AMTECH SYSTEMS INC
Form 10-K
November 20, 2017

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

_____

FORM 10-K

_____

(Mark One)

[X] ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended: September 30, 2017
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 (State or other jurisdiction of incorporation or organization)	86-0411215 (I.R.S. Employer Identification No.)
131 South Clark Drive, Tempe, Arizona (Address of principal executive offices)	85281 (Zip Code)

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

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

None

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 [X]

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 [X]

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (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. [X] Yes [ ] No

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted 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). [X] Yes [ ] No

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§ 229.405) is not contained herein, and will not be contained, to the best of registrant's knowledge in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. [X]

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

Large accelerated filer [ ] Accelerated filer [X] Non-accelerated filer [ ] (do not check if a smaller reporting company) [ ] Smaller Reporting Company [ ] Emerging Growth Company

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

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes [ ] No [X]

As of March 31, 2017, 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 $56,532,174, based upon the closing sales price reported by the NASDAQ Global Market on that date.

As of November 15, 2017, the registrant had outstanding 14,730,699 shares of Common Stock, $0.01 par value.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the Definitive Proxy Statement related to the registrant's 2018 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, 2017, are incorporated by reference into Items 10-14 of Part III of this Form 10-K.

AMTECH SYSTEMS, INC. AND SUBSIDIARIES

Table of Contents

Part I		
Item 1.	Business	3
Item 1A.	Risk Factors	12
Item 1B.	Unresolved Staff Comments	24
Item 2.	Properties	25
Item 3.	Legal Proceedings	25
Item 4.	Mine Safety Disclosures	25
Part II		
Item 5.	Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities	26
Item 6.	Selected Financial Data	28
Item 7.	Management's Discussion and Analysis of Financial Condition and Results of Operations	29
Item 7A.	Quantitative and Qualitative Disclosures about Market Risk	40
Item 8.	Financial Statements and Supplementary Data	41
Item 9.	Changes in and Disagreements with Accountants on Accounting and Financial Disclosure	73
Item 9A.	Controls and Procedures	73
Item 9B.	Other Information	74
Part III		
Item 10.	Directors, Executive Officers and Corporate Governance	74
Item 11.	Executive Compensation	74
Item 12.	Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters	74
Item 13.	Certain Relationships and Related Transactions, and Director Independence	74
Item 14.	Principal Accounting Fees and Services	74
Part IV		
Item 15.	Exhibits and Financial Statement Schedules	74
Item 16.	Form 10-K Summary	75
Signatures		77

FORWARD-LOOKING STATEMENTS

Certain information contained or incorporated by reference in this Annual Report on Form 10-K is forward-looking in nature. All statements included or incorporated by reference in this Annual Report on Form 10-K, or made by management of Amtech Systems, Inc. and its subsidiaries ("the Company" or "Amtech"), other than statements of historical fact, are hereby identified as "forward-looking statements" (as such term is defined in Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended). The forward-looking statements in this Annual Report on Form 10-K relate only to events or information as of the date on which the statements are made in this Annual Report on Form 10-K. Examples of forward-looking statements include statements regarding Amtech's future financial results, operating results, business strategies, projected costs, products under development, competitive positions and plans and objectives of the Company and its management for future operations. In some cases, forward-looking statements can be identified by terminology such as "may," "will," "should," "would," "expects," "plans," "anticipates," "intends," "believes," "estimates," "predicts," "potential," "continue," or the negati terms or other comparable terminology. 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 ability to successfully complete the turnkey orders and the associated costs and risks related thereto; difficulties in successfully executing our growth initiatives; 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; 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; possible future claims, litigation or enforcement actions and the results of any such claim, litigation proceeding, or enforcement action; 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 United States Securities and Exchange Commission. 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.

You should not place undue reliance on these forward-looking statements. Except as required by law, we undertake no obligation to update or revise publicly any forward-looking statements, whether as a result of new information, future events, changes in assumptions, or otherwise, after the date on which the statements are made or to reflect the occurrence of unanticipated events. You should read this report and the documents that we reference in this report, including documents referenced by incorporation, completely and with the understanding that our actual results may be materially different from what we expect or project.

All references to "we," "our," "us," or "Amtech" refer to Amtech Systems, Inc. and its subsidiaries.

PART I

ITEM 1. BUSINESS

OUR COMPANY

We are a leading, global manufacturer of capital equipment, including thermal processing and silicon wafer handling automation, and related consumables used in fabricating solar cells, light-emitting diodes, or LEDs, and semiconductor devices. 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 2017 Consolidated Net Revenue

Solar	53%
Semiconductor	41%
Polishing	6%

For information regarding net revenue, operating income and identifiable assets attributable to each of our three operating segments, see Note 17 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 "Solar and Semiconductor Products" and "Polishing 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 2017, 2016 and 2015 relate to the fiscal years ended September 30, 2017, 2016 and 2015, respectively.

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

Solar:
- Tempress Systems, Inc., or Tempress, a Texas corporation based in Vaassen, the Netherlands, acquired in 1994 and subsequently reincorporated in the Netherlands;
- R2D Automation SAS, or R2D, a French corporation located near Montpellier, France, acquired in October 2007; and
- SoLayTec B.V., or SoLayTec, a Netherlands corporation based in Eindhoven, the Netherlands, acquired 51% controlling interest in 2014 and acquired the remaining 49% ownership in 2017.

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

Polishing:
- P.R. Hoffman Machine Products, Inc., or PR Hoffman, an Arizona corporation based in Carlisle, Pennsylvania, acquired in July 1997.

Additionally, we also own a 15% interest in Kingstone Technology Hong Kong Limited ("Kingstone Hong Kong") which is the parent company of Shanghai Kingstone (collectively with Kingstone Hong Kong, "Kingstone"). The ownership in Kingstone Hong Kong effectively represents an 8% beneficial ownership interest in the operating entity, Shanghai Kingstone.

Our major emphasis in the solar industry is the development of thermal processes and deposition for solar cell manufacturing, which we believe, collectively, are key to driving higher cell efficiencies. The markets we serve are experiencing rapid technological advances and are, historically, cyclical. Therefore, future profitability and growth depend on our ability to develop or acquire and market new technology products and on our ability to adapt to cyclical trends.

Solar cells, semiconductor chips, LEDs and some microelectromechanical systems ("MEMS") are semiconductors fabricated on silicon wafer substrates, sliced from ingots. Solar cells are assembled into solar panels and are responsible for converting sunlight into electricity. Semiconductor chips are part of the circuitry, or electronic components, of many products including solar cells, computers, telecommunications devices, automotive products, consumer goods, 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, oxidation, and deposition steps, including atomic layer deposition used in the fabrication of solar cells, LEDs, semiconductors, MEMS and the polishing of newly sliced silicon wafers, as well as the packaging and assembly of the electronic components.

Our Polishing segment provides solutions to the lapping and polishing marketplace. 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, sapphire substrates for LED lighting and mobile devices, silicon carbide wafers for LED and power device applications, various glass and silica

components for 3D image transmission, quartz and ceramic components for telecommunications devices, medical device components and computer hard disks.

We believe our product portfolio, developed through a track record of technological innovation as well as the successful integration of key acquisitions, reduces the cost of solar cell manufacturing by increasing solar cell efficiency, increasing throughput and increasing yields. 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 in the solar industry. Our customers use our equipment to manufacture solar cells, semiconductor chips,

silicon wafers and MEMS, which are used in end markets such as solar power, telecommunications, consumer electronics, computers, automotive and mobile hand-held 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.

ACQUISITIONS AND DISPOSITIONS

In December 2014, we expanded our participation in the solar market by acquiring a 51% controlling interest in SoLayTec, which provides atomic layer deposition, or ALD, systems used in high efficiency solar cells. The acquisition of the controlling interest in SoLayTec supports our business model of growth through strategic acquisitions. In July 2017, we acquired the remaining 49% interest, resulting in us becoming the sole owner of SoLayTec.

In January 2015, we completed our acquisition of BTU, which allowed us to expand our thermal processing capability with the supply of solder reflow systems used for surface mount and semiconductor packaging applications in the electronics assembly market, and custom equipment for multiple industrial markets. The acquisition of BTU further positions Amtech as a leading, global supplier of solar and semiconductor production and automation systems.

In September 2015, we sold a portion of our interest in Kingstone Hong Kong, which 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), to a China-based venture capital firm. Proceeds from the sale of shares were paid to Amtech and used to support our core strategic initiatives. We now own 15% of the holding company, Kingstone Hong Kong, following consummation of the transaction, which effectively represents an 8% beneficial ownership interest in the Shanghai operating entity, Shanghai Kingstone.

GROWTH STRATEGY

Capitalize on Growth Opportunities in the Solar Industry by Leveraging Our Diffusion Furnace Market Share, Top-Tier Customer Relationships, and Track Record of Technological Innovation. We believe that long-term growth in the solar industry will be driven by several macro-economic factors, such as volatile energy prices, limited non-renewable energy resources, government incentives for solar generated electricity, increasing environmental awareness, energy security concerns and the expected decrease in the cost of solar energy. As the solar market continues to develop, advances in process technology will be vital to remaining competitive. We intend to continue leveraging our market position, relationships with leading global solar cell customers and demonstrated track record of technical innovation 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 solar market. As we add to our product portfolio, we plan to continue expanding our offerings within the solar cell production process, thus capturing a greater percentage of capital spent on building global solar cell manufacturing capacity. Our successful development of Plasma-Enhanced Chemical Vapor Deposition, or PECVD, equipment is a recent example of meeting our customers' needs and expanding the size of our addressable market.

Another example is our turnkey offering for N-type bifacial cell production. Our turnkey offering includes third-party equipment to complete the entire cell factory setup, from incoming wafer inspection, wet chemical equipment steps through the final production steps of printing, firing, sorting and testing, with all technology documented and the expertise to start up the factory.

Pursue Strategic Acquisitions That Complement Our Strong Platform. Over the course of our history, we have developed an acquisition strategy consistent with our focus of maintaining market leadership and a technology roadmap leading to higher efficiency and lower cost solar cells. Based on our acquisition strategy, we continue to evaluate potential technology, product and business acquisitions or joint ventures that are intended to increase our existing market share in the solar, semiconductor and LED industries and expand our addressable market. In evaluating these opportunities, our objectives include: enhancing our earnings and cash flows, adding complementary product offerings, actively expanding our geographic footprint, improving our production efficiency and enhancing our customer base.

Contribute to the Solar Industry's Mission of Reaching Grid Parity. We believe next-generation process technology for solar cell manufacturing is the driver to increasing efficiency and lowering manufacturing costs and is key to enabling

grid parity, where the cost of solar generated electricity is on parity with traditional, non-renewable sources of energy such as coal and natural gas. Our next-generation solar cell process technology has a demonstrated track record of increasing our customers' solar cell conversion efficiency. We will continue to develop next-generation solar cell manufacturing process technology that will enable our customers to displace non-renewable energy.

SOLAR OPERATIONS

We provide process equipment and related cell manufacturing equipment to many of the 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. Our N-type technology has been developed through a three-party research collaboration agreement with the Energy Research Centre of the Netherlands, or ECN, a leading solar research center in Europe and Yingli Green Energy Holding Company Limited, or Yingli, one of the world's leading vertically integrated photovolataic ("PV") product manufacturers. In 2012, we launched our PECVD system, which can be used for N-type or P-type systems. Additionally, through SoLayTec, we produce, develop, deliver and service ultrafast ALD machines used in high efficiency solar cells.

We also offer furnace automation and wafer handling systems used within the diffusion and deposition processing steps of solar cell manufacturing. 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.

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.

SEMICONDUCTOR AND POLISHING OPERATIONS

We provide diffusion equipment as well as handling, storage and automation equipment and related services to leading semiconductor manufacturers. Our products include horizontal and vertical diffusion furnaces used to produce semiconductors, silicon wafers and MEMS, as well as lapping equipment, polishing templates and wafer insert carriers, mass wafer transfer systems, loaders and sorters.

As demand for increasingly sophisticated electronic devices continues, new technologies such as electric and autonomous automobiles, advances in consumer electronics, mobile devices and Internet-of-Things (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 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.

SOLAR AND SEMICONDUCTOR PRODUCTS

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

Horizontal Diffusion Furnaces. Through Tempress and Bruce Technologies, we produce and sell horizontal diffusion furnaces. Our horizontal furnaces currently address several steps in the solar and semiconductor manufacturing processes, including diffusion, phosphorus tetrachloride doping, or POCl3, boron tribromide, or BBR_3, low-pressure chemical vapor deposition, or LPCVD, oxidation, 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 five thermal reactor chambers; and the gas distribution cabinet, where the flow of gases into the reactor chambers is controlled, and 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 solar customers and semiconductor customers who do not require the advanced automation of, or cannot justify the higher expense of, vertical furnaces for some or all of their diffusion processes. Our models are capable of processing all currently existing wafer sizes.

Chemical Vapor Deposition (CVD). We have two applications in the 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 also offer the combination of tunnel oxide with a LPCVD of poly-layer, this is a new application in our solar technology roadmap towards cell efficiencies above 21%. These products add two solar cell processing steps to Amtech's offerings. We are exploring next-generation high-efficiency technology and dedicating our efforts to process development.

Atomic Layer Deposition. We produce, develop, deliver and service worldwide machines for ultrafast, spatial (ALD) equipment, a promising technology for ultrathin Al_2O_3 passivation layers on solar cells. The ALD machines from SoLayTec are intended for industrial production in the solar market. The unique features of the SoLayTec machines are the breakthrough speed that enables industrial application and the precise control over the deposition thickness.

Automation Products - Solar & Semiconductor. Our automation products are used in several diffusion steps and in the anneal processing step of solar cell manufacturing. Our R2D automation equipment includes mass 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 solar wafer transfer systems designed to ensure high throughput, reduced breakage and thereby increased yield.

Use of our automation products reduces human handling and, therefore, reduces exposure of wafers to particle sources 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, solar cell 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. Our Comet and Gemini series of wafer transfer systems include a wide range of throughputs 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.

Small Batch Vertical Furnace. Our small batch, two-tube vertical furnace was developed internally with the active support from a large semiconductor manufacturer and long-term customer. The specifications for this furnace include

a two-tube vertical furnace for wafer sizes of up to 200mm, with each tube having a small flat zone capable of processing 25-50 wafers per run. We are targeting niche semiconductor applications, including research and development, while we continue to develop additional processes, since the competition in the large batch vertical furnace market is intense and our competitors are much larger and have substantially greater financial resources, processing knowledge and advanced technology.

Continuous Thermal Processing Systems. Through our BTU subsidiary, 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.

POLISHING PRODUCTS

Our Polishing division manufactures the products described below in Pennsylvania and sells them under our PR Hoffman brand name.

Wafer Carriers. Carriers are work holders into which silicon and sapphire wafers or other materials are inserted for the purpose of holding them securely in place during the lapping and polishing processes. We produce carriers for our line of lapping and polishing machines, as well as for those machines sold by our competitors. Substantially all of the carriers we produce are customized for specific applications. Insert carriers, our most significant category of carriers, contain plastic inserts molded onto the inside edge of the work-holes of the carrier, which hold the wafers in place during processing. Although our standard steel carriers are preferred in many applications because of their durability, rigidity and precise dimensions, they are typically not suited for applications involving softer materials or when metal contamination is an issue. Insert carriers, however, are well suited for processing large semiconductor wafers, up to 450mm in diameter, and other fragile materials or where contamination is an issue, because they provide the advantages of steel carriers while reducing the potential for damage to the edges of such sensitive materials. Our insert carriers are used for double-sided lapping or polishing of wafers up to 450mm in diameter.

Semiconductor Polishing Templates. Our polishing templates are used to securely hold sapphire or other wafer materials in place during single-sided polishing processes. Polishing templates are customized for specific applications and are manufactured to exacting tolerances. We manufacture polishing templates for most brands of tools and various processes. In addition to silicon wafers, these products are used in polishing silicon carbide wafers and sapphire crystals used in LEDs, power devices as well as mobile communication applications.

Double-Sided Lapping and Polishing Machines. Double-sided lapping and polishing machines are designed to process thin and fragile materials, such as semiconductor, sapphire and other wafer-like materials, precision optics, computer disk media and ceramic components for wireless communication devices, 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 LED, mobile device, semiconductor, optics, quartz, ceramics, medical, computer disk and metal working markets.

MANUFACTURING, RAW MATERIALS AND SUPPLIES

Our solar and 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 Vaassen, the Netherlands; Clapiers, France; North Billerica, Massachusetts; and Shanghai, China.

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 solar and semiconductor equipment and lapping plates, are purchased from suppliers who manufacture these items to our specifications. We purchase the automation for our PECVD equipment from a single source.

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, this business' 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 maintain appropriate inventories of key raw materials and parts.

CUSTOMERS AND SEASONALITY

During 2017, 88% of our net revenue came from customers outside of North America. This group represented 80% of revenues in 2016. In 2017, net revenue was distributed among customers in different geographic regions as follows: North/South America 12% (11% of which is in the United States), Asia 75% (including 47% to China, 9% to Malaysia and 12% to Taiwan) and Europe 13%. In 2017, a turnkey customer individually accounted for 25% of net revenue. In 2016, one customer individually accounted for 11% of net revenue. In 2015, two customers individually accounted for 15% and 11% of net revenue, respectively. Our business is not seasonal in nature, but is cyclical based on the capital equipment investment patterns of solar cell and 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 solar and 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 solar and semiconductor equipment do not stock a significant amount of our products, as the inventory they do hold is generally limited to parts needed to provide timely repairs to the customer.

RESEARCH, DEVELOPMENT AND ENGINEERING

The markets we serve are characterized by evolving industry standards and rapid 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, such as the acquisition of SoLayTec, which 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 2017, 2016 and 2015, we recorded research, development and engineering expense of $6.4 million, $8.0 million and $6.9 million, respectively.

COMPETITION

We compete in several distinct equipment markets for solar cells, 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. Since 2012, the solar cell industry has experienced a structural imbalance between supply and demand. This imbalance has increased competitive pressure on selling prices and negatively impacted our results of operations. Our high throughput equipment platforms, technologies for higher cell efficiency, and greater knowledge of the complete cell manufacturing process have contributed significantly to our success in securing the large orders for the first two phases of a multi-phase turnkey project announced in January and April of 2017 from a new solar cell manufacturer in China. For equipment orders not part of a turnkey solution, we compete with Chinese equipment manufacturers that offer lower prices coupled with liberal payment terms and localized service. We are finding it more difficult to participate in the capacity expansions of those Chinese companies that already have significant experience with all facets of producing solar cells and at least some prior experience working with the local equipment vendors. While we will continue to focus on developing advanced products and technologies, we plan to seek further cost reductions to address the competition from Chinese equipment vendors.

The Solar Cell, Semiconductor Device and MEMS Markets. Equipment and automation produced by our Solar and Semiconductor operating segments primarily compete with those produced by other original equipment manufacturers, some of which are well-established firms that are much larger and have substantially greater financial resources than we have. Competitors of our horizontal diffusion furnaces and PECVD equipment include Centrotherm GmbH, Koyo Systems Co. Ltd., Sandvik Thermal Process, Inc., a subsidiary of Sandvik AB, 48th Institute, Naura Technology Group Co., CVD Equipment, Inc., Semco Engineering S.A., S.C New Energy, Meyer Burger, Ltd. and Expertech, Inc. We are experiencing 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. Our semiconductor equipment and polishing products also face competition on the low-end of the price spectrum, where the customers' requirements are less demanding.

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. 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 Polishing 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., Lapmaster International, LLC, 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, 2017, we employed 455 people. Of these employees, 12 were based at our corporate offices in Tempe, Arizona, 33 at our manufacturing plant in Carlisle, Pennsylvania, 86 at our manufacturing plant in N. Billerica, Massachusetts, 123 at our combined facilities in the Netherlands, 138 at our facilities in China, 12 at other Asia-Pacific offices, 42 at our facilities in France, and 8 at our office in the United Kingdom. Of the 33 people employed at our Carlisle, Pennsylvania facility, 16 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
Gas-bearing-based Atomic Layer Deposition (ALD)	Europe	2028
Carrier-less gas bearing ALD	Europe	2029
Reciprocal and helical-scan multi-nozzle ALD configurations	Europe	2030
Ultrafast gas bearing-based reactive ion etching	Europe	2030
Contactless ALD patterning process	Europe	2030
Maskless patterned fast ALD	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

To the best of 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.

AVAILABLE INFORMATION

Our internet website address is www.amtechsystems.com. 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 Securities and Exchange Commission, or 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 http://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. The following risk factors should be read in conjunction with the other information and risks set forth herein.

Risks Related to the Industries We Operate In

There is ongoing volatility in the solar and semiconductor equipment industries.

The solar and semiconductor equipment industries are highly cyclical and the conditions of the industries we operate are 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, but not limited to:

- changes in global and regional economic conditions;
- changes in capacity utilization and production volume of manufacturers of solar cells, semiconductors, silicon wafers and MEMS;
- the profitability and capital resources of those manufacturers;
- tariffs, quotas and international trade barriers, including without limitation unfair trade proceedings against solar PV manufacturers in China;
- challenges associated with marketing and selling manufacturing equipment and services to a diverse and diffuse customer base;
- the financial condition of solar PV customers and their access to affordable financing and capital; and
- the shift of solar and semiconductor production to Asia, where there often is increased price competition.

For these and other reasons, our results of operations for past periods may not necessarily be indicative of 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 solar cells and semiconductors. 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 solar and semiconductor industries. The timing, length and severity of the up-and-down cycles in the solar and semiconductor equipment industries are difficult to predict. 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. Our failure to timely and effectively respond to these cyclical changes could have a material adverse effect on our business.

We are exposed to risks as a result of ongoing changes specific to the solar industry.

A significant portion of our business is to supply the solar market, which, in addition to the general industry changes described above, is characterized by ongoing changes specific to the solar industry, including:

- the varying energy policies of governments around the world and their influence on the rate of growth of the solar PV market, including the availability and amount of government incentives for solar power such as tax credits, feed-in tariffs, rebates, renewable portfolio standards that require electricity providers to sell a targeted amount of energy from renewable sources, and goals for solar installations on government facilities;
- the need to continually decrease the cost-per-watt of electricity produced by solar PV products to or below competing sources of energy by, among other things, reducing operating costs and increasing throughputs for solar PV manufacturing, and improving the conversion efficiency of solar PV;

- the impact on demand for solar PV products arising from the cost of electricity generated by solar PV compared to the cost of electricity from the existing grid or other energy sources;
- the growing number of solar PV manufacturers and increasing global production capacity for solar PV, primarily in China as a result of increased solar subsidies and lower manufacturing costs;
- tariff and international trade barriers, including without limitation such barriers arising from any trade tensions between the United States and China and potential retaliatory actions;
- the varying levels of operating and industry experience among solar PV manufacturers and the resulting differences in the nature and extent of customer support services requested from us;
- challenges associated with marketing and selling manufacturing equipment and services to a diverse and diffuse customer base;
- the cost of polysilicon and other materials;
- access to affordable financing and capital by customers and end-users; and
- an increasing number of local equipment and parts suppliers based in Asia with certain cost and other advantages over suppliers from outside Asia.

In addition, current projections for global solar PV production exceed anticipated near-term end-use demand, which is heavily dependent on installed cost-per-watt, government policies and incentives, and the availability of affordable capital. An oversupply of solar PV may lead customers to delay or reduce investments in manufacturing capacity and new technology, and adversely impact the sales and/or profitability of our products. If we do not successfully manage the risks resulting from the ongoing changes occurring in the solar industry, our business, financial condition and results of operations could be materially and adversely affected.

The solar and semiconductor equipment industries are competitive and, because we are relatively small in size and have fewer 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 having substantially greater financial resources and more extensive research, engineering, manufacturing, marketing and customer service and support capabilities than we can provide. We face competition from companies whose strategy is to provide a broad array of products, some of which compete with the products and services that we offer. These competitors may bundle their products in a manner that may discourage customers from purchasing our products. In addition, we face competition from emerging solar and 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. Furthermore, we face competition from Chinese equipment manufacturers, including 48th Institute, Naura, and S.C, which may receive greater support from Chinese customers and governmental agencies because they are locally based. Since 2012, the solar cell industry has experienced a structural imbalance between supply and demand. This imbalance has increased competitive pressure on selling prices and negatively impacted our results of operations. Our high throughput equipment platforms, technologies for higher cell efficiency, and greater knowledge of the complete cell manufacturing process have contributed significantly to our success in securing the large turnkey orders announced in January and April of 2017 from a new solar cell manufacturer in China. For equipment not sold as part of a turnkey solution, we compete with Chinese equipment manufacturers that offer lower prices coupled with liberal payment terms. We are finding it more difficult to participate in the capacity expansions of those Chinese companies that already have significant experience with all facets of producing solar cells and at least some prior experience working with the local equipment vendors. While we will continue to focus on developing advanced products and technologies, we plan to seek further cost reductions to address the competition from Chinese equipment vendors. Loss of competitive position 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. Our failure to compete successfully with these other companies would seriously harm our business. There is a risk that larger, better-financed competitors

will develop and market more advanced products than those that we currently offer, or that competitors with greater financial resources may decrease prices thereby putting us under financial pressure. The occurrence of any of these events could have a negative impact on our revenue and results of operations.

Demand declines could occur for horizontal diffusion furnaces and related equipment, or for other solar industry products.

The revenue of our solar equipment business is comprised primarily of sales of horizontal diffusion furnaces, PECVD equipment and our automation products. Our automation products are useable almost exclusively with horizontal diffusion furnaces. A significant part of our growth strategy involves expanding our sales to the solar industry. The solar industry is subject to risks relating to industry shortages of polysilicon, (which we discuss further herein), the continuation of government incentives, tariffs and trade barriers, the availability of specialized capital equipment, global energy prices and rapidly changing technologies offering alternative energy sources and manufacturing processes. If the demand for solar industry products declines, the demand by the solar industry for our products would also decline and our financial position and results of operations would be harmed.

There is a trend in the semiconductor industry, related to the trend to produce smaller chips on larger wafers, towards the use in semiconductor manufacturing facilities of newer technology, such as vertical diffusion furnaces. Vertical diffusion furnaces are more efficient than horizontal diffusion furnaces in certain manufacturing processes for smaller chips on larger wafers. To the extent that the trend to use vertical diffusion furnaces over horizontal diffusion furnaces continues, our revenue may decline and our corresponding ability to generate income may be adversely affected.

Governmental subsidies or demand for solar energy could decline.

The solar energy sector is dependent upon governmental subsidies, some of which have been scaled back and are not guaranteed to continue. A further decline in these subsidies could reduce our ability to make investments in our company and grow our business in this market. The solar industry is currently facing overcapacity in production. This overcapacity has a significant adverse impact on the demand for the capital equipment we supply to this industry. As a result of these risks there is no assurance that we will realize a return on these investments which may have a material adverse effect on our business.

Risks Related to Our Business and Our Operations

The number of turnkey project order opportunities is uncertain and such projects may increase our risks relating to current and future performance, project management, supplier fulfillment, unforeseen site conditions, and the regulatory environment.

A turnkey project is a complete solar cell manufacturing line, including equipment manufactured by third parties, and the design, delivery, installation, start-up, and qualification of the entire line. While we have successfully participated in turnkey projects in the past, historically, those and other orders have been for shipments of our equipment. The demand for turnkey projects from our customers can fluctuate significantly, and, therefore, the magnitude and frequency of previously announced turnkey orders may not be indicative of future turnkey orders or our financial performance. Additionally, turnkey orders may provide additional risks to us in executing the project, such as:

- project management, including potentially lower-than-expected revenue due to project delays and cost over-runs;
- organizational stress/burden that could impact order fulfillment of other orders;
- project duration and customer acceptance;
- use of and reliance on subcontractors;
- supplier relationships and constraints;
- pricing and fulfillment;
- turnkey site conditions, such as readiness of customer facilities and access restrictions; and
- local regulations and policies.

Such risks could make it difficult or impossible to complete a turnkey order or cause us to incur unforeseen costs and expenses to complete a turnkey order. Failure to complete a turnkey order or unforeseen costs and expenses incurred in completing a turnkey order could have a material adverse effect on our financial condition and results of operations.

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

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 the then existing shareholders, result in increased expenses or result in covenants or special rights that would restrict our operations.

Our reliance on sales to a few major customers and granting credit to those customers places us at financial risk.

We currently sell to a relatively small number of customers, and we expect our operating results will likely continue to depend on sales to a relatively small number of customers 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 been developed over a short period of time and certain customers are in their early stages of development. The loss of sales to any of these customers would have a significant negative impact on our business. Our agreements with these customers may be canceled if we fail to meet certain product specifications, materially breach the agreement or in the event of bankruptcy. Our customers may seek to renegotiate the terms of current agreements or renewals. We cannot be certain that these customers will generate significant revenue for us in the future nor that these customer relationships will continue to develop. If our relationships with other customers do not continue to develop, we may not be able to expand our customer base or maintain or increase our revenue.

As of September 30, 2017, two customers individually represented 24% and 11% of accounts receivable. As of September 30, 2016, one customer individually represented 11% of accounts receivable. 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. A concentration of our receivables from one or a small number of customers places us at risk. 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. If any one or more of our major customers does not pay us or continue business with us, it could adversely affect our financial position and results of operations.

If the practice of requiring certain customers to make advance payments when they place orders with us ceases, 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 finance our working capital requirements. We cannot assure that this practice will not cease 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, coupled with increased credit sales to a small number of major customers, expose us to additional and more concentrated credit risk since a significant portion of our outstanding accounts receivable is derived from sales to a limited number of customers. We may need to, from time to time, commence legal proceedings to recover accounts receivables from

customers, which may also increase our cost. 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, such as the turnkey order, 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.

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 2016, 80% of our net revenue came from customers outside of North America. During fiscal 2017, 88% of our net revenue came from customers outside of North America as follows:

- Asia - 75% (including China - 47%, Malaysia 9% and Taiwan - 12%); and
- Europe - 13%

Each region in the global solar and semiconductor equipment markets 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, but not limited, to:

- 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;
- the availability of advance payments made by our customers;
- difficulty in providing customer service and support in these 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;
- longer sales cycles and time collection periods;
- 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.

We incurred net foreign currency transaction losses of $0.1 million during the fiscal year ended September 30, 2017 and had a net foreign currency transaction loss of less than $0.1 million during the fiscal year ended September 30, 2016. While our business generally 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, possible 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 in various regions and government austerity measures, pose challenges to the industries in which we operate. Economic uncertainty and related factors, including unemployment, inflation and fuel prices, exacerbate negative trends in business and consumer spending and may cause our customers to push out, cancel, or refrain from placing orders for equipment or services. This 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 may also cause some customers to scale back operations, exit businesses, merge with other manufacturers, or file for bankruptcy protection and potentially cease operations, which can also 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 the 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.

Natural disasters, outbreaks of infectious diseases, terrorist attacks and threats of or actual war may negatively impact all aspects of 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 could also result in economic recession. Any of these occurrences could have a significant adverse impact on our financial position and results of operations.

Our Solar segment’s production, storage and administrative facilities are located in close proximity to one another in The Netherlands. A natural disaster or other unanticipated catastrophic event, including flood, power interruption, and war, could significantly disrupt our ability to manufacture our products and operate our business. If any of our productions facilities or equipment were to experience any significant damage or downtime, we would be unable to meet our production targets, our business would suffer and it could have a material adverse effect on our business, financial condition and results of operations.

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. During fiscal years 2012 through 2016, the rapid decline in demand has caused us to reduce headcount in manufacturing and field service and to reduce certain research and development costs. To successfully manage our growth, 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;
- leverage our expanded global sales and service presence through the acquisition of BTU International
- 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 cycles. If we are unable to manage these cycles effectively, we may not be able to take advantage of market opportunities, develop new technologies for the production of solar cells and other products, satisfy customer requirements, execute our business plan or respond to competitive pressures.

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

Historically, our product development has been accomplished through cooperative efforts with key customers. Our relationships with some customers and partners are substantially dependent on personal relations and other contacts established by either our Executive Chairman or our President and Chief Executive Officer. Our relationships with major European partners that are strategically important to the development and testing of our N-type technology solar diffusion furnace and PECVD equipment are substantially dependent upon our President and Chief Executive Officer, Mr. Fokko Pentinga. While there can be no assurance 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 Chairman, Mr. J.S. Whang, has established. Even though we are the beneficiary of life insurance policies on the life of Mr. Whang, in the amount of $2.0 million, there is no assurance that such amount 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 either Mr. Whang or Mr. Pentinga 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.

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. 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, including our acquisitions of R2D, SoLayTec and BTU, 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 risk that the issuance of our common stock, if any, in an acquisition or merger could be dilutive to our shareholders;
- acquired assets becoming impaired 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.

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 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 may also 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:

- 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.

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. Demand for products can change rapidly and unexpectedly. 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. During peak years in the solar and semiconductor industries, increases in demand for capital equipment results 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 would otherwise 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 a wide range of materials and services in the production of our products including custom electronic and mechanical components, and we use numerous suppliers of materials. Although we make what we believe are reasonable efforts to ensure that parts are available from multiple suppliers, this may not always be practical or possible. Accordingly,

some key parts are being procured from a single supplier or a limited group of suppliers. 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 solar and semiconductor production equipment.

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 appropriate internal organizational structures, internal controls and risk monitoring and management systems in line with the size of our organization.

Our business and operations have expanded rapidly through organic growth and acquisitions, as well as successfully managed frequent cyclical contractions. Significant management resources must be expended to develop and implement appropriate structures for internal organization and information flow, an effective internal control environment and risk monitoring and management systems in line with our fast growth as well as to hire and integrate qualified employees into our organization. It is challenging for us to hire, integrate and retain qualified employees in key areas of operations, such as engineers and technicians who are familiar with the industries. In addition, disclosure and other ongoing obligations associated with being a public company further increase the challenges to our finance, legal and accounting team. It is possible that our existing risk monitoring and management system could prove to be inadequate. If we fail to appropriately develop and implement 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, 2017 and 2016, our accrued warranty costs amounted to $1.3 million and $0.8 million, respectively. 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. We may 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:

- 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 stockholders could choose to act in their best interests and not necessarily those of our other stockholders.

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, 2017, and, therefore, have significant influence over our management and corporate policies. These stockholders have significant influence over all matters submitted to our stockholders, 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 stockholders may conflict with the interests of Amtech or those of our other stockholders, and these stockholders may cause us to take actions that align with their interests. Should conflicts of interest arise, we can provide no assurance that these stockholders would act in the best interests of our other stockholders or that any conflicts of interest would be resolved in a manner favorable to our other stockholders. In addition, involvement of certain activist stockholders 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.

Our results of operations are difficult to predict, and, if we do not meet the market expectations, the price of the our stock will likely decline.

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.

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.

21

Risks Related to Regulations and Litigation

Our business may be adversely affected by changes in foreign and domestic laws.

The operations of our companies are subject to the taxation policies, employment and labor laws, transportation regulations, import and export regulations and tariffs, possible foreign exchange restrictions and international monetary fluctuations. Changes in such laws and regulations may have a material adverse effect on our revenue and costs. We are subject to the Foreign Corrupt Practices Act, which may place us at a competitive disadvantage to foreign companies that are not subject to similar regulations. We could be adversely affected by violations of applicable anti-corruption laws or violations of our internal policies designed to ensure ethical business practices.

The United States could withdraw from or materially modify certain international trade agreements, or change tax provisions related to the global manufacturing and sales of our products.

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 presidential administration has made comments suggesting that it is not supportive of certain existing international trade agreements. At this time, it remains unclear what the current presidential administration will do with respect to these international trade agreements and U.S. tax provisions related to international commerce. Any action to withdraw from or materially modify international trade agreements, or change corporate tax policy related to international commerce, could adversely affect our financial condition 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 may also 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.

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.

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.

Securities litigation brought against us could cause us to incur substantial costs and divert management's attention and resources.

In the past, securities class action litigation often has been brought against a company 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. Any securities litigation could result in substantial costs and could divert the attention and resources of our management.

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 must also 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 either 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 competitive products and to satisfy customer demands for improved performance, features and functionality. There can be no 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 ensure 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. 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 risks resulting from diversification and entry into new markets and industries, 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. We also maintain trademarks on certain of our products and claim copyright protection for certain proprietary software and documentation. However, we can give no assurance that our trademarks and copyrights will be upheld or will successfully

deter infringement by third parties. The patent covering technology that we license and use in our manufacture of insert carriers has expired, which may have the effect of diminishing or eliminating any competitive advantage we may have with respect to this manufacturing process.

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. In such cases, we evaluate our position and consider the available alternatives, which may include seeking licenses to use the technology in question on commercially reasonable terms or defending our position. We cannot ensure that licenses can be obtained, or if obtained will be on acceptable terms, or that litigation or other administrative proceedings will not occur.

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. Intellectual property litigation, regardless of outcome, is expensive and time-consuming, could divert management’s attention from our business and have a material negative effect on our business, operating results or financial condition. 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. Our failure to develop non-infringing technologies or license the proprietary rights on a timely basis could harm our business. Parties making infringement claims on future issued patents may be able to obtain an injunction that would prevent us from selling or using our technology that contains the allegedly infringing intellectual property, which could harm our business.

Risks Related to Our Common Stock

Future sales 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, AZ	Corporate Headquarters	Own	15,000 sf
Solar Equipment Segment			
Vaassen, The Netherlands	Office, Mfg. & Warehouse	Own	54,000 sf
Vaassen, The Netherlands	Warehouse	Rent	23,000 sf
Clapiers, France	Office, Mfg. & Warehouse	Rent	12,000 sf
Clapiers, France	Manufacturing	Rent	6,500 sf
Le Cres, France	Manufacturing	Rent	3,000 sf
Semiconductor Equipment Segment			
N. Billerica, MA	Office, Mfg. & Warehouse	Own	150,000 sf
Ashvale, Surrey, U.K.	Office	Lease	1,900 sf
Shanghai, China	Office, Mfg. & Warehouse	Lease	49,000 sf
Singapore	Office	Lease	1,600 sf
Penang, Malaysia	Office	Lease	1,570 sf
Polishing Supplies Segment			
Carlisle, PA	Office & Mfg.	Lease	22,000 sf

Our building in North Billerica, MA secures a mortgage note with a remaining balance of $6.2 million as of September 30, 2017. 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. The maturity date of the debt is September 26, 2023.

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." On November 15, 2017, the closing price of our Common Stock as reported on the NASDAQ Global Select Market was $13.37 per share. The following table sets forth the high and low bid price at which the shares of our Common Stock traded for each quarter of fiscal 2017 and 2016, as reported by the NASDAQ Global Select Market.

	Fiscal 2017		Fiscal 2016	
	High	Low	High	Low
First quarter	$5.71	$4.00	$8.40	$4.12
Second quarter	$6.69	$3.99	$7.83	$4.41
Third quarter	$9.19	$5.17	$7.14	$5.53
Fourth quarter	$13.06	$8.13	$6.52	$4.75

COMPARISON OF STOCK PERFORMANCE

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, 2012.

HOLDERS

As of November 15, 2017, there were 459 shareholders of record of our Common Stock. Based upon a recent survey of brokers, we estimate there were approximately an additional 4,000 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.

COMPANY PURCHASES OF EQUITY SECURITIES

There were no purchases of equity securities in fiscal 2017.

UNREGISTERED SALES OF EQUITY SECURITIES

There were no unregistered sales of equity securities in fiscal 2017.

ITEM 6. SELECTED FINANCIAL DATA

This selected financial data 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.

	Years Ended September 30,				
	2017	2016	2015	2014	2013
Operating Data:					
Net revenue	$164,516	$120,308	$104,883	$56,501	$34,798
Gross profit	$51,932	$34,063	$27,008	$11,626	$4,313
Operating income (loss) [1]	$10,425	$(7,908)	$(13,521)	$(13,089)	$(19,994)
Net income (loss) attributable to Amtech Systems, Inc.[2][3]	$9,131	$(7,008)	$(7,771)	$(13,047)	$(20,069)
Income (loss) per share attributable to Amtech Systems, Inc.:					
Basic income (loss) per share	$0.68	$(0.53)	$(0.65)	$(1.34)	$(2.11)
Diluted income (loss) per share	$0.68	$(0.53)	$(0.65)	$(1.34)	$(2.11)
Order backlog	$102,377	$48,610	$34,589	$28,522	$26,766
Balance Sheet Data:					
Cash and cash equivalents	$51,121	$27,655	$25,852	$27,367	$37,197
Working capital	$71,144	$44,860	$46,331	$32,289	$42,861
Total assets	$191,623	$118,430	$125,456	$89,904	$110,947
Total current liabilities	$85,969	$38,064	$39,371	$33,136	$41,334
Current maturities of long-term debt	$361	$1,134	$919	$—	$—
Long-term debt	$8,134	$9,097	$8,448	$—	$—
Total equity	$90,483	$65,339	$72,647	$53,588	$66,803

(1) Includes $0.4 million, $0.1 million, $0.1 million, $0.3 million and $3.7 million of expense related to inventory write-downs in 2017, 2016, 2015, 2014 and 2013, respectively. Includes $0.6 million and $0.9 million of expense related to restructuring in 2015 and 2013, respectively. Includes $(0.7) million, $1.7 million, $(0.2) million, $1.3 million and $0.2 million of expense (benefit) related to provision for doubtful accounts receivable in 2017, 2016, 2015, 2014 and 2013, respectively.

(2) Includes a pre-tax gain of $2.6 million on the sale of service rights in 2016 and $8.8 million gain on deconsolidation resulting from the deconsolidation of Kingstone in 2015.

(3) Includes losses of $1.0 million, $1.5 million, $1.3 million, $1.7 million and $2.0 million in 2017, 2016, 2015, 2014 and 2013, respectively, which are attributable to the 55% controlling interest in Kingstone acquired February 18, 2011 (subsequently deconsolidated in 2015) and the 51% interest in SoLayTec acquired December 24, 2014. During 2017, we acquired the remaining 49% interest in SoLayTec, resulting in Amtech becoming the sole owner. Effective July 1, 2017, Amtech results no longer include a non-controlling interest attributable to SoLayTec.

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 in conjunction with our Consolidated Financial Statements and the related 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 discussed in "Risk Factors" and elsewhere in this Annual Report on Form 10-K. Please refer to page 3 for further information regarding forward-looking statements and Item 1A for a description of our risk factors.

Introduction

Management's Discussion and Analysis ("MD&A") is intended to facilitate an understanding of our business and results of operations. MD&A consists of the following sections:

- Overview: a summary of our business.
- Results of Operations: a discussion of operating results.
- Liquidity and Capital Resources: an analysis of cash flows, sources and uses of cash, financial position and off-balance sheet arrangements.
- Contractual Obligations and Commercial Commitments: a list of obligations and commercial commitments.
- Critical Accounting Policies: a discussion of critical accounting policies that require the exercise of judgments and estimates.
- Impact of Recently Issued Accounting Pronouncements: a discussion of how we are affected by recent pronouncements.

Overview

We operate in three reportable business segments: (i) Solar, (ii) Semiconductor and (iii) Polishing. In our Solar segment, we are a leading global supplier of thermal processing systems, including diffusion, plasma-enhanced chemical vapor deposition ("PECVD"), atomic layer deposition ("ALD"), and related automation, parts and services, to the solar/photovoltaic industry. In our Semiconductor segment, we supply thermal processing equipment, including solder reflow equipment and related controls and diffusion for use by leading semiconductor manufacturers, and in electronics assembly for automotive and other industries. In our Polishing segment, we produce consumables and machinery for lapping (fine abrading) and polishing of materials, such as sapphire substrates, optical components, silicon wafers, numerous types of crystalline materials, ceramics and metal components.

Our customers are primarily manufacturers of solar cells and integrated circuits. The solar cell and semiconductor industries are cyclical and historically have experienced significant fluctuations. Our revenue is impacted by these broad industry trends. Since 2012, the solar cell industry has experienced a structural imbalance between supply and demand. This imbalance has increased competitive pressure on selling prices and negatively impacted our results of operations. Our high throughput equipment platforms, technologies for higher cell efficiency, greater knowledge of the complete cell manufacturing process and advanced automation have contributed significantly to our success in

securing the large orders for the first two phases or a multi-phase turnkey project announced in January and April of 2017 from a new solar cell manufacturer in China. For equipment orders that are not part of turnkey projects, we compete with Chinese equipment manufacturers that offer lower prices coupled with liberal payment terms. We are finding it more difficult to participate in the capacity expansions of those Chinese companies that already have significant experience with all facets of producing solar cells and at least some prior experience working with the local equipment vendors. While we will continue to focus on developing advanced products and technologies, we plan to seek further cost reductions to address the competition from Chinese equipment vendors.

The large follow-on turnkey order announced in April 2017 (“Phase II”) is expected to ship primarily in the first quarter of fiscal 2018. Our quarterly and annual operating results have been and will continue to be impacted by the timing of large system orders. Further, the solar and semiconductor equipment industries are highly cyclical and the conditions of the industries we operate in are 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.

Our fiscal year is from October 1 to September 30. Unless otherwise stated, references to the years 2017, 2016 and 2015 relate to the fiscal years ended September 30, 2017, 2016 and 2015, respectively.

Results of Operations

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

	Years Ended September 30,		
	2017	2016	2015
Net revenue	100 %	100 %	100 %
Cost of sales	68 %	72 %	74 %
Gross margin	32 %	28 %	26 %
Selling, general and administrative	21 %	28 %	31 %
Restructuring charges	— %	— %	1 %
Research, development and engineering	4 %	7 %	7 %
Operating income (loss)	7 %	(7)%	(13)%
Gain on sale of other assets	— %	2 %	8 %
Income (loss) from equity method investment	— %	— %	— %
Interest expense and other income, net	— %	1 %	— %
Income (loss) before income taxes	7 %	(4)%	(5)%
Income tax provision	1 %	3 %	2 %
Net income (loss)	6 %	(7)%	(7)%
Add: net (income) loss attributable to non-controlling interest	1 %	1 %	(1)%
Net income (loss) attributable to Amtech Systems, Inc.	7 %	(6)%	(8)%

Fiscal 2017 compared to Fiscal 2016

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 or ratably 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 orders, system shipments, and recognition of revenue based on customer acceptances. The revenue of business units included in the Solar segment include some sales of equipment and parts to the semiconductor, silicon wafer and microelectromechanical (“MEMS”) industries, comprising less than 25% of the Solar segment revenue. See Critical Accounting Policies – Revenue Recognition.

Segment	Years Ended September 30, 2017	2016	Incr (Decr)	% Change
	(dollars in thousands)			
Solar	$87,031	$60,946	$26,085	43 %
Semiconductor	67,237	50,637	16,600	33 %
Polishing	10,248	8,725	1,523	17 %
Total net revenue	$164,516	$120,308	$44,208	37 %

Net revenue for the years ended September 30, 2017 and 2016 were $164.5 million and $120.3 million, respectively, an increase of $44.2 million or 37%. Revenue from the Solar segment increased $26.1 million or 43% primarily due to shipments of the first phase of a large turnkey order, previously announced in January 2017, slightly offset by lower sales of our ALD and automation equipment. Revenue from the Semiconductor segment increased 33% due primarily to improved industry trends and strong customer demand for our thermal processing systems and diffusion furnaces. Revenues from the Polishing segment increased 17% due primarily to increased sales of polishing templates and equipment.

Backlog and Orders

Our backlog as of September 30, 2017 and 2016 was $102.4 million and $48.6 million, respectively, an increase of $53.8 million or 108%. Our backlog as of September 30, 2017 includes approximately $81.4 million of orders and deferred revenue from our Solar segment customers compared to $34.0 million as of September 30, 2016. New orders booked in 2017 were $210.5 million ($126.6 million Solar) compared to $138.3 million ($76.0 million Solar) in 2016. The backlog of business units included in the Solar segment include some sales of equipment and parts to the semiconductor, silicon wafer and MEMS industries, comprising less than 25% of the Solar segment backlog.

At the end of 2017, one customer individually accounted for 49% of our total backlog, primarily related to the Phase II follow-on turnkey order announced in April 2017. Phase I of the turnkey order shipped in the third and fourth quarters of this fiscal year, with a meaningful portion of the revenue deferred until fiscal 2018, a portion of which will be recognized ratably through the final acceptance date and other portion will be recognized upon installation and acceptance. Phase II is expected to ship primarily in the first quarter of fiscal 2018, with a deferral of revenue similar to Phase I. 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. Our backlog also includes revenue deferred pursuant to our revenue recognition policy, derived from orders that have already been shipped, but which have not met the criteria for revenue recognition.

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 warranty, installation and paid service calls. Gross margin is gross profit as a percent of net revenue.

Segment	Years Ended September 30, 2017	Gross Margin	2016	Gross Margin	Incr (Decr)

Solar	$21,671	25%	$10,973	18%	$10,698
Semiconductor	26,340	39%	20,301	40%	6,039
Polishing	3,921	38%	2,789	32%	1,132
Total gross profit	$51,932	32%	$34,063	28%	$17,869

Gross profit for the years ended September 30, 2017 and 2016 was $51.9 million and $34.1 million respectively, representing an increase of $17.9 million or 52%. Gross margin for 2017 and 2016 was 32% and 28%, respectively.

Gross margin for the Solar segment increased to 25% in 2017, compared to 18% in 2016, due primarily higher sales volumes and product mix, slightly offset by less usage of previously reserved inventory. In the Semiconductor segment, gross margin decreased slightly to 39% in 2017, compared to 40% in 2016 primarily due to a lower margin product mix offset by increased sales volumes. In 2017 and 2016, use of previously written down inventory had a $0.4 million and $2.4 million favorable impact, respectively. Gross margin from our Polishing segment was 38% and 32% in 2017 and 2016, respectively. Higher margins in this segment in 2017 resulted primarily from increased sales volumes and sales of higher margin products. In 2017, we recognized $0.4 million of previously deferred gross profit compared to a gross profit deferral of $0.8 million in 2016.

Selling, General and Administrative Expenses

Selling, general and administrative expenses (“SG&A”) 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, 2017 and 2016 were $35.1 million and $34.0 million, respectively. In 2017, SG&A increased due to higher commissions on higher shipments, severance and other employee-related expenses. SG&A expense in 2016 includes a provision for doubtful accounts receivable of $1.7 million, of which $1.0 million was reversed when collected in the first quarter of fiscal 2017. SG&A expense includes $1.3 million and $1.4 million of stock-based compensation expense for 2017 and 2016, respectively.

Research, Development and Engineering

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.

	Years Ended September 30,			
	2017	2016	Inc (Dec)	%
	(dollars in thousands)			
Research, development and engineering	$7,001	$9,535	$(2,534)	(27)%
Grants earned	(629)	(1,531)	902	(59)%
Net research, development and engineering	$6,372	$8,004	$(1,632)	(20)%

RD&E expense, net of grants earned, for the year ended September 30, 2017 decreased $1.6 million compared to 2016, primarily due to lower spending and lower grant recognition.

Gain on Sale of Other Assets

For the year ended September 30, 2016, we recognized a gain of $2.6 million on the sale of our exclusive sale and service rights in the Kingstone solar ion implanter, with no comparable items in the 2017 period.

Income (Loss) from Equity Method Investment

For the years ended September 30, 2017 and 2016 we recognized investment loss of $0.4 million and investment income of $0.3 million, respectively, related to our 15% equity investment in Kingstone Hong Kong.

Income Taxes

Our effective tax rate was 17.7% and negative 56.9% in fiscal 2017 and 2016, respectively. The effective tax rate is the ratio of total income tax expense (benefit) to pre-tax income (loss). The effective tax rate for fiscal 2017 was lower than the U.S. statutory rate due primarily to the release of valuation allowances related to net operating loss carryforwards (“NOLs”) utilized in The Netherlands, China and the U.S. and lower tax rates on earnings in foreign jurisdictions. The tax expense for fiscal 2016 and the related negative effective tax rates were due primarily to taxes on gains related to

the partial dispositions of our investment in Kingstone and the added valuation allowance on the remaining U.S. deferred tax assets. See Note 10 of the Notes to Consolidated Financial Statements included in this Annual Report.

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 fiscal 2017, cumulative losses weighed heavily in the overall assessment. As a result of the review, where cumulative losses had been incurred, we concluded in 2017 that it was appropriate to maintain a full valuation allowance for substantially all net deferred tax assets in the U.S. and foreign jurisdictions, including the carryforwards of U.S. net operating losses and foreign tax credits, which were acquired in the merger with BTU International.

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.

Fiscal 2016 compared to Fiscal 2015

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 or ratably 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 recognition of revenue based on customer acceptances. See Critical Accounting Policies – Revenue Recognition.

	Years Ended September 30,			
Segment	2016	2015	Inc (Dec)	%
	(dollars in thousands)			
Solar	$60,946	$56,689	$4,257	8 %
Semiconductor	50,637	37,250	13,387	36 %
Polishing	8,725	10,944	(2,219)	(20)%
Total net revenue	$120,308	$104,883	$15,425	15 %

Net revenue for the years ended September 30, 2016 and 2015 were $120.3 million and $104.9 million, respectively, an increase of $15.4 million or 15%. Revenue from the solar segment increased 8% primarily due to higher ALD sales, partially offset by less revenues due to the deconsolidation of Kingstone. Additionally, the Solar segment had a net deferral of revenue of $0.8 million in 2016 compared to net recognition of previously-deferred revenue of $0.9 million in 2015. Revenue from the Semiconductor segment increased 36% due primarily to inclusion of BTU for all of fiscal year 2016 versus eight months in 2015, improved industry trends and changes in product mix. Revenues from the Polishing segment decreased due primarily to decreases in sales of polishing templates and equipment resulting from competitive pressures caused, in part, by the strength of the U.S. dollar versus other currencies in the markets in which we compete.

Backlog and Orders

Our backlog as of September 30, 2016 and 2015 was $48.6 million and $34.6 million, respectively. Our backlog as of September 30, 2016 included approximately $34.0 million of orders and deferred revenue from our solar industry customers compared to $22.9 million as of September 30, 2015. New orders booked in 2016 were $138.3 million ($76.0 million Solar) compared to $109.9 million ($61.2 million Solar) in 2015. At the end of fiscal 2016, two customers individually accounted for 26% and 14% of our total backlog. At the end of fiscal 2015, two customers individually accounted for 15% and 14% of our total backlog. 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. Our backlog also includes revenue deferred pursuant to our revenue recognition policy, derived from orders that have already been shipped, but which have not met the criteria for revenue recognition.

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 warranty, installation and paid service calls. Gross margin is gross profit as a percent of net revenue.

	Years Ended September 30,				
Segment	2016	Gross Margin	2015	Gross Margin	Incr (Decr)
Solar	$10,973	18%	$11,639	21%	$(666)
Semiconductor	20,301	40%	11,442	31%	8,859
Polishing	2,789	32%	3,927	36%	(1,138)
Total gross profit	$34,063	28%	$27,008	26%	$7,055

Gross profit for the years ended September 30, 2016 and 2015 was $34.1 million and $27.0 million respectively; an increase of $7.1 million or 26%. Gross margin for 2016 and 2015 was 28% and 26%, respectively. Gross margin for the Solar segment decreased to 18% in 2016, compared to 21% in 2015 due primarily to the net deferral of revenue in 2016 versus the net recognition of previously deferred revenue in 2015. In the Semiconductor segment gross margin was 40% in fiscal 2016, compared to 31% in fiscal 2015 primarily due to the BTU acquisition and favorable product mix. In 2016 and 2015, use of previously written down inventory had a $2.4 million and $4.0 million favorable impact, respectively. In 2016, we had a net profit deferral of $0.8 million compared to a net recognition of previously deferred profit of $1.3 million in 2015. Gross margin from our Polishing segment was 32% and 36% in 2016 and 2015, respectively. Lower margins in this segment resulted primarily from lower sales volumes.

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, 2016 and 2015 were $34.0 million and $33.0 million, respectively. In 2016, SG&A increased due to higher expenses incurred by BTU, which reflects twelve months of expenses in fiscal 2016 versus eight months in fiscal 2015 year-to-date, as well as a provision for doubtful accounts receivable of $1.7 million. The increases in SG&A were offset by lower acquisition and legal fees related to our

acquisition of BTU in January 2015, lower commissions expense resulting from lower commissionable sales and lower expenses due to the deconsolidation of Kingstone. SG&A expense includes $1.4 million and $1.2 million of stock-based compensation expense for 2016 and 2015, respectively.

Impairment and Restructuring Charges

There were no restructuring charges for the year ended September 30, 2016. Restructuring charges for the year ended September 30, 2015 were $0.6 million, related primarily to severance costs in connection with the BTU acquisition.

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.

	Years Ended September 30,			
	2016	2015	Inc (Dec)	%
	(dollars in thousands)			
Research, development and engineering	$9,535	$13,214	$(3,679)	(28)%
Grants earned	(1,531)	(6,296)	4,765	(76)%
Net research, development and engineering	$8,004	$6,918	$1,086	16 %

RD&E expense, net of grants earned, for the year ended September 30, 2016 increased $1.1 million compared to 2015, primarily due to lower grant recognition resulting from the deconsolidation of Kingstone.

Gain on Sale of Other Assets

For the year ended September 30, 2016, we recognized a gain of $2.6 million on the sale of our exclusive sale and service rights in the Kingstone solar ion implanter, compared to the $8.8 million gain on the 2015 Kingstone transaction and deconsolidation.

Income from Equity Method Investment

For the year ended September 30, 2016 we recognized investment income of $0.3 million related to our 15% equity investment in Kingstone Hong Kong.

Income Tax Provision

Our effective tax rate was negative 56.9% and negative 39.8% in 2016 and 2015, respectively. The effective tax rate is the ratio of total income tax expense (benefit) to pre-tax income (loss). The tax expense and the related negative effective tax rates were due primarily to taxes on gains related to the partial dispositions of our investment in Kingstone in 2016 and 2015 and the added valuation allowance on the remaining U.S. deferred tax assets in 2016. See Note 10 of the Notes to Consolidated Financial Statements included in this Annual Report. The valuation allowance on the remaining U.S. deferred tax assets was established in the current period when it was determined that, due to tax planning strategies, future taxable income in the U.S. on intercompany transactions will be reduced significantly. These transactions are eliminated in the consolidated financial statements. The effective tax rates in 2016 and 2015 were different than the 34% U.S. tax rate primarily due to the valuation allowance on net operating losses in The Netherlands, China and France and in 2016 the valuation on the remaining U.S. deferred tax assets.

The Financial Accounting Standards 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 standards, it is difficult to conclude that a valuation allowance is not needed when the negative evidence includes cumulative losses in recent years. Therefore,

cumulative losses weigh heavily in the overall assessment. As a result of the review, where cumulative losses had been incurred, we have concluded in 2015 and 2016 that it was appropriate to maintain a full valuation allowance for substantially all net deferred tax assets in foreign jurisdictions and the carryforwards of U.S. net operating losses and foreign tax credits, which were acquired in the merger with BTU International. Through the end of third quarter of fiscal 2016, the existence of future taxable income on intercompany transactions caused us to believe that it is more likely than not the other United States deferred tax assets would be realized. However, tax planning strategies to reduce sources of future taxable income caused us to conclude in the fourth quarter of fiscal 2016 that a valuation allowance should be established on the remaining U.S. deferred tax assets.

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

As of September 30, 2017 and 2016, cash and cash equivalents were $51.1 million and $27.7 million, respectively. As of September 30, 2017 and 2016, cash and cash equivalents held by our foreign subsidiaries was $17.0 million and $7.6 million, respectively. As of September 30, 2017 and 2016, restricted cash was $24.6 million and $0.9 million, respectively, of which $24.4 million and $0.7 million, respectively, was held by our foreign subsidiaries. Restricted cash increased due to an increase in customer deposits requiring bank guarantees collateralized by cash. Our working capital was $71.1 million as of September 30, 2017 and $44.9 million as of September 30, 2016.

The increase in cash during 2017 was primarily due to $12.3 million of net income adjusted for non-cash items. The large customer deposits received by our Solar segment related to Phase I and Phase II of the large turnkey project are mostly offset by an increase in restricted cash, with the remainder primarily used for increases in inventories and vendor deposits in order to facilitate the fulfillment of the turnkey orders. Further contributing to the increase in cash during 2017 is net proceeds from a stock offering in August 2017, of $10.6 million. We plan to use the net proceeds of the stock offering for general corporate purposes, which may include working capital, capital expenditures, and potential acquisitions. We maintain cash accounts denominated in currencies other than our reporting currency, which expose us to foreign exchange rate fluctuations.

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, acquisitions or expansion; consequently, we do not expect to pay dividends on common stock in the foreseeable future.

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 include common and preferred stock sold in private transactions and public offerings, long-term debt and customer deposits. There can be no assurance that we can raise such additional capital resources 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.

	Fiscal Years Ended September 30,		
	2017	2016	2015
	(dollars in thousands)		
Net cash provided by (used in) operating activities	$11,789	$(9,689)	$(10,067)
Net cash (used in) provided by investing activities	$(1,216)	$11,173	$8,281
Net cash provided by financing activities	$12,701	$457	$805

Cash Flows from Operating Activities

Cash provided by operating activities was $11.8 million in 2017 and cash used in operating activities was $9.7 million and $10.1 million in fiscal years 2016 and 2015, respectively. 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 restricted cash, an increase in accounts receivable due to the high volumes of shipments during the fourth quarter of 2017, and advances made to vendors.

During 2016 and 2015, cash declined due to losses from operations, adjusted for non-cash charges. In 2016, cash was used in operations due to an increase in accounts receivable and payments of accrued liabilities, partially offset by increases in inventories and accrued income taxes. In 2015, cash was used to make tax payments of $5.1 million and through increases in inventory and other working capital, partially offset by increases in accounts payable and customer deposits.

Cash Flows from Investing Activities

Cash used in investing activities was $1.2 million in 2017. Investing activities in 2016 provided cash of $7.0 million from the partial sale of our equity interest in Kingstone and $4.9 million from the sale of the related sale and service rights. Investing activities in 2015 provided cash of $8.3 million due to $8.2 million net of cash acquired in the acquisition of BTU and SoLayTec and $0.7 million of proceeds from the sale of a portion of our investment in Kingstone. Investing activities in 2017, 2016 and 2015 included capital expenditures of $1.3 million, $1.0 million and $0.6 million, respectively.

Cash Flows from Financing Activities

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. In 2016, the primary source of $0.5 million of cash provided by financing activities was borrowings of long-term debt of $1.1 million, net of payments of $0.7 million. In 2015, cash provided by financing activities was $0.8 million, consisting primarily of net borrowings on long-term obligations and net proceeds from the exercise of stock options.

Off-Balance Sheet Arrangements

As of September 30, 2017, we had no off-balance sheet arrangements as defined in Item 303(a)(4) of Regulation S-K promulgated by the Securities and Exchange Commission 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, 2017:

Contractual obligations	Total	Less than 1 year	1-3 years	3-5 years	More than 5 years
	(dollars in thousands)				
Debt obligations	$8,495	$361	$977	$1,679	$5,478
Operating lease obligations:					
Buildings	1,738	666	946	126	—
Office equipment	145	75	50	20	—
Vehicles	412	203	185	24	—
Total operating lease obligations	2,295	944	1,181	170	—
Purchase obligations	34,389	34,389	—	—	—
Total	$45,179	$35,694	$2,158	$1,849	$5,478
Other commercial obligations:					
Bank guarantees	$24,531	$24,531	$—	—	—

Critical Accounting Policies

“Management’s Discussion and Analysis of Financial Condition and Results of Operations” discusses 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 review product and service sales contracts with multiple deliverables to determine if separate units of accounting are present. Where separate units of accounting exist, revenue allocated to delivered items is the lower of the relative selling price of the delivered items in the sales arrangement or the portion of the selling price that is not contingent upon performance of the service.

We recognize revenue when persuasive evidence of an arrangement exists; the product has been delivered and title has transferred, or services have been rendered; and the seller's price to the buyer is fixed or determinable and collectability is reasonably assured. For us, this policy generally results in revenue recognition at the following points:

1. For our equipment business, transactions where legal title passes to the customer upon shipment, we recognize revenue upon shipment for those products where the customer's defined specifications have been met with at least two similarly configured systems and processes for a comparably situated customer. Our selling prices may include both equipment and services, i.e., installation and start-up services performed by our service technicians. The equipment and services are multiple deliverables. Certain equipment that has a positive track record of successful installation and customer acceptance are considered to be routine systems. Our recognition of revenue upon delivery of such equipment that has been routinely installed and accepted is equal to the total selling price minus the relative selling price of the undelivered services.

Where the installation and acceptance of more than two similarly configured items of equipment have not become routine, recognition of revenue upon delivery of equipment is limited to the lesser of (i) the total selling price minus the relative selling price of the undelivered services or (ii) the non-contingent amount. Since we defer only those costs directly related to installation, or other unit of accounting not yet delivered, and the portion of the contract price is often considerably greater than the relative selling price of those items, our policy at times will result in deferral of profit that is disproportionate in relation to the deferred revenue. When this is the case, the gross margin recognized in one period will be lower and the gross margin reported in a subsequent period will improve.

2. 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. We have, on occasion, experienced longer than expected delays in receiving cash from certain customers pending final installation or system acceptance. If some of our customers refuse to pay the final payment, or otherwise delay final acceptance or installation, the deferred revenue would not be recognized, adversely affecting our future cash flows and operating results.

3. Sales of certain equipment, spare parts and consumables are recognized upon shipment, as there are no post shipment obligations other than standard warranties.

4.

Service revenue is recognized upon performance of the services requested by the customer. Revenue related to service contracts is recognized ratably over the period of the contract or in accordance with the terms of the contract, which generally coincides with the performance of the services requested by the customer.

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.

In fiscal 2016 and 2015, judgment was also exercised in determining the amount of income taxes to recognize in those years in connection with the reorganization of our Netherlands operations and the related tax on those transfers. In fiscal 2015, judgment was necessary in the proper application of the tax regulations of foreign jurisdictions in conjunction with the partial sale of our investment in Kingstone.

Inventory Valuation and Inventory Purchase Commitments. We value our inventory at the lower of cost or net realizable value. Costs for approximately 55% of inventory are determined on an average cost basis with the remainder determined on a first-in, first-out (FIFO) 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 ASC 360-Property, Plant, and Equipment, 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 ASC 350-Intangibles-Goodwill and Other, 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 the impact of recently issued accounting pronouncements, see “Item 8: Financial Statements and Supplementary Data” under Footnote 1 “Summary of Significant Accounting Policies” under “Impact of Recently Issued Accounting Pronouncements.”

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

We are exposed to foreign currency exchange rates to the extent sales contracts, purchase contracts, assets or liabilities of our operations are denominated in currencies other than their functional currency. Our operations in the United States are generally conducted in U.S. dollars. Our operations in Europe, China and other countries conduct business primarily in their respective functional currencies, but occasionally we enter into transactions in non-functional currencies. It is highly uncertain how currency exchange rates will fluctuate in the future. Actual changes in foreign exchange rates could adversely affect our operating results or financial condition.

During 2017 and 2016, we did not hold any stand-alone or separate derivative instruments. We incurred net foreign currency transaction losses of $0.1 million in 2017 and a foreign currency transaction losses of less than $0.1 million in 2016.

We incurred a foreign currency translation gain of $0.4 million and a loss of $0.2 million during 2017 and 2016, respectively, a type of other comprehensive income (loss), which is a direct adjustment to stockholders’ equity. Our net investment in and long-term advances to our foreign operations totaled $59.9 million as of September 30, 2017. A 10% change in the value of the foreign currencies relative to the U.S. dollar would cause approximately $6.0 million of other comprehensive income (loss).

As of September 30, 2017 sales commitments denominated in a currency other than the functional currency of our transacting operation totaled approximately $15.5 million. Our lead-times to fulfill these commitments generally range between 13 and 26 weeks. A 10% change in the relevant exchange rates between the time the order was taken and the time of shipment would cause our gross profit on such orders to be $1.5 million greater or less than expected on the date the order was taken.

As of September 30, 2017, purchase commitments denominated in a currency other than the functional currency of our transacting operation totaled $5.1 million. A 10% change in the relevant exchange rates between the time the purchase order was placed and the time the order is received would not cause our cost of such items to be significantly greater or less than expected on the date the purchase order was placed.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

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

Financial Statements

Reports of Independent Registered Public Accounting Firm	42
Consolidated Balance Sheets: September 30, 2017 and 2016	44
Consolidated Statements of Operations: Years ended September 30, 2017, 2016 and 2015	45
Consolidated Statements of Comprehensive Income (Loss): Years ended September 30, 2017, 2016 and 2015	46
Consolidated Statements of Stockholders' Equity: Years ended September 30, 2017, 2016 and 2015	47
Consolidated Statements of Cash Flows: Years ended September 30, 2017, 2016 and 2015	48
Notes to Consolidated Financial Statements	49

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Board of Directors and
Stockholders of
AMTECH SYSTEMS, INC.

We have audited the accompanying consolidated balance sheets of Amtech Systems, Inc. and Subsidiaries as of September 30, 2017 and 2016, and the related consolidated statements of operations, comprehensive income (loss), stockholders' equity, and cash flows for each of the three years in the period ended September 30, 2017. These consolidated financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these consolidated financial statements based on our audits.

We conducted our audits in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the consolidated financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall consolidated financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of Amtech Systems, Inc. and Subsidiaries as of September 30, 2017 and 2016, and the results of their operations and their cash flows for each of the three years in the period ended September 30, 2017, 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 effectiveness of Amtech Systems, Inc. and Subsidiaries' internal control over financial reporting as of September 30, 2017, based on criteria established in Internal Control-Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO), and our report dated November 20, 2017, expressed an unqualified opinion.

/s/ MAYER HOFFMAN MCCANN P.C.

Phoenix, Arizona
November 20, 2017

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Board of Directors and
Stockholders of
AMTECH SYSTEMS, INC.

We have audited Amtech Systems, Inc. and Subsidiaries' (the "Company") internal control over financial reporting as of September 30, 2017 based on criteria established in Internal Control-Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). 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 conducted our audit in accordance with the standards of the Public Company Accounting Oversight Board (United States). 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.

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

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

In our opinion, Amtech Systems, Inc. and Subsidiaries maintained, in all material respects, effective internal control over financial reporting as of September 30, 2017, based on criteria established in Internal Control-Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

We have also audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States), the consolidated balance sheets and the related consolidated statements of operations, comprehensive income (loss), stockholders' equity, and cash flows of the Company, and our report dated November 20, 2017, expressed an unqualified opinion.

/s/ MAYER HOFFMAN MCCANN P.C.

Phoenix, Arizona
November 20, 2017

43

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

Assets	September 30, 2017	September 30, 2016
Current Assets		
Cash and cash equivalents	$ 51,121	$ 27,655
Restricted cash	24,640	893
Accounts receivable		
Trade (less allowance for doubtful accounts of $866 and $3,730 at September 30, 2017 and September 30, 2016, respectively)	22,519	17,642
Unbilled and other	14,275	8,634
Inventories	30,210	23,223
Refundable income taxes	—	260
Vendor deposits	11,806	1,962
Other	2,542	2,655
Total current assets	157,113	82,924
Property, Plant and Equipment - Net	15,792	15,960
Intangible Assets - Net	3,495	4,100
Goodwill - Net	11,405	11,119
Investments	2,615	3,032
Deferred Income Taxes - Long-Term	200	200
Other Assets - Long-Term	1,003	1,095
Total Assets	$ 191,623	$ 118,430
Liabilities and Stockholders' Equity		
Current Liabilities		
Accounts payable	$ 21,555	$ 15,397
Accrued compensation and related taxes	7,592	5,710
Accrued warranty expense	1,254	795
Other accrued liabilities	2,056	2,164
Customer deposits	48,784	7,055
Current maturities of long-term debt	361	1,134
Deferred profit	4,081	4,709
Income taxes payable	286	1,100
Total current liabilities	85,969	38,064
Long-Term Debt	8,134	9,097
Income Taxes Payable - Long-Term	7,037	5,930
Total Liabilities	101,140	53,091
Commitments and Contingencies		
Stockholders' 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: 14,710,591 and 13,179,355 at September 30, 2017 and September 30, 2016, respectively	147	132
Additional paid-in capital	125,564	111,631
Accumulated other comprehensive loss	(8,529)	(8,876)
Retained deficit	(26,699)	(35,830)

Total Stockholders' Equity	90,483	67,057
Non-controlling interest	—	(1,718)
Total Equity	90,483	65,339
Total Liabilities and Stockholders' Equity	$ 191,623	$ 118,430

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,		
	2017	2016	2015
Revenue, net of returns and allowances	$164,516	$120,308	$104,883
Cost of sales	112,584	86,245	77,875
Gross profit	51,932	34,063	27,008
Selling, general and administrative	35,135	33,967	33,028
Research, development and engineering	6,372	8,004	6,918
Restructuring charges	—	—	583
Operating income (loss)	10,425	(7,908)	(13,521)
Gain on deconsolidation of Kingstone	—	—	8,814
Gain on sale of other assets	—	2,576	—
(Loss) income from equity method investment	(417)	299	—
Interest and other expense, net	(178)	(417)	(100)
Income (loss) before income taxes	9,830	(5,450)	(4,807)
Income tax provision	1,744	3,100	1,910
Net income (loss)	8,086	(8,550)	(6,717)
Add: Net loss (income) attributable to non-controlling interest	1,045	1,542	(1,054)
Net income (loss) attributable to Amtech Systems, Inc.	$9,131	$(7,008)	$(7,771)
Income (Loss) Per Share:			
Basic income (loss) per share attributable to Amtech shareholders	$0.68	$(0.53)	$(0.65)
Weighted average shares outstanding	13,378	13,168	12,022
Diluted income (loss) per share attributable to Amtech shareholders	$0.68	$(0.53)	$(0.65)
Weighted average shares outstanding	13,501	13,168	12,022

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,		
	2017	2016	2015
Net income (loss)	$8,086	$(8,550)	$(6,717)
Foreign currency translation adjustment	423	(199)	(3,010)
Comprehensive income (loss)	8,509	(8,749)	(9,727)
Comprehensive (income) loss attributable to non-controlling interest	969	1,531	(920)
Comprehensive income (loss) attributable to Amtech Systems, Inc.	$9,478	$(7,218)	$(10,647)

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

AMTECH SYSTEMS, INC. AND SUBSIDIARIES
Consolidated Statements Of Stockholders' Equity
(in thousands)

	Common Stock Number of Shares	Amount	Additional Paid-In Capital	Accumulated Other Comprehensive Income (Loss)	Retained Earnings	Total Stockholders' Equity	Non-controlling Interest	Total Equity
Balance at September 30, 2014	9,848	$ 98	$ 81,884	$ (5,790)	$ (21,051)	$ 55,141	$ (1,553)	$ 53,588
Net loss	—	—	—	—	(7,771)	(7,771)	1,054	(6,717)
Translation adjustment	—	—	—	(2,876)	—	(2,876)	(134)	(3,010)
Acquisition of interest in SoLayTec	—	—	—	—	—	—	1,221	1,221
Deconsolidation of Kingstone	—	—	—	—	—	—	(775)	(775)
Tax benefit of stock compensation	—	—	30	—	—	30	—	30
Stock compensation expense	—	—	1,162	—	—	1,162	—	1,162
Shares issued for BTU purchase	3,186	32	26,593	—		26,625	—	26,625
Restricted shares released	22	—	—	—	—	—	—	—
Stock options exercised	94	1	522	—	—	523	—	523
Balance at September 30, 2015	13,150	$ 131	$ 110,191	$ (8,666)	$ (28,822)	$ 72,834	$ (187)	$ 72,647
Net loss	—	—	—	—	(7,008)	(7,008)	(1,542)	(8,550)
Translation adjustment	—	—	—	(210)	—	(210)	11	(199)
Tax benefit of stock compensation	—	—	—	—	—	—	—	—
Stock compensation expense	—	—	1,390	—	—	1,390	—	1,390
Restricted shares released	14	—	—	—	—	—	—	—
Stock options exercised	15	1	50	—	—	51	—	51
Balance 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
Balance at September 30, 2017	14,711	$ 147	$ 125,564	$ (8,529)	$ (26,699)	$ 90,483	$ —	$ 90,483

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

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

	Year Ended September 30,		
	2017	2016	2015
Operating Activities			
Net income (loss)	$8,086	$(8,550)	$(6,717)
Adjustments to reconcile net income (loss) to net cash provided by (used in) operating activities:			
Depreciation and amortization	2,493	2,974	3,357
Write-down of inventory	420	84	138
Capitalized interest	277	322	—
(Reversal of) provision for allowance for doubtful accounts	(720)	1,698	(194)
Deferred income taxes	(27)	2,280	454
Non-cash share based compensation expense	1,328	1,390	1,162
Gain on deconsolidation of subsidiary	—	—	(8,814)
Loss (gain) on sale of fixed assets	26	(60)	—
Gain on sale of other assets	—	(2,576)	—
Loss (income) from equity method investment	417	(299)	—
Changes in operating assets and liabilities:			
Restricted cash	(22,262)	(253)	(1,731)
Accounts receivable	(8,655)	(4,998)	1,700
Inventories	(6,638)	491	(1,308)
Accrued income taxes	573	351	(4,329)
Vendor deposits and other assets	(8,898)	(814)	2,119
Accounts payable	5,374	(224)	939
Customer deposits and accrued liabilities	40,817	(1,355)	4,647
Deferred profit	(822)	(150)	(1,490)
Net cash provided by (used in) operating activities	11,789	(9,689)	(10,067)
Investing Activities			
Purchases of property, plant and equipment	(1,256)	(978)	(610)
Investment in acquisitions, net of cash	—	—	8,191
Proceeds from sale of property, plant and equipment	40	255	—
Proceeds from partial sale of subsidiary	—	7,012	700
Proceeds from the sale of other assets	—	4,884	—
Net cash (used in) provided by investing activities	(1,216)	11,173	8,281
Financing Activities			
Proceeds from issuance of common stock, net	12,602	51	523
Payments on long-term obligations	(674)	(739)	(482)
Borrowings on long term debt	755	1,145	734
Excess tax benefit of stock compensation	18	—	30
Net cash provided by financing activities	12,701	457	805
Effect of Exchange Rate Changes on Cash	192	(138)	(534)
Net Increase (Decrease) in Cash and Cash Equivalents	23,466	1,803	(1,515)
Cash and Cash Equivalents, Beginning of Year	27,655	25,852	27,367
Cash and Cash Equivalents, End of Year	$51,121	$27,655	$25,852
Supplemental Cash Flow Information:			
Income tax refunds (payments), net	$146	$(116)	$(5,104)
Issuance of common stock for acquisitions	—	—	26,625

Interest paid, net of capitalized interest	269	305	440
Supplemental Non-cash Financing and Investing Activities:			
Transfer inventory to property, plant, and equipment	$120	$—	$—
Transfer of property, plant, and equipment to inventory	22	526	—
Net of acquired non-controlling interest over debt forgiveness (See Note 12)	(332)	—	—

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

Notes to Consolidated Financial Statements
For the Years Ended September 30, 2017, 2016 and 2015

1. Summary of Operations and Significant Accounting Policies

Description of Business – Amtech Systems, Inc. (the "Company," "Amtech," "we," "our" or "us") is a global manufacturer of capital equipment, including thermal processing, silicon wafer handling automation, and related consumables used in fabricating solar cells, LED and semiconductor devices. We sell these products to solar cell and semiconductor manufacturers worldwide, particularly in Asia, United States and Europe.

We serve niche markets in industries that are experiencing rapid 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.

Our fiscal year is from October 1 to September 30. Unless otherwise stated, references to the years 2017, 2016 and 2015 relate to the fiscal years ended September 30, 2017, 2016 and 2015, respectively.

Acquisitions and Divestitures – In December 2014, we expanded our participation in the solar market by acquiring a 51% controlling interest in SoLayTec B.V. ("SoLayTec"), based in Eindhoven, the Netherlands, which provides ALD systems used in high efficiency solar cells. The acquisition of the controlling interest in SoLayTec supports our business model of growth through strategic acquisition. In July 2017, we purchased the non-controlling interest in SoLayTec, pursuant to which SoLayTec became a wholly-owned subsidiary of Amtech.

In January 2015, we completed our acquisition of BTU International, Inc. ("BTU"), a Delaware corporation, pursuant to which BTU became a wholly-owned subsidiary of Amtech. Amtech acquired all of the outstanding stock of BTU in an all-stock transaction. BTU stockholders received 0.3291 shares of Amtech common stock for every share of BTU stock. The combination with BTU further positioned Amtech as a leading, global supplier of solar and semiconductor production and automation systems.

In September 2015, we sold a portion of our interest in Kingstone Technology Hong Kong Limited ("Kingstone Hong Kong") that is the parent company of Shanghai Kingstone (collectively with Kingstone Hong Kong, "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), to a China-based venture capital firm. Proceeds from the sale of shares were paid to Amtech and used to support our core strategic initiatives. We now own 15% of the holding company, Kingstone Hong Kong, following consummation of the transaction, which effectively represents an 8% beneficial ownership interest in the Shanghai operating entity, Shanghai Kingstone.

See Note 12 for a discussion of our acquisitions and Note 13 for a discussion of our divestitures.

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, the non-controlling interest will no longer be 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. These reclassifications had no effect on the previously reported Consolidated Financial Statements for any period.

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.

Accounts Receivable – Unbilled and Other – Unbilled and other accounts receivable consist mainly of the contingent portion of the sales price that is not collectible until successful installation of the product. These amounts are generally billed upon final customer acceptance.

Inventory – We value our inventory at the lower of cost or net realizable value. Costs for approximately 55% and 50% of inventory as of September 30, 2017 and 2016, respectively, are determined on an average cost basis with the remainder determined on a first-in, first-out (FIFO) basis.

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 is 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.

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 and intangible assets with indefinite lives are 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 or the indefinite-lived intangible asset 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.

Revenue Recognition – We review product and service sales contracts with multiple deliverables to determine if separate units of accounting are present. Where separate units of accounting exist, revenue allocated to delivered items

is the lower of the relative selling price of the delivered items in the sales arrangement or the portion of the selling price that is not contingent upon performance of the service.

We recognize revenue when persuasive evidence of an arrangement exists; the product has been delivered and title has transferred, or services have been rendered; and the seller's price to the buyer is fixed or determinable and collectability is reasonably assured. For us, this policy generally results in revenue recognition at the following points:

1. For our equipment business, transactions where legal title passes to the customer upon shipment, we recognize revenue upon shipment for those products where the customer's defined specifications have been met with at least two similarly configured systems and processes for a comparably situated customer. Our selling prices may include both equipment and services, i.e., installation and start-up services performed by our service technicians. The equipment and services are multiple deliverables. Certain equipment that has a positive track record of successful installation and customer acceptance are considered to be routine systems. Our recognition of revenue upon delivery of such equipment that has been routinely installed and accepted is equal to the total selling price minus the relative selling price of the undelivered services.

Where the installation and acceptance of more than two similarly configured items of equipment have not become routine, recognition of revenue upon delivery of equipment is limited to the lesser of (i) the total selling price minus the relative selling price of the undelivered services or (ii) the non-contingent amount. Since we defer only those costs directly related to installation, or other unit of accounting not yet delivered, and the portion of the contract price is often considerably greater than the relative selling price of those items, our policy at times will result in deferral of profit that is disproportionate in relation to the deferred revenue. When this is the case, the gross margin recognized in one period will be lower and the gross margin reported in a subsequent period will improve.

2. 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. We have, on occasion, experienced longer than expected delays in receiving cash from certain customers pending final installation or system acceptance. If some of our customers refuse to pay the final payment, or otherwise delay final acceptance or installation, the deferred revenue would not be recognized, adversely affecting our future cash flows and operating results.

3. Sales of certain equipment, spare parts and consumables are recognized upon shipment, as there are no post shipment obligations other than standard warranties.

4. Service revenue is recognized upon performance of the services requested by the customer. Revenue related to service contracts is recognized ratably over the period of the contract or in accordance with the terms of the contract, which generally coincides with the performance of the services requested by the customer.

Deferred Profit – Revenue deferred pursuant to our revenue policy, net of the related deferred costs, if any, is recorded as deferred profit in current liabilities. The components of deferred profit are as follows:

	September 30,	
	2017	2016
	(dollars in thousands)	
Deferred revenue	$6,822	$7,029
Deferred costs	2,741	2,320
Deferred profit	$4,081	$4,709

Warranty – A limited warranty is provided free of charge, generally for periods of 12 to 24 months to 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, 2017, 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.

	Years Ended September 30,	
	2017	2016
	(dollars in thousands)	
Beginning balance	$795	$793
Additions for warranties issued during the period	1,723	1,074
Reductions in the liability for payments made under the warranty	(414)	(832)
Changes related to pre-existing warranties	(872)	(250)
Currency translation adjustment	22	10
Ending balance	$1,254	$795

Shipping Expense – Shipping expenses of $1.9 million, $2.3 million and $2.5 million for 2017, 2016 and 2015 are included in selling, general and administrative expenses.

Advertising Expense – Advertising costs are expensed as incurred. Advertising expense of $0.4 million, $0.6 million and $0.5 million for 2017, 2016 and 2015 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, less an estimate of expected forfeitures. Forfeitures were estimated based upon historical experience. Beginning in 2018, we will begin recognizing forfeitures as they occur. The benefits or deficiencies of tax deductions in excess of or less than recognized compensation cost are reported as cash flow from financing activities rather than as cash flow from operating activities.

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 – Research, development and engineering 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.

	Years Ended September 30,		
	2017	2016	2015
	(dollars in thousands)		
Research, development and engineering	$7,001	$9,535	$13,214
Grants earned	(629)	(1,531)	(6,296)
Net research, development and engineering	$6,372	$8,004	$6,918

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

stockholders' 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 a portion or all of the deferred tax asset will not be realized. Each quarter, the valuation allowance is re-evaluated. In 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.

Concentrations of Credit Risk – Our customers consist of solar cell and semiconductor 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, 2017, two customers individually represented 24% and 11% of accounts receivable. As of September 30, 2016, one customer individually represented 11% of accounts receivable.

We maintain our cash, cash equivalents and restricted cash in multiple financial institutions. Balances in the United States (approximately 45% and 70% of total cash balances as of September 30, 2017 and 2016, respectively) are primarily invested in US Treasuries or are in financial institutions insured by the Federal Deposit Insurance Corporation (FDIC). The remainder of our cash is maintained with financial institutions with reputable credit in The Netherlands, France, China, the United Kingdom, Singapore and Malaysia.

Refer to Note 19, "Geographic Regions," 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 Financial Accounting Standards Board ("FASB") Accounting Standards Codification ("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 primarily market 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 this cash equivalent is 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

In January 2017, the FASB issued ASU No. 2017-04, “Intangibles-Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment.” The guidance is intended to simplify the subsequent accounting for goodwill acquired in a business combination. Prior guidance required utilizing a two-step process to review goodwill for impairment. A second step was required if there was an indication that an impairment may exist, and the second step required calculating the potential impairment by comparing the implied fair value of the reporting unit’s goodwill (as if purchase accounting were performed on the testing date) with the carrying amount of the goodwill. The new guidance eliminates the second step from the goodwill impairment test. Under the new guidance, an entity should perform its annual, or interim, goodwill impairment test by comparing the fair value of a reporting unit with its carrying amount, and then recognize an impairment charge for the amount by which the carrying amount exceeds the reporting unit’s fair value (although the loss should not exceed the total amount of goodwill allocated to the reporting unit). The guidance requires prospective adoption and will be effective for annual or interim goodwill impairment tests in fiscal years beginning after December 15, 2019. Early adoption of this guidance is permitted for interim or annual goodwill impairment tests performed on testing dates after January 1, 2017. We early adopted this guidance in the fourth quarter of fiscal 2017 with no impact on our consolidated financial statements.

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. This ASU is effective retrospectively for fiscal years and interim periods within those years beginning after December 15, 2017. We plan to adopt this standard effective October 1, 2018, the first quarter of our fiscal year 2019. We do not expect the adoption of this ASU to have a material impact on our consolidated financial statements.

In June 2016, the FASB issued ASU 2016-13, “Financial Instruments - Credit Losses: Measurement of Credit Losses on Financial Instruments.” ASU 2016-13 amends the impairment model to utilize an expected loss methodology in place of the currently used incurred loss methodology, which will result in the more timely recognition of losses. The new standard applies to financial assets measured at amortized cost basis, including receivables that result from revenue transactions and held-to-maturity debt securities. The new guidance will be effective for us starting in the first quarter of fiscal 2021. Early adoption is permitted starting in the first quarter of fiscal 2020. We are in the process of determining the effects the adoption will have on our consolidated financial statements as well as whether to adopt the new guidance early.

In March 2016, the FASB issued ASU 2016-09, “Compensation - Stock Compensation (Topic 718).” ASU 2016-09 identifies areas for simplification involving several aspects of accounting for share-based payment transactions, including the income tax consequences, classification of awards as either equity or liabilities, an option to recognize gross stock compensation expense with actual forfeitures recognized as they occur, as well as certain classifications on the statement of cash flows. The amendments in this ASU are effective for annual periods beginning after December 15, 2016 and for the interim periods therein. This new standard increases volatility in the statement of operations by requiring all excess tax benefits and deficiencies to be recognized as discrete income tax benefits or expenses in the statement of operations in the period in which they occur. We adopted the new standard as of October 1, 2017, and prospectively applied the provisions in this guidance requiring recognition of excess tax benefits and deficits in the

statement of operations. Also, as a result of the adoption of the new standard, we made an accounting policy election to recognize forfeitures as they occur and no longer estimate expected forfeitures. The provisions in this guidance requiring the use of a modified retrospective transition method would have required us to record a cumulative-effect adjustment in retained earnings as of October 1, 2017. We elected not to adjust retained earnings and to record such cumulative-effect adjustment as stock-based compensation in the first quarter of 2018 on the basis of immateriality. Lastly, we applied the provisions of this guidance relating to classification on the statement of cash flows retrospectively.

In February 2016, the FASB issued ASU 2016-02, “Leases (Topic 842),” which requires companies to generally recognize on the balance sheet operating and financing lease liabilities and corresponding right-of-use-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. We are currently in the process of evaluating the impact of this standard on our consolidated financial statements.

In November 2015, the FASB issued ASU 2015-17, “Balance Sheet Classification of Deferred Taxes.” This ASU requires entities to classify deferred tax liabilities and assets as noncurrent in a classified statement of financial position. This ASU is effective for fiscal years beginning after December 15, 2016, and interim periods within those annual periods. Early adoption is permitted for all entities as of the beginning of an interim or annual reporting period. We will adopt this standard effective October 1, 2017, the first quarter of our fiscal 2018. The adoption of this guidance is not expected to have a material impact on our consolidated financial statements.

In May 2014, the FASB issued ASU 2014-09, “Revenue from Contracts with Customers,” which amends the existing accounting standards for revenue recognition. The core principle of the guidance is that an entity should recognize revenue to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. In July 2015, the FASB voted to amend ASU 2014-09 by approving a one-year deferral of the mandatory effective date as well as providing the option to early adopt the standard on the original effective date. An entity may choose to adopt the new standard either retrospectively or through a cumulative effect adjustment as of the start of the first period for which it applies the new standard. We are in the process of determining the effect that the adoption will have on our consolidated financial statements. Based on our analysis to date, we have reached the following tentative conclusions regarding the new standard and how we expect it to affect our consolidated financial statements and related disclosures:

- We expect to adopt the standard as of October 1, 2018, the start of our first quarter of fiscal 2019.
- We expect to use the cumulative effect transition method. Such method provides that upon applying the new standard, the cumulative effect from prior periods is recognized in our consolidated balance sheet as of the date of adoption, including an adjustment to retained earnings. Prior periods will not be retrospectively adjusted.
- We believe that since substantially all of our revenue is contractual, substantially all of our revenue falls within the scope of ASU 2014-09, as amended.
- As discussed above, our equipment revenue is generally recognized upon shipment, except for non-routine technology equipment, which is subject to a deferral until acceptance. We are continuing to evaluate how the new standard will affect the allocation of the contract prices between equipment and service deliverables and the timing of the recognition of such revenue, as well as how this will apply to our non-routine technology equipment. Additionally, we are reviewing the effect of customer acceptance clauses on the timing of revenue recognition and related deferrals, for both routine and non-routine technology equipment, under the new standard.
- We believe that the only significant incremental costs incurred to obtain contracts with our clients within the scope of ASU 2014-09, as amended, are sales commissions. Under current accounting standards, we recognize sales commissions as the revenue is earned and record such amounts within selling and administrative expenses in our statements of operations. The majority of our contracts are completed within a one-year performance period. Under

the new standard, we expect to record sales commissions on contracts with performance periods that exceed one year as an asset and amortize the asset to expense over the related contract performance period in proportion to the revenue recognized.

- We expect that our disclosures in our notes to our consolidated financial statements related to revenue recognition will be significantly expanded under the new standard.

Our analysis and evaluation of the new standard will continue through its effective date in the first quarter of fiscal 2019. A substantial amount of work remains to be completed due to the complexity of the new standard, the application of judgment and the requirement for the use of estimates in applying the new standard, as well as the volume of our client portfolio and the related terms and conditions of our contracts that must be reviewed. The quantification of the effects of the new standard, including the items discussed above, is a significant undertaking. Further, we will be required to implement necessary changes in our processes, accounting systems and internal controls in conjunction with applying the new standard.

2. Earnings Per Share & Diluted Earnings Per Share

Basic earnings per share is computed by dividing net income (loss) available to common stockholders by the weighted average number of common shares outstanding for the period. Diluted earnings per share is computed similarly to basic earnings per share 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 earnings per share is calculated in the same manner as basic earnings per share. Options and restricted stock of approximately 1,364,000, 1,840,000 and 1,640,000 weighted average shares are excluded from the 2017, 2016 and 2015 earnings per share calculations as they are anti-dilutive. These shares could be dilutive in the future.

	Years ended September 30,		
	2017	2016	2015
	(dollars in thousands, except per share amounts)		
Basic Earnings Per Share Computation			
Net income (loss) attributable to Amtech Systems, Inc.	$9,131	$(7,008)	$(7,771)
Weighted Average Shares Outstanding:			
Common stock	13,378	13,168	12,022
Basic income (loss) per share attributable to Amtech shareholders	$0.68	$(0.53)	$(0.65)
Diluted Earnings Per Share Computation			
Net income (loss) attributable to Amtech Systems, Inc.	$9,131	$(7,008)	$(7,771)
Weighted Average Shares Outstanding:			
Common stock	13,378	13,168	12,022
Common stock equivalents [1]	123	—	—
Diluted shares	13,501	13,168	12,022
Diluted income (loss) per share attributable to Amtech shareholders	$0.68	$(0.53)	$(0.65)

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

3. Inventory

The components of inventory are as follows:

	September 30, 2017	September 30, 2016
	(dollars in thousands)	
Purchased parts and raw materials	$14,789	$ 12,435

Work-in-process	11,078	7,044
Finished goods	4,343	3,744
	$30,210	$ 23,223

4. Property, Plant and Equipment

The following is a summary of property, plant and equipment:

	September 30, 2017	September 30, 2016
	(dollars in thousands)	
Land	$4,990	$4,891
Building and leasehold improvements	14,408	13,364
Equipment and machinery	8,934	9,056
Furniture and fixtures	5,243	5,426
	33,575	32,737
Accumulated depreciation and amortization	(17,783)	(16,777)
	$15,792	$15,960

Depreciation and capital lease amortization expense was $1.6 million, $2.1 million and $2.2 million in 2017, 2016 and 2015, respectively.

5. Intangible Assets

The following is a summary of intangible assets:

		Years Ended September 30,					
		2017			2016		
	Useful Life	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount
		(dollars in thousands)					
Customer lists	6-10 years	$2,471	$ (1,521)	$ 950	$2,432	$ (1,164)	$ 1,268
Technology	5-10 years	3,386	(2,024)	1,362	3,214	(1,678)	1,536
Trade names	10-15 Years	1,468	(285)	1,183	1,455	(219)	1,236
Other	2-10 years	78	(78)	—	277	(217)	60
		$7,403	$ (3,908)	$ 3,495	$7,378	$ (3,278)	$ 4,100

Amortization expense related to intangible assets was $0.8 million, $0.8 million and $1.2 million in 2017, 2016 and 2015, respectively. The aggregate amortization expense for the intangible assets for each of the five succeeding fiscal years is estimated to be $0.6 million, $0.6 million, $0.6 million, $0.4 million, $0.3 million and $1.2 million in 2018, 2019, 2020, 2021, 2022 and thereafter, respectively.

On December 24, 2014, we acquired a 51% controlling interest in SoLayTec. The intangible assets of SoLayTec total $2.1 million, of which $1.9 million is included in “Technology” and $0.2 million is included in “Trade names” in the table above. On January 30, 2015, we completed the merger with BTU. The intangible assets of BTU total $2.9 million, of which $1.2 million is included in “Trade names” and $1.7 million is included in “Customer lists” in the table above. See Note 12, “Acquisitions,” for more information regarding the acquisition of SoLayTec and the merger with BTU.

As a result of the sale of our partial ownership in Kingstone in 2015, we derecognized $3.2 million of intangible assets and $1.9 million of accumulated amortization. See Note 13, “Deconsolidation,” for additional details.

57

6. Goodwill

The changes in the carrying amount of goodwill for the year ended September 30, 2017 are as follows.

	Solar	Semiconductor	Polishing	Total
	(dollars in thousands)			
Goodwill	$6,597	$ 5,063	$ 728	$12,388
Accumulated impairment losses	(1,269)	—	—	(1,269)
Carrying value at September 30, 2016	5,328	5,063	728	11,119
Net exchange differences	286	—	—	286
Carrying value at September 30, 2017	$5,614	$ 5,063	$ 728	$11,405
Goodwill	$6,962	$ 5,063	$ 728	$12,753
Accumulated impairment losses	(1,348)	—	—	(1,348)
Carrying value at September 30, 2017	$5,614	$ 5,063	$ 728	$11,405

During 2017, 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 2017. The results of the first step of the goodwill impairment test indicated that the fair values of our reporting units were in excess of their respective carrying values, and thus we did not require an impairment charge.

7. Long-Term Debt

In January 2015, we acquired $7.2 million of long-term debt as part of the BTU acquisition. The debt acquired is a mortgage note secured by BTU's real property in Billerica, Massachusetts, and has a remaining balance of $6.2 million as of September 30, 2017. 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. The maturity date of the debt is September 26, 2023.

In December 2014, we acquired long-term debt as part of the SoLayTec acquisition. During the year ended September 30, 2017, SoLayTec borrowed an additional $0.3 million. Effective with the Exit Agreement between Amtech and SoLayTec's minority owners in July 2017 (see Note 12), approximately $2.4 million of long-term debt was forgiven by SoLayTec's minority owners. This debt forgiveness was recorded as a capital contribution, with no effect on the Consolidated Statement of Operations. As of September 30, 2017, SoLayTec's remaining debt balance is $1.9 million. This loan has an interest rate of 7.00% and was modified in 2017 to allow SoLayTec to defer repayment indefinitely, contingent on SoLayTec's results of operations. We expect to begin making repayments in fiscal 2020 through 2023.

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, 2017 was 2.23%. The debt has a 15-year term.

Annual maturities relating to our long-term debt as of September 30, 2017 are as follows:

	Annual Maturities (in thousands)
2018	$ 361
2019	375
2020	602
2021	831
2022	848
Thereafter	5,478
Total	$ 8,495

8. 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, par value $0.01 per share, 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.

Stock-Based Compensation Expense

Stock-based compensation expense of $1.3 million, $1.4 million and $1.2 million for 2017, 2016 and 2015, respectively, are included in selling, general and administrative expenses. As of September 30, 2017, total compensation cost related to non-vested stock options not yet recognized is $0.9 million, which is expected to be recognized over the next 1.13 years on a weighted-average basis.

Amtech Equity 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 (the "Board") 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 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.

Stock-based compensation plans as of September 30, 2017 are summarized in the table below:

Name of Plan	Shares Authorized	Shares Available	Options Outstanding	Plan Expiration
2007 Employee Stock Incentive Plan	3,000,000	686,032	1,342,391	Mar. 2020
1998 Employee Stock Option Plan	500,000	—	—	Jan. 2008
Non-Employee Directors Stock Option Plan	500,000	107,600	218,050	Mar. 2020

793,632 1,560,441

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, with the most recent grant expiring in 2026. 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,		
	2017	2016	2015
Risk free interest rate	2%	2%	2%
Expected life	6 years	6 years	6 years
Dividend rate	0%	0%	0%
Volatility	63%	63%	67%

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

	Years Ended September 30,					
	2017		2016		2015	
	Options	Weighted Average Exercise Price	Options	Weighted Average Exercise Price	Options	Weighted Average Exercise Price
Outstanding at beginning of period	1,848,567	$ [illegible]	1,629,477	$ [illegible]	1,063,324	$ [illegible]
Granted	145,200	[illegible]	366,075	[illegible]	329,500	[illegible]
Assumed - merger	—	—	—	—	361,219	[illegible]
Exercised	(361,986)	[illegible]	(15,346)	[illegible]	(94,521)	[illegible]
Forfeited/canceled	(108,740)	[illegible]	(130,869)	[illegible]	(352,475)	[illegible]
Outstanding at end of period	1,560,941	$ [illegible]	1,848,567	$ [illegible]	1,629,477	$ [illegible]