAT EACH PERSON WHOSE SIGNATURE APPEARS BELOW CONSTITUTES AND APPOINTS JONG S. WHANG AND LISA D. GIBBS, AND EACH OF THEM, HIS TRUE AND LAWFUL ATTORNEYS-IN-FACT AND AGENTS, WITH FULL POWER OF SUBSTITUTION AND RESUBSTITUTION, FOR HIM AND IN HIS NAME, PLACE AND STEAD, IN ANY AND ALL CAPACITIES, TO SIGN AMTECH SYSTEMS, INC.'S ANNUAL REPORT ON FORM 10-K FOR THE FISCAL YEAR ENDED SEPTEMBER 30, 2019, AND ANY AND ALL AMENDMENTS TO SUCH ANNUAL REPORT ON FORM 10-K, AND TO FILE THE SAME, WITH ALL EXHIBITS THERETO, 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 AND NECESSARY TO BE DONE IN AND ABOUT THE PREMISES, AS FULLY AND TO ALL INTENTS AND PURPOSES AS HE MIGHT OR COULD DO IN PERSON HEREBY RATIFYING AND CONFIRMING ALL THAT SAID ATTORNEYS-IN-FACT AND AGENTS, OR HIS SUBSTITUTE OR SUBSTITUTES, MAY LAWFULLY DO OR CAUSE TO BE DONE BY VIRTUE HEREOF.

Signature	Title	Date
/s/ Jong S. Whang Jong S. Whang	Executive Chairman, Chairman of the Board and Chief Executive Officer	November 19, 2019
/s/ Lisa D. Gibbs Lisa D. Gibbs	Vice President and Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer)	November 19, 2019
/s/ Robert M. Averick Robert M. Averick	Director	November 19, 2019
/s/ Michael Garnreiter Michael Garnreiter	Director	November 19, 2019
/s/ Robert F. King Robert F. King	Director	November 19, 2019
/s/ Sukesh Mohan Sukesh Mohan	Director	November 18, 2019

Exhibit 31.1

AMTECH SYSTEMS, INC. AND ITS SUBSIDIARIES
CERTIFICATION PURSUANT TO RULE 13a-14(a)/15d-14(a)
OF THE SECURITIES EXCHANGE ACT OF 1934, AS AMENDED

I, Jong S. Whang, certify that:

1. I have reviewed this Annual Report on Form 10-K of Amtech Systems, Inc. (the “registrant”);

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 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.

By /s/ Jong S. Whang
Jong S. Whang
Executive Chairman, Chairman of the Board and Chief Executive Officer
Amtech Systems, Inc.
Date: November 21, 2019

Exhibit 31.2

AMTECH SYSTEMS, INC. AND ITS SUBSIDIARIES
CERTIFICATION PURSUANT TO RULE 13a-14(a)/15d-14(a)
OF THE SECURITIES EXCHANGE ACT OF 1934, AS AMENDED

I, Lisa D. Gibbs, certify that:

1. I have reviewed this Annual Report on Form 10-K of Amtech Systems, Inc. (the “registrant”),

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)) 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 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.

By /s/ Lisa D. Gibbs
Lisa D. Gibbs
Vice President and Chief Financial Officer
Amtech Systems, Inc.
Date: November 21, 2019

Exhibit 32.1

AMTECH SYSTEMS, INC. AND ITS SUBSIDIARIES

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

In connection with the Annual Report of Amtech Systems, Inc. (the "Company") on Form 10-K for the period ended September 30, 2019, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Jong S. Whang, Executive Chairman, Chairman of the Board and Chief Executive Officer of the Company, certify, pursuant to 18 U.S.C. ss. 1350, as adopted pursuant to ss. 906 of the Sarbanes-Oxley Act of 2002, that:

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

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

By /s/ Jong S. Whang
Jong S. Whang
Executive Chairman, Chairman of the Board and
Chief Executive Officer
Date: November 21, 2019

Exhibit 32.2

AMTECH SYSTEMS, INC. AND ITS SUBSIDIARIES

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

In connection with the Annual Report of Amtech Systems, Inc. (the "Company") on Form 10-K for the period ended September 30, 2019, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Lisa D. Gibbs, Vice President & Chief Financial Officer of the Company, certify, pursuant to 18 U.S.C. ss. 1350, as adopted pursuant to ss. 906 of the Sarbanes-Oxley Act of 2002, that:

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

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

By /s/ Lisa D. Gibbs
Lisa D. Gibbs
Vice President and Chief Financial Officer
Amtech Systems, Inc.
Date: November 21, 2019

Exhibit 4.2

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

Amtech Systems, Inc. ("Amtech," "we," "our" or "us") has one class of securities registered under Section 12 of the Securities Exchange Act of 1934, as amended: our common stock.

DESCRIPTION OF CAPITAL STOCK

The following summary of the terms of our capital stock is based upon our Amended and Restated Articles of Incorporation, as amended through February 6, 2012 (the "Articles of Incorporation") and our Amended and Restated Bylaws, as amended (the "Bylaws"). The summary is not complete, and is qualified by reference to our Articles of Incorporation and our Bylaws, which are filed as exhibits to this Annual Report on Form 10-K and are incorporated by reference herein. We encourage you to read our Articles of Incorporation, our Bylaws and the applicable provisions of the Arizona Revised Statutes 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, and 100,000,000 shares of preferred stock. As of November 15, 2019, there were 14,268,797 shares of common stock issued and outstanding and no shares of preferred stock issued and outstanding. The outstanding shares of our common stock are duly authorized, validly issued, fully paid, and nonassessable.

Listing

Our common stock trades on the Nasdaq Global Select Market, under the symbol "ASYS."

Voting Rights

Each outstanding share of our common stock is entitled to one vote per share of record on all matters submitted to a vote of shareholders and to vote together as a single class for the election of directors and in respect of other corporate matters. At a meeting of shareholders at which a quorum is present, all questions other than the contested election of directors shall be decided by determining if the votes cast by shareholders favoring the action exceed the votes casts by shareholders opposing the action, without regard to abstentions, unless the matter is one upon which a different vote is required by express provision of Arizona law, the NASDAQ or our articles of incorporation or bylaws. Directors, in a contested election, will be elected by a plurality of the votes of the shares present at a meeting. Holders of shares of common stock have cumulative voting rights with respect to the election of directors.

Dividend Rights

Holders of our common stock are entitled to receive dividends or other distributions when, as and if declared by our board of directors. The right of our board of directors to declare dividends, however, is subject to any rights of the holders of other classes of our capital stock and the availability of sufficient funds under Arizona law to pay dividends.

Preemptive Rights

The holders of our common stock do not have preemptive rights to purchase or subscribe for any of our capital stock or other securities.

Redemption

The shares of our common stock are not subject to redemption by operation of a sinking fund or otherwise.

Liquidation Rights

In the event of any liquidation, dissolution or winding up of the Company, subject to the rights, if any, of the holders of other classes of our capital stock, the holders of shares of our common stock are entitled to receive any of our assets available for distribution to our shareholders ratably in proportion to the number of shares held by them.

Transfer Agent and Registrar

The transfer agent and registrar for our common stock is Computershare Trust Company, 350 Indiana Street, Suite 800, Golden, Colorado 80401.

Certain Provisions of Arizona Law and The Company's Articles of Incorporation and Bylaws

Certain provisions of our articles of incorporation and bylaws and Arizona law could make our acquisition by a third party, a change in our incumbent management or a similar change in control more difficult, including:

- an acquisition of us by means of a tender or exchange offer;
- an acquisition of us by means of a proxy contest or otherwise; or
- the removal of a majority or all of our incumbent officers and directors.

These provisions, which are summarized below, are likely to discourage certain types of coercive takeover practices and inadequate takeover bids. These provisions are also designed to encourage persons seeking to acquire control of us to first negotiate with our board of directors. We believe that these provisions help to protect our potential ability to negotiate with the proponent of an unfriendly or unsolicited proposal to acquire or restructure us, and that this benefit outweighs the potential disadvantages of discouraging such a proposal because our ability to negotiate with the proponent could result in an improvement of the terms of the proposal. The existence of these provisions which are described below could limit the price that investors might otherwise pay in the future for our securities. This description is intended as a summary only and is qualified in its entirety by reference to our articles of incorporation and bylaws, as well as Arizona law.

Exhibit 4.2

Articles of Incorporation, Bylaws and Arizona Law

Authorized But Unissued Capital Stock. We have shares of common stock and preferred stock available for future issuance without shareholder approval, subject to any limitations imposed by the listing standards of the NASDAQ. We may utilize these additional shares for a variety of corporate purposes, including for future public offerings to raise additional capital or facilitate corporate acquisitions or for payment as a dividend on our capital stock. The existence of unissued and unreserved common stock and preferred stock may enable our board of directors to issue shares to persons friendly to current management or to issue preferred stock with terms that could have the effect of making it more difficult for a third party to acquire, or could discourage a third party from seeking to acquire, a controlling interest in the Company by means of a merger, tender offer, proxy contest or otherwise. In addition, if we issue preferred stock, the issuance could adversely affect the likelihood that such holders will receive dividend payments and payments upon liquidation.

Blank Check Preferred Stock. Our board of directors, without shareholder approval, has the authority under our articles of incorporation to issue preferred stock with rights superior to the rights of the holders of common stock. As a result, preferred stock could be issued quickly and easily, could impair the rights of holders of common stock and could be issued with terms calculated to delay or prevent a change in control or make removal of management more difficult.

Number of Directors; Removal; Filling Vacancies. Our articles of incorporation provide that the number of directors shall be fixed by the bylaws which our board of directors can amend without shareholder approval. Our bylaws default to Arizona law with respect to the removal of directors. Arizona law provides that directors may be removed with or without cause where the votes cast by shareholders opposing the action would not be sufficient to elect the director under cumulative voting. A vote to remove one or more directors must be taken at a shareholder's meeting at which a quorum is present where one of the purposes of the meeting is to remove one or more directors. A director cannot be removed by written consent of shareholders unless written consents are obtained from the holders of all the outstanding shares entitled to vote on the removal of the director. Our bylaws provide that vacancies on our board of directors may be filled by a majority vote of the remaining directors, though not less than a quorum. Arizona law also provides that shareholders may fill any vacancy on our board of directors.

Shareholder Meetings and Action. Our bylaws provide that shareholders can only call a special meeting with the approval of holders of not less than fifty percent (50%) of all votes entitled to be cast on any issue proposed to be considered at the proposed special meeting. Our bylaws also provide that the business of special meetings of shareholders shall be confined to the purposes stated in the notice of the meeting. These provisions may discourage another person or entity from making a tender offer, unless it acquired a majority of our outstanding voting stock, because the person or entity could only take action at a duly called shareholders' meeting relating to the business specified in the notice of meeting and not by written consent. Arizona law provides that shareholders may act outside of a meeting if one or more written consents describing the action taken are signed by the holders of outstanding shares having one hundred percent (100%) of the votes entitled to be cast at a meeting at which all shares entitled to vote on the action were present and voted.

Anti-Takeover Effects of Various Provisions of Arizona Law

Arizona Revised Statutes ("ARS") Sections 10-2701 et seq. were adopted by the Arizona legislature in an attempt to prevent corporate "greenmail" and restrict the ability of a potential suitor to acquire domestic corporations. These statutes generally apply to business combinations or control share acquisitions of "issuing public corporations," which defined term includes Amtech. The provisions summarized below could discourage, deter, delay or impede a tender offer or other attempt to acquire control of Amtech.

Arizona Business Combination Statute. The Arizona business combination statute would limit our ability to engage in Business Combinations with Interested Shareholders (each as defined below).

Business Combination" means any (A) merger or consolidation of Amtech or any subsidiary of Amtech with an Interested Shareholder, (B) exchange of shares of the Amtech's common stock or any subsidiary for shares of an Interested Shareholder, or (C) sale, lease, transfer or other disposition to or with an Interested Shareholder of 10% or more of the consolidated assets of Amtech.

Interested Shareholder" means any person other than Amtech or a subsidiary of Amtech that is either (A) a direct or indirect beneficial owner of 10% or more of the voting power of the outstanding common stock of Amtech or (B) an affiliate of Amtech who at any time during the three years immediately before the date in question was the beneficial owner of 10% or more of the voting power of the then outstanding common stock of Amtech.

Share Acquisition Date" means the date that a person first becomes an Interested Shareholder of Amtech.

Business Combinations within Three Years After Share Acquisition Date. For three years after an Interested Shareholder's Share Acquisition Date, Amtech may not directly or indirectly engage in any Business Combination with an Interested Shareholder or any affiliate of an Interested Shareholder unless, before the Interested Shareholder's Share Acquisition Date, a committee of disinterested directors approved either:

- the Business Combination; or

- the acquisition of common stock made by the Interested Shareholder on the Interested Shareholder's Share Acquisition Date.

Business Combinations More Than Three Years After Share Acquisition Date. If a committee of disinterested directors has not approved the Business Combination or the acquisition of common stock as provided above, Amtech may not directly or indirectly engage in any Business Combination with an Interested Shareholder or any affiliate of an Interested Shareholder unless:

- the Business Combination is consummated no earlier than three years after the Interested Shareholder's Share Acquisition Date, and before the Share Acquisition Date, Amtech's Board of Directors approved either

  - the Business Combination; or

- the acquisition of common stock made by the Interested Shareholder on the Share Acquisition Date;

- the Business Combination is approved no earlier than three years after the Interested Shareholder's Share Acquisition Date by the affirmative vote of a majority of the outstanding voting shares of the common stock of Amtech (excluding shares of common stock beneficially owned by the Interested Shareholder or any affiliate thereof); or

- the Business Combination is consummated no earlier than three years after the Interested Shareholder's Share Acquisition Date and meets certain specified conditions designed to ensure against discriminatory pricing.

Arizona Control Share Acquisition Statute. The Arizona control share acquisition statute would limit the voting rights of a person who acquires shares of Amtech under certain circumstances in a control share acquisition (as defined below).

Control Share Acquisition means an acquisition, directly or indirectly (in one or more transactions within 120 days or pursuant to a plan), by a person of beneficial ownership of shares of common stock of Amtech that would, but for the limitations in the control share acquisition statute, entitle the acquiring person to exercise a new range of voting power within the following specified ranges: (A) at least 20% but less than 33-1/3%, (B) at least 33-1/3% but less than or equal to 50% and (C) over 50%.

Within ten days after a Control Share Acquisition, the acquiring person must deliver to the corporation an information statement specifying, among other things, the range of voting power in the election of directors that, but for the limitations in the statute, the acquiring person believes would result from the Control Share Acquisition. At the time of delivery of the information statement, the acquiring person may request that a special meeting of shareholders be called to consider the voting rights of "excess" shares (referred to below).

To the extent that shares of common stock of Amtech acquired in a Control Share Acquisition exceed the threshold of voting power of any of the next specified range of voting power, such "excess" shares will have the same voting rights as other shares of common stock for election of directors but will not have the right to vote on other matters unless approved by a shareholder resolution at an annual or special meeting. Such resolution must be approved by the affirmative vote of a majority of the outstanding voting shares of common stock (excluding shares owned by the acquiring person, its affiliates or any officer or director of Amtech).

The status of voting rights of "excess" shares is not required to be presented for consideration at any meeting of shareholders unless, at the time of delivery of the information statement referred to above, the acquiring person has entered into a definitive financing agreement for any financing of the acquisition not to be provided by monies of the acquiring person.

If an acquiring person fails to deliver the required information statement within ten days after a Control Share Acquisition or if the Companies' shareholders have voted not to accord voting rights to an acquiring person's "excess" shares referred to above, then Amtech may call for the redemption of such "excess" shares at the fair market value of those shares at the time the call for redemption is given.

Exhibit 4.2

Limitation of Liability and Indemnification

Pursuant to Amtech's articles of incorporation, Amtech shall indemnify any and all of its existing and former directors, officers, employees and agents against all expenses incurred by them and each of them, including, but not limited to legal fees, judgments, penalties and amounts paid in settlement or compromise, which may arise or be incurred, rendered, or levied in any legal action brought or threatened against any of them for or on account of any action or omission alleged to have been committed while acting within the scope of employment as director, officer, employee or agent of the Company, whether or not any action is or has been filed against them and whether or not any settlement or compromise is approved by a court, indemnification shall be made by the Company whether the legal action brought or threatened is by or in the right of the Company or by any other person. Whenever any existing or former director, officer, employee, or agent shall report to the President of the Company or the chairman of the board of directors that he or she has incurred or may incur expenses, including, but not limited to, legal fees, judgments, penalties and amounts paid in settlement or compromise in a legal action brought or threatened against him or her for or on account of any action or omission alleged to have been committed by him or her while acting within the scope of his or her employment as a director, officer, employee or agent of the Company, the board of directors shall, at its next regular or at a special meeting held within a reasonable time thereafter, determine in good faith, whether in regard to the matter involved in the action or contemplated action, such person acted, failed to act, or refused to act willfully or with gross negligence or with fraudulent or criminal intent. If the board of directors determines, in good faith, that such person did not act, fail to act, or refuse to act willfully or with gross negligence or with fraudulent or criminal intent, in regard to the matter involved in the action or contemplated action, such person acted, failed to act, or refused to act willfully or with gross negligence or with fraudulent criminal intent, indemnification shall be mandatory and shall be automatically extended as specified herein; provided, that the Company shall have the right to refuse indemnification in any instance in which the person to whom indemnification would otherwise have been applicable shall have unreasonably refused to permit the Company, at its own expense and through counsel of its own choosing, to defend him or her in the action.

Section 10-851 of Arizona's Revised Statutes enables a corporation to eliminate or limit personal liability of members of its board of directors for violations of their fiduciary duty of care. However, Arizona law does not permit the elimination of a director's or officer's liability: (i) in connection with a proceeding by or in the right of the corporation in which the director was adjudged liable to the corporation; and (ii) in connection with any other proceeding charging improper financial benefit to the director, whether or not involving action in the director's official capacity, in which the director was adjudged liable on the basis that financial benefit was improperly received by the director.

Insofar as indemnification for liabilities arising under the Securities Act may be permitted to directors, officers or persons controlling Amtech pursuant to the foregoing provision, Amtech has been informed that in the opinion of the SEC such indemnification is against public policy as expressed in the Securities Act and is therefore unenforceable.