UNITED STATES SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

Form 10-K

(Mark One)

☑ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**
For fiscal year ended September 30, 2019

or

☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**
For the transition period from to .

Commission File Number: 0-25434

Brooks Automation, Inc.

(Exact name of Registrant as Specified in Its Charter)

Delaware	**04-3040660**
(State or Other Jurisdiction of Incorporation or Organization)	*(I.R.S. Employer Identification No.)*
15 Elizabeth Drive Chelmsford, Massachusetts	**01824**
(Address of Principal Executive Offices)	*(Zip Code)*

978-262-2400

(Registrant's telephone number, including area code)

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

Title of Each Class	Trading Symbols	Name of Each Exchange on Which Registered
Common Stock, $0.01 par value	**BRKS**	**The Nasdaq Stock Market LLC**

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

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

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934. Yes ☐ No ☑

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

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

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

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

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

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

The aggregate market value of the registrant's Common Stock, $0.01 par value, held by non-affiliates of the registrant as of March 31, 2019, was approximately $1,545,043,570 based on the closing price per share of $29.33 on March 29, 2019 on the Nasdaq Stock Market. As of March 31, 2019, 72,131,313 shares of the registrant's Common Stock, $0.01 par value, were outstanding. As of December 6, 2019, 73,617,759 shares of the registrant's Common Stock, $0.01, par value, were outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's Proxy Statement involving the election of directors, which is expected to be filed within 120 days after the end of the registrant's fiscal year, are incorporated by reference in Part III of this Report.

BROOKS AUTOMATION, INC.

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Information Relating to Forward-Looking Statements

Certain statements in this Form 10-K constitute forward-looking statements, which are subject to the safe harbor provisions created by the Private Securities Litigation Reform Act of 1995. Certain, but not all, of the forward-looking statements in this report are specifically identified as forward-looking, by use of phrases and words such as “we believe,” “we estimate,” “we expect,” “may,” “should,” “could,” “intend,” “likely,” and other future-oriented terms. The identification of certain statements as “forward-looking” is not intended to mean that other statements not specifically identified are not forward-looking. Forward-looking statements include, but are not limited to, statements that relate to our future revenue, margin, costs, earnings, product development, demand, acceptance and market share, competitiveness, market opportunities and performance, levels of research and development, or R&D, the success of our marketing, sales and service efforts, outsourced activities and operating expenses, anticipated manufacturing, customer and technical requirements, the ongoing viability of the solutions that we offer and our customers’ success, tax expenses, our management’s plans and objectives for our current and future operations and business focus, the expected benefits and other statements relating to our divesture and acquisitions, the material weaknesses identified in our internal control over financial reporting, including the impact thereof and our remediation plan, the levels of customer spending, general economic conditions, the sufficiency of financial resources to support future operations, and capital expenditures. Such statements are based on current expectations and are subject to risks, uncertainties, and changes in condition, significance, value and effect, including without limitation those discussed within Item 1A, “Risk Factors” and elsewhere in this report and other documents we file from time to time with the Securities and Exchange Commission, or SEC, such as our quarterly reports on Form 10-Q and our current reports on Form 8-K. Such risks, uncertainties and changes in condition, significance, value and effect could cause our actual results, performance or achievements to differ materially from those expressed in this report and in ways we cannot readily foresee. Readers are cautioned not to place undue reliance on these forward-looking statements, which speak only as of the date hereof and are based on information currently and reasonably known to us. We do not undertake any obligation to release the results of any revisions to these forward-looking statements, which may be made to reflect events or circumstances that occur after the date of this report or to reflect the occurrence or effect of anticipated or unanticipated events. Precautionary statements made herein should be read as being applicable to all related forward-looking statements wherever they appear in this report.

Unless the context indicates otherwise, references in this report to “we”, “us”, “our” and other similar references mean Brooks Automation, Inc. and its consolidated subsidiaries.

PART I

Item 1. *Business*

Overview

We are a leading provider of semiconductor manufacturing automation solutions and life science sample-based services and solutions worldwide. In the semiconductor manufacturing market, we have been a provider of precision robotics, integrated automation systems and services for more than 40 years. In the life sciences market, we apply our automation and cryogenics expertise to offer a full suite of sample-based services and products, including a full line of cold chain management solutions for handling and storing biological and chemical compound samples used in areas such as drug development, clinical research and advanced cell therapies. We are also a global provider of gene sequencing and gene synthesis services. We believe our leadership positions and our global support capability in each of these markets make us a valued business partner to the largest semiconductor capital equipment device makers, and pharmaceutical and life science research institutions in the world. In total, we employ approximately 3,000 full-time employees worldwide and have sales in more than 50 countries. We are headquartered in Chelmsford, Massachusetts and have operations in North America, Asia, and Europe.

Since our founding in 1978, we have been a leading partner to the global semiconductor manufacturing industry. We initially developed and marketed automated silicon wafer handling equipment for semiconductor equipment manufacturers. Since then, we have expanded our products and services through product development initiatives and acquisitions, and we are now recognized as a leading provider of vacuum robots, vacuum automation systems, wafer carrier contamination control systems, and reticle storage solutions to the global semiconductor capital equipment

industry. We sell our semiconductor products and services to both original equipment manufacturers, or OEMs, and directly to global chip manufacturers.

In April 2018, we acquired Tec-Sem Group AG, or Tec-Sem, a Switzerland-based manufacturer of semiconductor fabrication automation equipment with a focus on reticle storage management systems that support the needs for advanced lithography. Prior to fiscal year 2016, we made several acquisitions that support our business in the semiconductor market. On July 1, 2019, we completed the sale of our semiconductor cryogenics business to Edwards Vacuum LLC (a member of the Atlas Copco Group) for approximately $675.0 million in cash subject to adjustments for working capital and other items.

We have also invested in research and development initiatives to advance the offerings acquired in these acquisitions, as well as in our vacuum automation and services offerings. Our business supporting the semiconductor capital equipment and adjacent markets provided approximately 57% of our revenue in fiscal year 2019.

We entered the life sciences market, specifically in the area of sample management storage systems, in 2011. We entered this market based on our ability to leverage our core technology competencies in automation and cryogenics into our sample management offerings. We applied these competencies to provide a range of automated ultra-cold freezer systems and then to expand into a portfolio of products and services to assist customers in efficiently managing the end-to-end "cold chain of custody" of their chemical compound and biological samples. Today, we are a leading provider of the life sciences sample management solutions for automated cold sample storage systems, off-site storage services, and consumables and instruments. We are also a provider of software offerings which enable or enhance our customers' visibility into their sample inventories, and laboratory services at our storage service locations, both of which are expected to help our customers accelerate their research and development efforts. Taken together, we believe our sample management product and services offerings allow our customers to maintain a complete "cold chain of custody" and enhance efficiency of related workflow for their samples.

On November 15, 2018, we significantly expanded our life sciences offerings with the acquisition of GENEWIZ Group, or GENEWIZ, a leading provider of gene sequencing and gene synthesis services to pharmaceutical, biotechnology and academic institutions around the world. GENEWIZ is headquartered in New Jersey and has a network of genomics laboratories spanning the United States, China, Japan, Germany, and the United Kingdom. We believe the GENEWIZ acquisition, combined with our core capabilities in sample management services, positions us to add more value to samples under our care.

In addition to the GENEWIZ acquisition, over the last four fiscal years we have completed six acquisitions to expand and enhance our life science sample management offerings and establish a comprehensive portfolio of sample management solutions. Three of these acquisitions were outsourced sample management services companies.

- In November 2015, we acquired BioStorage Technologies, Inc., a full-service outsourcing sample management business, supporting customers in the United States, Europe, and Asia with an integrated solution for off-site storage services, transportation services, laboratory services and software-based inventory management.

- In July 2017, we acquired substantially all of the assets and certain liabilities of Pacific Bio-Material Management, Inc. and Novare, LLC, two companies with operations in California and New York, respectively, providing off-site storage, transportation, and management services for biological samples.

- In April 2018, we acquired BioSpeciMan Corporation, a Canada-based provider of off-site storage services for biological sample materials.

Other recent acquisitions also added cryogenic temperature management products, software products and consumable products to our life sciences portfolio.

- In November 2016, we completed the acquisition of Cool Lab, LLC, a subsidiary of BioCision, LLC, a provider of cryogenic product solutions that assist in managing temperature stability of biological samples in a laboratory environment.

- In August 2017, we acquired certain assets and liabilities from RURO, Inc. related to FreezerPro®, a web-based software platform which aids customers in their sample management needs, and became the exclusive distributor of BiobankPro®, a software system that manages sample processing and storage while providing a single location for research and clinical data and related analysis.

- In October 2017, we acquired 4titude Limited, or 4titude, a U.K.-based manufacturer of scientific consumables used in a variety of genomic analytical applications.

Through the acquisitions described above, we have expanded product and service offerings, accelerated product development cycles, broadened our installed base and added customer relationships to our life science business. As such, we use acquisitions and divestitures to strengthen our portfolio and achieve increased growth and profitability. For further information on our acquisitions and equity investments, please refer to Note 4, "Acquisitions," and Note 8, "Equity Method and Other Investments," to our Consolidated Financial Statements included under Item 8, "Financial Statements and Supplementary Data" of this Form 10-K. Our business supporting the life sciences market provided approximately 43% of our revenue in fiscal 2019.

We believe the life science market is generally more stable than the semiconductor capital equipment market and we expect that, over the long term, it will grow at a higher rate than our semiconductor business which historically has displayed cyclical trends related to demand for capital investments. Within the life sciences business, revenue comes from storage services and genomic services that are provided to thousands of customers and are generally more predictable than the sale of automated sample storage equipment, which has historically displayed uneven sales due to large purchases and fewer customers.

Segments

We have three operating segments aggregated into two reportable segments consisting of Brooks Semiconductor Solutions Group segment and Brooks Life Sciences segment. For further information on our operating segments, please refer to Note 21, "Segment and Geographic Information" to our Consolidated Financial Statements included under Item 8, "Financial Statements and Supplementary Data" of this Form 10-K.

Brooks Semiconductor Solutions Group Segment

Brooks Semiconductor Solutions Group is a leader in wafer automation and contamination controls solutions and services that are designed to improve throughput, yield, and cost of ownership of complex processing equipment, or tools, in semiconductor fabrication plants, or fabs. Our product offerings include vacuum and atmospheric robots, turnkey vacuum and atmospheric wafer handling systems, as well as wafer carrier clean and reticle storage systems. We also capture the complete life cycle of value through a global service network of expert application and field engineers who are located close to our customers. Our services include rapid refurbishment of robots to stringent specifications, upgrades to improve equipment productivity, and proactive monitoring and diagnostics for predictive risk management and improved up-time of the installed base.

Markets and Customers

The demand for semiconductors and semiconductor manufacturing equipment is cyclical, resulting in periodic expansions and contractions of this market. While the services element of our semiconductor business is generally more stable, the cyclical nature of the capital equipment business causes sales from products to vary quarterly based on short-term market demands. It is not unusual for these variations in sales to be up or down 10% to 20% in sequential quarters. As a result, our quarterly and yearly sales have fluctuated in this market and we expect future sales in this market will continue to fluctuate between quarters and year-over-year.

The principal markets served by the Brooks Semiconductor Solutions Group segment include the following:

- *Semiconductor capital equipment market*

Each year, the global semiconductor industry makes significant capital investments in equipment to keep up with advancements in semiconductor technology, to add manufacturing capacity and to improve productivity within existing

fabs. We are recognized as a market leader in three critical sub-segments: vacuum automation for wafer handling; contamination control; and wafer automation for advanced packaging. As discussed above, the global semiconductor capital equipment industry is cyclical, but we believe that it possesses a long-term growth profile driven by the demand for increasingly sophisticated consumer electronics, automotive and smart appliance products, growth in data centers, the expansion of the Internet-of-Things which increasingly connects various appliances and devices to servers, and mobile communications infrastructure such as 5G. The demand for higher performance, lower power consumption and reduced size for all of these products is enabled by advancements in the technology and processes used for the manufacturing of the devices. We believe this trend continues to provide market opportunities for the Brooks Semiconductor Solutions Group to be a valued partner in support of the industry's needs.

We have been a long-term partner to device manufacturers and OEMs who are the providers of tools to fabs. We maintain collaborative relationships with our customers for the innovative design of solutions that enable our customers to have a valued wafer process advantage and improved cost of ownership in the fab. Our global network of technical specialists provides extensive support to our customers in all regions, including the key semiconductor markets in Korea, Taiwan, China, Japan, Europe and the United States.

The production of advanced semiconductor chips requires many complex and logistically challenging manufacturing activities. Silicon wafers must go through hundreds of process steps in order to create billions of microscopic transistors and connect them in both horizontal and vertical layers to produce a functioning integrated circuit, or IC. These initial fabrication steps, which are referred to in the industry as front-end processes, are repeated many times on a single wafer to create the desired pattern on the silicon wafer. Up to 50% of these processes are performed in tools that operate under vacuum conditions, such as removing, depositing, or measuring materials on wafer surfaces. As the complexity of semiconductors has increased, the number of process steps that occur in a vacuum environment have also increased, resulting in a greater need for vacuum automation technology solutions.

The increase in packing density of components in mobile devices has led the industry to devise advanced packaging techniques for chip interconnectivity using what is called wafer level packaging, or WLP. This advanced packaging technology is a process of combining multiple wafers together prior to cutting them into pieces and then forming them onto a packaging substrate where they are ultimately divided into the multitude of chips. The recent increased adoption of WLP has increased the need for a contaminant free and high purity manufacturing environment, resulting in higher demand for our semiconductor offerings tailored to handle full wafer forms.

We believe there is a growing demand for equipment to perform cleaning and conditioning of the wafer carriers which are used in all advanced semiconductor fabs. These cleaning tools remove microscopic particles, organic compounds and water that are attracted to the inside surface of the carrier. Automated cleaning and conditioning of the wafer carriers are also in demand as customers look to improve overall manufacturing yields. Similarly, as lithography also requires cleaner controlled environments, our reticles solutions provide contamination control for highly valued reticles or masks that are used in printing the technological features onto the wafer.

- *Adjacent capital equipment markets*

There are a few adjacent capital equipment markets that use manufacturing processes similar to the semiconductor manufacturing industry. These markets include microelectromechanical systems, or MEMs devices, light-emitting diodes, or LEDs, Organic Light Emitting Diodes, or OLEDs, and touch screen technology. These markets and the semiconductor capital equipment market share common customers and utilize similar technology applications. For example, LEDs are manufactured using vacuum systems and handling processes similar to those used in semiconductor manufacturing.

We believe the desire for efficient, higher throughput and extremely clean manufacturing for semiconductor wafer fabs, the chip packaging process and other industrial or high performance electronic-based products and processes have created a substantial market for us in the following offerings: (i) substrate handling automation, which is related to moving the wafers in a semiconductor fab, (ii) tool automation, which moves wafers from station-to-station, (iii) vacuum systems technology to create and sustain the clean environment necessary for fabricating various products, and (iv) automated contamination control systems to clean and condition substrate carriers.

Product and Service Offerings

The principal offerings of the Brooks Semiconductor Solutions Group segment consist of: (i) wafer handling robotics and systems and (ii) semiconductor contamination control solutions. The segment also provides support services, including repair, diagnostic and installation, as well as spare parts and productivity enhancement upgrades to enhance tool productivity.

Wafer handling robotics and systems offerings - include vacuum robots, atmospheric robotic modules, and tool automation systems that provide precision handling and clean wafer environments. In the semiconductor industry, wafer handling represents a critical technology in the highly complex production tools in the world's most advanced wafer fabs. A typical customer tool is designed and built around a process chamber and uses automation technology to move wafers in and out of the chamber. We specialize in developing and building the automated handling systems and the vacuum technologies used in these tools. We provide individual components within an OEM customer system and complete integrated handling systems. We provide automation products that are used for both atmospheric pressure and vacuum-based tools and are designed to improve performance and productivity of the manufacturing process.

Contamination control solutions - include automated cleaning and inspection systems for wafer carriers, reticle pod cleaners, and stockers, which are automated systems that store wafers or reticles. Our products are used to remove critical airborne contamination within the workflow of the manufacturing process. Our solutions contribute to improving yields, productivity and process stability in the manufacturing process which requires an ultra-clean manufacturing environment.

Within the semiconductor industry, we sell our products and services to the world's major semiconductor chip makers and OEMs, who provide process tools to the IC makers for the manufacture of chips. Our customers outside the semiconductor industry are broadly diversified. We have major customers in North America, Europe and Asia. Although we ship much of our equipment OEMs in the United States, a large percentage of these OEM tools are ultimately installed in semiconductor fabs that are outside of North America. We also provide support services to leading OEMs, fabs and foundries across the globe.

Brooks Life Sciences Segment

Our Brooks Life Sciences segment is a global leader of comprehensive sample management solutions and genomic services, providing pharmaceutical, biotechnology, and academic customers with complete end-to-end "cold-chain of custody" and gene sequencing and synthesis solutions to advance scientific research and support drug development. Our sample management solutions are focused on providing customers with the highest level of sample quality, security, availability, intelligence and integrity throughout the life cycle of samples. Our solutions include automated ultra-cold storage systems, off-site storage services, transport services, laboratory services, consumables and instruments. We also provide informatics solutions that manage samples throughout our customers' research discovery and development work flows. Our key genomic services include gene sequencing on Sanger and Next-Generation platforms, and gene synthesis. Our workforce has deep scientific knowledge and utilizes our proprietary technologies and services, and is supported by a network of 13 global laboratories spanning the United States, China, Japan, Germany, and the United Kingdom. We believe this has positioned us to provide our customers with a valued combination of speed, convenience and scientific expertise in our service offerings.

As referenced above, we completed the acquisition of GENEWIZ in November 2018. GENEWIZ is a leading global provider of genomic analysis and gene synthesis services. We believe GENEWIZ's solutions have significantly expanded our offerings to our existing sample management customers. GENEWIZ has been in business since 1999 and provides analysis of millions of samples collected by researchers in pharmaceutical, academic, government, and clinical areas as well as gene synthesis capabilities.

Life Science Market

Brooks Life Sciences serves a broad range of end markets within the life sciences industry to address a confluence of life science industry trends, such as technology, information management and new sophisticated tools and applications. With the advent of biologics and personalized medicine, biological samples have become critical assets to the success of drug and therapy pipelines, and the proper management and protection of these samples has gained increased importance

to our customers. We believe this trend has created a sizable market opportunity for Brooks Life Sciences to provide comprehensive sample management and genomic solutions.

Since the mapping of the of the full human genome at the turn of this century, the market for genomic services has grown in support of the demands in biologic drug development, personalized medicine and cell/gene therapy. Top pharmaceutical and biotechnology companies are able to use their own in-house laboratory resources to sequence the billions of genes needed as part of their research work-flow but many of the companies look to outsource their gene sequencing to independent laboratories that provide expedited results with expertise. Other companies and institutions have fewer or no in-house options and make use of outsourced capabilities as their primary solution. GENEWIZ participates in this market as a value-added laboratory offering precise genetic testing services with fast turnaround time.

The Brooks Life Sciences segment currently serves customers around the globe, including all of the top-20 global bio-pharmaceutical companies. Due to the comprehensive nature of our sample management and genomic services solutions, we are continuing to expand our customer base and geographic reach to increase our revenue streams with the goal of delivering consistent growth over the long-term. GENEWIZ has more than 4,000 customers globally, which includes many of our over 1,500 sample management customers.

Product and Service Offerings

The principal offerings of the Brooks Life Sciences segment include the following:

Automated cold storage systems – provides stand-alone systems that typically store one to two million samples each in temperature ranges from +4°C to -196°C. Our systems provide high throughput capability and optimized storage of multi-format tubes and plates, and increased storage capacity while maintaining consistent temperature profiles across stored samples. We also provide support services for our installed base of storage systems.

Sample management services - includes a complete range of services consisting of on-site and off-site sample storage, cold chain logistics, sample transport and collection relocation, bio-processing solutions (inclusive of sample preparation, and genomic and cell culture analysis), disaster recovery and business continuity, as well as project management and consulting.

Genomic Services - provides gene sequencing and gene synthesis services, a service which enables the fast-expanding research of gene-based healthcare discoveries and therapies through our acquisition of GENEWIZ. These service offerings include Sanger sequencing, gene synthesis, molecular biology, high throughput and Next Generation sequencing, or NGS, bioinformatics, and good laboratory practices, or GLP, regulatory services.

Consumables and Instruments - includes a complete range of unique consumables, including multiple formats of racks, tubes, caps, plates and foils, which support storage of samples prior to placing them in ultra-cold storage environment. A comprehensive range of instruments used for labeling, bar coding, capping, de-capping, auditing, sealing, peeling, and piercing tubes and plates complement our consumables. Our offerings acquired with 4titude include a range of products aimed at the genomic sample preparation and services market for polymerase chain reactions, or PCR, & sequencing, imaging, plate sealing, liquid handling, forensic and NGS, sample processing.

Informatics - provides sample intelligence software solutions and integration of customer technology. Our informatics suite supports laboratory work flow scheduling for life science tools and instrument work cells, sample inventory and logistics, environmental and temperature monitoring, clinical trial and consent management, as well as planning, data management, virtualization, and visualization of sample collections.

Sales, Marketing and Customer Support

We market and sell the majority of our semiconductor products and services in Asia, Europe, the Middle East and North America through our direct sales organization. The sales process for our products is often multilevel, involving a team comprised of individuals from sales, marketing, engineering, operations and senior management. In many cases we assign a team to a customer and that team engages the customer at different levels of its organization to facilitate planning, provide product customization when required, and ensure open communication and support.

The majority of our life sciences sales are completed through our direct Brooks Life Sciences sales force, particularly our store systems, storage services, and genomic services. We supplement the sale of genomic services, consumables and instruments with distributors that reach a broad range of customers. In regions with emerging life science industries such as China, India and the Middle East, we leverage local distributors to assist with the sales process for store systems. The sales process for our larger sample management systems may take 6 to 18 months to complete and it involves a team typically comprised of individuals from sales, marketing, engineering and senior management.

We typically provide product warranties for a period of one to two years depending on the product type.

Our marketing activities include participation in trade shows, delivery of seminars, participation in industry forums, distribution of sales literature and white papers, publication of press releases and articles in business and industry publications. We maintain sales and service centers in Asia, Europe, the Middle East and North America to enhance support and communication with our customers.

Competition

Brooks Semiconductor Solutions Group segment operates in a variety of market segments of varying breadth with differing competitors and competitive dynamics. The semiconductor and adjacent technology markets, as well as process equipment manufacturing industries, are highly competitive and characterized by continual changes and technology improvements. A significant portion of equipment automation is still done by the OEMs themselves. Our competitors among merchant vacuum robot automation suppliers include primarily Japanese companies, such as Daihen Corporation, Daikin Industries, Ltd., and Rorze Corporation. Atmospheric tool automation is typically less demanding technologically, has fewer barriers to entry and has a larger field of competitors. We compete directly with other equipment automation suppliers of atmospheric modules and systems, such as Hirata Corporation, Kawasaki Heavy Industries, Ltd., Genmark Automation, Inc., Rorze Corporation, Sankyo Seisakusho Co., Ltd., TDK Corporation and Sinfonia Technology Co., Ltd.

We believe our customers will purchase our equipment, automation products and vacuum subsystems as long as our products continue to provide the necessary throughput, reliability, contamination control and accuracy at an acceptable price. We believe our semiconductor offerings are competitive with respect to all of these factors. We cannot guarantee, however, that we will be successful in selling our products to OEMs who currently satisfy a portion of their automation needs in-house or from other independent suppliers, regardless of the performance or price of our products.

Given the breadth of the sample management solutions and genomic services offered by the Brooks Life Sciences segment, there are no direct competitors for the comprehensive set of product and service solutions we provide to our customers. Each of the business lines within the Brooks Life Sciences segment, however, has unique competitors in their area of offerings. This includes Hamilton Company and Liconic AG for automation systems, Thermo-Fisher for consumables and services, LabCorp and Covance for storage services, as well as BGI, Integrated DNA Technologies, Eurofins and GenScript for genomic services.

Research and Development

Our research and development efforts are focused on developing new products and enhancing the functionality, degree of integration, reliability and performance of our existing products. Our engineering, marketing, operations and management personnel leverage their close collaborative relationships with their counterparts in customer organizations in an effort to proactively identify market demands that helps us refocus our research and development investment to match our customers' demands. With the rapid pace of change that characterizes the markets we serve, it is essential for us to provide high-performance, reliable products in order to maintain our leadership position in both our Brooks Semiconductor Solutions Group and Brooks Life Sciences businesses.

Our research and development expense was $56.4 million, $46.9 million and $39.9 million during fiscal years 2019, 2018 and 2017, respectively.

We invest in research and development initiatives within our Brooks Semiconductor Solutions Group segment to maintain continued leadership positions in the markets we serve. We launched our newest Vacuum Automation platform, MagnaTran LEAP™, for the advanced technologies related to manufacturing 10 nanometer design rule semiconductor

chips. MagnaTran LEAP is well positioned to deliver clean, accurate and fast wafer transport for the fast-growing Deposition and Etch market.

We have developed and continue to develop automated biological sample storage solutions for operating in ultra-low temperature environments within the Brooks Life Sciences segment. We have developed the Twin-bank platform, including an expansion of the product range for a smaller, more space-efficient automated storage system marketed under the brands of SampleStore™ SE and BioStore™ SE and introduced the BioStore™ III Cryo automated cryogenic sample management system which offers sample automation, cold chain management and improved security and accessibility while maintaining sample protection within the storage environment. With the acquisition of GENEWIZ, we acquired and continue to invest in research and development activities related to our processes and technologies to support complex gene reading and writing services.

Manufacturing and Service

Our manufacturing operations include product assembly, integration and testing. We implement quality assurance procedures that include standard design practices, reliability testing and analysis, supplier and component selection procedures, vendor controls, manufacturing process controls, and service processes that ensure high-quality performance of our products. Our major manufacturing facilities are located in Chelmsford, Massachusetts; Yongin-City, South Korea; and Manchester, United Kingdom. Our manufacturing operations are designed to provide high quality, optimal cost, differentiated products to our customers in short lead times through responsive and flexible processes and sourcing strategies. We utilize lean manufacturing techniques for a large portion of our manufacturing, including manufacture of assemblies that we have outsourced to competitive regions, including Asia. We also believe the continued sourcing of portions of our manufacturing processes in these regions allows us to better serve our customers who have operations in these regions.

We have service and support locations for our products near to our customers to provide rapid response to their service needs. Our principal product service and support locations include Chelmsford, Massachusetts; Fremont, California; Chu Bei City, Taiwan; Yongin-City, South Korea; Yokohama, Japan; Shanghai, China; Singapore; Manchester, United Kingdom; and Kiryat-Gat, Israel.

Our Brooks Life Sciences segment provides sample management storage and transportation services in Indianapolis, Indiana; Fresno, California; El Segundo, California; Torrance, California; Bronx, New York; Germany, China, and Singapore. We have a network of 13 laboratories that provide genomic services, including seven in the United States, three in China, as well as laboratories in Japan, Germany, and the United Kingdom.

Patents and Proprietary Rights

We rely on patents, trade secret laws, confidentiality procedures, copyrights, trademarks and licensing agreements to protect our technology. Due to the rapid technological change that characterizes the life sciences, semiconductor, adjacent technology markets and related process equipment industries, we believe that the improvement of existing technology, reliance upon trade secrets, unpatented proprietary know-how and the development of new products may be as important as patent protection in establishing and maintaining a competitive advantage. Our policy is to require all employees to enter into proprietary information and nondisclosure agreements to protect trade secrets and know-how. We cannot guarantee that these efforts will meaningfully protect our trade secrets.

As of September 30, 2019, we owned 385 issued U.S. patents, with various corresponding patents issued in foreign jurisdictions. We also had 95 pending U.S. patent applications, with foreign counterparts of certain of these applications having been filed or which may be filed at the appropriate time. Our patents will expire at various dates through 2037.

Backlog

Backlog for the Brooks Semiconductor Solutions Group segment offerings totaled approximately $127 million as of September 30, 2019 as compared to approximately $124 million at September 30, 2018. Backlog for the Brooks Semiconductor Solutions Group segment includes all purchase orders for which our customers have scheduled delivery, regardless of the expected delivery date, and consists principally of orders for products and service agreements. Substantially all of this backlog consists of orders scheduled to be delivered within the next 12 months.

Backlog for the Brooks Life Sciences segment offerings totaled $303 million as of September 30, 2019 as compared to approximately $273 million at September 30, 2018. Backlog for the Brooks Life Sciences segment includes all purchase orders for which customers have scheduled delivery, regardless of the expected delivery date, and consists of orders for products and service agreements. In addition, it includes estimated revenue for future services related to our BioStorage business for which contracts have been secured. Final revenue realized will vary based on volumes, prices, duration, and other factors. Storage contracts vary in length of time, with some being short term and some indefinite. We include the estimated value for time periods in the contract up to a maximum of 5 years.

Environmental Matters

We are subject to federal, state, local environmental laws and regulations, and the environmental laws and regulations of the foreign national and local jurisdictions in which we have manufacturing facilities. We believe we are materially in compliance with all such laws and regulations.

Compliance with foreign, federal, state, and local laws and regulations has not had, and is not expected to have, an adverse effect on our capital expenditures, competitive position, financial condition or results of operations.

Employees

At September 30, 2019, we had 2,984 full time employees. In addition, we employ part time workers and contractors. We consider our relationships with our employees to be good.

Available Information

We file annual, quarterly and current reports, proxy statements and other information with the SEC. Our SEC filings are available to the public over the internet at the SEC's website at http://www.sec.gov. We also maintain a website at www.brooks.com, through which you can access our SEC filings.

The information found on our website is not part of this or any other report we file with or furnish to the SEC.

Item 1A. *Risk Factors*

Factors That May Affect Future Results

You should carefully consider the risks described below and the other information in this report before deciding to invest in shares of our common stock. These are the risks and uncertainties we believe are most important for you to consider. Additional risks and uncertainties not presently known to us, which we currently deem immaterial or which are similar to those faced by other companies in our industry or business in general, may also impair our business operations. If any of the following risks or uncertainties actually occurs, our business, financial condition and operating results would likely suffer. In that event, the market price of our common stock could decline and you could lose all or part of your investment.

Risks Relating to Our Industries

Due in part to the cyclical nature of the semiconductor manufacturing industry and related industries, as well as due to volatility in worldwide capital and equity markets, we have previously incurred operating losses and may have future losses.

A significant portion of our business is largely dependent on capital expenditures in the semiconductor manufacturing industry and other businesses employing similar manufacturing technologies. The semiconductor manufacturing industry in turn depends on current and anticipated demand for ICs and the products that use them. These businesses have experienced unpredictable and volatile business cycles due in large part to rapid changes in demand and manufacturing capacity for semiconductors, and these cycles have had an impact on our business, sometimes causing declines in revenue and operating losses. We could experience future operating losses during an industry downturn. If an industry downturn continues for an extended period of time, our business could be materially harmed. Conversely, in periods of rapidly increasing demand, we could have insufficient inventory and manufacturing capacity to meet our customers' needs on a

timely basis, which could result in the loss of customers and various other expenses that could reduce gross margins and profitability.

We face competition which may lead to price pressure and otherwise adversely affect our sales.

We face competition throughout the world in each of our product and service areas, including from the competitors discussed in Part I, Item 1, "Business - Competition" as well as from internal automation capabilities at larger OEMs and other internal capabilities at our other customers and potential customers. Many of our competitors have substantial engineering, manufacturing, marketing and customer support capabilities. In addition, in our semiconductor business, strategic initiatives in China to encourage local semiconductor manufacturing and supply chain could increase competition from domestic equipment manufacturers in China. We expect our competitors to continue to improve the performance of their current products and services and to introduce new products, services and technologies that could adversely affect sales of our current and future products and services. New products, services and technologies developed by our competitors or more efficient production of their products or provisions of their services as well as increased and more efficient internal capabilities at our customers and potential customers could require us to make significant price reductions or decide not to compete for certain business. If we fail to respond adequately to pricing pressures or fail to develop products with improved performance or better quality services with respect to the other factors on which we compete, we could lose customers or orders. If we are unable to compete effectively, our business and prospects could be materially harmed.

Risks Relating to Our Operations

Our operating results could fluctuate significantly, which could negatively impact our business.

Our revenue, operating margins and other operating results could fluctuate significantly from quarter-to-quarter and year-to-year depending upon a variety of factors, including:

- demand for our products as a result of the cyclical nature of the semiconductor manufacturing industry and the markets upon which the industry depends or otherwise;
- changes in the timing and terms of product orders by our customers as a result of our customer concentration or otherwise;
- changes in the demand for the mix of products and services that we offer;
- timing and market acceptance of our new product and services introductions;
- delays or problems in the planned introduction of new products or services, or in the performance of any such products following delivery to customers or the quality of such services;
- new products, services or technological innovations by our competitors increased and more efficient internal capabilities at our customers and potential customers, which can, among other things, render our products and services less competitive due to the rapid technological changes in the markets in which we provide products and services;
- the timing and related costs of any acquisitions, divestitures or other strategic transactions;
- our ability to reduce our costs in response to decreased demand for our products and services;
- our ability to accurately estimate customer demand, including the accuracy of demand forecasts used by us;
- disruptions in our manufacturing process or in the supply of components to us;
- write-offs for excess or obsolete inventory;
- competitive pricing pressures; and

- increased amount of investment into the infrastructure to support our growth, including capital equipment, research and development, as well as selling and marketing initiatives to support continuous product innovation, technological capability enhancements and sales efforts. The timing of revenue generation coupled with the increased amount of investment may result in operating losses.

As a result of these risks, we believe that reference to past performance for comparisons of our revenue and operating results may not be meaningful, and that these comparisons may not be an accurate indicator of our future performance.

If we do not continue to introduce new products and services that reflect advances in technology in a timely and effective manner, our products and services may become obsolete and our operating results will suffer.

Our success is dependent on our ability to respond to the technological changes present in the markets we serve. The success of our product development and introduction of products and services to market depends on our ability to:

- identify and define new market opportunities, products and services in accurate manner;
- obtain market acceptance of our products and services;
- innovate, develop, acquire and commercialize new technologies and applications in a timely manner;
- adjust to changing market conditions;
- differentiate our offerings from our competitors' offerings;
- obtain and maintain intellectual property rights where necessary;
- continue to develop a comprehensive, integrated product and service strategy;
- price our products and services appropriately; and
- design our products to high standards of manufacturability so that they meet customer requirements.

If we cannot succeed in responding in a timely manner to technological and/or market changes or if the new products and services that we introduce do not achieve market acceptance, our competitive position would diminish which could materially harm our business and our prospects.

The global nature of our business exposes us to multiple risks.

During fiscal years ended September 30, 2019, 2018 and 2017, approximately 58%, 63% and 67% of our revenue was derived from sales outside of North America. We expect that international sales, including increased sales in Asia, will continue to account for a significant portion of our revenue for the foreseeable future, and that in particular, the proportion of our sales to customers in China will continue to increase, due in large part to our acquisition of GENEWIZ, which maintains a significant presence in China. Additionally, we intend to invest additional resources in facilities in China, which will increase our global footprint of sales, service and repair operations. As a result of our international operations, we are exposed to many risks and uncertainties, including:

- longer sales-cycles and time to collection;
- tariff and international trade barriers;
- fewer or less certain legal protections for intellectual property and contract rights abroad;
- different and changing legal and regulatory requirements in the jurisdictions in which we operate;
- government currency control and restrictions on repatriation of earnings;

- a diverse workforce with different experience levels, languages, cultures, customs, business practices and worker expectations, and differing employment practices and labor issues;
- fluctuations in foreign currency exchange and interest rates, particularly in Asia and Europe; and
- political and economic instability, changes, hostilities and other disruptions in regions where we operate.

Negative developments in any of these areas in one or more countries could result in a reduction in demand for our products, the cancellation or delay of orders already placed, threats to our intellectual property, difficulty in collecting receivables, and a higher cost of doing business, any of which could materially harm our business and profitability.

The acquisition of GENEWIZ involves numerous risks, including the inability to effectively integrate GENEWIZ's business and operations or realize the expected benefits from the acquisition, which could materially harm our operating results.

Our November 2018 acquisition of GENEWIZ has increased our service offerings within the Brooks Life Sciences segment, the number of end markets in which we operate, and the number of employees and facilities we need to efficiently manage. GENEWIZ's genomic services are significantly different from our historical offerings and experience. Combining our businesses may make it more difficult to maintain relationships with customers, employees or suppliers. The continued integration of GENEWIZ's business and operations will require significant management attention, efforts and expenditures, and we may not be able to achieve the integration in an effective, complete timely or cost-efficient manner.

Potential risks related to our acquisition of GENEWIZ include our continued ability to:

- expand our financial and management controls and reporting systems and procedures to integrate and manage GENEWIZ;
- integrate our information technology systems to enable the management and operation of the combined business;
- identify and retain key GENEWIZ personnel; and
- successfully integrate our respective corporate cultures such that we achieve the benefits of acting as a unified company.

Our inability to continue these tasks and successfully integrate the GENEWIZ business will have a material adverse effect on our business and financial results.

Our business could be materially harmed if we fail to adequately integrate the operations of the businesses that we have acquired or may acquire.

We have made in the past, and may make in the future, acquisitions or significant investments in businesses with complementary products, services and/or technologies. In addition to the risks discussed above regarding our acquisition of GENEWIZ, our acquisitions, including the acquisition of GENEWIZ, present numerous risks, including:

- difficulties in integrating the operations, technologies, products and personnel of the acquired companies and realizing the anticipated synergies of the combined businesses;
- defining and executing a comprehensive product strategy;
- managing the risks of entering markets or types of businesses in which we have limited or no direct experience;
- the potential loss of key employees, customers and strategic partners of ours or of acquired companies;

- unanticipated problems or latent liabilities, such as problems with the quality of the installed base of the target company's products or infringement of another company's intellectual property by a target company's activities or products;
- problems associated with compliance with the acquired company's existing contracts;
- difficulties in managing geographically dispersed operations; and
- the diversion of management's attention from normal daily operations of the business.

If we acquire a new business, we may expend significant funds, incur additional debt or issue additional securities, which may negatively affect our operations and be dilutive to our stockholders. In periods following an acquisition, we will be required to evaluate goodwill and acquisition-related intangible assets for impairment. If such assets are found to be impaired, they will be written down to estimated fair value, with a charge against earnings. The failure to adequately address these risks or the impairment of any assets could materially harm our business and financial results.

Expanding within current markets introduces new competitors and commercial risks.

A key part of our growth strategy is to continue expanding within the life sciences sample management and genomic services markets. As part of this strategy, we expect to diversify our product sales and service revenue by leveraging our core technologies, which requires investments and resources which may not be available on favorable terms or at all when needed. We cannot guarantee that we will be successful in leveraging our capabilities into the life sciences sample management and genomic services markets to meet all the needs of new customers and to compete favorably. Because a significant portion of our growth potential may be dependent on our ability to increase sales within the Brooks Life Sciences segment, our inability to successfully expand within the markets serviced by this segment may adversely impact future financial results.

Changes in key personnel could impair our ability to execute our business strategy.

The continuing service of our executive officers and essential engineering, technical and management personnel, together with our ability to attract and retain such personnel, is an important factor in our continuing ability to execute our strategy. There is substantial competition to attract such employees and the loss of any such key employees could have a material adverse effect on our business and operating results. The same could be true if we were to experience a high turnover rate among engineering and technical personnel and we were unable to replace them.

Our failure to protect our intellectual property could adversely affect our future operations.

Our ability to compete is significantly affected by our ability to protect our intellectual property. We rely upon patents, trade secret laws, confidentiality procedures, copyrights, trademarks and licensing agreements to protect our technology. Existing trade secret, trademark and copyright laws offer only limited protection. Our success depends in part on our ability to obtain and enforce patent protection for our products both in the United States and in other countries. We own numerous U.S. and foreign patents, and we intend to file additional applications, as appropriate, for patents covering our products and technology. Any issued patents owned by or licensed to us may be challenged, invalidated or circumvented, and the rights under these patents may not provide us with competitive advantages. In addition, the laws of some countries in which our products are or may be developed, manufactured or sold may not fully protect our products. Due to the rapid technological change that characterizes the semiconductor and adjacent technology markets, we believe that the improvement of existing technology, reliance upon trade secrets and unpatented proprietary know-how and the development of new products may be as important as patent protection in establishing and maintaining competitive advantage. To protect trade secrets and know-how, it is our policy to require all technical and management personnel to enter into nondisclosure agreements.

We cannot guarantee that the steps we have taken to protect our intellectual property will be adequate to prevent the misappropriation of our technology. Other companies could independently develop similar or superior technology without violating our intellectual property rights. In the future, it may be necessary to engage in litigation or like activities to enforce our intellectual property rights, to protect our trade secrets or to determine the validity and scope of proprietary

rights of others, including our customers. This could require us to incur significant expenses and to divert the efforts and attention of our management and technical personnel from our business operations.

The expiration of our patents over time could lead to an increase of competition and a decline in our revenue.

One of our main competitive strengths is our technology, and we are dependent on our patent rights and other intellectual property rights to maintain our competitive position. Our current patents will expire from time to time through 2037 which could result in increased competition and declines in product and service revenue.

We may be subject to claims of infringement of third-party intellectual property rights, or demands that we license third-party technology, which could result in significant expense and prevent us from using our technology.

There has been substantial litigation regarding patent and other intellectual property rights in the industries in which we do business. We have in the past been, and may in the future be, notified that we may be infringing intellectual property rights possessed by third parties. We cannot guarantee that infringement claims by third parties or other claims for indemnification by customers or end-users of our products and services resulting from infringement claims will not be asserted in the future or that such assertions, whether or not proven to be true, will not materially and adversely affect our business, financial condition and results of operations.

We cannot predict the extent to which we might be required to seek licenses or alter our products or services so that they no longer infringe the rights of others. We also cannot guarantee that licenses will be available or the terms of any licenses we may be required to obtain will be reasonable. Similarly, changing our products, services or processes to avoid infringing the rights of others may be costly or impractical and could detract from the value of our products and services. If a judgment of infringement were obtained against us, we could be required to pay substantial damages and a court could issue an order preventing us from selling one or more of our products or offering certain of our services. Further, the cost and diversion of management attention brought about by such litigation could be substantial, even if we were to prevail. Any of these events could result in significant expense to us and may materially harm our business and our prospects.

Unexpected events could disrupt our sample storage operations and adversely affect our reputation and results of operations.

Unexpected events, including fires or explosions at our facilities, natural disasters, such as tornadoes, hurricanes and earthquakes, war or terrorist activities, unplanned power outages, supply disruptions and failure of equipment or systems, could adversely affect our reputation and results of operations. Our Brooks Life Sciences' service customers rely on us to securely store and timely retrieve and transport their critical samples, and these events could result in service disruptions, physical damage to one or more key storage facilities and the customer samples stored in those facilities, the temporary closure of one or more key operating facilities or the temporary disruption of service, each of which could negatively impact our reputation and results of operations. Our primary storage facility is located in Indianapolis, Indiana, an area of the United States that can be prone to tornado and other severe weather events.

If our manufacturing sites were to experience a significant disruption in operations, our business could be materially harmed, while the failure to estimate customer demand accurately could result in excess or obsolete inventory.

We have a limited number of manufacturing facilities for our products and we have moved portions of our manufacturing to third parties, including some in lesser developed countries. If the operations at any one of these facilities were disrupted as a result of a natural disaster, fire, power or other utility outage, work stoppage or other similar event, our business could be seriously harmed because we may be unable to manufacture and ship products and parts to our customers in a timely fashion. The impact of any disruption at one of our facilities may be exacerbated if the disruption occurs at a time when we need to rapidly increase our manufacturing capabilities to meet increased demand or expedited shipment schedules.

Moreover, if actual demand for our products is different than expected, we may purchase more/fewer component parts than necessary or incur costs for canceling, postponing or expediting delivery of such parts. If we purchase inventory in anticipation of customer demand that does not materialize, or if our customers reduce or delay orders, we may incur excess inventory charges. Any or all of these factors could materially and adversely affect our business, financial condition and results of operations.

Our business could be materially harmed if one or more key suppliers fail to continuously deliver key components of acceptable cost and quality.

We currently obtain many of our key components on an as-needed, purchase order basis from numerous suppliers. In some cases we have only a single source of supply for key components and materials used in the manufacturing of our products. Further, we are increasing our sourcing of products in Asia, and particularly in China, and we do not have a previous history of dealing with many of these suppliers. Our inability to obtain components or materials in required quantities or of acceptable cost and quality and with the necessary continuity of supply could result in delays or reductions in product shipments to our customers. In addition, if a supplier or sub-supplier suffers a production stoppage or delay for any reason, including natural disasters such as the tsunamis that affected Japan in 2011 and Thailand in 2004, this could result in a delay or reduction in our product shipments to our customers. Any of these contingencies could cause us to lose customers, result in delayed or lost revenue and otherwise materially harm our business.

Our business could be adversely affected by a decline in the availability of raw materials.

We are dependent on the availability of certain key raw materials and natural resources used in our products and various manufacturing processes, and we rely on third parties to supply us with these materials in a cost-effective and timely manner. Our access to raw materials may be adversely affected if our suppliers' operations were disrupted as a result of limited or delayed access to key raw materials and natural resources which may result in increased cost of these items. While most of the raw materials used in our products and various manufacturing processes are commercially available, we rely in some cases on materials that have a limited supply and are considered rare Earth elements, such as helium. If the supply of these elements is drastically reduced, it may lead to price increases which could result in higher costs of our products and corresponding revenue declines and have a material adverse impact on our business, financial condition and results of operations.

Our outsource providers may fail to perform as we expect.

Outsource providers have played and will continue to play a key role in our manufacturing operations and in many of our transactional and administrative functions, such as information technology and facilities management. Although we attempt to select reputable providers and secure their performance on terms documented in written contracts, it is possible that one or more of these providers could fail to perform as we expect and such failure could have an adverse impact on our business.

Our business relies on certain critical information systems and a failure or breach of such a system could harm our business and results of operations and, in the event of unauthorized access to a customer's data or our data, incur significant legal and financial exposure and liabilities.

We maintain and rely upon certain critical information systems for the effective operation of our business. These information systems include telecommunications, the internet, our corporate intranet, various computer hardware and software applications, network communications and e-mail. These information systems may be owned and maintained by us, our outsource providers or third parties such as vendors and contractors. These information systems are subject to attacks, failures, and access denials from a number of potential sources including viruses, destructive or inadequate code, power failures, and physical damage to computers, hard drives, communication lines and networking equipment. To the extent that these information systems are under our control, we have implemented security procedures, such as virus protection software and emergency recovery processes, to mitigate the outlined risks. However, security procedures for information systems cannot be guaranteed to be failsafe and our inability to use or access these information systems at critical points in time, or unauthorized releases of confidential information, could unfavorably impact the timely and efficient operation of our business.

Confidential information stored on these information systems could also be compromised. If a third party gains unauthorized access to our data, including any information regarding our customers, such security breach could expose us to a risk of loss of this information, loss of business, litigation and possible liability. These security measures may be breached as a result of third-party action, including intentional misconduct by computer hackers, employee error, malfeasance or otherwise. Additionally, third parties may fraudulently attempt to induce employees or customers into disclosing sensitive information such as user names, passwords or other information in order to gain access to our

customers' data or our data, including our intellectual property and other confidential business information, or our information technology systems. Because the techniques used to obtain unauthorized access, or to sabotage systems, change frequently and generally are not recognized until launched against a target, we may be unable to anticipate these techniques or to implement adequate preventative measures. Any security breach could result in a loss of confidence by our customers, damage our reputation, disrupt our business, lead to legal liability and negatively impact our future sales.

We have identified material weaknesses in our internal control over financial reporting at an individual business unit within our Brooks Life Sciences segment and an individual business unit within our Brooks Semiconductor Solutions Group segment and such weaknesses have led to a conclusion that our internal control over financial reporting and disclosure controls and procedures were not effective as of September 30, 2019. Our ability to remediate the material weaknesses, our discovery of additional weaknesses, and our inability to achieve and maintain effective disclosure controls and procedures and internal control over financial reporting, could adversely affect our results of operations, our stock price and investor confidence in our company.

Section 404 of the Sarbanes-Oxley Act of 2002 requires that companies evaluate and report on the effectiveness of their internal control over financial reporting. In addition, we engaged our independent registered public accounting firm to report on its evaluation of those controls. As disclosed in more detail under Item 9A, "Controls and Procedures" below, we have identified two material weaknesses as of September 30, 2019 in our internal control over financial reporting resulting from (i) deficiencies in our controls at a business unit within our Brooks Life Sciences segment as we did not maintain effective controls to verify the accuracy of the price and quantity data for customer transactions entered into the business unit's billing system, and to verify that the invoices generated from the billing system were based on the appropriate amounts, and (ii) a deficiency in our controls at a business unit within our Brooks Semiconductor Solutions Group segment as we did not design and maintain effective controls to verify that revenue from product shipments from contract manufacturers in this business unit were evaluated for proper revenue recognition at the point of transfer of control. Due to the material weaknesses in our internal control over financial reporting, we have also concluded our disclosure controls and procedures were not effective as of September 30, 2019.

Failure to have effective internal control over financial reporting and disclosure controls and procedures could impair our ability to produce accurate financial statements on a timely basis and could lead to a restatement of our financial statements. For example, the identified material weaknesses resulted in immaterial adjustments to the consolidated financial statements for the year ended September 30, 2019 and caused a difference between the financial results we reported in the press release we issued on November 6, 2019 and furnished to the SEC with our Current Report on Form 8-K on the same date and reported in this annual report. Management, however, has concluded that the material weaknesses did not result in any misstatements that are material to our consolidated financial statements for any of the periods presented. If, as a result of the ineffectiveness of our internal control over financial reporting and disclosure controls and procedures, we cannot provide reliable financial statements, our business decision processes may be adversely affected, our business and results of operations could be harmed, investors could lose confidence in our reported financial information and our ability to obtain additional financing, or additional financing on favorable terms, could be adversely affected. In addition, failure to maintain effective internal control over financial reporting could result in investigations or sanctions by regulatory authorities.

Our management has taken immediate action to begin remediating the material weaknesses, however, certain remedial actions have not started or have only recently been undertaken, and while we expect to continue to implement our remediation plans throughout the fiscal year ended September 30, 2020, we cannot be certain as to when remediation will be fully completed. Additional details regarding the initial remediation efforts are disclosed in more detail under Item 9A, "Controls and Procedures" below. In addition, we may in the future identify additional internal control deficiencies that could rise to the level of a material weakness or uncover other errors in financial reporting. During the course of our evaluation, we may identify areas requiring improvement and may be required to design additional enhanced processes and controls to address issues identified through this review. In addition, there can be no assurance that such remediation efforts will be successful, that our internal control over financial reporting will be effective as a result of these efforts or that any such future deficiencies identified may not be material weaknesses that would be required to be reported in future periods. In addition, we cannot assure you that our independent registered public accounting firm will be able to attest that such internal controls are effective when they are required to do so.

If we fail to remediate these material weaknesses and maintain effective disclosure controls and procedures or internal control over financial reporting, we may not be able to rely on the integrity of our financial results, which could result in inaccurate or late reporting of our financial results, as well as delays or the inability to meet our reporting obligations or to comply with SEC rules and regulations. Any of these could result in delisting actions by the Nasdaq Stock Market, investigation and sanctions by regulatory authorities, stockholder investigations and lawsuits, and could adversely affect our business and the trading price of our common stock.

Our goodwill and intangible assets may become impaired.

As of September 30, 2019, we had $488.6 million of goodwill and $251.2 million in net intangible assets as a result of our acquisitions. We periodically review our goodwill and the estimated useful lives of our identifiable intangible assets, taking into consideration any events or circumstances that might result in either a diminished fair value, or for intangible assets, a revised useful life. These events and circumstances include significant changes in the business climate, legal factors, operating performance indicators, advances in technology and competition. Any impairment or revised useful life could have a material and adverse effect on our financial position and results of operations and could harm the trading price of our common stock.

Changes in tax rates or tax regulation could affect results of operations.

As a global company, we are subject to taxation in the United States and various other countries. Significant judgment is required to determine and estimate worldwide tax liabilities. Our future annual and quarterly effective tax rates could be affected by numerous factors, including changes in the following: applicable tax laws; composition of pre-tax income in countries with differing tax rates; and/or establishment of a valuation allowance against deferred tax assets based on the assessment of their realizability prior to expiration. In addition, we are subject to regular examination by the U.S. Internal Revenue Service and state, local and foreign tax authorities. We regularly assess the likelihood of favorable or unfavorable outcomes resulting from these examinations to determine the adequacy of our provision for income taxes. Although we believe our tax estimates are reasonable, there can be no assurance that any final determination will not be materially different from the treatment reflected in our historical income tax provisions and accruals, which could materially and adversely affect our financial condition and results of operations.

The implementation of tariffs and export controls on our products may have a material impact on our business.

Our global business operations and supply chain may be disrupted by the additional tariffs imposed on our products.

As of July 6, 2018, the United States imposed a 25% tariff on a list of products that included certain parts and components made in China and imported into the United States for incorporation with our products. We are implementing operational changes that should mitigate the impact of the 25% tariff on our imports into the United States from China. As a result of these operational changes, we do not expect that the increase in these tariffs will have a significant impact on our business, supply chain, operations or financial results. However, if the United States increases the amount of these tariffs or adds additional items to the list of products subject to tariff, tariffs could materially adversely affect our business, financial results and operations.

In addition to the increased tariffs imposed by the United States, China has implemented additional retaliatory tariffs on products made in the United States. While these tariffs currently do not materially impact us, if China increases its tariffs or places additional tariffs or other nations impose tariffs on our products, it could materially adversely affect our business, financial results and operations.

We are subject to numerous governmental regulations.

We are subject to federal, state, local and foreign regulations, including environmental regulations, regulations relating to the design and operation of our products and control systems and regulations relating to certain of our service offerings in the Brooks Life Sciences segment. We might incur significant costs as we seek to ensure that our products meet safety and emissions standards, many of which vary across the states and countries in which our products are used. In the past, we have invested significant resources to redesign our products to comply with these directives. Compliance with future regulations, directives, and standards could require us to modify or redesign some products, change our service offerings,

make capital expenditures, or incur substantial costs. If we do not comply with current or future regulations, directives, and standards:

- we could be subject to fines;
- our production or shipments could be suspended; and
- we could be prohibited from offering particular products or services in specified markets.

Any of these events could materially and adversely affect our business, financial condition and results of operations.

Regulations and customer demands related to conflict minerals may adversely affect us.

The Dodd-Frank Wall Street Reform and Consumer Protection Act imposes disclosure requirements regarding the use in components of our products of “conflict minerals” mined from the Democratic Republic of Congo and adjoining countries, whether the components of our products are manufactured by us or third parties. This requirement could affect the pricing, sourcing and availability of minerals used in the manufacture of components we use in our products. In addition, there are additional costs associated with complying with the disclosure requirements and customer requests, such as costs related to our due diligence to determine the source of any conflict minerals used in our products. We may face difficulties in satisfying customers who may require that all of the components of our products are certified as conflict mineral free and/or free of numerous other hazardous materials.

Unfavorable currency exchange rate fluctuations may lead to lower operating margins, or may cause us to raise prices, which could result in reduced sales.

Currency exchange rate fluctuations could have an adverse effect on our sales and results of operations, and we could experience losses with respect to forward exchange contracts into which we may enter. Unfavorable currency fluctuations could require us to increase prices to foreign customers, which could result in lower net sales by us to such customers. Alternatively, if we do not adjust the prices for our products in response to unfavorable currency fluctuations, our results of operations could be materially and adversely affected. In addition, most sales made by our foreign subsidiaries are denominated in the currency of the country in which these products are sold and the currency they receive in payment for such sales could be less valuable as compared to the U.S. dollar at the time of receipt as a result of exchange rate fluctuations. From time to time, we enter into forward exchange contracts to reduce currency exposure. However, we cannot be certain that our efforts will be adequate to protect us against significant currency fluctuations or that such efforts will not expose us to additional exchange rate risks, which could materially and adversely affect our results of operations.

Risk related to the referendum of the United Kingdom’s membership in the European Union

In June 2016, a majority of voters in the United Kingdom voted “for” the Referendum of the United Kingdom’s Membership in the European Union, referred to as Brexit, approving the exit of the United Kingdom from the European Union, which triggered volatility in exchange rate fluctuations of the U.S. dollar against foreign currencies in which we conduct our business. We may experience volatility in exchange rates as the United Kingdom continues to negotiate its exit from the European Union or as a result of the United Kingdom’s exit from the European Union with or without an agreement governing the exit. As described in Item 7A, "Quantitative and Qualitative Disclosures About Market Risk", of this Form 10-K, most of our foreign currency denominated transactions are conducted in Euros, British Pounds and a variety of Asian currencies. Sales in currencies other than the U.S. dollar were approximately 35% and 34%, respectively, of our total sales during fiscal years 2019 and 2018. If a dollar strengthens, our revenue denominated in foreign currencies may be adversely affected when translated into U.S. dollars.

Actions to implement Brexit, the potential terms of Brexit and the uncertainty of when Brexit will occur (the deadline for which has been extended a number of times), if at all, have also created global economic uncertainty, which may cause our customers to closely monitor their costs and reduce their spending on our products and services. The effects of Brexit, if it occurs, depend on any agreements, if any, the United Kingdom makes to retain access to European Union and other markets either during a transitional period or more permanently. The measures could potentially disrupt the markets we serve and may cause us to lose customers and employees. In addition, Brexit could lead to legal uncertainty and potentially

divergent national laws and regulations with respect to business and trade with and in the United Kingdom. Any of these effects of Brexit, among others, could adversely affect our business, results of operations and financial condition.

Our indebtedness may adversely affect our ability to operate our business, generate cash flows and make payments on such indebtedness

On October 4, 2017, we entered into a $200.0 million Senior Secured Term Loan Facility, or term loan, with Morgan Stanley Senior Funding, Inc., JPMorgan Chase Bank, N.A. and Wells Fargo Securities, LLC pursuant to the terms of a credit agreement with the lenders. The term loan matures and becomes fully payable on October 4, 2024. We are required to redeem the term loan at the principal amount then outstanding upon occurrence of certain events, as described in the credit agreement. For further information on this transaction, please refer to Note 11, "Debt" to our Consolidated Financial Statements included in Item 8, "Financial Statements and Supplementary Data" of this Form 10-K.

Our ability to pay interest and repay the principal for our indebtedness, including the term loan, is dependent upon our ability to manage our business operations and maintain sufficient liquidity to service such debt. The loan borrowings are subject to variable interest rates which create exposure to interest rate risk. Interest rate increases may result in higher cost of servicing our loans and reduce our profitability and cash flows. The terms of our debt covenants in the credit agreement for the term loan could limit our ability to raise additional funds and the manner in which we conduct our business. We have the ability to refinance the term loan and obtain additional indebtedness as long as we maintain a certain level of liquidity and earnings, as specified in the credit agreement for the term loan. If our liquidity and earnings are reduced below a certain level, we will have limited ability to service the term loan and obtain additional debt financing. Our failure to comply with the restrictive covenants under the term loan and our other indebtedness could also result in an event of default under the term loan which, if not cured or waived, could result in the acceleration of all or a portion of our indebtedness, including under the term loan. Accordingly, a default under the term loan would have a material adverse effect on our business and our lender would have the right to exercise its rights and remedies to collect, which would include the right to foreclose on our assets.

Risks Relating to Our Customers

Because we rely on a limited number of customers for a large portion of our revenue, the loss of one or more of these customers could materially harm our business.

We receive a significant portion of our revenue in each fiscal period from a relatively limited number of customers, and that trend is likely to continue. Sales to our ten largest customers accounted for approximately 28%, 34% and 35%, respectively, of our total revenue in the fiscal years ended September 30, 2019, 2018 and 2017. The loss of one or more of these major customers, a significant decrease in orders from one of these customers, or the inability of one or more customers to make payments to us when they are due could materially affect our revenue, business and reputation. In addition, there has been and may continue to be significant consolidation among some of our largest OEM customers, which could lead to increased pressure to reduce the price of our semiconductor products and/or decreased market share of our semiconductor products with the combined companies.

Because of the lengthy sales cycles of many of our products, we may incur significant expenses before we generate any revenue related to those products.

Our customers may need several months to test and evaluate our products. This increases the possibility that a customer may decide to cancel an order or change its plans, which could reduce or eliminate our sales to that customer. The impact of this risk can be magnified during the periods in which we introduce a number of new products, as has been the case in recent years. As a result of this lengthy sales cycle, we may incur significant research and development expenses, and selling, general and administrative expenses before we generate the related revenue for these products, and we may never generate the anticipated revenue if our customer cancels an order or changes its plans.

In addition, many of our semiconductor products will not be sold directly to the end-user but will be components of other products manufactured by OEMs. As a result, we rely on OEMs to select our semiconductor products from among alternative offerings to be incorporated into their equipment at the design stage; so-called design-ins. The OEMs' decisions often precede the generation of volume sales, if any, by a year or more. Moreover, if we are unable to achieve these design-

ins from an OEM, we would have difficulty selling our semiconductor products to that OEM because changing suppliers after design-ins involves significant cost, time, effort and risk on the part of that OEM.

Customers generally do not make long term commitments to purchase our products and our customers may cease purchasing our products at any time.

Sales of our products are often made pursuant to individual purchase orders and not under long-term commitments and contracts. Our customers frequently do not provide any assurance of minimum or future sales and are not prohibited from purchasing products from our competitors at any time. Accordingly, we are exposed to competitive pricing pressures on each order. Our customers also engage in the practice of purchasing products from more than one manufacturer to avoid dependence on sole-source suppliers for certain of their needs. The existence of these practices makes it more difficult for us to increase price, gain new customers and win repeat business from existing customers.

We may face claims for liability related to damages of customer materials attributed to the failure of our products or services, exposing us to significant financial or reputational harm.

Our automation products for the semiconductor manufacturing market are used in the handling and movement of silicon wafers at various points in the production process, and our automated cold storage systems for the life sciences sample management market are used in the handling, movement and storage of biological and chemical samples. We also provide sample storage services to customers where we store their biological and chemical samples at our facilities and other genomic services at our facilities. In any case, inaccurate or faulty testing services or damage to our customers' materials attributed to a failure of our products or services could lead to claims for damages made by our customers and could also harm our relationship with our customers and damage our reputation in each of these industries, resulting in material harm to our business.

Risks Relating to Owning Our Securities

Our stock price is volatile.

The market price of our common stock has fluctuated widely. From the beginning of fiscal year 2018 through the end of fiscal year 2019, our stock price fluctuated between a high of $41.75 per share and a low of $22.54 per share. Consequently, the current market price of our common stock may not be indicative of future market prices, and we may be unable to sustain or increase the value of an investment in our common stock. Factors affecting our stock price may include:

- variations in operating results from quarter-to-quarter and year-to-year;
- changes in earnings estimates by analysts or our failure to meet analysts' expectations;
- changes in the market price per share of our public company customers;
- market conditions in the semiconductor, life sciences sample management and genomic services and other industries into which we sell products and services;
- global economic conditions;
- political changes, hostilities or natural disasters such as hurricanes and floods;
- low trading volume of our common stock; and
- the number of firms making a market in our common stock.

In addition, the stock market has in the past experienced significant price and volume fluctuations. These fluctuations have particularly affected the market prices of the securities of high technology companies like ours. These market fluctuations could adversely affect the market price of our common stock.

We may not pay dividends on our common stock.

Holders of our common stock are only entitled to receive dividends when and if they are declared by our Board of Directors. Although we have declared cash dividends on our common stock for the past several years, we are not required to do so and may reduce or eliminate our cash dividends in the future. This could adversely affect the market price of our common stock.

Provisions in our charter documents and Delaware law may delay or prevent an acquisition of us, which could decrease the value of your shares.

Our restated certificate of incorporation and by-laws and Delaware law contain provisions that could make it harder for a third party to acquire us without the consent of our Board of Directors. These provisions include limitations on actions by our stockholders by written consent, the inability of stockholders to call special meetings and the potential for super majority votes of our stockholders in certain circumstances. In addition, as discussed below, our Board of Directors has the right to issue preferred stock without stockholder approval, which could be used to dilute the stock ownership of a potential hostile acquirer.

Our restated certificate of incorporation makes us subject to the anti-takeover provisions of Section 203 of the Delaware General Corporation Law. In general, Section 203 prohibits publicly held Delaware corporations to which it applies from engaging in a "business combination" with an "interested stockholder" for a period of three years after the date of the transaction in which the person became an interested stockholder, unless the business combination is approved in a prescribed manner. This provision could discourage others from bidding for our shares of common stock and could, as a result, reduce the likelihood of an increase in the price of our common stock that would otherwise occur if a bidder sought to buy our common stock.

Although we believe these provisions provide for an opportunity to receive a higher bid by requiring potential acquirers to negotiate with our Board of Directors, these provisions apply even if the offer may be considered beneficial by stockholders. If a change of control or change in management is delayed or prevented, the market price of our common stock could decline.

Our restated certificate of incorporation authorizes the issuance of shares of blank check preferred stock.

Our restated certificate of incorporation provides that our Board of Directors is authorized to issue from time to time, without further stockholder approval, up to 1,000,000 shares of preferred stock in one or more series and to fix and designate the rights, preferences, privileges and restrictions of the preferred stock, including dividend rights, conversion rights, voting rights, redemption rights and terms of redemption and liquidation preferences. Such shares of preferred stock could have preferences over our common stock with respect to dividends and liquidation rights. Our issuance of preferred stock may have the effect of delaying or preventing a change in control. Our issuance of preferred stock could decrease the amount of earnings and assets available for distribution to the holders of common stock or could adversely affect the rights and powers, including voting rights, of the holders of common stock. The issuance of preferred stock could have the effect of decreasing the market price of our common stock.

Item 1B. *Unresolved Staff Comments*

None.

Item 2. *Properties*

Our corporate headquarters and primary manufacturing/research and development facilities are currently located in three buildings in Chelmsford, Massachusetts.

We maintained the following principal facilities as of September 30, 2019:

Location	Functions	Square Footage (Approx.)	Ownership Status/Lease Expiration
Chelmsford, Massachusetts . . .	Corporate headquarters, training, manufacturing, R&D and sales & support	298,000	Owned
Indianapolis, Indiana	Sample storage, sales & support	116,800	September 2023
Suzhou, China	Laboratory & office	105,000	June 2021
South Plainfield, New Jersey . .	Laboratory & office	77,800	January 2025

Our Brooks Semiconductor Solutions Group segment utilizes the facilities in Chelmsford, Massachusetts; Fremont, California; South Korea, Germany and Taiwan. Our Brooks Life Sciences segment utilizes the facilities in Manchester, United Kingdom; Indianapolis, Indiana; South Plainfield, New Jersey; Suzhou, China; Chelmsford, Massachusetts; Bronx, New York; and Fremont, California.

We maintain additional sales, support and training offices in Texas, Europe (France and Germany), Asia (China, Japan and Singapore) and the Middle East (Israel). We also maintain sample storage facilities in China, Germany and Singapore.

Item 3. *Legal Proceedings*

We are subject to various legal proceedings, both asserted and unasserted, that arise in the ordinary course of business. We cannot predict the ultimate outcome of such legal proceedings or in certain instances provide reasonable ranges of potential losses. However, as of the date of this report, we believe that none of these claims will have a material adverse effect on our consolidated financial condition or results of operations. In the event of unexpected subsequent developments and given the inherent unpredictability of these legal proceedings, there can be no assurance that our assessment of any claim will reflect the ultimate outcome and an adverse outcome in certain matters could, from time-to-time, have a material adverse effect on our consolidated financial condition or results of operations in particular quarterly or annual periods.

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*

Our common stock is traded on the Nasdaq Stock Market LLC under the symbol "BRKS."

Number of Holders

As of December 6, 2019, there were 518 holders of record of our common stock.

Dividend Policy

Dividends are declared at the discretion of our Board of Directors and depend on actual cash flow from operations, our financial condition, capital requirements and any other factors our Board of Directors may consider relevant. Future dividend declarations, as well as the record and payment dates for such dividends, will be determined by our Board of Directors on a quarterly basis. We intend to pay quarterly cash dividends in the future; however, the amount and timing of these dividends may be impacted by the cyclical nature of certain markets we serve. We may reduce, delay or cancel a quarterly cash dividend based on the severity of a cyclical downturn.

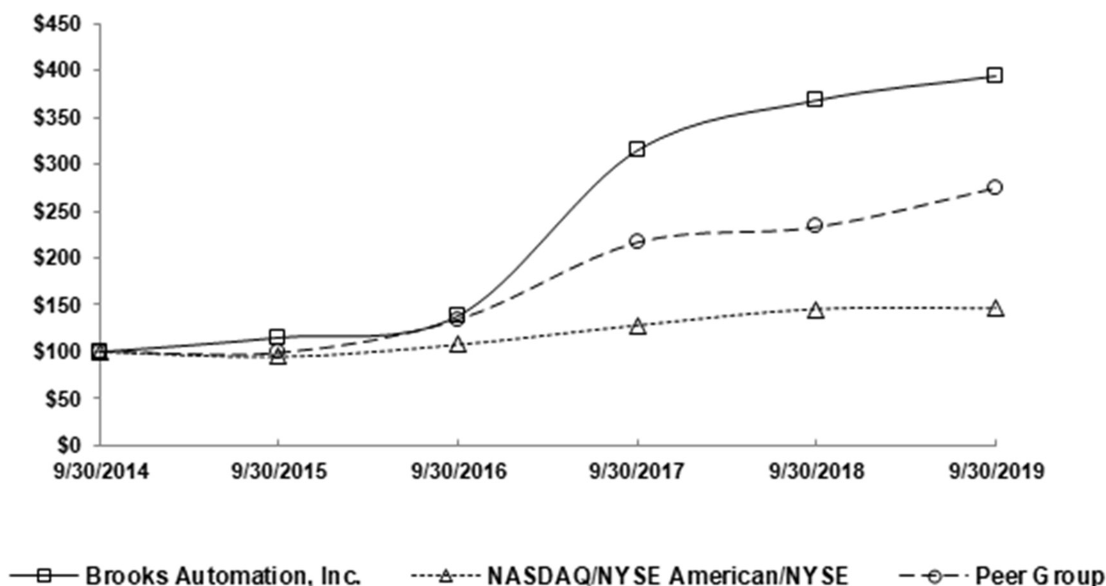
On November 1, 2019, our Board of Directors approved a cash dividend of $0.10 per share payable on December 20, 2019 to common stockholders of record on December 6, 2019.

Comparative Stock Performance

The following graph compares the cumulative total shareholder return (assuming reinvestment of dividends) from investing $100 on September 30, 2014, and plotted at the last trading day of each of the fiscal years ended September 30, 2015, 2016, 2017, 2018 and 2019, in each of (i) our Common Stock; (ii) the Nasdaq/NYSE American/NYSE Index of companies; and (iii) a peer group for the fiscal year ended September 30, 2019 ("Peer Group").

The Peer Group for the year ended September 30, 2019 is comprised of Advanced Energy Industries, Inc., Axcelis Technologies Inc., Bio Rad Laboratories Inc., Bruker Corp., Cabot Microelectronics Corp., Coherent Inc., Entegris, Inc., Formfactor Inc., Haemonetics Corp., MKS Instruments, Inc., MTS Instruments, Inc., Novanta Inc., Rudolph Technologies Inc. (now known as Onto Innovation Inc.), Ultra Clean Holdings, Inc., Varex Imaging Corp. and Veeco Instruments Inc.

The stock price performance on the graph below is not necessarily indicative of future price performance.



	9/30/2014	9/30/2015	9/30/2016	9/30/2017	9/30/2018	9/30/2019
Brooks Automation, Inc..	$ 100.00	$ 115.39	$ 138.94	$ 315.60	$ 369.13	$ 394.94
Nasdaq/NYSE American/NYSE	100.00	94.66	107.61	128.30	145.62	146.46
Peer Group	100.00	98.83	134.56	217.32	233.70	275.46

The information included under the heading "Comparative Stock Performance" in Item 5 of "this report" shall not be deemed to be "soliciting material" or subject to Regulation 14A, shall not be deemed "filed" for purposes of Section 18 of the Exchange Act, or otherwise subject to the liabilities of that section, nor shall it be deemed incorporated by reference in any filing under the Securities Act of 1933, as amended, or the Exchange Act.

Issuer's Purchases of Equity Securities

On September 29, 2015, our Board of Directors approved a share repurchase program for up to $50.0 million worth of our common stock. The timing and amount of any shares to be repurchased under this program will be based on market and business conditions, legal requirements and other factors and may be commenced or suspended at any time at our discretion. There were no shares repurchased under this program during fiscal year ended September 30, 2019.

Item 6. *Selected Financial Data*

The selected consolidated financial data [(1)(5)] set forth below should be read in conjunction with our Consolidated Financial Statements and notes thereto and "Management's Discussion and Analysis of Financial Condition and Results of Operations," appearing elsewhere in this report.

	Year Ended September 30,				
	2019	2018 (2)	2017	2016 (2)	2015
	(In thousands, except per share data)				
Revenue	$ 780,848	$ 631,560	$ 527,499	$ 434,012	$ 406,874
Gross profit	316,260	246,081	198,887	156,689	132,766
Operating income (loss)	46,038	31,409	14,319	(17,054)	(22,564)
Income (loss) from continuing operations	9,554	67,717	10,687	(85,457)	(12,523)
Income from discontinued operations, net of tax	427,862	48,747	51,925	15,981	26,744
Net income (loss) attributable to Brooks Automation, Inc.	437,416	116,575	62,612	(69,476)	14,221
Basic net income (loss) per share attributable to Brooks Automation, Inc. common stockholders:					
Income (loss) from continuing operations	0.13	0.96	0.15	(1.25)	(0.19)
Income from discontinued operations, net of tax	5.95	0.69	0.75	0.23	0.40
Basic net income (loss) per share attributable to Brooks Automation, Inc.	$ 6.08	$ 1.65	$ 0.90	$ (1.01)	$ 0.21
Diluted net income (loss) per share attributable to Brooks Automation, Inc. common stockholders:					
Income (loss) from continuing operations	$ 0.13	$ 0.95	$ 0.15	$ (1.25)	$ (0.18)
Income from discontinued operations, net of tax	5.91	0.69	0.74	0.23	0.39
Diluted net income (loss) per share attributable to Brooks Automation, Inc.	$ 6.04	$ 1.64	$ 0.89	$ (1.01)	$ 0.21
Dividend declared per share	$ 0.40	$ 0.40	$ 0.40	$ 0.40	$ 0.40

	As of September 30,				
	2019	2018	2017	2016	2015 (4)
	(In thousands)				
Cash and cash equivalents and marketable securities	$ 338,611	$ 251,227	$ 104,292	$ 91,221	$ 214,030
Working capital [(3)]	36,409	109,799	61,385	59,996	53,809
Total assets	1,515,999	1,095,257	766,628	685,905	758,702
Total equity	1,138,954	717,832	607,644	553,690	632,045

	Year Ended September 30, 2019			
	First Quarter	Second Quarter (2)	Third Quarter	Fourth Quarter
	(In thousands, except per share data)			
Revenue	$ 179,368	$ 198,390	$ 203,880	$ 199,210
Gross profit	72,081	80,516	83,510	80,153
Operating income	5,333	13,672	16,423	10,610
Net income attributable to Brooks Automation, Inc.	14,415	3,421	7,254	412,326
Basic net income per share	0.20	0.05	0.10	5.71
Diluted net income per share	0.20	0.05	0.10	5.68

	Year Ended September 30, 2018			
	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
	(In thousands, except per share data)			
Revenue	$ 142,599	$ 156,952	$ 172,363	$ 159,646
Gross profit	54,259	62,386	66,816	62,620
Operating income	4,925	10,321	12,547	3,616
Net income attributable to Brooks Automation, Inc.	16,486	67,020	22,717	10,352
Basic net income per share	0.23	0.95	0.32	0.15
Diluted net income per share	0.23	0.95	0.32	0.15

(1) We make acquisitions frequently and the selected financial data includes the operation results from these acquisitions in the results of operations from the dates of the acquisitions. Please refer to Note 4, “Acquisitions” to our Consolidated Financial Statements for additional information.

(2) Operating income (loss) and net income (loss) includes a charge of $76.5 million during fiscal year 2016 related to an additional valuation allowance against our U.S. net deferred tax assets and a benefit of $77.2 million during fiscal year 2018 due to the partial reversal of the valuation allowance against U.S. net deferred tax assets. Please refer to Note 12, “Income Taxes” to our Consolidated Financial Statements for additional information.

(3) The calculation of working capital excludes "Cash and cash equivalents" and "Marketable securities”.

(4) Working capital amounts were adjusted to reflect the reclassification of current deferred tax assets and liabilities to non-current in accordance with Accounting Standard Update 2015-17, Income Taxes (Topic 740): Balance Sheet Classification of Deferred Taxes, issued by the Financial Accounting Standards Board. We reclassified $16.4 million and $18.2 million, respectively, of net deferred tax assets from current to non-current at September 30, 2015.

(5) On August 27, 2018, we entered into an agreement to sell our semiconductor cryogenics business. We determined that the semiconductor cryogenics business met the criteria of being reported as a discontinued operation as of September 30, 2018. As a result, the selected financial data presented for current period and prior periods have been revised to reflect the discontinued operation classification. Please refer to Note 3, “Discontinued Operations” to our Consolidated Financial Statements for additional information. The sale was completed in the fourth quarter of fiscal year 2019. Net income attributable to Brooks Automation, Inc. for the fourth quarter and full fiscal year of 2019 includes the net gain on the sale of the business of $408.6 million.

(6) In connection with the closing of the sale of the semiconductor cryogenics business in the fourth quarter of fiscal 2019, we recorded accrued taxes payable of approximately $95 million as of September 30, 2019, which reduce our working capital for fiscal year 2019. Also, in connection with the closing of the sale of the semiconductor cryogenics business, we entered into Amendment No. 2 to the Asset Purchase Agreement with the purchaser. As part of this amendment, liabilities assumed by the purchaser were revised to include accounts payable related to the semiconductor cryogenics business. As a result, net working capital for fiscal years 2018, 2017, 2016 and 2015 was revised to exclude accounts payable related to the semiconductor cryogenics business which increased working capital by $11.1 million, $10.6 million, $5.3 million and $8.5 million, respectively.

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

The Management's Discussion and Analysis of Financial Condition and Results of Operations, or MD&A, describes principal factors affecting the results of our operations, financial condition and liquidity, as well as our critical accounting policies and estimates that require significant judgment and thus have the most significant potential impact on our Consolidated Financial Statements. Our MD&A is organized as follows:

- *Overview*. This section provides a general description of our business and operating segments, recent developments, as well as a brief discussion and overall analysis of our business and financial performance, including key developments affecting us during fiscal years ended September 30, 2019, 2018 and 2017.
- *Critical Accounting Policies and Estimates.* This section discusses accounting policies and estimates that require us to exercise subjective or complex judgments in their application. We believe these accounting policies and estimates are important to understanding the assumptions and judgments incorporated in our reported financial results.
- *Results of Operations.* This section provides an analysis of our financial results for the fiscal year ended September 30, 2019 compared to the fiscal year ended September 30, 2018. For the discussion covering the fiscal year ended September 30, 2018, please refer to Item 7, "Management's Discussion and Analysis of Financial Condition and Results of Operations" in our Form 10-K for the fiscal year ended September 30, 2018.
- *Liquidity and Capital Resources.* This section provides an analysis of our liquidity and changes in cash flows, as well as a discussion of available borrowings and contractual commitments.

You should read the MD&A in conjunction with our Consolidated Financial Statements and related notes in this Form 10-K. In addition to historical information, the MD&A contains forward-looking statements that involve risks and uncertainties. You should read "Information Related to Forward-Looking Statements" included above in this Form 10-K and Item 1A, "Risk Factors" for a discussion of important factors that could cause our actual results to differ materially from our expectations.

OVERVIEW

General

We are a leading provider of semiconductor manufacturing automation solutions and life science sample-based services and solutions worldwide. In the semiconductor manufacturing market, we have been a provider of precision robotics, integrated automation systems and services for more than 40 years. In the life sciences market, we apply our automation and cryogenics expertise to offer a full suite of sample-based services and products, including a full line of cold chain management solutions for handling and storing biological and chemical compound samples used in areas such as drug development, clinical research and advanced cell therapies. We are also a global provider of gene sequencing and gene synthesis services. We believe our leadership positions and our global support capability in each of these markets make us a valued business partner to the largest semiconductor capital equipment device makers, and pharmaceutical and life science research institutions in the world.

In the semiconductor capital equipment market, equipment productivity and availability are critical factors for our customers, who typically operate equipment under demanding temperature and/or pressure environments. We are a leader in wafer automation and contamination controls solutions and services that are designed to improve throughput, yield, and cost of ownership of tools in semiconductor fabs. Our product offerings include vacuum and atmospheric robots, turnkey vacuum and atmospheric wafer handling systems, as well as wafer carrier cleaning and reticle storage systems. We also capture the complete life cycle of value through our global service network of expert application and field engineers who are located close to our customers. Our services include rapid refurbishment of robots to stringent specifications, upgrades to improve equipment productivity, and proactive monitoring and diagnostics for predictive risk management and improved up-time of the installed base. Although the demand for semiconductors and semiconductor manufacturing equipment is cyclical resulting in periodic expansions and contractions, we expect the semiconductor equipment market to remain one of our principal markets as we continue making investments to maintain and grow our semiconductor product

and service offerings. A majority of our research and development spending advances our current product lines and drives innovations for new product offerings. We invest in research and development initiatives within the Brooks Semiconductor Solutions Group segment to maintain continued leadership position in the markets we serve. We launched our newest Vacuum Automation platform, MagnaTran LEAP™, for the rapidly emerging advanced technologies related to manufacturing 10 nanometer design rule semiconductor chips. MagnaTran LEAP is well positioned to deliver clean, accurate and fast wafer transport available for the fast-growing Deposition and Etch markets. In addition, we expect to continue to support and expand our technology and product offerings for the semiconductor market through acquisitions. In 2018, we acquired Tec-Sem, a Switzerland-based provider of semiconductor fabrication automation equipment with a focus on reticle management. The acquisition is expected to enhance our contamination controls solutions offerings.

In the life sciences sample management market, we utilize our core technology competencies and capabilities in automation and cryogenics to provide comprehensive bio-sample management solutions to a broad range of end markets within the life sciences industry. Our offerings include automated ultra-cold storage freezers, consumable sample storage containers, instruments which assist in the workflow of sample management, and both on-site and off-site full sample management services. We expect the life sciences sample management market to remain one of our principal markets for our product and service offerings and provide favorable opportunities for the growth of our overall business. Over the past several years, we have acquired and developed essential capabilities required to strategically address the sample management needs across multiple end markets within the life sciences industry.

In November of 2015, we acquired BioStorage Technologies, a full-service outsourcing sample management business, for a total purchase price of $125.2 million, net of cash acquired. The acquisition provided us with the capability to support customers with an integrated, comprehensive set of sample management products, services and solutions. In July 2017, we acquired substantially all of the assets and liabilities of Pacific Bio-Material Management, Inc., or PBMMI, and Novare, LLC, or Novare, for a total purchase price of $34.1 million, net of cash acquired. PBMMI and Novare provide storage, transportation, management, and cold chain logistics of biological materials. The acquisition expanded our capabilities with respect to sample management and integrated cold chain storage and transportation solutions. We acquired Cool Lab, LLC, a subsidiary of BioCision, LLC, which provides a range of cryogenic product solutions that assist in managing the temperature stability of therapeutics, biological samples and related biomaterials in ultra-cold environments, in November 2016. We held an equity interest in BioCision prior to the acquisition of Cool Lab and collaborated in the development of advanced solutions in temperature-controlled environments. The aggregate purchase price of $15.2 million consisted of a cash payment of $4.8 million, a liability to the seller of $0.1 million and a non-cash consideration of $10.3 million measured at fair value on the acquisition date. We have made several investments in developing new consumable and instrument offerings since the acquisitions of FluidX and Cool Lab.

In August 2017, we acquired certain assets and liabilities related to FreezerPro® web-based software platform from RURO, Inc. for a total purchase price of $5.5 million. RURO, Inc. provides sample management software across multiple end markets, including academic research, government, pharmaceutical, biotech, and healthcare. Our informatics solutions address needs within laboratories, biobanks, and enterprises that manage biological samples. In October 2017, we acquired all of the outstanding capital stock of 4titude Limited, or 4titude, a U.K.-based manufacturer of scientific consumables for biological sample materials used in a variety of genomic and DNA analytical applications, for a total purchase price of $65.1 million, net of cash acquired. The acquisition has expanded our existing offerings of consumables and instruments within the Brooks Life Sciences segment. In April 2018, we acquired BioSpeciMan Corporation, or BioSpeciMan, a Canadian provider of storage services for biological sample materials. We made a total cash payment of $5.2 million, net of cash acquired and subject to working capital adjustments. The acquisition expanded customer relationships and geographic reach within our sample management storage services business.

In fiscal year 2019, we acquired GENEWIZ Group, or GENEWIZ, a leading global genomics service provider headquartered in South Plainfield, New Jersey. GENEWIZ is a global leader in genomics services that enable research scientists to advance their discoveries within the pharmaceutical, academic, biotechnology, agriculture and other markets. GENEWIZ provides gene sequencing and synthesis services for more than 4,000 institutional customers worldwide supported by their global network of laboratories spanning the United States, China, Japan, Germany and the United Kingdom. This transaction has added a new and innovative services platform which we expect to leverage, along with our core capabilities, to add even more value to samples under our care.

Since entering the life sciences industry, we have also strengthened and broadened our product portfolio and market reach by investing in internal product development. For the fiscal years ended 2019, 2018 and 2017, more than 23% of our cumulative research and development spending was focused on innovating and advancing solutions in the life sciences sample management market. We expect to continue investing in research and development and making strategic acquisitions with the objective of expanding our offerings in the life sciences sample management market. Within the Brooks Life Sciences segment, we have developed and continue to develop automated biological sample storage solutions for operating in ultra-low temperature environments. We have developed the Twin-bank platform which provides -20°C and -80°C ultracold storage and the BioStore™ III Cryo for -190°C cryogenic storage. With the acquisition of GENEWIZ, we acquired and continue to invest in research and development activities related to our protocols, processes and technologies to support complex gene reading and writing services.

Recent Developments

In the fourth quarter of fiscal year 2018, we entered into a definitive agreement to sell our semiconductor cryogenics business to Edwards Vacuum LLC (a member of the Atlas Copco Group) for approximately $675.0 million in cash, subject to customary adjustments. We originally acquired the cryogenics business in 2005 as part of the acquisition of Helix Technology Corporation. The semiconductor cryogenics business has been classified as discontinued operations and, unless otherwise noted, the description of our business in this report relates solely to our continuing operations and does not include the operations of our semiconductor cryogenics business.

On July 1, 2019, we completed the sale of the semiconductor cryogenics business for $661.5 million which excludes $6.3 million retained by the buyer at closing based on an estimate of net working capital adjustments, which are currently pending finalization. Net proceeds from the sale were $553.1 million, net of estimated taxes payable and closing costs. As part of this sale, we transferred our intellectual property, or IP, for our cryogenics pump products, but not our IP related to our semiconductor automation or life sciences businesses.

On July 1, 2019, in connection with the completion of the sale of our semiconductor cryogenics business, we used $495.3 million of the cash proceeds to extinguish debt. As a result of the debt extinguishment we recorded a loss on extinguishment of debt of $5.2 million in the fourth quarter of fiscal year 2019. Refer to “Liquidity and Capital Resources” for further discussion of the debt extinguishment.

Segments

We have three operating segments aggregated into two reportable segments consisting of Brooks Semiconductor Solutions Group and Brooks Life Sciences. For additional information on our operating segments and the related restructuring actions, as well as segment revenues and their operating results, please refer to Note 17, "Restructuring and Other Charges" and Note 21, "Segment and Geographic Information" to our Consolidated Financial Statements included in Item 8, "Financial Statements and Supplementary Data" of this Form 10-K.

The Brooks Semiconductor Solutions Group segment provides a variety of products, services and solutions that enable improved throughput and yield in controlled operating environments, as well as an extensive range of support services. The solutions include atmospheric and vacuum robots, robotic modules, tool automation systems, and contamination control of wafer carrier front opening unified pods. The support services include repair services, diagnostic support services, and installation services in support of the products, which enable our customers to maximize process tool uptime and productivity. This segment also provides end-user customers with spare parts and productivity enhancement upgrades to maximize tool productivity.

The Brooks Life Sciences segment provides comprehensive life cycle sample management solutions to life science and bioscience customers including complete end-to-end “cold chain of custody” solutions and sample-based lab services such as genomic sequencing and gene synthesis to advance scientific research and support drug development. The segment’s product offerings include automated cold sample management systems for compound and biological sample storage, equipment for sample preparation and handling, consumables, and informatics that help customers manage samples throughout their research discovery and development work flows. The segment’s service offerings include sample storage, genomic sequencing, gene synthesis, lab processing services, lab analysis, and other support services provided to a wide range of life science customers, including pharmaceutical companies, biotechnology companies, biorepositories

and research institutes. We combine two reporting operating segments, Sample Management and GENEWIZ, into one reportable segment, Brooks Life Sciences, based on long term economic similarities of the two segments.

Business and Financial Performance

Fiscal Year Ended September 30, 2019 Compared to Fiscal Year Ended September 30, 2018

Review of Revenue Recognition Timing - We have completed our review of the timing of revenue recognition with respect to a product shipment from one of our contract manufacturers within the Brooks Semiconductor Solutions Group segment and similar transactions announced in our Notification of Late Filing on Form 12b-25 filed with the SEC on December 2, 2019 and determined that approximately $1.0 million of revenue from this product should be recognized in the fiscal quarter ended December 31, 2019 as opposed to the fiscal quarter ended September 30, 2019. As a result, the revenue and related profits from this product previously recorded in the fiscal fourth quarter and of the fiscal year ended September 30, 2019 as reported in the press release we issued on November 6, 2019 and furnished to the SEC with our Current Report on Form 8-K on the same date was adjusted downward and the revenue and related profits from this product will subsequently be recorded in the fiscal quarter ended December 31, 2019. Our financial results included in this Form 10-K and the consolidated financial statements included elsewhere in this Form 10-K reflect these adjustments. Following our review of this issue, we conducted an assessment of our controls relating to the timing of revenue recognition for products shipped from our contract manufacturers and determined we had a material weakness in our internal control over financial reporting, as described further in this annual report in Item 9A, Controls and Procedures.

Results of Operations - We reported revenue of $780.8 million for fiscal year 2019 compared to $631.6 million for fiscal year 2018, an increase of $149.3 million, or 24%. Gross margin was 40.5% for fiscal year 2019 compared to 39.0% for fiscal year 2018, an increase in gross profit of $70.2 million. Operating expenses were $270.2 million for fiscal year 2019 compared to $214.7 million for fiscal year 2018, an increase of $55.6 million. Operating income was $46.0 million for fiscal year 2019 compared to $31.4 million for fiscal year 2018, an increase of $14.6 million, which was primarily attributable to the revenue growth and gross margin improvement, partially offset by higher operating expenses. We generated income from continuing operations of $9.6 million during fiscal year 2019 as compared to $67.7 million in fiscal year 2018. This decrease was primarily attributable to an increase in income taxes of $47.1 million driven by the release of the tax valuation allowance of $77.2 million in fiscal year 2018. Additional factors contributing to the decrease in income from continuing operations compared to the prior fiscal year include a loss on extinguishment of debt of $14.3 million and higher interest expense of $12.7 million in fiscal year 2019, partially offset by an increase in operating income of $14.6 million. Please refer to the “Results of Operations” section below for a detailed discussion of our financial results for the fiscal year 2019 compared to fiscal year 2018.

Cash Flows and Liquidity - Cash and cash equivalents, restricted cash and marketable securities were $342.1 million at September 30, 2019 as compared to $251.2 million at September 30, 2018. The increase in cash and cash equivalents and marketable securities of $90.9 million was primarily attributable to cash inflows of $661.6 million related to proceeds from the sale of our semiconductor cryogenics business and cash inflows of $90.9 million generated from our operating activities, partially offset by net cash outflows of $442.7 million to acquire GENEWIZ, net cash outflows of $163.8 million related to principal payments made on and proceeds received from our term loans, cash dividends paid of $28.9 million and capital expenditures of $23.9 million. Please refer to the “Liquidity and Capital Resources” section below for a detailed discussion of our liquidity and changes in cash flows for fiscal year 2019 compared to fiscal year 2018.

CRITICAL ACCOUNTING POLICIES AND ESTIMATES

The preparation of the Consolidated Financial Statements requires us to make estimates and judgments that affect the reported amounts of assets, liabilities, revenue and expenses, and related disclosure of contingent assets and liabilities. On an ongoing basis, we evaluate our estimates, including those related to revenue, intangible assets, goodwill, inventories, income taxes, and stock-based compensation. We base our estimates on historical experience and various other assumptions that are believed to be reasonable under the circumstances. We evaluate current and anticipated worldwide economic conditions, both in general and specifically in relation to the semiconductor and life science industries, that serve as a basis for making judgments about the carrying values of assets and liabilities that are not readily determinable based on information from other sources. Actual results may differ from these estimates under different assumptions or conditions that could have a material impact on our financial condition and results of operations.

We believe that the assumptions and estimates associated with the following critical accounting policies involve significant judgment and thus have the most significant potential impact on our Consolidated Financial Statements.

Revenue Recognition

We generate revenue from the sale of products and services. A description of our revenue recognition policies is included in the Note 2, "Summary of Significant Accounting Policies" in the Notes to the Consolidated Financial Statements included in Item 8, "Financial Statements and Supplementary Data" of this Form 10-K.

Although most of our sales agreements contain standard terms and conditions, certain agreements contain multiple performance obligations or non-standard terms and conditions. For customer contracts that contain more than one performance obligation, we allocate the total transaction consideration to each performance obligation based on the relative stand-alone selling price of each performance obligation within the contract. We rely on either observable standalone sales or an expected cost plus margin approach to determine the standalone selling price of offerings, depending on the nature of the performance obligation. Performance obligations whose standalone selling price is estimated using an expected cost plus margin approach relate to the sale of customized automated cold sample management systems and service-type warranties within the Brooks Life Sciences segment.

Revenue from the sales of certain products that involve significant customization, which include primarily automated cold sample management systems is recognized over time as the asset created by our performance does not have alternative use to us and an enforceable right to payment for performance completed to date is present. We recognize revenue as work progresses based on a percentage of actual labor hours incurred on the project to-date and total estimated labor hours expected to be incurred on the project. The selection of the method to measure progress towards completion requires judgment. We have concluded that using the percentage of labor hours incurred to estimated labor hours needed to complete the project most appropriately depicts our efforts towards satisfaction of the performance obligation. We develop profit estimates for long-term contracts based on total revenue expected to be generated from the project and total costs anticipated to be incurred in the project. These estimates are based on a number of factors, including the degree of required product customization and the work required to be able to install the product in the customer's existing environment, as well as our historical experience, project plans and an assessment of the risks and uncertainties inherent in the contract related to implementation delays or performance issues that may or may not be within our control. We estimate a loss on a contract by comparing total estimated contract revenue to the total estimated contract costs and recognize a loss during the period in which it becomes probable and can be reasonably estimated. We review profit estimates for long-term contracts during each reporting period and revise the estimate based on changes in circumstances.

If our judgment regarding revenue recognition proves incorrect, our revenue in particular periods may be adversely affected and could have a material impact on our financial condition and results of operations.

Business Combinations

We account for business acquisitions using the purchase method of accounting, in accordance with which assets acquired and liabilities assumed are recorded at their respective fair values at the acquisition date. The fair value of the consideration paid, including contingent consideration, is assigned to the assets acquired and liabilities assumed based on their respective fair values. Goodwill represents the excess of the purchase price over the estimated fair values of the assets acquired and liabilities assumed.

Significant judgment is used in determining fair values of assets acquired and liabilities assumed, as well as intangibles and their estimated useful lives. Fair value and useful life determinations are based on, among other factors, estimates of future expected cash flows, royalty cost savings and appropriate discount rates used in computing present values. Particularly for GENEWIZ, management applied significant judgement in estimating the fair value of the acquired intangible assets, which involved significant estimates and assumptions with respect to forecast revenue growth rates, gross margin percentage, selling, general, and administrative expenses and the discount rate. These judgments may materially impact the estimates used in allocating acquisition date fair values to assets acquired and liabilities assumed, as well as our current and future operating results. Actual results may vary from these estimates that may result in adjustments to goodwill and acquisition date fair values of assets and liabilities during a measurement period or upon a final

determination of asset and liability fair values, whichever occurs first. Adjustments to fair values of assets and liabilities made after the end of the measurement period are recorded within our operating results.

Changes in the fair value of contingent consideration resulting from a change in the underlying inputs are recognized in results of operations until the arrangement is settled.

Intangible Assets, Goodwill and Other Long-Lived Assets

We have identified intangible assets and generated significant goodwill as a result of our acquisitions. Intangible assets other than goodwill are valued based on estimated future cash flows and amortized over their estimated useful lives. Goodwill is tested for impairment annually or more often if impairment indicators are present, at the reporting unit level. Intangible assets other than goodwill and long-lived assets are subject to impairment testing if events and circumstances indicate that the carrying amount of an asset or a group of assets may not be recoverable.

The goodwill impairment test is performed at the reporting unit level. A reporting unit is either an operating segment or one level below it, which is referred to as a "component." The level at which the impairment test is performed requires an assessment of whether the operations below an operating segment constitute a self-sustaining business, in which case testing is generally performed at this level.

We have three operating and two reportable segments consisting of Brooks Semiconductor Solutions Group and Brooks Life Sciences. We have five reporting units, including three reporting units within the Brooks Semiconductor Solutions Group operating segment and two reporting units which is the Brooks Life Sciences operating segment.

We perform our annual goodwill impairment assessment on April 1st of each fiscal year. We evaluate a reporting unit's goodwill for impairment between annual tests if events occur or circumstances change that would more likely than not reduce the fair value of such reporting unit below its carrying value In accordance with ASC 350, *Intangibles-Goodwill and Other*, we initially assess qualitative factors to determine whether the existence of events or circumstances indicates that it is more likely than not that the fair value of a reporting unit is less than its carrying value. If we determine, based on this assessment, that it is more likely than not that the fair value of the reporting unit is less than its carrying value, we perform a quantitative goodwill impairment test by comparing the reporting unit's fair value with its carrying value. An impairment loss is recognized for the amount by which the reporting unit's carrying value exceeds its fair value, up to the total amount of goodwill allocated to the reporting unit. No impairment loss is recognized if the fair value of the reporting exceeds its carrying value.

We determine fair values of our reporting units based on an income approach in accordance with the discounted cash flow method, or DCF Method. The DCF Method is based on projected future cash flows and terminal value estimates discounted to their present values. Terminal value represents a present value an investor would pay on the valuation date for the rights to the cash flows of the business for the years subsequent to the discrete cash flow projection period. We consider the DCF Method to be the most appropriate valuation technique since it is based on management's long-term financial projections. Due to the cyclical nature of the semiconductor equipment market, management's projections as of the valuation date are considered more subjective since market metrics of peer companies fluctuate during the cycle. In addition, we also compare aggregate values of our net corporate assets and reporting unit fair values to our overall market capitalization and use certain market-based valuation techniques to test the reasonableness of the reporting unit fair values determined in accordance with the DCF Method. The observable inputs used in the DCF Method include discount rates that are at or above our weighted-average cost of capital. We derive discount rates that are commensurate with the risks and uncertainties inherent in the respective businesses and our internally developed projections of future cash flows.

We completed our annual goodwill impairment test as of April 1, 2019 for our five reporting units: Automation Solutions, Contamination Control Solutions and Global Semiconductor Services within the Brooks Semiconductor Solutions Group segment, as well as Sample Management and GENEWIZ within the Brooks Life Sciences segment. Based on the test results, we determined that no adjustment to goodwill was necessary. We conducted a qualitative assessment for the three reporting units within the Brooks Semiconductor Solutions Group segment and determined that it was more likely than not that their fair values were more than their carrying values. As a result of the analysis, we did not perform the quantitative assessment for these reporting units and did not recognize any impairment losses. We performed the quantitative goodwill impairment test for the two reporting units within the Brooks Life Sciences segment. We determined

that no adjustment to goodwill was necessary for these two reporting units. The Sample Management reporting unit's fair value significantly exceeded book value. The GENEWIZ reporting unit, which was recently acquired, had a fair value slightly above its book value.

Application of the goodwill impairment test requires judgment based on market and operational conditions at the time of the evaluation, including management's best estimates of the reporting unit's future business activity and the related estimates and assumptions of future cash flows from the assets that include the associated goodwill. Different assumptions of forecasted sales volumes, product costs, future cash flows, risk-adjusted weighted average cost of capital discount rate, as well as long-term growth rate projections used in the DCF model could results in different estimates of the reporting unit's fair value as of each testing date.

We are required to test long-lived assets, other than goodwill, for impairment when impairment indicators are present. For purposes of this test, long-lived assets are grouped with other assets and liabilities at the lowest level for which identifiable cash flows are largely independent of the cash flows of other assets and liabilities. If we determine that indicators of potential impairment are present, we assess the recoverability of the long-lived asset group by comparing its undiscounted future cash flows to its carrying value. If the carrying value of the long-lived asset group exceeds its future cash flows, we determine fair values of the individual net assets within the long-lived asset group to assess potential impairment. If the aggregate fair values of the individual net assets of the group are less than their carrying values, an impairment loss is recognized for an amount in excess of the group's aggregate carrying value over its fair value. The loss is allocated to the assets within the group based on their relative carrying values, with no asset reduced below its fair value. We did not test our long-lived assets for impairment during fiscal years 2019 and 2018 since no events indicating impairment occurred during the periods then ended.

Inventory

We state our inventory at the lower of cost or market amount and make adjustments to reduce the inventory cost to its net realizable value by providing estimated reserves for obsolete or unmarketable inventory. The reserves are established for the difference between the cost of inventory and its estimated market value based on assumptions related to future demand and market conditions. We fully reserve for inventories and non-cancelable purchase orders for inventory deemed obsolete. We perform periodic reviews of our inventory to identify excess inventories on hand. We compare on-hand inventory balances to anticipated inventory usage based on our recent historical activity and anticipated or forecasted demand for our products developed through our planning systems and sales and marketing inputs.

We adjust the reserves for obsolete or unmarketable inventory and record additional inventory write downs based on unfavorable changes in estimated customer demand or actual market conditions that may differ from management projections.

Deferred Income Taxes

We record a valuation allowance to reduce our deferred tax assets to the amount that is more likely than not to be realized. We consider recent historical income, estimated future taxable income, carry-forward periods of tax attributes, the volatility of the semiconductor industry and ongoing tax planning strategies in assessing the need for the valuation allowance. Throughout fiscal year 2017 we maintained a full valuation allowance against our U.S. net deferred tax assets along with those of certain foreign tax-paying components. We evaluate the realizability of our deferred tax assets by tax-paying component and assess the need for a valuation allowance on an annual and quarterly basis. We evaluate the profitability of each tax-paying component on a historic cumulative basis and on a forward-looking basis while performing this analysis. After evaluating all the relevant positive and negative evidence as of March 31, 2018, we concluded that it was more likely than not that a substantial portion of the U.S. deferred tax assets would be realized. In the second quarter of fiscal year 2018 we reached a significant level of cumulative profitability in the U.S., coupled with an improved outlook of U.S. earnings. During the full fiscal year 2018, we reduced our U.S. valuation against our U.S. net deferred tax assets resulting in a tax benefit of $77.2 million. The remaining portion of our U.S. valuation allowance is related to the realizability of certain state tax credits and net operating loss carry-forwards. We also continue to maintain valuation allowances against net deferred tax assets in certain foreign tax-paying components as of the end of fiscal year 2019.

Stock-Based Compensation

We measure compensation cost for all employee stock awards at fair value on the date of grant and recognize compensation expense over the service period for awards expected to vest. The fair value of restricted stock units is determined based on the number of shares granted and the closing price of our common stock quoted on Nasdaq on the date of grant, and the fair value of stock options is determined using the Black-Scholes valuation model. Such fair values are recognized as expense over the service period, net of estimated forfeitures. The estimation of stock awards that will ultimately vest requires significant judgment. We consider many factors when estimating expected forfeitures, including types of awards, employee class, and historical experience. In addition, for stock-based awards where vesting is dependent upon achieving certain operating performance goals, we estimate the likelihood of achieving the performance goals. Actual results, and future changes in estimates, may differ from our current estimates.

Recently Issued Accounting Pronouncements

For a summary of recently issued accounting pronouncements applicable to our Consolidated Financial Statements which is incorporated here by reference, please refer to Note 2, “Summary of Significant Accounting Policies” in the Notes to the Consolidated Financial Statements included in Item 8, “Financial Statements and Supplementary Data” of this Form 10-K.

RESULTS OF OPERATIONS

Fiscal Year Ended September 30, 2019 Compared to Fiscal Year Ended September 30, 2018

Revenue

We reported revenue of $780.8 million for fiscal year 2019 compared to $631.6 million for fiscal year 2018, an increase of $149.3 million, or 24%. In the first quarter of fiscal 2019, we adopted new accounting guidance for recognizing revenue on a modified retrospective basis. The difference in reported revenue due to the adoption of the new revenue recognition standard was a net decrease in revenue of $0.9 million for fiscal year 2019.

Our Brooks Semiconductor Solutions Group segment reported revenue of $446.7 million for fiscal year 2019 compared to $435.0 million for fiscal year 2018. The increase of $11.7 million, or 3%, reflects increases in revenue from contamination control solutions and automation systems, partially offset by a decline in revenue from our robotics products. The increase in contamination control solutions revenue is primarily due to organic growth, and includes $15.1 million of revenue from Tec-Sem which was driven by the additional months of ownership in fiscal year 2019 compared to fiscal year 2018. The difference in reported revenue due to the adoption of the new revenue recognition standard was a net increase of $1.9 million for fiscal year 2019.

Our Brooks Life Sciences segment reported revenue of $334.2 million for fiscal year 2019 compared to $196.5 million for fiscal year 2018. The increase of $137.6 million, or 70%, included organic growth of $16.0 million, or 8%, which was primarily driven by consumables and instruments, BioStore III Cryo systems, sample storage services, and infrastructure services. Acquisitions accounted for $126.8 million of the increase compared to fiscal year 2018, which consisted of $126.3 million from the acquisition of GENEWIZ, and $0.5 million from the acquisition of BioSpeciMan. The difference in reported revenue due to the adoption of the new revenue recognition standard was a net decrease of $2.8 million for fiscal year 2019.

We anticipate continued growth in revenue from our Brooks Life Sciences segment through our internally-developed products and services and through our acquired businesses. We will continue to seek opportunities to expand our market share in the semiconductor and adjacent technology markets served by our Brooks Semiconductor Solutions Group segment. Our sales into the semiconductor and adjacent technology markets are substantially capital investments for our customers and these markets are cyclical, often fluctuating significantly from quarter to quarter. Demand for our Brooks Semiconductor Solution Group products is affected by these cycles.

Revenue generated outside the United States amounted to $455.6 million, or 58% of total revenue, for fiscal year 2019 compared to $398.9 million, or 63% of total revenue, for fiscal year 2018.

Operating Income

We reported operating income of $46.0 million for fiscal year 2019 compared to $31.4 million for fiscal year 2018. The increase of 47% is driven by higher revenue and gross profit, partially offset by an increase in both research and development expenses and selling, general and administrative expenses compared to the prior fiscal year. Drivers of the increases to research and development and selling, general and administrative expenses are described below.

Operating income for our Brooks Semiconductor Solutions Segment was $66.2 million for fiscal year 2019 compared to $58.4 million for fiscal year 2018. Operating income includes charges for amortization related to completed technology of $3.6 million and $3.4 million for fiscal years 2019 and 2018, respectively and includes inventory step-up charges of $0.2 million and $0.7 million for fiscal years 2019 and 2018, respectively. Adjusted operating income for our Brooks Semiconductor Solutions Group segment, which excludes the charges mentioned above, was $70.0 million for fiscal year 2019 compared to $62.5 million in fiscal year 2018. Please refer to Note 21, "Segment Information".

Operating income for our Brooks Life Sciences segment was $13.5 million for fiscal year 2019 compared to $1.2 million for fiscal year 2018. Operating income for our Brooks Life Sciences segment includes charges for amortization related to completed technology of $6.8 million and $1.5 million for fiscal years 2019 and 2018, respectively. Fiscal year 2018 includes $1.2 million inventory step-up charges. There were no inventory step-up charges for fiscal year 2019. Fiscal year 2019 includes restructuring related charges of $0.3 million. There were no restructuring related charges for fiscal year 2018. Adjusted operating income for our Brooks Life Sciences segment, which excludes the charges mentioned above, was $20.6 million for fiscal year 2019 compared to $3.8 million in fiscal year 2018. Please refer to Note 21, "Segment Information".

Gross Margin

We reported gross margins of 40.5% for fiscal year 2019 compared to 39.0% for fiscal year 2018. Gross margin increased 3.6 points in the Brooks Life Sciences segment and increased 0.7 points in the Brooks Semiconductor Solutions segment. Cost of revenue for fiscal year 2019 included $10.4 million of charges for amortization related to completed technology as compared to $4.9 million incurred during fiscal year 2018. The increase compared to the prior year period was due to the amortization of intangible assets acquired with GENEWIZ. Additionally, cost of revenue for fiscal year 2019 also included $0.3 million of restructuring related charges and $0.2 million of inventory step-up charges from acquisitions, compared to the prior year period which included $1.9 million of inventory step-up charges. The difference in reported gross margin due to the adoption of the new revenue recognition standard was a net increase in gross profit of $1.0 million for fiscal year 2019.

Our Brooks Semiconductor Solutions Group segment reported gross margins of 40.7% for fiscal year 2019 compared to 40.0% for fiscal year 2018. Margins improved on the impact of product mix, and lower production material variances. Cost of revenue during fiscal year 2019 included $3.6 million of amortization related to completed technology compared to $3.4 million during fiscal year 2018. During fiscal years 2019 and 2018, cost of revenue included $0.2 million and $0.7 million, respectively, of inventory step-up charges, which were attributable to the acquisition of Tec-Sem. The difference in reported gross margin due to the adoption of the new revenue recognition standard was a net increase in gross profit of $1.9 million for fiscal year 2019.

Our Brooks Life Sciences segment reported gross margins of 40.3% for fiscal year 2019 compared to 36.7% for fiscal year 2018. Margins benefitted from the impact of GENEWIZ, acquired in November of 2018, which carries higher than average gross margins, and improved in gross margins in Sample Management driven by consumables and instruments and BioStorage services. These benefits were offset by lower margins in our manufactured automated stores business, which experienced cost overruns in the areas of production and project management. Cost of revenue during fiscal year 2019 included $6.8 million of amortization related to completed technology as compared to $1.5 million incurred during fiscal year 2018. During fiscal year 2019, cost of revenue included $0.3 million of restructuring related charges and during fiscal year 2018, cost of revenue included $1.2 million of inventory step-up charges. The difference in reported gross margin due to the adoption of the new revenue recognition standard was a net decrease in gross profit of $0.9 million for fiscal year 2019.

Research and Development Expenses

Research and development expenses were $56.4 million in fiscal year 2019 compared to $46.9 million in fiscal year 2018. The increase of $9.4 million was due to increased expense of $5.3 million within the Brooks Life Sciences segment and $4.1 million within the Brooks Semiconductor Solutions Group segment.

Research and development expenses in our Brooks Semiconductor Solutions Group segment were $39.1 million in fiscal year 2019 compared to $34.9 million in fiscal year 2018. Higher research and development expenses were primarily attributable to employee related costs of $2.2 million and outside services of $1.1 million. The additional months of Tec-Sem under ownership acquired in April of 2018, drove $1.3 million of the increase.

Research and development expenses in our Brooks Life Sciences Segment were $17.3 million in fiscal 2019 compared to $12.0 million in fiscal year 2018. The acquisition of GENEWIZ in November of 2018 added $5.0 million of expense in fiscal year 2019.

Selling, General and Administrative Expenses

Selling, general and administrative expenses were $212.0 million in fiscal year 2019 compared to $167.0 million in fiscal year 2018. The increase of $44.9 million was due to increased expense of $44.8 million within the Brooks Life Sciences Segment. Corporate expenses, not allocated to segments, were $31.8 million in in fiscal year 2019, compared to $27.4 million in fiscal year 2018. Corporate unallocated expenses included amortization expense related primarily to customer relationships of $24.7 million and $19.3 million, during fiscal years 2019 and 2018 respectively, and merger and acquisition related expenses of $6.7 million and $6.9 million, during fiscal years 2019 and 2018 respectively. These increases were partially offset by a $4.2 million decrease within the Brooks Semiconductor Solutions Segment.

Selling, general, and administrative expenses in our Brooks Semiconductor Solutions Group segment were $76.4 million in fiscal year 2019 compared to $80.6 million in fiscal year 2018. The decrease of $4.2 million is primarily related to a reduction in corporate allocated expenses, due to the addition of GENEWIZ, and lower variable compensation expense. The additional months of Tec-Sem under ownership acquired in April of 2018, drove $0.4 million of the increase.

Selling, general, and administrative expenses in our Brooks Life Sciences segment were $103.8 million in fiscal year 2019 compared to $59.0 million in fiscal year 2018. The increase of $44.8 million is primarily related to GENEWIZ, which added, $39.8 million of expense.

Restructuring Charges

We recorded restructuring charges of $1.9 million during fiscal year 2019 as compared to $0.7 million during fiscal year 2018.

Restructuring Charges Incurred During Fiscal Year Ended September 30, 2019

Restructuring charges of $1.9 million incurred during fiscal year 2019 were related to severance costs and consisted primarily of actions initiated during the second half of fiscal year 2019. Of these charges, $1.3 million related to the continued action to eliminate redundancies in both our Brooks Life Sciences segment and our Brooks Semiconductor Solutions Group segment primarily due to acquisitions. Cost savings realized during fiscal year 2019 related to these actions were $0.4 million in the Brooks Life Sciences segment and $0.6 million in the Brooks Semiconductor Solutions Group segment. During the fourth quarter of fiscal year 2019, the Company initiated the first phase of an action to eliminate costs within our Brooks Life Sciences segment's sample management business. During the fourth quarter of fiscal year 2019, the Brooks Life Sciences segment incurred severance costs related to this action of $0.6 million. Cost savings realized during fiscal year 2019 related to this action were nominal as it was initiated in the fourth quarter of fiscal year 2019.

Restructuring Charges Incurred During Fiscal Year Ended September 30, 2018

Restructuring charges of $0.7 million incurred during fiscal year 2018 were related to severance costs and consisted primarily of actions initiated during the fourth quarter of fiscal year 2018. Of these charges, $0.3 million related to the integration of Tec-Sem which was acquired during fiscal year 2018 as part of our Brooks Semiconductor Solutions Group segment and $0.3 million related to the announced closure of our Denmark facility which will eliminate redundancies in our Brooks Life Sciences segment. Cost savings realized during fiscal year 2019 related to these actions in our Brooks Semiconductor Solutions Group and our Brooks Life Sciences segment Group were $0.4 million and $0.5 million, respectively. Cost savings realized during fiscal year 2018 related to these actions were nominal as these actions were initiated during the fourth quarter of fiscal year 2018.

Non-Operating Income (Expenses)

Interest income – During fiscal years 2019 and 2018, we recorded interest income of $1.5 million and $1.9 million respectively, which represented interest earned on our marketable securities.

Interest expense – During fiscal years 2019 and 2018, we recorded interest expense of $22.2 million and $9.5 million, respectively. The increase in interest expense during fiscal year 2019 primarily related to the incremental term loan originated in November 2018. Please refer to the "Liquidity and Capital Resources" section below for further information on the term loan.

Loss on extinguishment of debt - During fiscal year 2019, we recorded losses on extinguishment of debt of $14.3 million of which $9.1 million was in connection with the syndication of the incremental term loan secured during the first quarter of fiscal 2019. The syndication to a new group of lenders during the second quarter of fiscal 2019 met the criteria of a debt extinguishment and therefore the amortization of the deferred financing costs associated with the origination of the incremental term loan was accelerated and recorded as a loss on extinguishment of debt in our statement of operations. In addition, as a result of the $495.3 million extinguishment of debt during the fourth quarter of fiscal year 2019, we recorded an additional $5.2 million loss on extinguishment of debt.

Other expenses, net – During fiscal years 2019 and 2018 we recorded other expenses, net of $1.5 million and $3.3 million, respectively. The $1.8 million decrease in expense was primarily attributable to higher foreign currency exchange losses of $1.5 million recognized during fiscal year 2018 as compared to the current fiscal year period. Please refer to Item 7A, "Quantitative and Qualitative Disclosures About Market Risk – Currency Rate Exposure" in this Annual Report on Form 10-K for additional information about these currency exchange losses.

Income Tax Provision

We recorded an income tax benefit on continuing operations of $0.1 million in fiscal year 2019 compared to an income tax benefit of $47.3 million in fiscal year 2018. The income tax benefit during fiscal year 2019 was driven primarily by benefits in the U.S. jurisdiction related to continuing operations losses, research tax credits, and stock compensation deductions in excess of book expenses. We also recorded a $1.4 million benefit due to a state tax change that resulted from the acquisition of GENEWIZ. We also recorded a tax provision of $3.0 million during the year related to changes in the toll charge recorded during 2018. The provision was the result of a change in tax legislation and the completion of all accounting of the charge under Staff Accounting Bulletin No.118. The overall benefit for fiscal year 2019 was partially offset by the tax provisions on earnings in our foreign jurisdictions during the year. The income tax benefit during fiscal year 2018 was driven primarily by the reversal of the valuation allowance against a substantial portion of the U.S. net deferred tax assets, offset by the estimated toll charge of $8.0 million on our taxable foreign earnings, net of foreign tax credits, associated with the enactment of the Tax Cuts and Jobs Act during fiscal year 2018. The tax benefit for fiscal year 2018 also included a $0.7 million tax benefit related to the re-measurement of net U.S. deferred tax liabilities to account for the reduced 21 percent statutory federal income tax rate. The overall benefit for fiscal year 2018 was partially offset by the tax provisions on earnings in our foreign jurisdictions during the year.

Discontinued Operations

On July 1, 2019, we completed the sale of the semiconductor cryogenics business which we include as a discontinued operation. We incurred revenue from discontinued operations of $109.5 million for fiscal year 2019 and $427.9 million of net income for fiscal year 2019, which includes the net gain on sale of the business of $408.6 million. We incurred revenue and net income related to the semiconductor cryogenics business of $196.1 million and $48.7 million, respectively for fiscal year 2018. The net income is also inclusive of income from the UCI joint venture in 2019 and 2018. The income from discontinued operations only includes direct operating expenses incurred that (1) are clearly identifiable as costs being disposed of upon completion of the sale and (2) will not be continued by the Company on an ongoing basis. Indirect expenses which supported the Cryogenics business, and which will remain as part of the continuing operations, are not reflected in income from discontinued operations.

LIQUIDITY AND CAPITAL RESOURCES

A considerable portion of our revenue is dependent on the demand for semiconductor capital equipment which historically has experienced periodic downturns. We believe that we have adequate resources to satisfy our working capital, financing activities, debt service and capital expenditure requirements for the next twelve months. The cyclical nature of our served markets and uncertainty in the current global economic environment make it difficult for us to predict longer-term liquidity requirements with sufficient certainty. We may be unable to obtain any required additional financing on terms favorable to us, if at all. If adequate funds are not available to us on acceptable terms or otherwise, we may be unable to successfully develop or enhance products and services, respond to competitive pressure or take advantage of acquisition opportunities, any of which could have a material adverse effect on our business, financial condition and operating results.

The discussion of our cash flows and liquidity that follows does not include the impact of the disposition of the semiconductor cryogenics business, unless otherwise noted, and is stated on a total company consolidated basis.

Overview of Cash Flows and Liquidity

Our cash, cash equivalents and marketable securities as of September 30, 2019 and 2018 consist of the following (in thousands):

	Year Ended September 30,	
	2019	2018
Cash and cash equivalents	$ 301,642	$ 197,708
Restricted cash	3,529	—
Short-term marketable securities	34,124	46,281
Long-term marketable securities	2,845	7,237
	$ 342,140	$ 251,226

Our cash, cash equivalents, restricted cash and marketable securities were $342.1 million as of September 30, 2019. Our cash balances are held in numerous locations throughout the world, with the substantial majority of those amounts located outside of the United States. As of September 30, 2019, we had cash and cash equivalents of $305.2 million, of which $152.9 million was held outside of the United States. If these funds are needed for the United States. operations, we would need to repatriate these funds. As a result of recent changes in U.S. tax legislation, any repatriation in the future would not result in U.S. federal income tax. Our intent is to permanently reinvest these funds outside of the U.S. and our current operating plans do not demonstrate a need to repatriate these funds for our U.S. operations. We had marketable securities of $37.0 million and $53.5 million as of September 30, 2019 and 2018, respectively. Our marketable securities are generally readily convertible to cash without an adverse impact.

Fiscal Year Ended September 30, 2019 Compared to Fiscal Year Ended September 30, 2018

Overview

Cash and cash equivalents, restricted cash and marketable securities were $342.1 million at September 30, 2019 as compared to $251.2 million at September 30, 2018. The increase in cash and cash equivalents, restricted cash and

marketable securities of $90.9 million was primarily attributable to cash inflows of $661.6 million related to proceeds from the sale of our semiconductor cryogenics business and cash inflows of $90.9 million generated from our operating activities, partially offset by net cash outflows of $442.7 million to acquire GENEWIZ, net cash outflows of $163.8 million related to proceeds received and principal payments made on our term loans, cash dividends paid of $28.9 million, and capital expenditures of $23.9 million.

Divestiture and Extinguishment of Debt

In 2019, we completed the sale of the semiconductor cryogenics business for $661.5 million which excludes $6.3 million retained by the buyer at closing to preliminarily settle net working capital adjustments. Net proceeds from the sale were $553.1 million, net of estimated taxes payable and closing costs. In connection with the completion of the sale of our semiconductor cryogenics business, we used $348.3 million of the cash proceeds from the sale to extinguish the total remaining outstanding balance of the incremental term loan and $147.0 million of the cash proceeds from the sale to extinguish a portion of the outstanding balance of the term loan. The total amount of debt extinguished was $495.3 million.

Operating Activities

Cash flows from operating activities can fluctuate significantly from period to period as earnings, working capital needs and the timing of payments for income taxes, restructuring activities and other charges impact reported cash flows.

Cash flows provided by operating activities were $90.9 million during fiscal year 2019 and comprised primarily of earnings of $84.6 million and sources of cash provided by changes in operating assets and liabilities of $6.3 million. Earnings of $84.6 million consists of net income of $437.4 million offset by the impact of non-cash related charges of $352.8 million which includes the net gain on the sale of our semiconductor cryogenics business of $408.6 million and $13.4 million of contingent transaction fees paid related to the closing of the sale of the cryogenics business. The changes in operating assets and liabilities which results in sources of cash consisted primarily of an increase in accrued expenses and other liabilities which includes accrued taxes of approximately $95 million related to the sale of our semiconductor cryogenics business, as well as decreases in accounts receivable, prepaids and other current assets and an increase of deferred revenue. These sources of cash were partially offset by decreased accrued compensation and tax withholdings. Cash flows provided by operating activities were $74.0 million during fiscal year 2018 comprised primarily of earnings of $120.6 million, including net income of $116.5 million and the impact of non-cash related charges of $4.1 million. Partially offsetting these items were the uses of cash of $46.6 million related to the changes in our operating assets and liabilities. The changes in operating assets and liabilities that resulted in a use of cash consisted primarily of an increase in accounts receivable as a result of higher revenue and an increase in inventory levels to support the growth of our business. These uses of cash were partially offset by sources of cash related primarily to increases in accounts payable as well as increased accrued compensation and tax withholdings.

Net income from discontinued operations contributed $427.9 million and $48.7 million for fiscal years ended 2019 and 2018, respectively, in the net income referenced for the respective periods above. Net income for fiscal year 2019 includes the net gain on sale of the semiconductor cryogenics business of $408.6 million. The sale of the semiconductor cryogenics business was completed on July 1, 2019 and may negatively impacted in future periods by the completion of sale of our cryogenic business.

Investing Activities

Cash flows from investing activities consist primarily of cash used for acquisitions, proceeds from divestitures, capital expenditures and purchases of marketable securities as well as cash proceeds generated from sales and maturities of marketable securities. Cash provided by investing activities was $211.3 million during fiscal year 2019 and consisted of $661.6 million related to the proceeds from the sale of our semiconductor cryogenics business, partially offset by net cash outflows of $442.7 million to acquire GENEWIZ, $23.9 million of capital expenditures, and net purchases, sales and maturities of marketable securities of $16.2 million. Cash used in investing activities of $148.5 million during fiscal year 2018 included cash payments of $85.8 million for acquisitions, $69.7 million for purchases of marketable securities and $12.8 million of capital expenditures, partially offset by cash inflows from sales and maturities of marketable securities of $19.1 million and $0.7 million in proceeds from other investments and sales of property, plant and equipment.

Capital expenditures are made primarily for increasing capacity, replacing equipment, supporting new product development and improving information technology infrastructure. Capital expenditures were $23.9 million during fiscal year 2019 as compared to $12.8 million during the fiscal year 2018.

Financing Activities

Cash used for financing activities was $191.2 million during fiscal year 2019 and included net cash outflows of $163.8 million primarily related to the extinguishment of debt and principal payments on our term loans totaling $850.2 million offset by proceeds of $686.4 million. Proceeds from the incremental term loan in the first quarter of fiscal year 2019 were $340.5 million. In the second quarter of fiscal year 2019, we syndicated the incremental term loan which resulted in an extinguishment of the incremental term loan of $349.1 million and proceeds from syndication of $345.2 million. Cash outflows also included cash dividends paid of $28.9 million. Cash provided by financing activities was $170.3 million during fiscal year 2018 as compared to $25.9 million used in financing activities during fiscal year 2017. Cash provided by financing activities during fiscal year 2018 included cash inflows of $197.6 million related to proceeds from the term loan originated in October 2017, partially offset by cash dividend payments to our shareholders of $28.3 million and principal payments on the term loan of $1.5 million.

China Facility

In April 2019, we committed to construct a facility in Suzhou China, to consolidate the Suzhou operations of the GENEWIZ business and provide an infrastructure to support future growth. The facility will be constructed in two phases. We expect to incur $50.0 to $55.0 million of capital expenditures related to this facility over the next five years, of which $0.7 million was incurred during fiscal year 2019.

Capital Resources

Term Loans

On October 4, 2017, we entered into a $200.0 million term loan with Morgan Stanley Senior Funding, Inc., JPMorgan Chase Bank, N.A. and Wells Fargo Securities, LLC pursuant to the terms of a credit agreement with the lenders. The term loan was issued at $197.6 million, or 98.8% of its par value, resulting in a discount of $2.4 million, or 1.2%, which represented loan origination fees paid at the closing. The loan principal amount may be increased by an aggregate amount equal to $75.0 million plus any voluntary repayments of the term loan plus any additional amount such that our secured leverage ratio is less than 3.00 to 1.00.

The term loan matures and becomes fully payable on October 4, 2024. Installment principal payments equal to 0.25% of the initial principal amount of the term loan are payable on the last day of each quarter, with any remaining principal amount becoming due and payable on the maturity date. Subject to certain conditions stated in the credit agreement, we may redeem the term loan at any time at our option without a significant premium or penalty, except for a repricing transaction, as defined in the credit agreement. We are required to redeem the term loan at the principal amount then outstanding upon the occurrence of certain events, as set forth in the credit agreement.

On November 15, 2018, we entered into an incremental amendment to the credit agreement under which we obtained an incremental term loan in an aggregate principal amount of $350.0 million, issued at $340.5 million. The proceeds of the incremental term loan were used to pay a portion of the purchase price for our acquisition of GENEWIZ. On February 15, 2019, we entered into the second amendment to the credit agreement and syndicated the incremental term loan to a group of new lenders. The syndicated incremental term loan was issued at $345.2 million. Except as provided for in the amendments, the incremental term loan was subject to the same terms and conditions of the initial term loan.

On July 1, 2019, in connection with the completion of the sale of our semiconductor cryogenics business, we used $348.3 million of the cash proceeds from the transaction to extinguish the outstanding balance at July 1, 2019 of the incremental term loan and $147.0 million of the cash proceeds from the transaction to extinguish a portion of the outstanding balance at July 1, 2019 of the term loan. The total amount of debt extinguished on July 1, 2019 was $495.3 million. At September 30, 2019, the outstanding term loan principal balance was $51.1 million, excluding unamortized deferred financing costs of $0.5 million.

The credit agreement, as amended, for contains certain customary representations and warranties, covenants and events of default. As of September 30, 2019, we were in compliance with all covenants and conditions under the credit agreement, as amended.

In connection with our acquisition of GENEWIZ in November 2018, we assumed three five-year term loans and two one-year term loans. At September 30, 2019, we had an aggregate outstanding principal balance of $1.7 million under the three five-year term loans. The two one-year short term loans matured and were repaid in full as of September 30, 2019.

At September 30, 2019, the aggregate outstanding principal balance of all of the outstanding term loans was $51.1 million, excluding unamortized deferred financing costs of $0.5 million. Borrowings under the term loans bear variable interest rates. As a result, we may experience exposure to interest rate risk due to the potential volatility associated with the variable interest rates on the term loans. If rates increase, we may be subject to higher costs of servicing the loans which could reduce our profitability and cash flows. During the year ended September 30, 2019, the weighted average stated interest rate on the term loans was 5.3%. During the year ended September 30, 2019, we incurred aggregate interest expense of $21.9 million on the term loans, including $1.1 million of deferred financing costs amortization. Our debt service requirements are expected to be funded through our existing sources of liquidity and operating cash flows.

Line of Credit Facility

We maintain a revolving line of credit with Wells Fargo Bank, N.A. and JPMorgan Chase Bank, N.A that provides for revolving credit financing of up to $75.0 million, subject to borrowing base availability, as defined in the credit agreement. The line of credit matures on October 4, 2022. The proceeds from the line of credit are available for permitted acquisitions and general corporate purposes.

As of September 30, 2019, we had approximately $40.4 million available for borrowing under the line of credit. There were no amounts outstanding pursuant to the line of credit as of September 30, 2019. The amount of funds available for borrowing under the line of credit arrangement may fluctuate each period based on our borrowing base availability. The line of credit contains certain customary representations and warranties, a financial covenant, affirmative and negative covenants, as well as events of default. We were in compliance with the line of credit covenants as of September 30, 2019. Although we believe we will be able to generate sufficient cash in the United States and foreign jurisdictions to fund future operating costs, we secured the revolving line of credit as an additional assurance for maintaining liquidity in the United States during potentially severe downturns of the cyclical semiconductor market, as well as for strategic investments and acquisitions.

Shelf Registration Statement

On August 8, 2019, we filed a registration statement on Form S-3 with the SEC to sell securities, including common stock, preferred stock, warrants, debt securities, depository shares, purchase contracts and purchase units in amounts to be determined at the time of an offering. Any such offering, if it does occur, may happen in one or more transactions. The specific terms of any securities to be sold will be described in supplemental filings with the SEC. This registration statement will expire on August 7, 2022.

Dividends

Our Board of Directors declared the following dividends during the fiscal years 2019 and 2018 (in thousands, except per share data):

Declaration Date	Dividend per Share	Record Date	Payment Date	Total
Fiscal Year Ended September 30, 2019:				
November 6, 2018	$ 0.10	December 2, 2018	December 20, 2018	$ 7,191
January 30, 2019	0.10	March 1, 2019	March 22, 2019	7,212
April 26, 2019	0.10	June 7, 2019	June 28, 2019	7,222
July 31, 2019	0.10	September 6, 2019	September 27, 2019	7,230
Fiscal Year Ended September 30, 2018				
November 8, 2018	$ 0.10	December 1, 2017	December 22, 2017	$ 7,040
January 31, 2018	0.10	March 2, 2018	March 23, 2018	7,050
April 30, 2018	0.10	June 1, 2018	June 22, 2018	7,058
July 31, 2018	0.10	September 7, 2018	September 28, 2018	7,066

On November 1, 2019, our Board of Directors approved a cash dividend of $0.10 per share of our common stock. The total dividend of approximately $7.4 million will be paid on December 20, 2019 to shareholders of record at the close of business on December 6, 2019. Dividends are declared at the discretion of our Board of Directors and depend on actual cash flow from operations, our financial condition, capital requirements and any other factors our Board of Directors may consider relevant. We intend to pay quarterly cash dividends in the future; however, the amount and timing of these dividends may be impacted by the cyclical nature of certain markets we serve. We may reduce, delay or cancel a quarterly cash dividend based on the severity of a cyclical downturn.

Share Repurchase Program

On September 29, 2015, our Board of Directors approved a share repurchase program for up to $50.0 million worth of our common stock. The timing and amount of any shares repurchased are based on market and business conditions, legal requirements and other factors and may be commenced or suspended at any time at our discretion. There were no shares repurchased under this program during fiscal year 2019.

Contractual Obligations and Requirements

Our contractual obligations were as follows at September 30, 2019 (in thousands):

	Total	Less than One Year	One to Three Years	Four to Five Years	Thereafter
Contractual Cash Obligations:					
Operating leases	$ 28,523	$ 8,898	$ 9,690	$ 5,686	$ 4,249
Capital leases	2,660	1,176	1,484	—	—
Pension and other post-retirement benefit plans	6,010	672	743	758	3,837
Term loan	51,137	828	827	—	49,482
Inventory purchase commitment	76,920	70,898	6,022	—	—
IT-related commitments	26,581	7,585	10,372	5,553	3,071
China facility commitments	19,712	10,111	9,601	—	—
Other commitments	3,336	3,336	—	—	—
Total contractual cash obligations	$ 214,879	$ 103,504	$ 38,739	$ 11,997	$ 60,639
Other Commercial Commitments:					
Letters of credit	$ 1,259	$ 767	$ 492	$ —	$ —
Total commitments	$ 216,138	$ 104,271	$ 39,231	$ 11,997	$ 60,639

The letters of credit of approximately $1.3 million are related primarily to customer advances and other performance obligations at September 30, 2019. These arrangements guarantee the refund of advance payments received from our

customers in the event that the product is not delivered or warranty obligations are not fulfilled in accordance with the contract terms. These obligations could be called by the beneficiaries at any time before the expiration date of the particular letter of credit if we fail to meet certain contractual requirements. None of these obligations were called during fiscal year 2019, and we currently do not anticipate any of these obligations to be called in the near future.

As of September 30, 2019, the total amount of net unrecognized tax benefits for uncertain tax positions and the accrual for the related interest was $18.3 million, all of which represents a potential future cash outlay. In comparison to September 30, 2018 where the balance was $3.5 million. The increase results from a $13.4 million of unrecognized tax benefits recorded with the acquisition of GENEWIZ. We are unable to make a reasonably reliable estimate of the timing of the cash settlement for this liability since the timing of future tax examinations by various tax jurisdictions and the related resolution is uncertain, however, we have an indemnification agreement in place for any liabilities associated with the unrecognized tax benefits recorded with the acquisition of GENEWIZ.

Off-Balance Sheet Arrangements

As of September 30, 2019, we did not have any off-balance sheet arrangements, as defined in Item 303(a)(4)(ii) of SEC Regulation S-K.

Item 7A. ***Quantitative and Qualitative Disclosures About Market Risk***

We are exposed to a variety of market risks, including changes in interest rates affecting the return on our cash and cash equivalents, short-term and long-term investments and fluctuations in foreign currency exchange rates.

Interest Rate Exposure

Our $200.0 million term loan bears variable interest rates which subjects us to interest rate risk. Our primary interest rate risk exposure results from changes in the short-term LIBOR rate, the federal funds effective rate and the prime rate. As of September 30, 2019, the weighted average stated interest rate on the term loans was 5.3%. At September 30, 2019, the outstanding term loan principal balance was $51.1 million, excluding unamortized deferred financing costs of $0.5 million. During fiscal year 2019, we incurred aggregate interest expense of $21.9 million on the term loans. A hypothetical 100 basis point change in interest rates would result in a $5.1 million change in interest expense incurred during fiscal year 2019.

Our cash and cash equivalents consist principally of money market securities which are short-term in nature. At September 30, 2019 and 2018, our aggregate short-term and long-term investments were $37.0 million and $53.5 million, respectively, and consisted mostly of highly rated corporate debt securities and municipal securities. At September 30, 2019 and 2018, the unrealized loss position on marketable securities was insignificant, which is included in “Accumulated other comprehensive income” in the Consolidated Balance Sheets. A hypothetical 100 basis point change in interest rates would result in an annual change of approximately $0.3 million and less than $1.0 million, respectively, in interest income earned in fiscal years 2019 and 2018.

Currency Rate Exposure

We have transactions and balances denominated in currencies other than the U.S. dollar. Most of these transactions or balances are denominated in Euros, British Pounds and a variety of Asian currencies. Sales in currencies other than the U.S. dollar were 35% and 34%, respectively, of our total sales for fiscal years ended September 30, 2019 and 2018. These sales were made primarily by our foreign subsidiaries, which have cost structures that substantially align with the currency of sale.

In the normal course of our business, we have liquid assets denominated in non-functional currencies which include cash, short-term advances between our legal entities and accounts receivable which are subject to foreign currency exposure. Such balances were approximately $117.7 million and $84.7 million, respectively, at September 30, 2019 and 2018, and related to the Euro, British Pound and a variety of Asian currencies. We mitigate the impact of potential currency translation losses on these short-term intercompany advances by the timely settlement of each transaction, generally within 30 days. We also utilize forward contracts to mitigate our exposures to currency movement. We incurred foreign currency

losses of $1.8 million and $3.3 million, respectively, in fiscal years 2019 and 2018, which related to the currency fluctuation on these balances between the time the transaction occurred and the ultimate settlement of the transaction. A hypothetical 10% change in foreign exchange rates would result in a change of $0.2 million and $4.9 million, respectively, in our net income during fiscal year 2019 and 2018.

Item 8. ***Financial Statements and Supplementary Data***

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The supplementary quarterly financial information required by this Item 8 is included in Part II, Item 6, "Selected Financial Data", and is incorporated herein by reference.

Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of
Brooks Automation, Inc.

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of Brooks Automation, Inc. and its subsidiaries (the "Company") as of September 30, 2019 and 2018, and the related consolidated statements of operations, of comprehensive income, of changes in equity, and of cash flows for each of the three years in the period ended September 30, 2019, including the related notes (collectively referred to as the "consolidated financial statements"). We also have audited the Company's internal control over financial reporting as of September 30, 2019, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of September 30, 2019 and 2018, and the results of its operations and its cash flows for each of the three years in the period ended September 30, 2019 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company did not maintain, in all material respects, effective internal control over financial reporting as of September 30, 2019, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the COSO because material weaknesses in internal control over financial reporting existed as of that date related to (i) the accuracy of revenue recorded at a business unit within the Brooks Life Sciences segment and (ii) the occurrence and cut-off of revenue on products shipped to customers from contract manufacturers for a business unit within the Brooks Semiconductor Solutions Group segment.

A material weakness is a deficiency, or a combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of the annual or interim financial statements will not be prevented or detected on a timely basis. The material weaknesses referred to above are described in Management's Report on Internal Control Over Financial Reporting appearing under Item 9A. We considered these material weaknesses in determining the nature, timing, and extent of audit tests applied in our audit of the September 30, 2019 consolidated financial statements, and our opinion regarding the effectiveness of the Company's internal control over financial reporting does not affect our opinion on those consolidated financial statements.

Basis for Opinions

The Company's management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in management's report referred to above. Our responsibility is to express opinions on the Company's consolidated financial statements and on the Company's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial

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

As described in Management's Report on Internal Control Over Financial Reporting, management has excluded GENEWIZ Group from its assessment of internal control over financial reporting as of September 30, 2019 because it was acquired by the Company in a purchase business combination during fiscal year 2019. We have also excluded GENEWIZ Group from our audit of internal control over financial reporting. GENEWIZ Group is a wholly-owned subsidiary whose total assets and total revenues excluded from management's assessment and our audit of internal control over financial reporting represent 9% and 16%, respectively, of the related consolidated financial statement amounts as of and for the year ended September 30, 2019.

Definition and Limitations of Internal Control over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) 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 (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

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

Critical Audit Matters

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

Acquisition of GENEWIZ Group – Valuation of Acquired Intangible Assets

As described in Note 4 to the consolidated financial statements, on November 15, 2018, the Company acquired all of the outstanding capital stock of GENEWIZ Group for a total cash purchase price of $442.7 million, net of cash acquired and a working capital settlement of $0.4 million. As of September 30, 2019, the Company recorded $189.1 million of intangible assets and $235.2 million of goodwill. Management applied variations of the income approach to estimate the fair values of the intangible assets acquired. The identifiable intangible assets include customer relationships (excess earnings method) of $125.5 million, completed technology (relief from royalty method) of $44.5 million, and trademarks (relief from royalty method) of $19.1 million. Management applied significant judgment in estimating the fair value of the acquired intangible assets, which involved significant estimates and assumptions with respect to forecast revenue growth rates, gross margin percentage, selling, general, and administrative expenses, and the discount rate.

The principal considerations for our determination that performing procedures relating to the valuation of the acquired intangible assets is a critical audit matter are there was significant judgment by management when developing the fair

value measurement of the acquired intangible assets. This in turn led to a high degree of auditor judgment, subjectivity, and effort in performing procedures and evaluating audit evidence relating to management’s estimates of forecast revenue growth rates, gross margin percentage, selling, general, and administrative expenses, and the discount rate. In addition, the audit effort involved the use of professionals with specialized skill and knowledge to assist in performing procedures over the discount rate and evaluating the audit evidence obtained.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of controls relating to the acquisition accounting, including controls over management’s valuation of the acquired intangible assets and assumptions related to forecast revenue growth rates, gross margin percentage, selling, general, and administrative expenses and the discount rate. These procedures also included, among others, testing management’s process for determining the fair value measurements. This included evaluating the appropriateness of the valuation methods and reasonableness of significant assumptions used by management, including forecast revenue growth rates, gross margin percentage, selling, general, and administrative expenses, and the discount rate. Evaluating the assumptions related to the forecast revenue growth rates, gross margin percentage, and selling, general, and administrative expenses involved whether the assumptions used were reasonable considering the past performance of the acquired entity and industry data. Professionals with specialized skill and knowledge were used to assist in evaluating the reasonableness of the discount rate.

/s/ PricewaterhouseCoopers LLP

Boston, Massachusetts
December 17, 2019

We have served as the Company’s auditor since 2016.

BROOKS AUTOMATION, INC.
CONSOLIDATED BALANCE SHEETS

	September 30, 2019	September 30, 2018
	(In thousands, except share and per share data)	
Assets		
Current assets		
Cash and cash equivalents	$ 301,642	$ 197,708
Marketable securities	34,124	46,281
Accounts receivable, net	165,602	125,192
Inventories	99,445	96,986
Prepaid expenses and other current assets	46,332	31,741
Current assets held for sale	—	66,148
Total current assets	647,145	564,056
Property, plant and equipment, net	100,669	59,988
Long-term marketable securities	2,845	7,237
Long-term deferred tax assets	5,064	43,798
Goodwill	488,602	255,876
Intangible assets, net	251,168	99,956
Other assets	20,506	5,294
Non-current assets held for sale	—	59,052
Total assets	$ 1,515,999	$ 1,095,257
Liabilities and Stockholders' Equity		
Current liabilities		
Current portion of long-term debt	$ 829	$ 2,000
Accounts payable	58,919	44,724
Deferred revenue	29,435	25,884
Accrued warranty and retrofit costs	7,175	6,340
Accrued compensation and benefits	31,375	29,322
Accrued restructuring costs	1,040	659
Accrued income taxes payable	99,263	6,746
Accrued expenses and other current liabilities	44,234	30,405
Current liabilities held for sale	—	18,537
Total current liabilities	272,270	164,617
Long-term debt	50,315	194,071
Long-term tax reserves	18,274	1,102
Long-term deferred tax liabilities	20,636	7,135
Long-term pension liabilities	5,338	4,255
Other long-term liabilities	10,212	5,547
Non-current liabilities held for sale	—	698
Total liabilities	377,045	377,425
Commitments and contingencies (Note 23)		
Stockholders' Equity		
Preferred stock, $0.01 par value - 1,000,000 shares authorized, no shares issued or outstanding	—	—
Common stock, $0.01 par value - 125,000,000 shares authorized, 85,759,700 shares issued and 72,297,831 shares outstanding at September 30, 2019, 84,164,130 shares issued and 70,702,261 shares outstanding at September 30, 2018	857	841
Additional paid-in capital	1,921,954	1,898,434
Accumulated other comprehensive income	3,511	13,587
Treasury stock, at cost- 13,461,869 shares	(200,956)	(200,956)
Accumulated deficit	(586,412)	(994,074)
Total stockholders' equity	1,138,954	717,832
Total liabilities and stockholders' equity	$ 1,515,999	$ 1,095,257

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

BROOKS AUTOMATION, INC.
CONSOLIDATED STATEMENTS OF OPERATIONS

	Year Ended September 30,		
	2019	2018	2017
	(In thousands, except per share data)		
Revenue			
Products	$ 504,029	$ 482,389	$ 406,986
Services	276,819	149,171	120,513
Total revenue	780,848	631,560	527,499
Cost of revenue			
Products	302,237	288,323	249,396
Services	162,351	97,156	79,216
Total cost of revenue	464,588	385,479	328,612
Gross profit	316,260	246,081	198,887
Operating expenses			
Research and development	56,368	46,936	39,875
Selling, general and administrative	211,960	167,022	141,549
Restructuring charges	1,894	714	3,144
Total operating expenses	270,222	214,672	184,568
Operating income	46,038	31,409	14,319
Interest income	1,449	1,881	464
Interest expense	(22,250)	(9,520)	(408)
Gain on settlement of equity method investment	—	—	1,847
Loss on extinguishment of debt	(14,339)	—	—
Other expenses, net	(1,455)	(3,304)	(1,702)
Income before income taxes	9,443	20,466	14,520
Income tax (benefit) provision	(111)	(47,251)	3,380
Income before equity in earnings of equity method investments	9,554	67,717	11,140
Equity in earnings of equity method investments	—	—	(453)
Income from continuing operations	9,554	67,717	10,687
Income from discontinued operations, net of tax	427,862	48,747	51,925
Net income	$ 437,416	$ 116,464	$ 62,612
Net loss attributable to noncontrolling interest	—	111	—
Net income attributable to Brooks Automation, Inc.	$ 437,416	$ 116,575	$ 62,612
Basic net income per share attributable to Brooks Automation, Inc. common stockholders:			
Income from continuing operations	$ 0.13	$ 0.96	$ 0.15
Income from discontinued operations, net of tax	5.95	0.69	0.75
Basic net income per share	$ 6.08	$ 1.65	$ 0.90
Diluted net income per share attributable to Brooks Automation, Inc. common stockholders:			
Income from continuing operations	$ 0.13	$ 0.95	$ 0.15
Income from discontinued operations, net of tax	5.91	0.69	0.74
Diluted net income per share	$ 6.04	$ 1.64	$ 0.89
Weighted average shares used in computing net income per share:			
Basic	71,992	70,489	69,575
Diluted	72,386	70,937	70,485

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

BROOKS AUTOMATION, INC.
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME

	Year Ended September 30,		
	2019	2018	2017
		(In thousands)	
Net income	$ 437,416	$ 116,464	$ 62,612
Other comprehensive income (loss), net of tax:			
Foreign currency translation adjustments	(9,333)	(1,651)	(221)
Unrealized gains (losses) on marketable securities, net of tax effects of ($1), $0 and $0 for fiscal years 2019, 2018 and 2017	104	(111)	2
Actuarial (losses) gains, net of tax effects of $13, ($49) and ($74) for fiscal years 2019, 2018 and 2017	(847)	136	525
Pension settlement	—	—	(259)
Total other comprehensive (loss) income, net of tax	(10,076)	(1,626)	47
Comprehensive income	427,340	114,838	62,659
Comprehensive loss attributable to noncontrolling interest	—	111	—
Comprehensive income attributable to common stockholders	$ 427,340	$ 114,949	$ 62,659

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

BROOKS AUTOMATION, INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS

	Year Ended September 30,		
	2019	2018	2017
	(In thousands)		
Cash flows from operating activities			
Net income	$ 437,416	$ 116,464	$ 62,612
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation and amortization	54,454	37,429	28,149
Gain on settlement of equity method investment	—	—	(1,847)
Impairment of property, plant and equipment	285	—	—
Stock-based compensation	20,113	19,822	17,278
Amortization of premium on marketable securities and deferred financing costs	1,121	710	252
Earnings of equity method investments	(6,188)	(6,788)	(9,381)
Loss recovery on insurance claim	—	(1,103)	—
Deferred income taxes	(15,161)	(45,217)	517
Loss on extinguishment of debt	14,339	—	—
Pension settlement	—	—	(259)
Other losses (gains) on disposals of assets	209	(758)	(406)
Gain on sale of divestiture, net of tax	(408,575)	—	—
Contingent transaction fees paid stemming from divestiture	(13,388)	—	—
Changes in operating assets and liabilities, net of acquisitions and divestiture:			
Accounts receivable	(11,445)	(28,463)	(11,178)
Inventories	(2,933)	(24,365)	(12,792)
Prepaid expenses and other assets	(16,009)	(3,676)	(5,829)
Accounts payable	4,695	5,457	7,846
Deferred revenue	4,213	2,791	8,049
Accrued warranty and retrofit costs	1,109	(157)	1,602
Accrued compensation and tax withholdings	(6,453)	5,978	5,565
Accrued restructuring costs	399	(1,080)	(4,241)
Accrued pension costs	—	—	(32)
Proceeds from recovery on insurance claim	1,082	—	—
Accrued expenses and other liabilities	31,615	(3,080)	10,319
Net cash provided by operating activities	90,898	73,964	96,224
Cash flows from investing activities			
Purchases of property, plant and equipment	(23,861)	(12,787)	(12,677)
Purchases of technology intangibles	—	—	(240)
Purchases of marketable securities	(35,225)	(69,692)	—
Sales of marketable securities	48,903	1,584	3,590
Maturities of marketable securities	2,557	17,482	—
Proceeds from divestiture	661,642	—	—
Acquisitions, net of cash acquired	(442,704)	(85,755)	(44,791)
Purchase of other investments	—	500	(170)
Proceeds from sales of property, plant and equipment	—	200	100
Net cash provided by (used in) investing activities	211,312	(148,468)	(54,188)
Cash flows from financing activities			
Proceeds from term loans, net of discount	686,386	197,554	—
Proceeds from issuance of common stock	3,422	2,826	2,040
Payments of financing costs	(687)	(318)	(28)
Principal payments on debt	(850,190)	(1,500)	—
Payments of capital leases	(1,197)	—	—
Common stock dividends paid	(28,895)	(28,285)	(27,932)
Net cash provided by (used in) financing activities	(191,161)	170,277	(25,920)
Effects of exchange rate changes on cash and cash equivalents	(3,586)	313	420
Net increase in cash, cash equivalents and restricted cash	107,463	96,086	16,536
Cash, cash equivalents and restricted cash, beginning of period	197,708	101,622	85,086
Cash, cash equivalents and restricted cash, end of period	$ 305,171	$ 197,708	$ 101,622
Supplemental disclosures:			
Cash paid for interest	$ 20,799	$ 6,537	$ 200
Cash paid for income taxes, net	16,990	21,051	8,142
Supplemental disclosure of non-cash investing and financing activities:			
Deferred financing costs included in accounts payable	—	—	423
Fair value of non-cash consideration for the acquisition of Cool Lab, LLC	—	—	10,348
Reconciliation of cash, cash equivalents, and restricted cash to the consolidated balance sheets			
Cash and cash equivalents	$ 301,642	$ 197,708	$ 101,622
Restricted cash included in prepaid expenses and other current assets	3,529	—	—
Total cash, cash equivalents and restricted cash shown in the consolidated statements of cash flows	$ 305,171	$ 197,708	$ 101,622

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

BROOKS AUTOMATION, INC.
CONSOLIDATED STATEMENTS OF CHANGES IN EQUITY

	Common Stock Shares	Common Stock at Par Value	Additional Paid-In Capital	Accumulated Other Comprehensive Income	Accumulated Deficit	Treasury Stock	Total Brooks Automation, Inc. Stockholders' Equity	Noncontrolling Interests in Subsidiaries	Total Equity
				(In thousands, except share data)					
Balance September 30, 2016	82,220,270	$ 821	$ 1,855,703	$ 15,166	$ (1,117,044)	$ (200,956)	$ 553,690	$ —	$ 553,690
Shares issued under restricted stock and purchase plans, net	1,074,578	12	1,937				1,949		1,949
Stock-based compensation			17,278				17,278		17,278
Common stock dividends declared, at $0.40 per share					(27,932)		(27,932)		(27,932)
Net income					62,612		62,612		62,612
Foreign currency translation adjustments				(221)			(221)		(221)
Changes in unrealized losses on marketable securities, net of tax effects of $0				2			2		2
Actuarial gains arising in the year, net of tax effects of ($74)				525			525		525
Pension settlement				(259)			(259)		(259)
Balance September 30, 2017	83,294,848	833	1,874,918	15,213	(1,082,364)	(200,956)	607,644	—	607,644
Shares issued under restricted stock and purchase plans, net	869,282	8	2,818				2,826		2,826
Stock-based compensation			19,822				19,822		19,822
Common stock dividends declared, at $0.40 per share					(28,285)		(28,285)		(28,285)
Acquisition of noncontrolling interest			876				876	111	987
Net income					116,575		116,575	(111)	116,464
Foreign currency translation adjustments				(1,651)			(1,651)		(1,651)
Changes in unrealized losses on marketable securities, net of tax effects of $0				(111)			(111)		(111)
Actuarial gains arising in the year, net of tax effects of ($49)				136			136		136
Balance September 30, 2018	84,164,130	841	1,898,434	13,587	(994,074)	(200,956)	717,832	—	717,832
Shares issued under restricted stock and purchase plans, net	1,595,570	16	3,407				3,423		3,423
Stock-based compensation			20,113				20,113		20,113
Common stock dividends declared, at $0.40 per share					(28,895)		(28,895)		(28,895)
Net income					437,416		437,416		437,416
Foreign currency translation adjustments				(9,333)			(9,333)		(9,333)
Changes in unrealized losses on marketable securities, net of tax effects of ($1)				104			104		104
Actuarial loss arising in the year, net of tax effects of $13				(847)			(847)		(847)
Cumulative effect of adoption of ASC 606				—	(859)		(859)		(859)
Balance September 30, 2019	85,759,700	$ 857	$ 1,921,954	$ 3,511	$ (586,412)	$ (200,956)	$ 1,138,954	$ —	$ 1,138,954

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

BROOKS AUTOMATION, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

1. Nature of the Business

Brooks Automation, Inc. ("Brooks", or the "Company") is a leading provider of semiconductor manufacturing automation solutions and life science sample-based services and solutions worldwide. In the semiconductor manufacturing market, the Company has been a provider of precision robotics, integrated automation systems and services for more than 40 years. In the life sciences market, the Company applies its automation and cryogenics expertise to offer a full suite of sample-based services and products, including a full line of cold chain management solutions for handling and storing biological and chemical compound samples used in areas such as drug development, clinical research and advanced cell therapies. The Company is also a global provider of gene sequencing and gene synthesis services. The Company believes its leadership positions and its global support capability in each of these markets make it a valued business partner to the largest semiconductor capital equipment device makers, and pharmaceutical and life science research institutions in the world. The Company's offerings are also applied to other adjacent technology and industrial markets, and the Company provides customer support services globally.

Discontinued Operations

In the fourth quarter of fiscal year 2018, the Company entered into a definitive agreement to sell its semiconductor cryogenics business to Edwards Vacuum LLC (a member of the Atlas Copco Group) ("Edwards"), (the "Disposition"). The Company determined that the semiconductor cryogenics business met the "held for sale" criteria and the "discontinued operations" criteria in accordance with Financial Accounting Standard Boards ("FASB") Accounting Standards Codification ("ASC") 205, *Presentation of Financial Statements*, ("FASB ASC 205") as of September 30, 2018 (please refer to Note 3, "Discontinued Operations" for further information about the discontinued business). The Consolidated Balance Sheets and Consolidated Statements of Operations, and the notes to the Consolidated Financial Statements were restated for all periods presented to reflect the discontinuation of the semiconductor cryogenics business, in accordance with FASB ASC 205. The discussion in the notes to these Consolidated Financial Statements, unless otherwise noted, relate solely to the Company's continuing operations.

On July 1, 2019, we completed the sale of the semiconductor cryogenics business for $661.5 million, which excludes $6.3 million retained by Edwards at closing as a result of the initial net working capital adjustments. Net cash proceeds from the sale were $553.1 million, after deducting estimated taxes payable and closing costs, which remains subject to adjustment for the final determination of working capital and other items. In connection with the closing the parties entered into Amendment No. 2 to the Asset Purchase Agreement. As part of this amendment, liabilities assumed by Edwards were revised to include accounts payable related to the semiconductor cryogenics business. As of September 30, 2018, the Company has revised its accounts payable balance on a continuing operations basis to exclude accounts payable related to the semiconductor cryogenics business and revised its current liabilities held for sale balance to include accounts payable related to the semiconductor cryogenics business on its Consolidated Balance Sheets. Accounts payable and total liabilities of the discontinued operation have also been revised in Note 3, "Discontinued Operations". As of September 30, 2018 and 2017, the accounts payable balance related to the semiconductor cryogenics business was $11.1 million and $10.6 million, respectively. The Company has also revised these balances in previously reported historical periods in the event those periods are presented in any filings.

2. Summary of Significant Accounting Policies

Principles of Consolidation and Basis of Presentation

The accompanying Consolidated Financial Statements include the accounts of the Company and its majority-owned subsidiaries. All intercompany balances and transactions have been eliminated in consolidation. The Company applies the equity method of accounting to investments that provide it with the ability to exercise significant influence over the entities in which it lacks controlling financial interest and is not a primary beneficiary.

Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America ("GAAP") requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements, as well as the reported amounts of revenue and expenses during the reporting period. Significant estimates are associated with recording accounts receivable, inventories, goodwill, intangible assets other than goodwill, long-lived assets, derivative financial instruments, deferred income taxes, warranty obligations, revenue recognized in accordance with the percentage of completion method, and stock-based compensation expense. The Company assesses the estimates on an ongoing basis and records changes in estimates in the period they occur and become known. Actual results could differ from these estimates.

Business Combinations

The Company accounts for business acquisitions using the acquisition method of accounting, in accordance with which assets acquired and liabilities assumed are recorded at their respective fair values at the acquisition date. The fair value of the consideration paid, including contingent consideration, is assigned to the assets acquired and liabilities assumed based on their respective fair values. Goodwill represents excess of the purchase price over the estimated fair values of the assets acquired and liabilities assumed.

Significant judgments are used in determining fair values of assets acquired and liabilities assumed, as well as intangibles. Fair value and useful life determinations are based on, among other factors, estimates of future expected cash flows and appropriate discount rates used in computing present values. These judgments may materially impact the estimates used in allocating acquisition date fair values to assets acquired and liabilities assumed, as well as the Company's current and future operating results. Actual results may vary from these estimates which may result in adjustments to goodwill and acquisition date fair values of assets and liabilities during a measurement period or upon a final determination of asset and liability fair values, whichever occurs first. Adjustments to fair values of assets and liabilities made after the end of the measurement period are recorded within the Company's operating results.

Foreign Currency Translation

Certain transactions of the Company and its subsidiaries are denominated in currencies other than their functional currency. Foreign currency exchange gains (losses) generated from the settlement and remeasurement of these transactions are recognized in earnings and presented within "Other expenses, net" in the Company's Consolidated Statements of Operations. Net foreign currency transaction and remeasurement losses totaled $1.8 million, $3.3 million and $2.3 million for the fiscal years ended September 30, 2019, 2018 and 2017, respectively.

The determination of the functional currency of the Company's subsidiaries is based on their financial and operational environment and is the local currency of all of the Company's foreign subsidiaries. The subsidiaries' assets and liabilities are translated into the reporting currency at period-end exchange rates, while revenue, expenses, gains and losses are translated at the average exchange rates during the period. Gains and losses from foreign currency translations are recorded in "Accumulated other comprehensive income" in the Company's Consolidated Balance Sheets and presented as a component of comprehensive income in the Company's Consolidated Statements of Comprehensive Income.

Derivative Financial Instruments

All derivatives, whether designated as a hedging relationship or not, are recorded in the Consolidated Balance Sheets at fair value. The accounting for changes in fair value of a derivative instrument depends on whether it has been designated and qualifies as part of a hedging relationship and the type of hedging relationship. For those derivative instruments that are designated and qualify as hedging instruments, the Company must designate the hedging instrument as a fair value hedge, cash flow hedge or a hedge of a net investment in a foreign operation based on the exposure being hedged. Certain derivatives held by the Company are not designated as hedges but are used in managing exposure to changes in foreign exchange rates.

A fair value hedge is a derivative instrument designated for the purpose of hedging the exposure to changes in fair value of an asset or a liability resulting from a particular risk. If the derivative is designated as a fair value hedge, the

changes in the fair value of the derivative and of the hedged item attributable to the hedged risk are both recognized in the results of operations and presented in the same caption in the Consolidated Statements of Operations and Consolidated Statements of Comprehensive Income.

A cash flow hedge is a derivative instrument designated for the purpose of hedging the exposure to variability in future cash flows resulting from a particular risk. If the derivative is designated as a cash flow hedge, the effective portions of changes in the fair value of the derivative are recorded in accumulated other comprehensive income and recognized in the results of operations when the hedged item affects earnings. Ineffective portions of changes in the fair value of cash flow hedges are recognized in the results of operations.

A hedge of a net investment in a foreign operation is achieved through a derivative instrument designated for the purpose of hedging the exposure of changes in value of investments in foreign subsidiaries. If the derivative is designated as a hedge of a net investment in a foreign operation, the effective portions of changes in the fair value of the derivative are recorded in other comprehensive income as a part of the foreign currency translation adjustment. Ineffective portions of net investment hedges are recognized in the results of operations.

For derivative instruments not designated as hedging instruments, changes in fair value are recognized in the Consolidated Statements of Operations as gains or losses consistent with the classification of the underlying risk.

Concentration of Credit Risk

Financial instruments that potentially subject the Company to concentrations of credit risk consist of cash deposits and cash equivalents, marketable securities, derivative instruments and accounts receivable. All of the Company's cash, cash equivalents, marketable securities and derivative instruments are maintained by major financial institutions.

The Company invests cash not used in operations in investment grade, high credit quality securities in accordance with the Company's investment policy which provides guidelines and limits regarding investments type, concentration, credit quality and maturity terms aimed at maintaining liquidity and reducing risk of capital loss.

The Company regularly monitors the creditworthiness of its customers and believes that it has adequately provided for exposure to potential credit losses. The Company's ten largest customers accounted for approximately 28%, 34% and 35% of its consolidated revenue for the fiscal years ended September 30, 2019, 2018 and 2017, respectively. No customers accounted for more than 10% of the Company's consolidated revenue for fiscal years 2019, 2018 and 2017.

Fair Value of Financial Instruments

The Company's financial instruments consist of cash and cash equivalents, marketable securities, derivative instruments, the term loan, accounts receivable, and accounts payable. Marketable securities and derivative instruments are measured at fair value based on quoted market prices or observable inputs other than quoted market prices for identical or similar assets or liabilities. The carrying amounts of cash, cash equivalents, accounts receivable and accounts payable approximate their fair value due to their short-term nature.

Cash and Cash Equivalents, and Restricted Cash

Cash and cash equivalents consist of cash and highly liquid investments with original maturities of three months or less that are readily convertible to known amounts of cash. At September 30, 2019 and 2018, cash equivalents were $16.2 million and $50.6 million, respectively. Cash equivalents are reported at fair value.

We classify certain restricted cash balances within prepaid expenses and other current assets on the accompanying consolidated balance sheets based upon the term of the remaining restrictions.

Accounts Receivable, Allowance for Doubtful Accounts and Sales Returns

Trade accounts receivable do not bear interest and are recorded at the invoiced amount. The Company maintains an allowance for doubtful accounts representing its best estimate of probable credit losses related to its existing accounts receivable and their net realizable value. The Company determines the allowance based on a number of factors, including

an evaluation of customer credit worthiness, the age of the outstanding receivables, economic trends and historical experience. The Company reviews its allowance for doubtful accounts on a quarterly basis and adjusts the balance based on the Company's estimates of the receivables' recoverability in the period the changes in estimates occur and become known. Accounts receivable balances are written off against the allowance for doubtful accounts when the Company determines that the balances are not recoverable. Provisions for doubtful accounts are recorded in "Selling, general and administrative expenses" in the Consolidated Statements of Operations. The Company determines the allowance for sales returns based on its best estimate of probable customer returns. Provisions for sales returns are recorded in "Revenue" in the Consolidated Statements of Operations. The Company does not have any off-balance-sheet credit exposure related to its customers.

Inventories

Inventories are stated at the lower of cost or net realizable value determined on a first-in, first-out basis and include the cost of materials, labor and manufacturing overhead. The Company reports inventories at their net realizable value and provides reserves for excess, obsolete or damaged inventory based on changes in customer demand, technology and other economic factors.

Fixed Assets, Intangible Assets and Impairment of Long-lived Assets

Property, plant and equipment are stated at cost, net of accumulated depreciation. Depreciation expense is computed based on the straight-line method and charged to results of operations to allocate the cost of the assets over their estimated useful lives, as follows:

Buildings	10 - 40 years
Computer equipment and software	3 - 7 years
Machinery and equipment	2 - 10 years
Furniture and fixtures	3 - 10 years

Leasehold improvements are amortized over the shorter of their estimated useful lives or the remaining terms of the respective leases. Equipment used for demonstrations to customers is included in machinery and equipment and depreciated over its estimated useful life. Repair and maintenance costs are expensed as incurred.

The Company has developed software for internal use. Internal and external labor costs incurred during the application development stage of a project are capitalized. Costs incurred prior to application development and post implementation are expensed as incurred. Training and data conversion costs are expensed as incurred. As of September 30, 2019, and 2018, the Company had cumulative capitalized direct costs of $11.6 million and $5.6 million, respectively, associated with the development of software for its internal use. These capitalized costs are included within "Property, plant and equipment, net" in the accompanying Consolidated Balance Sheets. During fiscal year 2019, the Company capitalized direct costs of $5.1 million associated with the development of software for its internal use.

Cost of disposed assets and the associated accumulated depreciation are derecognized upon their retirement or at the time of disposal, and the resulting gain or loss is included in the Company's results of operations.

The Company identified finite-lived intangible assets other than goodwill as a result of acquisitions. Finite-lived intangible assets are valued based on estimated future cash flows and amortized over their estimated useful lives based on methods that approximate the pattern in which the economic benefits are expected to be realized.

Finite-lived intangibles assets and fixed assets are tested for impairment when indicators of impairment are present. For purposes of this test, long-lived assets are grouped with other assets and liabilities at the lowest level for which identifiable cash flows are largely independent of the cash flows of other assets and liabilities. If the Company determines that indicators of potential impairment are present, it assesses the recoverability of long-lived asset group by comparing its undiscounted future cash flows to its carrying value. The future cash flow period is based on the future service life of the primary asset within the long-lived asset group. If the carrying value of the long-lived asset group exceeds its future cash flows, the Company determines fair values of the individual net assets within the long-lived asset group to assess potential impairment. If the aggregate fair values of the individual net assets of the group are less than their carrying values,

an impairment loss is recognized for an amount in excess of the group's aggregate carrying value over its fair value. The loss is allocated to the assets within the group based on their relative carrying values, with no asset reduced below its fair value.

Finite-lived intangible assets are amortized over their useful lives, as follows:

Patents	7 - 15 years
Completed technology	3 - 15 years
Customer relationships	3 - 14 years

Goodwill

Goodwill represents the excess of purchase price over the fair value of net tangible and identifiable intangible assets of the businesses acquired by the Company. Goodwill is tested for impairment annually or more often if impairment indicators are present at the reporting unit level. The Company has elected April 1st as its annual goodwill impairment assessment date. If the existence of events or circumstances indicates that it is more likely than not that fair values of the reporting units are below their carrying values, the Company performs additional impairment tests during interim periods to evaluate goodwill for impairment.

Application of the goodwill impairment test requires significant judgment based on market and operational conditions at the time of the evaluation, including management's best estimate of future business activity and the related estimates of future cash flows from the assets and the reporting units that include the associated goodwill. These periodic evaluations could cause management to conclude that impairment factors exist, requiring an adjustment of these assets to their then-current fair market values. Future business conditions and/or activity could differ materially from the projections made by management which could result in additional adjustments and impairment charges.

The goodwill impairment test is performed at the reporting unit level. A reporting unit is either an operating segment or one level below it, which is referred to as a "component". The level at which the impairment test is performed requires an assessment of whether the operations below an operating segment constitute a self-sustaining business, in which case testing is generally performed at this level.

In accordance with ASC 350, *Intangibles- Goodwill and Other* ("ASC 350"), the Company first assesses qualitative factors to determine whether the existence of events or circumstances indicates that it is more likely than not that the fair value of a reporting unit is less than its carrying value. If the Company determines, based on this assessment, that it is more likely than not that the fair value of the reporting unit is less than its carrying value, it performs a quantitative goodwill impairment test by comparing the reporting unit's fair value with its carrying value. An impairment loss is recognized for the amount by which the reporting unit's carrying value exceeds its fair value, up to the total amount of goodwill allocated to the reporting unit.

The Company determines fair values of its reporting units based on an income approach in accordance with the discounted cash flow method (DCF Method). The DCF Method is based on projected future cash flows and terminal value estimates discounted to their present values. Terminal value represents a present value an investor would pay on the valuation date for the rights to the cash flows of the business for the years subsequent to the discrete cash flow projection period. The observable inputs used in the DCF Method include discount rates set above the Company's weighted-average cost of capital. The Company derives discount rates that are commensurate with the risks and uncertainties inherent in the respective businesses and its internally developed projections of future cash flows. The Company considers the DCF Method to be the most appropriate valuation technique since it is based on management's long-term financial projections. Due to the cyclical nature of the semiconductor equipment market, management's projections as of the valuation date are considered more objective since market metrics of peer companies fluctuate during the cycle. In addition, the Company also compares aggregate values of its net corporate assets and reporting unit fair values to its overall market capitalization and uses certain market-based valuation techniques to test the reasonableness of the reporting unit fair values determined in accordance with the DCF Method.

Deferred Financing Costs

The Company records commitment fees and other costs directly associated with obtaining the term loan and line of credit financing as deferred financing costs which are presented as a reduction of Long-term debt on the Consolidated Balance Sheets. Deferred financing costs were $0.9 million and $2.9 million at September 30, 2019 and 2018, respectively. Such costs are amortized over the term of the related financing arrangement and included in "Interest expense" in the accompanying Consolidated Statements of Operations. Amortization expense related to deferred financing costs was $1.1 million and $0.5 million for fiscal years ended September 30, 2019 and 2018, respectively, and was included in interest expense in the accompanying Consolidated Statements of Operations. Please refer to Note 10, "Line of Credit" and Note 11, "Debt" for further information on this arrangement.

Warranty Obligations

The Company offers warranties on the sales of certain of its products and records warranty obligations for estimated future claims at the time revenue is recognized. Warranty obligations are estimated based on historical experience and management's estimate of the level of future claims.

Revenue Recognition

The Company generates revenue from the following sources:

- Products, including sales of tool automation and automated cold sample management systems, atmospheric and vacuum robots, contamination control solutions, consumables, instruments, spare parts and software.
- Services, including repairs, upgrades, diagnostic support, installation, as well as biological sample services such as DNA sequencing, gene synthesis, molecular biology, bioinformatics, biological sample storage and other support services.

The Company recognizes revenue for the transfer of such promised products or services to customers in an amount that reflects the consideration to which the Company expects to be entitled to in exchange for those products or services. Under ASC 606, *Revenue from Contracts with Customers* ("ASC 606"), revenue is recognized when or as the transfer of control of the underlying performance obligation occurs. To determine the amount of consideration the Company expects to be entitled to and whether transfer of control has occurred, the Company applies the following five-step model:

- *Identify the contract with a customer.* Contracts are accounted for when approval and commitment has been received from both parties, the rights of each party are identified, payment terms are identified, the contract has commercial substance and collectability of the consideration to which the Company is entitled is probable. Contracts are generally evidenced through receipt of an approved purchase order or execution of a binding arrangement. Within the Brooks Semiconductor Solutions Group segment, contracts are typically short-term with the exception of service-type warranty contracts, which generally have a stated contract term that is greater than one year. Within the Brooks Life Sciences segment, contracts are both short and long-term. Long-term contracts within this segment relate to the sale of products with attached service-type warranty contracts that generally have a stated contract term that is greater than one year. Contracts within both operating segments may contain acceptance provisions where the Company is required to obtain technical acceptance from the customer upon completion of installation services and evidence of the systems functional performance within the customer's operating environment. The Company has concluded that acceptance criteria within its contracts can be objectively evaluated and will not impact the Company's transfer of control assessment under ASC 606.

- *Identify the performance obligations in the contract.* Performance obligations include the sale of products and services. Certain customer arrangements related to the sale of automated cold sample management systems and contamination control solution products generally include more than one performance obligation and may include a combination of goods and or services, such as products with installation services or service-type warranty obligations. These contracts include multiple promises and as a result, the Company is required to evaluate each promise and determine whether the promise qualifies as a performance obligation within the contract. Contracts may contain the option to acquire additional products or services at defined prices. The Company reviews the

pricing of these options to determine whether the option would exist independently of the current contract. If the pricing of contract options provides a material right to the customer that it would not receive without entering into the current contract, the Company accounts for the option as a separate performance obligation.

- *Determine the transaction price.* The transaction price of the Company's contracts with its customer is generally fixed, based on the amounts to be contractually billed to the customer. Certain contracts may contain variable consideration in the form of customer allowances and rebates that consist primarily of retrospective volume based discounts and other incentive programs. Variable consideration is estimated at contract inception and included in the transaction price if it is probable that a subsequent change in the estimate would not result in a significant revenue reversal. The period between transfer of control of the performance obligations within a customer contract and timing of payment is generally within one year. As a result, the Company's contracts typically do not include significant financing components.

- *Allocate the transaction price to the performance obligations in the contract.* For customer contracts that contain more than one performance obligation, the Company allocates the total transaction consideration to each performance obligation based on the relative stand-alone selling price of each performance obligation within the contract. The Company relies on either observable standalone sales or an expected cost plus margin approach to determine the standalone selling price of offerings, depending on the nature of the performance obligation. Performance obligations whose standalone selling price is estimated using an expected cost plus margin approach relate to the sale of customized automated cold sample management systems and service-type warranties within the Brooks Life Sciences segment.

- *Recognize revenue when or as the Company satisfies a performance obligation*. The Company satisfies its performance obligations by transferring a product or service either at a point in time or over time, when the transfer of control of the underlying performance obligation has occurred. Control is evidenced by the customer's ability to direct the use of, and obtain substantially all the remaining benefits from the performance obligation. Revenue from third-party sales for which the Company does not meet the criteria for gross revenue recognition is recognized on a net basis. All other revenue is recognized on a gross basis. The Company excludes from the transaction price all sales taxes assessed by governmental authorities and as a result, revenue is presented net of tax.

As a result of applying this five-step model under ASC 606, the Company recognizes revenues from its sale of products and services as follows:

- *Products:* Revenue from the sale of standard products is recognized upon their transfer of control to the customer, which is generally upon delivery. Delivery is considered complete at either the time of shipment or arrival at destination, based on the agreed upon terms within the contract. The Company's payment terms for the sale of standard products are typically 30 to 60 days.

  Revenue from the sales of certain products that involve significant customization, which include primarily automated cold sample management systems is recognized over time as the asset created by the Company's performance does not have alternative use to the Company and an enforceable right to payment for performance completed to date is present. The Company recognizes revenue as work progresses based on a percentage of actual labor hours incurred on the project to-date and total estimated labor hours expected to be incurred on the project. The selection of the method to measure progress towards completion requires judgment. The Company has concluded that using the percentage of labor hours incurred to estimated labor hours needed to complete the project most appropriately depicts the Company's efforts towards satisfaction of the performance obligation. The Company develops profit estimates for long-term contracts based on total revenue expected to be generated from the project and total costs anticipated to be incurred in the project. These estimates are based on a number of factors, including the degree of required product customization and the work required to be able to install the product in the customer's existing environment, as well as the Company's historical experience, project plans and an assessment of the risks and uncertainties inherent in the contract related to implementation delays or performance issues that may or may not be within the Company's control. The Company estimates a loss on a

contract by comparing total estimated contract revenue to the total estimated contract costs and recognizes a loss during the period in which it becomes probable and can be reasonably estimated. The Company reviews profit estimates for long-term contracts during each reporting period and revises the estimate based on changes in circumstances. Revenue for certain arrangements that involve significant product customization but do not provide the customer with an enforceable right to payment for performance completed to date are recognized at a point in time, upon completion or substantial completion of the project, provided transfer of control has occurred. The project is considered substantially complete when the Company receives acceptance from the customer and remaining tasks are perfunctory or inconsequential and in control of the Company. Generally, the terms of long-term contracts provide for progress billings based on completion of milestones or other defined phases of work. In certain instances, payments collected from customers in advance of recognizing the related revenue are recorded and presented as contract liabilities within "Deferred revenue" on the Company's Consolidated Balance Sheet. Additionally, due to certain billing constraints within contracts, the customer may retain a portion of the contract price until completion of the contract. In these contracts, revenue recognized may exceed billings, which the Company presents as a contract asset on the balance sheet, which is included within the "Prepaid expenses and other current assets" on the Company's Consolidated Balance Sheet.

- *Services:* Service revenue is generally recognized ratably over time or on an output method, as the customer simultaneously receives and consumes the benefit of these services as they are performed. Revenue from short-term services, generally related to repair services or upgrades of customer-owned equipment is recognized upon completion of the repair effort and the shipment of the repaired product back to the customer. Payments related to service-type warranties may be made up front or proportionally over the contract term. Payment due or received from the customers prior to rendering the associated services are recorded as a contract liability.

Research and Development Expense

Research and development costs are expensed as incurred. Research and development costs consist primarily of personnel expenses related to development of new products, as well as enhancements and engineering changes to existing products and development of hardware and software components.

Stock-Based Compensation Expense

The Company measures stock-based compensation cost at fair value on the grant date and recognizes the expense over the service period for the awards expected to vest. The fair value of restricted stock units is determined based on the number of shares granted and the closing price of the Company's common stock quoted on Nasdaq on the date of grant.

For awards that vest based on service conditions, the Company recognizes stock-based compensation expense on a straight-line basis over the requisite service period. For awards that vest subject to performance conditions, the Company recognizes stock-based compensation expense ratably over the performance period if it is probable that performance condition will be met and adjusted for the probability percentage of achieving the performance goals. The Company makes estimates of stock award forfeitures and the number of awards expected to vest. The Company considers many factors in developing forfeiture estimates, including award types, employee classes and historical experience. Each quarter, the Company assesses the probability of achieving the performance goals. Current estimates may differ from actual results and future changes in estimates.

The following table reflects stock-based compensation expense, excluding amounts related to discontinued operations, recorded during the fiscal years ended September 30, 2019, 2018 and 2017 (in thousands):

	Year Ended September 30,		
	2019	2018	2017
Restricted stock units	$ 18,276	$ 18,081	$ 16,056
Employee stock purchase plan	1,203	775	517
Total stock-based compensation expense	$ 19,479	$ 18,856	$ 16,573

Valuation Assumptions for an Employee Stock Purchase Plan

The fair value of shares issued under the employee stock purchase plan is estimated on the commencement date of each offering period using the Black-Scholes option-pricing model with the following weighted average assumptions for the fiscal years ended September 30, 2019, 2018 and 2017:

	Year Ended September 30,		
	2019	2018	2017
Risk-free interest rate	2.3 %	1.9 %	0.9 %
Volatility	52 %	46 %	34 %
Expected life	6 months	6 months	6 months
Dividend yield	1.2 %	1.5 %	3.4 %

The risk-free rate is based on the U.S. Treasury yield curve for notes with terms approximating the expected life of the shares granted. The expected stock price volatility is determined based on the Company's historic stock prices over a period commensurate with the expected life of the shares granted. The expected life represents the weighted average period over which the shares are expected to be purchased. Dividend yields are projected based on the Company's history of dividend declarations and management's intention for future dividend declarations.

Restructuring Expenses

The Company records restructuring expenses associated with management-approved restructuring actions, such as consolidation of duplicate infrastructure and reduction in force, to streamline its business operations and improve profitability and competitiveness. Restructuring expenses include severance costs, contract termination costs to vacate facilities and consolidate operations, and other costs directly associated with restructuring actions. The Company records severance and other employee termination costs associated with restructuring actions when it is probable that benefits will be paid and the amounts can be reasonably estimated. The rates used in determining restructuring liabilities related to severance costs are based on existing plans, historical experience and negotiated settlements.

Income Taxes

The Company records income taxes using the asset and liability method. Deferred income tax assets and liabilities are recognized for the future tax differences between the financial statement carrying amounts of existing assets and liabilities and their respective income tax bases, as well as operating loss and tax credit carryforwards. The Company's Consolidated Financial Statements contain certain deferred tax assets that were recorded as a result of operating losses, as well as other temporary differences between financial and tax accounting. A valuation allowance is established against deferred tax assets if, based upon the evaluation of positive and negative evidence and the extent to which that evidence is objectively verifiable, it is more likely than not that some or all of the deferred tax assets will not be realized.

Significant management judgment is required in determining the Company's income tax provision, the Company's deferred tax assets and liabilities and any valuation allowance recorded against those net deferred tax assets. The Company evaluates the weight of all available evidence to determine whether it is more likely than not that some portion or all of the net deferred income tax assets will not be realized.

The calculation of the Company's tax liabilities involves consideration of uncertainties in the application of complex tax regulations. The Company recognizes liabilities for uncertain tax positions based on a two-step process. The first step is to evaluate the tax position for recognition by determining if the weight of available evidence indicates that it is more likely than not that the position will be sustained upon an audit or an examination conducted by taxing authorities, including resolution of related appeals or litigation processes, if any. If the Company determines that a tax position will more likely than not be sustained, the second step requires the Company to estimate and measure the tax benefit as the largest amount that is more likely than not to be realized upon ultimate settlement. It is inherently difficult and subjective to estimate such amounts, as the Company has to determine the probability of various possible outcomes. The Company re-evaluates these uncertain tax positions on a quarterly basis. This evaluation is based on factors, such as changes in facts or circumstances, tax law, new audit activity and effectively settled issues. Determining whether an uncertain tax position is effectively

settled requires judgment. A change in recognition or measurement may result in the recognition of a tax benefit or an additional charge to the tax provision.

Earnings Per Share

Basic income per share is determined by dividing net income by the weighted average common shares outstanding during the period. Diluted income per share is determined by dividing net income by diluted weighted average shares outstanding during the period. Diluted weighted average shares reflect the dilutive effect, if any, of potential common shares. To the extent their effect is dilutive, employee equity awards and other commitments to be settled in common stock are included in the calculation of diluted income per share based on the treasury stock method. Potential common shares are excluded from the calculation of dilutive weighted average shares outstanding if their effect would be anti-dilutive at the balance sheet date based on a treasury stock method or due to a net loss.

Recently Issued Accounting Pronouncements

In February 2016, the FASB issued ASU 2016-02, *Leases (Topic 842)*, an amendment of the FASB ASC. In accordance with the provisions of the newly issued guidance, a lessee should recognize at the inception of the arrangement a right-of-use asset and a corresponding lease liability initially measured at the present value of lease payments over the lease term. For finance leases, interest on a lease liability should be recognized separately from the amortization of the right-of-use asset, while for operating leases, total lease costs are recorded on a straight-line basis over the lease term. For leases with a term of twelve months or less, a lessee is permitted to make an accounting policy election by class of underlying assets to forgo a recognition of right-of-use assets and corresponding lease liabilities and record a lease expense on a straight-line basis. Entities should determine at the inception of the arrangement whether a contract represents a lease or contains a lease which is defined as a right to control the use of identified property for a period of time in exchange for consideration. Additionally, entities should separate the lease components from the non-lease components and allocate the contract consideration on a relative standalone price basis in accordance with provisions of ASC 606. The guidance is effective for fiscal years, and interim periods within those years, beginning after December 15, 2018 and should be adopted via a modified retrospective approach with certain optional practical expedients that entities may elect to apply. The Company will adopt the provisions of this ASU during the first quarter of fiscal year 2020 and not recast prior periods. The Company expects to record a right-of-use asset and lease liability of approximately $31 million to $36 million as of October 1, 2019. The Company does not expect the adoption of this standard to have a significant impact on its Consolidated Statements of Operations or Consolidated Statements of Cash Flows.

In June 2016, the FASB issued ASU 2016-13, *Financial Instruments—Credit Losses (Topic 326)*, which amends ASC 326 to add, remove, and clarify disclosure requirements related to credit losses of financial instruments. The new guidance introduces a new "expected loss" impairment model which applies to most financial assets measured at amortized cost and certain other instruments, including trade and other receivables, loans, held-to-maturity debt securities and other financial assets. Entities are required to estimate expected credit losses over the life of financial assets and record an allowance against the assets' amortized cost basis to present them at the amount expected to be collected. Additionally, the guidance amends the impairment model for available for sale debt securities and requires entities to determine whether all or a portion of the unrealized loss on such debt security is a credit loss. The guidance is effective for fiscal years, and interim periods within those years, beginning after December 15, 2019. Early adoption is permitted for fiscal years, and interim periods within those years, beginning after December 15, 2018. The standard should be applied as a cumulative-effect adjustment to retained earnings as of the beginning of the first reporting period in which the guidance is effective. The Company expects to adopt the guidance during the first quarter of fiscal year 2021 and is currently evaluating the impact of this guidance on its financial position and results of operations.

In March 2018, the FASB issued ASU 2018-02, *Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income*, which amends ASC 220 to add, remove, and clarify disclosure requirements related to reporting comprehensive income. This ASU gives entities the option to reclassify tax effects recorded in accumulated other comprehensive income as a result of tax reform to retained earnings. The entities have the option to apply the guidance retrospectively or in the period of adoption. The guidance requires entities to make new disclosures, regardless of whether they elect to reclassify tax effects. The guidance is effective for fiscal years beginning after December 15, 2018, and interim periods within those fiscal years. Early adoption in any period is permitted. The Company expects to adopt the

guidance during the first quarter of fiscal year 2020 and is evaluating the effect that ASU 2018-02 will have on its consolidated financial statements and related disclosures.

In August 2018, the FASB issued ASU 2018-13, *Fair Value Measurement (Topic 820): Disclosure Framework - Changes to the Disclosure Requirements for Fair Value Measurement*, which amends ASC 820 to add and remove disclosure requirements related to fair value measurement. The amendments include new disclosure requirement for changes in unrealized gains or losses included in other comprehensive income for recurring Level 3 fair value measurements held at the end of the reporting period and the range and weighted average used to develop significant unobservable inputs for Level 3 fair value measurements. The amendments eliminated disclosure requirements for amount of and reasons for transfers between Level 1 and Level 2, valuation processes for Level 3 fair value measurements, and policy for timing of transfers between levels of the fair value hierarchy. In addition, the amendments modified certain disclosure requirement to provide clarification or to promote appropriate exercise of discretion by entities. ASU 2018-13 is effective for fiscal years beginning after December 15, 2019, including interim periods therein. Early adoption is permitted. The Company is currently evaluating the impact of this ASU.

In August 2018, the FASB issued ASU 2018-14, *Disclosure Framework — Changes to the Disclosure Requirements for Defined Benefit Plans*, which amends ASC 715 to add, remove, and clarify disclosure requirements related to defined benefit pension and other postretirement plans. The amendments require additional disclosure for the weighted-average interest crediting rates, a narrative description of the reasons for significant gains and losses, and an explanation of any other significant changes in the benefit obligation or plan assets. The amendment removes disclosure requirement for accumulated other comprehensive income expected to be recognized over the next year, information about plan assets to be returned to the entity, and the effects of a one-percentage-point change on the assumed health care costs and the effect of this change in rates on service cost, interest cost, and the benefit obligation for postretirement health care benefits. The ASU is effective for fiscal years ending after December 15, 2020. Early adoption is permitted. The ASU does not amend the interim disclosure requirements of ASC 715-20. The Company is currently evaluating the impact of this ASU.

In August 2018, the FASB issued ASU 2018-15, *Intangibles – Goodwill and Other – Internal-Use Software (Subtopic 350-40): Customer's Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement That Is a Service Contract*. The amendments align the requirements for capitalizing implementation costs incurred in a hosting arrangement that is a service contract with the requirements for capitalizing implementation costs incurred to develop or obtain internal-use software (and hosting arrangements that include an internal-use software license). The accounting for the service element of a hosting arrangement that is a service contract is not affected by these amendments. The provisions may be adopted prospectively or retrospectively. This ASU is effective for annual periods, including interim periods within those annual periods, beginning after December 15, 2019. Early adoption is permitted. The Company is currently evaluating the impact of this ASU.

In December 2018, the FASB issued ASU 2018-20, *Leases (Topic 842): Narrow-Scope Improvements for Lessors*. The amendments create a lessor practical expedient applicable to sales and other similar taxes incurred in connection with a lease and simplify lessor accounting for lessor costs paid by the lessee. The ASU permits lessors to present sales and other similar taxes that arise from a specific leasing transaction on a net basis. It requires lessors to present lessor costs paid by the lessee directly to a third party on a net basis – regardless of whether the lessor knows, can determine or can reliably estimate those costs. It requires lessors to present lessor costs paid by the lessee to the lessor on a gross basis. It clarifies that lessors should recognize variable payments allocable to non-lease components as revenue in accordance with relevant other guidance. The effective date coincides with the effective date of the new leases standard for companies that have not early adopted. As such, this ASU is effective for fiscal years beginning after December 15, 2018 and interim periods within those fiscal years. Early adoption is permitted. The Company is currently evaluating the impact of this ASU.

In March 2019, the FASB issued ASU 2019-01, *Leases (Topic 842) - Codification Improvements*, which makes targeted changes to lessor accounting and clarifies interim transition disclosure requirements. The ASU clarifies that companies are exempt from making the interim period transition disclosures required by ASC 250, *Accounting Changes and Error Corrections*, for the period in which a change in accounting principle is made as a result of adopting ASC 842. This interim period disclosure exemption is consistent with ASC 842, which already allowed companies to exclude the annual effect of the accounting change on income from continuing operations, net income and per-share amounts for

periods post-adoption. This ASU is effective for fiscal years beginning after December 15, 2018 and interim periods within those fiscal years. Early adoption is permitted. The Company is currently evaluating the impact of this ASU.

In April 2019, the FASB issued ASU 2019-04, *Codification Improvements to Topic 326, Financial Instruments - Credit Losses, Topic 815, Derivatives and Hedging, and Topic 825, Financial Instruments*, which makes targeted changes to standards on credit losses, hedging, and recognizing and measuring financial instruments to clarify them and address implementation issues. The amendments clarify the scope of the credit losses standard and address issues related to accrued interest receivable balances, recoveries, variable interest rates and prepayments, among other things. On recognizing and measuring financial instruments, the amendments address the scope of the guidance, the requirement for remeasurement under ASC 820 when using the measurement alternative, certain disclosure requirements and which equity securities have to be remeasured at historical exchange rates. The amendments in ASU 2019-04 related to ASU 2016-01 are effective for fiscal years beginning after December 15, 2019, including interim periods therein. Early adoption is permitted if the entity has adopted those standards. The Company is currently evaluating the impact of this ASU.

In May 2019, the FASB issued ASU 2019-05, *Financial Instruments - Credit Losses (Topic 326) - Targeted Transition Relief*, which provides transition relief for entities adopting ASU 2016-13. The amendments in ASU 2019-05 allow entities to elect the fair value option on certain financial instruments. ASU 2019-05 amends ASU 2016-13 to allow companies to irrevocably elect, upon adoption of ASU 2016-13, the fair value option on financial instruments that were previously recorded at amortized cost and are within the scope of ASC 326-20 if the instruments are eligible for the fair value option under ASC 825-10. Entities are required to make this election on an instrument-by-instrument basis. ASU 2019-05's amendments should be applied "on a modified-retrospective basis by means of a cumulative-effect adjustment to the opening balance of retained earnings in the statement of financial position as of the date that an entity adopted the amendments in ASU 2016-13." Certain disclosures are required. For entities that have not adopted ASU 2016-13, the effective date of ASU 2019-05 will be the same as the effective date of ASU 2016-13 which is for fiscal years, and interim periods within those years, beginning after December 15, 2019. Early adoption is permitted if the entity has adopted ASU 2016-13. The Company is currently evaluating the impact of this ASU.

Recently Adopted Accounting Pronouncements

In May 2014, the FASB issued ASC 606 which contained new accounting guidance for reporting revenue recognition. The guidance provides for the recognition of revenue when promised goods or services are transferred to customers in an amount that reflects the consideration that is expected to be received for those goods or services. In addition, the guidance requires disclosure of the nature, amount, timing, and uncertainty of revenue and cash flows arising from contracts with customers. The guidance also specifies the accounting for certain costs to obtain and fulfill a contract, as codified in ASC 340-40 *Accounting for Other Assets and Deferred Costs* ("ASC 340-40").

The Company adopted this standard effective October 1, 2018, using the modified retrospective method and has only applied this method to contracts that were not completed as of the effective date and all new contracts initiated on or after the effective date. Results for reporting periods beginning on or after October 1, 2018 are presented under ASC 606, while prior period amounts have not been restated and continue to be reported in accordance with the governing revenue recognition standards applicable to that period.

The impact of the cumulative effect of adopting ASC 606 effective October 1, 2018 on the Company's Consolidated Balance Sheet is as follows:

	As Reported September 30, 2018	Impact of Adopting ASC 606	As Adopted October 1, 2018
Prepaid expenses and other current assets	$ 31,741	$ 350	$ 32,091
Prepaid expenses and other current assets - discontinued operations	343	235	578
Other assets	5,294	1,483	6,777
Long-term deferred tax assets	43,798	403	44,201
Deferred revenue	25,884	2,850	28,734
Deferred revenue - discontinued operations	1,052	480	1,532
Accumulated deficit	(994,074)	(859)	(994,933)

Upon adoption of ASC 606, the Company recorded a cumulative effect adjustment of $0.9 million, net of a tax adjustment of $0.4 million, which resulted in an increase to the opening accumulated deficit balance on the Consolidated Balance Sheet, primarily driven by deferral of previously recognized revenue within the Brooks Life Sciences segment, offset by deferral of previously recognized commission expense within the Brooks Life Sciences segment and acceleration of revenue within the Brooks Semiconductor Solutions Group segment.

A portion of the adjustment related to the acceleration of revenue within the Brooks Semiconductor Solutions Group segment resulted from the change in the revenue recognition rules. Upon the adoption of ASC 606, the Company is no longer required to defer revenue in accordance with billing constraints defined in the contract with the customer. The change impacted the Company's semiconductor contamination control solutions revenue stream as under ASC 606, the Company recognizes revenue in an amount equivalent to the transfer of control that has occurred. (Please refer to Note 19, "Revenue from Contracts with Customers" for further information on when control is transferred). As a result, revenue previously deferred due to the contractual billing restraints that otherwise met the revenue recognition requirements was accelerated into the opening accumulated deficit balance resulting in an increase to accumulated deficit of $0.9 million as of October 1, 2018.

A portion of the adjustment related to the deferral of previously recognized revenue within the Brooks Life Science segment related to fees associated with registration of biological samples. This adjustment is derived from the new requirement to recognize revenue associated with certain sample life cycle management solutions transactions over time under ASC 606, while historically these transactions have been recorded at a point in time. Registration fees for these samples were previously recognized as revenue at a point in time upon completion of the registration and are now required to be recognized ratably over the period of benefit under ASC 606. As a result, upon adopting ASC 606, the Company deferred previously recognized registration fee revenue for contracts not completed as of the effective date. The period of benefit associated with registration fees has been determined to be approximately 24 months resulting in the deferral of revenue historically recognized at a point in time over this period. This change resulted in a decrease to accumulated deficit of $3.1 million as of October 1, 2018.

A portion of the adjustment is related to the deferral of previously recognized commission expense within the Brooks Life Science segment. This portion of the adjustment is derived from the new requirement to recognize the cost to obtain certain transactions over time under ASC 340-40, while historically this expense has been recognized at a point in time. The standard requires certain costs incurred to obtain a contract to be recorded as an asset when incurred and expensed as the transfer of control of the underlying performance obligations occur or over the estimated customer life, depending on the nature of the underlying contract. As a result, upon adopting ASC 606, the Company deferred previously recognized costs for contracts not completed as of the effective date. The estimated customer life has been determined to be approximately 60 months resulting in the deferral of costs historically expensed at a point in time over this period. This change resulted in an increase to accumulated deficit of $1.5 million as of October 1, 2018.

Additional changes to the Company's accumulated deficit were made as the result of adopting ASC 606. These changes, which resulted in a cumulative decrease to accumulated deficit of $0.2 million as of October 1, 2018, were driven by the identification of additional performance obligations as well as changes in the transfer of control of certain performance obligations across both the Brooks Semiconductor Solutions Group and Brooks Life Science segments. The additional changes to the Company's accumulated deficit included a cumulative decrease to accumulated deficit of $0.2 million from discontinued operations.

As the Company has adopted ASC 606 using the modified retrospective method, the standard requires disclosure of impact from adoption of the standard to each financial statement line item in the current reporting period. The impact of adoption of ASC 606 on the Company's Consolidated Statement of Operations and Consolidated Balance Sheet was as follows:

	Year Ended September 30, 2019		
	As Reported	**Without adoption of ASC 606**	**Effect of Change Higher/(Lower)**
Revenue	$ 780,848	$ 781,714	$ (866)
Cost of revenue	464,588	466,425	(1,837)
Gross profit	316,260	315,289	971
Operating expenses	270,222	269,559	663
Operating income	$ 46,038	$ 45,730	$ 308

	September 30, 2019		
	As Reported	**Without adoption of ASC 606**	**Effect of Change Higher/(Lower)**
Prepaid expenses and other current assets	$ 46,332	$ 42,294	$ 4,038
Other assets	20,506	19,686	820
Deferred revenue	29,435	27,390	2,045
Accumulated deficit	(586,412)	(589,225)	2,813

The difference between the reported results and the results without the adoption of ASC 606 was primarily driven from the elimination of revenue constraints due to billing limitations that resulted in acceleration of revenue within the Brooks Semiconductor Solutions Group segment and the deferral of fees associated with the registration of biological samples within the Brooks Life Science segment. Amortization of costs to obtain a contract capitalized through the cumulative effect adjustment described above have resulted in additional expense in the current period under ASC 606. Except as disclosed above, the adoption of ASC 606 did not have a significant impact on the Company's Consolidated Statement of Operations for the year ended September 30, 2019 and Consolidated Balance Sheet as of September 30, 2019.

In January 2017, the FASB issued ASU 2017-01, Business Combinations (Topic 805), *Clarifying the Definition of a Business*. ASU 2017- 01 clarifies the definition of a business with the objective of addressing whether transactions involving in-substance nonfinancial assets, held directly or in a subsidiary, should be accounted for as acquisitions or disposals of nonfinancial assets or of businesses. The Company adopted this standard effective October 1, 2018. The adoption of ASU 2017-01 did not have a material impact on the Company's Consolidated Financial Statements.

In July 2019, the FASB issued ASU 2019-07, *Codification Updates to SEC Sections*. The ASU clarifies or improves the disclosure and presentation requirements of a variety of codification topics by aligning them with the U.S. Securities and Exchange Commission's regulations, thereby eliminating redundancies and making the codification easier to apply. This ASU is effective upon issuance and did not have a material impact on the Company's Consolidated Financial Statements and related disclosures.

In November 2016, the FASB issued ASU 2016-18, *Statement of Cash Flows (Topic 230)*: Restricted Cash, which requires companies to include amounts generally described as restricted cash and restricted cash equivalents in cash and cash equivalents when reconciling beginning-of-period and end-of-period total amounts shown on the statements of cash flows. The amendments in this update are effective for public business entities for fiscal years beginning after December 15, 2017, and interim periods within those fiscal years. The Company adopted the new standard effective July 1, 2019 since the Company booked the restricted cash in connection with closing of the Disposition on the same date. The adoption of ASU 2016-18 did not have a material impact on the Company's Consolidated Financial Statements.

3. Discontinued Operations

On August 27, 2018, the Company entered into a definitive agreement to sell its semiconductor cryogenics business to Edwards for $675.0 million in cash, subject to adjustments. On July 1, 2019, the Company completed the sale of the semiconductor cryogenics business for $661.5 million, which excludes $6.3 million retained by Edwards at closing based on the initial adjustment for net working capital. Net proceeds from the sale were approximately $553.1 million, after deducting estimated taxes payable and closing costs, which remains subject to adjustment for the final determination of working capital and other items. Net income from discontinued operations for fiscal year 2019 is inclusive of the net gain on sale of $408.6 million.

The semiconductor cryogenics business consists of the CTI pump business, Polycold chiller business, the related services business and a 50% share in Ulvac Cryogenics, Inc., a joint venture based in Japan. The semiconductor cryogenics business was originally acquired by the Company in its 2005 merger with Helix Technology Corporation. The operating results of the semiconductor cryogenics business had been included in the Brooks Semiconductor Solutions Group segment before the plan of disposition.

In connection with the closing of the Disposition on July 1, 2019, the Company and Edwards entered into a transition service agreement, a supply agreement, and lease agreements. The transition service agreement outlines the information technology, people, and facility support the parties will provide to each other for a period up to 9 months after transaction closing date. The supply agreement allows the Company to purchase CTI and Polycold goods at cost from Edwards up to an aggregate amount equal to $1.0 million during the one-year term after closing of the Disposition. The lease agreements provide facility space in Chelmsford, Massachusetts to Edwards free of charge for three years after the transaction closing date. Edwards has the option to renew each lease at the then current market rates after the initial three-year lease term has ended. This Disposition is consistent with the Company's long-standing strategy to increase shareholder value by accelerating the growth of its Life Sciences businesses with further acquisitions and strengthening its semiconductor automation business with opportunistic acquisitions.

The Disposition met the "held for sale" criteria and the "discontinued operation" criteria in accordance with FASB ASC 205 as of September 30, 2018. As such, its operating results have been reported as a discontinued operation for all periods presented.

The following table presents the financial results of discontinued operations (in thousands):

	Year Ended September 30,		
	2019	2018	2017
Revenue			
Products	$ 76,227	$ 150,365	$ 126,638
Services	33,291	45,731	38,748
Total revenue	109,518	196,096	165,386
Cost of revenue			
Products	47,148	85,350	73,714
Services	19,016	22,834	22,400
Total cost of revenue	66,164	108,184	96,114
Gross profit	43,354	87,912	69,272
Operating expenses			
Research and development	6,605	7,605	6,860
Selling, general and administrative	20,889	25,017	12,536
Restructuring charges	24	2	82
Total operating expenses	27,518	32,624	19,478
Operating income	15,836	55,288	49,794
Other income, net	539,948	1,091	1,057
Income before income taxes and earnings of equity method investment	555,784	56,379	50,851
Income tax provision	134,110	14,420	8,760
Income before equity in earnings of equity method investment	421,674	41,959	42,091
Equity in earnings of equity method investment	6,188	6,788	9,834
Net income	$ 427,862	$ 48,747	$ 51,925

The table above reflects revenue for the year ended September 30, 2019 in accordance with ASC 606, while results for the years ended September 30, 2018 and 2017 have not been restated and are reported in accordance with the governing revenue recognition standards applicable to those periods prior to adoption of ASC 606. Results for the year ended September 30, 2019 were not significantly impacted by the adoption of ASC 606.

The Company performed its annual goodwill impairment analysis in April 2018. This analysis was updated upon announcement of the Disposition for the year ended September 30, 2018. The Company has concluded that there is no impairment indicator related to the goodwill of the Disposition group at either date the impairment analysis was performed. The Company did not include goodwill related to the semiconductor cryogenics business in its annual impairment analysis in April 2019, as the Disposition was classified as assets held for sale.

The following table presents the summarized financial information for Ulvac Cryogenics, Inc., the unconsolidated subsidiaries accounted for based on the equity method (in thousands):

	September 30,
	2018
Balance Sheets:	
Current assets	$ 69,302
Non-current assets	21,338
Current liabilities	26,006
Non-current liabilities	8,397

	Year Ended September 30,		
	2019	2018	2017
Statements of Operations:			
Total revenue	$ 88,357	$ 94,652	$ 104,667
Gross profit	35,127	34,982	41,241
Operating Income	17,791	18,405	26,340
Net income	12,483	13,345	19,451

The following table presents the significant non-cash items and capital expenditures for the discontinued operations that are included in the Consolidated Statements of Cash Flows (in thousands):

	Year Ended September 30,		
	2019	2018	2017
Depreciation and amortization	$ 4	$ 743	$ 919
Capital expenditures	666	302	1,049
Stock-based compensation	635	966	705
Earnings of equity method investment	(6,188)	(6,788)	(9,834)

The carrying value of the assets and liabilities of the discontinued operations on the Consolidated Balance Sheet as of September 30, 2018 was as follows (in thousands):

	September 30, 2018
Assets	
Accounts receivable, net	$ 27,852
Inventories	37,953
Other current assets	343
Total current assets of discontinued operation	$ 66,148
Property, plant and equipment, net	$ 1,081
Goodwill	26,485
Intangibles, net	14
Equity method investment	31,472
Total long-term assets of discontinued operation	$ 59,052
Liabilities	
Accounts payable	$ 11,149
Deferred revenue	1,052
Accrued warranty and retrofit costs	2,464
Other current liabilities	3,872
Total current liabilities of discontinued operation	$ 18,537
Long-term liabilities of discontinued operation	$ 698

4. Acquisitions

Acquisitions Completed in Fiscal Year 2019

Acquisition of the GENEWIZ Group

On November 15, 2018, the Company acquired all the outstanding capital stock of GENEWIZ Group (“GENEWIZ”), a leading global genomics service provider headquartered in South Plainfield, New Jersey. GENEWIZ provides genomics

services that enable research scientists to advance their discoveries within the pharmaceutical, academic, biotechnology, agriculture and other markets. It provides gene sequencing and synthesis services for more than 4,000 institutional customers worldwide supported by their global network of laboratories spanning the United States, China, Japan, Germany and the United Kingdom. This transaction has added a new and innovative platform which further enhances the Company's core capabilities and added even more value to samples under the Company's care.

The total cash purchase price for the acquisition was $442.7 million, net of cash acquired, which included a working capital settlement of $0.4 million. The Company used the proceeds of the incremental term loan described in Note 11, "Debt" to pay a portion of the purchase price.

On the acquisition date, the Company paid $32.3 million to escrow accounts related to the satisfaction of the seller's indemnification obligations with respect to their representations and warranties and other indemnities. The Company also retained an amount equal to $1.5 million as collateral for any adjustment shortfall based on the final merger consideration calculation. During the three months ended March 31, 2019, the final merger consideration was calculated to be $4.0 million less than the merger consideration paid at closing. To satisfy the shortfall, the Company reversed the $1.5 million liability associated with the holdback, received approval from the former shareholders to retain $0.7 million of funds the Company received on their behalf, and collected $1.8 million from the escrow accounts.

The Company recorded the assets acquired and liabilities assumed related to GENEWIZ at their fair values as of the acquisition date, from a market participant's perspective. While the Company uses its best estimates and assumptions as part of the purchase price allocation process to value the assets acquired and liabilities assumed on the acquisition date, its estimates and assumptions are subject to refinement. Fair value estimates are based on a complex series of judgments about future events and uncertainties and rely heavily on estimates and assumptions. The judgments used to determine the estimated fair value assigned to each class of assets acquired and liabilities assumed, as well as asset lives, can materially impact the Company's results of operations. The finalization of the assignment of fair values will be completed within one year after the acquisition date. The following table presents the net purchase price and the fair values of the assets and liabilities of GENEWIZ (in thousands):

	Fair Value of Assets and Liabilities
Accounts receivable (approximates contractual value)	$ 28,566
Inventories	4,370
Prepaid expenses and other current assets	11,635
Property, plant and equipment	36,379
Goodwill	235,160
Intangible assets	189,129
Other assets	15,998
Current portion of long-term debt	(3,170)
Accounts payable	(6,522)
Deferred revenue	(67)
Accrued compensation and benefits	(5,145)
Other current liabilities	(10,073)
Long-term debt	(2,482)
Long-term tax reserves	(13,400)
Long-term deferred tax liabilities	(34,993)
Other long-term liabilities	(2,681)
Total purchase price, net of cash acquired	$ 442,704

The Company applied variations of the income approach to estimate the fair values of the intangible assets acquired. The identifiable intangible assets include customer relationships (excess earnings method) of $125.5 million with a useful life of 14 years, completed technology (relief from royalty method) of $44.5 million with useful lives from 10 to 15 years and trademarks (relief from royalty method) of $19.1 million with a useful life of 13 years. The intangible assets acquired are amortized over the total weighted average period of 13.3 years using methods that approximate the pattern in which

the economic benefits are expected to be realized. During the three months ended June 30, 2019, the Company recorded a measurement adjustment related to the revised valuation of the intangible assets which increased intangible assets by $0.6 million. The additional amortization related to this adjustment was recorded during the three months ended June 30, 2019.

Goodwill of $235.2 million largely reflects the potential synergies and expansion of the Company's core technologies and offerings in the Life Sciences business. The goodwill from this acquisition is reported within the Brooks Life Sciences segment and is not tax deductible. During the three months ended March 31, 2019, a $0.3 million measurement period adjustment was recorded related to the working capital settlement which increased goodwill. During the three months ended June 30, 2019, the Company recorded measurement period adjustments which resulted in a net decrease to goodwill of $0.8 million. These adjustments included a $0.6 million increase to intangible assets which decreased goodwill, a $0.5 million decrease to tax related liabilities which decreased goodwill, partially offset by a $0.3 million decrease to an indemnification asset which increased goodwill and a $0.1 million increase for an asset retirement obligation which increased goodwill. During the three months ended September 30, 2019, the Company recorded measurement period adjustments which resulted in a net decrease to goodwill of $0.9 million. These adjustments included a $1.0 million decrease to accounts receivable which increased goodwill, and a $1.9 million decrease to tax related liabilities which decreased goodwill.

During the three months ended March 31, 2019, the Company made a measurement period adjustment in the amount of $0.7 million to prepaid expenses and other current assets and $0.7 million to accrued expenses and other current liabilities. During the three months ended September 30, 2019, the Company made a measurement period adjustment in the amount of $2.7 million which increased both accounts receivable and customer deposits for the same amount.

The revenues and net income from GENEWIZ recognized in the Company's consolidated results of operations were $126.3 million and $3.2 million, respectively, during the year ended September 30, 2019. During the year ended September 30, 2019, net income included $11.4 million related to amortization expense of acquired intangible assets. The Company incurred $6.5 million and $3.8 million, respectively, in transaction costs with respect to the GENEWIZ acquisition during the years ended September 30, 2019 and 2018. Transaction costs were recorded in "Selling, general and administrative" expenses within the accompanying unaudited Consolidated Statements of Operations.

The following unaudited pro forma information reflects the Company's consolidated results of operations as if the acquisition had taken place on October 1, 2017. The unaudited pro forma information is not necessarily indicative of the results of operations that the Company would have reported had the transaction actually occurred at the beginning of these periods nor is it necessarily indicative of future results. The unaudited pro forma financial information does not reflect the impact of future events that may occur after the acquisition, including, but not limited to, anticipated costs savings from synergies or other operational improvements (in thousands).

	Year Ended September 30,	
	2019	2018
	(pro forma)	
Revenue	$ 797,501	$ 752,061
Net income from continuing operations	10,350	2,273

The unaudited pro forma financial information presented in the table above includes adjustments for the application of the Company's accounting policies, elimination of related party transactions, depreciation and amortization related to fair value adjustments to property, plant and equipment and intangible assets, and interest expense on acquisition related debt.

To present the Company's consolidated results of operations as if the acquisition had taken place on October 1, 2017, the unaudited pro forma earnings for the years ended September 30, 2019 and 2018 have been adjusted to include the following additional expenses related to the acquisition: $1.6 million and $12.7 million, respectively, of depreciation and amortization related to the fair value step up of property, plant, and equipment and leases, recording of intangible assets, $0 million and $53.6 million, respectively, of one-time nonrecurring compensation expenses and transaction costs related

to the GENEWIZ acquisition, $2.0 million and $19.8 million, respectively, of interest expense related to financing activities.

The Company identified that the pro forma calculation for the acquisition of GENEWIZ, in Note 5 of the previously issued interim consolidated financial statements included in the Company's Quarterly reports on Form 10-Q's for the periods ended December 31, 2018, March 31, 2019, and June 30, 2019, incorrectly included the nonrecurring compensation expenses and transaction costs in the 2019 fiscal year, rather than the 2018 fiscal year. This resulted in overstatements of 2018 pro-forma earnings and understatements of 2019 pro-forma earnings in each of the 10-Q filings for the periods ended December 31, 2018, March 31, 2019, and June 30, 2019. The misstatements had no impact on the Company's reported results of operations. The corrections for the presentation are as follows (pro forma, unaudited, in thousands):

	Three Months Ended December 31, 2018		
	As Previously Reported	**Adjustment**	**As Revised**
Revenue	$ 196,021	$ —	$ 196,021
Net (loss) income from Continuing operations	(35,325)	42,120	6,795

	Six Months Ended March 31, 2019		
	As Previously Reported	**Adjustment**	**As Revised**
Revenue	$ 394,411	$ —	$ 394,411
Net (loss) income from Continuing operations	(38,154)	42,240	4,086

	Nine Months Ended June 30, 2019		
	As Previously Reported	**Adjustment**	**As Revised**
Revenue	$ 598,291	$ —	$ 598,291
Net (loss) income from Continuing operations	(37,233)	42,295	5,062

	Three Months Ended December 31, 2017		
	As Previously Reported	**Adjustment**	**As Revised**
Revenue	$ 170,033	$ —	$ 170,033
Net (loss) income from Continuing operations	(8,714)	(46,549)	(55,263)

	Six Months Ended March 31, 2018		
	As Previously Reported	**Adjustment**	**As Revised**
Revenue	$ 356,947	$ —	$ 356,947
Net (loss) income from Continuing operations	50,345	(46,429)	3,916

	Nine Months Ended June 30, 2018		
	As Previously Reported	**Adjustment**	**As Revised**
Revenue	$ 561,397	$ —	$ 561,397
Net (loss) income from Continuing operations	53,318	(46,374)	6,944

Acquisitions Completed in Fiscal Year 2018

Acquisition of Tec-Sem

On April 6, 2018, the Company acquired approximately 93% of the outstanding capital stock of Tec-Sem Group AG ("Tec-Sem"), a Switzerland-based manufacturer of semiconductor fabrication automation equipment with a focus on reticle management. In the fourth quarter of fiscal year 2018, the Company acquired the remaining 7% noncontrolling interest upon the completion of certain procedural steps. The total cash payment to acquire the business was $15.6 million, net of cash acquired and subject to working capital adjustments. The acquisition of Tec-Sem has expanded the Company's contamination control solutions business within the Brooks Semiconductor Solutions Group segment.

The Company used a market participant approach to record the assets acquired and liabilities assumed with the Tec-Sem acquisition as follows (in thousands):

	Fair Value of Assets and Liabilities
Accounts receivable (approximates contractual value)	$ 988
Inventories	4,297
Prepaid expenses and other current assets	4,038
Property, plant and equipment	85
Intangible assets	10,694
Goodwill	7,665
Accounts payable	(1,049)
Accrued liabilities	(6,962)
Deferred tax liabilities	(1,391)
Accrued pension liability	(2,800)
Total purchase price, net of cash acquired	$ 15,565

The Company applied variations of the income approach to estimate the fair values of the intangible assets acquired. The identifiable intangible assets include completed technology (excess earnings method) of $8.4 million with a useful life of 10 years, backlog (excess earnings method) of $1.6 million with a useful life of 1 year, and customer relationships (distributor method) of $0.7 million with a useful life of 9 years. The intangible assets acquired are amortized over the total weighted average period of 8.6 years using methods that approximate the pattern in which the economic benefits are expected to be realized.

Goodwill of $7.7 million largely reflects the potential synergies and expansion of technical capabilities to the Company's existing contamination control solutions business. The goodwill from this acquisition is reported within the Brooks Semiconductor Solutions Group segment and is not tax deductible.

As part of the acquisition, the Company assumed all the assets and liabilities of Tec-Sem's Swiss defined benefit plan, which covered substantially all its full-time employees. At acquisition date, the plan was fully funded for each employee's pension contribution plus an expected rate of return equal to the statutory discount rate. Total plan assets and plan liability were $5.1 million and $7.9 million, respectively, at acquisition date. The Company recorded a liability of $2.8 million for the unfunded projected benefit obligation related to each plan participant's future services.

The Company reports the results of operations for Tec-Sem in the Brooks Semiconductor Solutions Group segment. The revenues and net income from Tec-Sem included in the Company's consolidated results for fiscal year 2019 were $30.9 million and $8.1 million, respectively. The revenues and net loss from Tec-Sem included in the Company's consolidated results for fiscal year 2018 were $11.6 million and $1.2 million, respectively. During fiscal year 2019, the net income included $0.2 million related to the step-up in value of the acquired inventories and $2.7 million related to amortization expense of acquired intangible assets. During fiscal year 2018, the net loss included $0.7 million related to the step-up in value of the acquired inventories and $2.1 million related to amortization expense of acquired intangible assets. During fiscal year 2018, the Company incurred $0.9 million in transaction costs related to the Tec-Sem acquisition.

The escrow at closing had a balance of $2.6 million which consisted of $1.8 million related to satisfaction of the sellers' indemnification obligations with respect to their representations and warranties and other indemnities. The remaining $0.8 million of the escrow balance is related to a performance obligation that the Company assumed at the acquisition date for the transfer of non-core wafer stocker technology to an unrelated third party. As of September 30, 2019, the escrow balance was $1.1 million related to the satisfaction of the sellers' indemnification obligations, and $0.3 million related to the delivery of the technology.

The Company did not present a pro forma information summary for its consolidated results of operations for the fiscal years ended September 30, 2018 and 2017 as if the acquisition of Tec-Sem occurred on October 1, 2016 because such results were immaterial.

Acquisition of 4titude Limited

On October 5, 2017, the Company acquired all the outstanding capital stock of 4titude Limited ("4titude"), a U.K.-based manufacturer of scientific consumables for biological sample materials used in a variety of genomic and DNA analytical applications. The acquisition of 4titude has expanded the Company's existing offerings of consumables and instruments within the Brooks Life Sciences segment. The aggregate purchase price of $65.1 million, net of cash acquired, consisted primarily of a cash payment of $64.8 million subject to working capital adjustments and the assumption of the seller's liabilities of $0.4 million.

The Company used a market participant approach to record the assets acquired and liabilities assumed in the 4titude acquisition as follows (in thousands):

	Fair Value of Assets and Liabilities
Accounts receivable (approximates contractual value)	$ 1,581
Inventories	2,667
Prepaid expenses and other current assets	140
Property, plant and equipment	1,555
Intangible assets	27,212
Goodwill	38,185
Accounts payable	(286)
Accrued liabilities	(845)
Deferred tax liabilities	(5,090)
Total purchase price, net of cash acquired	$ 65,119

The Company applied variations of the income approach to estimate the fair values of the intangible assets acquired. The identified intangible assets include customer relationships (excess earnings method) of $21.4 million with a useful life of 10 years, completed technology (relief from royalty method) of $5.2 million with a useful life of 13 years, backlog (excess earnings method) of $0.4 million with a useful life of 1 year and trademarks (excess earnings method) of $0.2 million with a useful life of 1 year. The intangible assets acquired are amortized over the total weighted average period of 10.4 years using methods that approximate the pattern in which the economic benefits are expected to be realized.

At the acquisition date, a cash payment of $0.4 million was placed into escrow which was ascribed to the purchase price. The escrow was related to satisfaction of the sellers' indemnification obligations with respect to their representations and warranties and other indemnities. The escrow balance was $0.2 million as of September 30, 2019 and was fully released subsequently.

Goodwill represents the excess of the consideration paid over the fair value of the net assets acquired and has been assigned to the Brooks Life Sciences segment. Goodwill is primarily the result of expected synergies from combining the operations of 4titude with the Company's operations and is not deductible for tax purposes.

The operating results of 4titude have been reflected in the results of operations for the Brooks Life Sciences segment. During fiscal year 2019, revenue and net income from 4titude recognized in the Company's results of operations were $16.1 million and $0.7 million, respectively. During fiscal year 2018, revenue and net loss from 4titude recognized in the Company's results of operations were $15.9 million and $0.8 million, respectively. The net income in fiscal year 2019 included recurring charges of $3.7 million, related to amortization expense of acquired intangible assets. The net loss in fiscal year 2018 included recurring charges of $4.1 million, related to amortization expense of acquired intangible assets. The net loss in fiscal year 2018 also included non-recurring charges of $1.2 million related to the step-up in value of the acquired inventories. During fiscal year 2018, the Company incurred $1.1 million in non-recurring transaction costs with respect to the 4titude acquisition.

The Company did not present a pro forma information summary for its consolidated results of operations for the fiscal years ended September 30, 2018 and 2017 as if the acquisition of 4titude occurred on October 1, 2016 because such results were immaterial.

Other

On April 20, 2018, the Company acquired BioSpeciMan Corporation ("BioSpeciMan"), a Canada-based provider of storage services for biological sample materials. BioSpeciMan, founded in 2002, provides temperature controlled biological sample storage services to an attractive mix of pharma, biotech and contract laboratory customers. This acquisition has expanded customer relationships and geographic reach within its growing sample management storage services business in the Brooks Life Sciences segment. The total cash payment made by the Company was $5.2 million, net of cash acquired and subject to working capital adjustments.

The Company allocated the purchase price of $5.2 million based on the fair value of the assets and liabilities acquired, which included $0.3 million of accounts receivable, $2.6 million of customer relationships, $2.7 million of goodwill and $0.7 million of assumed liabilities. The Company applied the excess earnings method, a variation of the income approach to determine the fair value of the customer relationship intangible asset. The goodwill from this acquisition is reported within the Brooks Life Sciences segment and is not tax deductible.

At the acquisition date, a cash payment of $0.5 million was placed into escrow which was ascribed to the purchase price. The escrow was related to satisfaction of the sellers' indemnification obligations with respect to their representations and warranties and other indemnities.

The operating results of the acquisition have been reflected in the results of operations for the Brooks Life Sciences segment. The Company did not present a pro forma information summary for its consolidated results of operations for the fiscal years ended September 30, 2018 and 2017 as if the acquisition of BioSpeciMan occurred on October 1, 2016 because such results were immaterial.

Acquisitions Completed in Fiscal Year 2017

Acquisition of Pacific Bio-Material Management, Inc. and Novare, LLC

On July 5, 2017, the Company entered into an asset purchase agreement with Pacific Bio-Material Management, Inc. ("PBMMI") and Novare, LLC, a wholly owned subsidiary of PBMMI (collectively, the "sellers"), to acquire substantially all the assets and certain liabilities of the sellers' business related to providing storage, transportation, management, and cold chain logistics of biological materials. The acquisition has expanded the Company's existing capabilities with respect to sample management and integrated cold chain storage and transportation solutions within the Brooks Life Sciences segment. The Company paid to the sellers cash consideration of $34.3 million, net of cash acquired and subject to working capital adjustments.

The Company used a market participant approach to record the assets acquired and liabilities assumed in the PBMMI acquisition. The amounts recorded were as follows (in thousands):

	Fair Value of Assets and Liabilities
Accounts receivable (approximates contractual value)	$ 2,800
Prepaid expenses and other current assets	267
Property, plant and equipment	2,887
Intangible assets	8,600
Goodwill	21,434
Accounts payable	(699)
Accrued liabilities	(673)
Deferred revenue	(385)
Other liabilities	(103)
Total purchase price, net of cash acquired	$ 34,128

The Company applied variations of the income approach to estimate the fair values of the intangible assets acquired. The identified intangible assets include customer relationship intangible (excess-earnings method) of $8.5 million and

trademarks of $0.1 million. The intangible assets acquired are amortized over the total weighted average period of 11.0 years using methods that approximate the pattern in which the economic benefits are expected to be realized.

At the acquisition date, a cash payment of $3.3 million was placed into escrow which was ascribed to the purchase price. The escrow balance of $3.3 million included $2.9 million related to satisfaction of the sellers' indemnification obligations with respect to their representations and warranties and other indemnities, as well as $0.4 million payable to the former owner of Novare as a compensation for a sale of his ownership interest. This escrow arrangement is administered by the Company on behalf of the sellers. The escrow balance related to satisfaction of the sellers' indemnification obligations was reduced by its full amount as of September 30, 2019. The Novare escrow balance was reduced by its full amount as of September 30, 2018.

Goodwill represents the excess of the consideration transferred over the fair value of the net assets acquired and has been assigned to the Brooks Life Sciences segment. Goodwill is primarily the result of expected synergies from combining the operations of PBMMI with the Company’s operations and is deductible for tax purposes.

The operating results of PBMMI have been reflected in the results of operations for the Brooks Life Sciences segment. During fiscal year 2019, revenue and net income from PBMMI recognized in the Company’s results of operations were $11.9 million and $0.7 million, respectively. During fiscal year 2018, revenue and net income from PBMMI recognized in the Company’s results of operations were $11.5 million and $0.7 million, respectively. During fiscal year 2017, revenue and net income from PBMMI recognized in the Company’s results of operations were $3.4 million and $0.8 million, respectively. During fiscal year ended September 30, 2019, 2018 and 2017, the net income included amortization expense of $1.1 million, $1.6 million and $0.3 million, respectively, related to acquired intangible assets. During fiscal year 2018 and 2017, the Company incurred less than $0.1 million and $0.3 million in non-recurring transaction costs with respect to the PBMMI acquisition.

The Company did not present a pro forma information summary for its consolidated results of operations for the fiscal years ended September 30, 2017 and 2016 as if the acquisition of PBMMI occurred on October 1, 2015 because such results were immaterial.

Acquisition of Cool Lab, LLC

On November 28, 2016, the Company acquired 100% of the equity of Cool Lab, LLC ("Cool Lab") from BioCision, LLC ("BioCision"). The Company held a 20% equity ownership interest in BioCision prior to the acquisition. Cool Lab was established as a subsidiary of BioCision on November 28, 2016 upon the transfer of certain assets related to cell cryopreservation solutions. Cool Lab’s offerings assist in managing the temperature stability of therapeutics, biological samples, and related biomaterials in ultra-cold and cryogenic environments. The acquisition of Cool Lab has allowed the Company to extend its comprehensive sample management solutions across the cold chain of custody, which is consistent with the other offerings it brings to its life sciences customers.

The aggregate purchase price of $15.2 million consisted of a cash payment of $4.8 million, a liability to the seller of $0.1 million and the settlement of certain preexisting relationships with Cool Lab and BioCision, disclosed as non-cash consideration of $10.3 million, which has been measured at fair value on the acquisition date.

The Company used a market participant approach to record the assets acquired and liabilities assumed in the Cool Lab acquisition. The amounts recorded were as follows (in thousands):

	Fair Value of Assets and Liabilities
Inventory	$ 1,283
Intangible assets	6,100
Goodwill	8,527
Accrued liabilities	(30)
Other liabilities	(686)
Total purchase price	$ 15,194

The Company applied variations of the income approach to estimate the fair values of the intangible assets acquired. The identified intangible assets include customer relationship with a certain customer (excess-earnings method) of $3.6 million with a useful life of 3 years, completed technology (relief-from-royalty) of $1.2 million with a useful life of 8 years, and other customer relationship (excess-earnings method) of $1.3 million with a useful life of 10 years. The intangible assets acquired are amortized over the total weighted average period of 5.4 years using methods that approximate the pattern in which the economic benefits are expected to be realized, including percentage of revenue expected to be generated from sales to a certain customer over the contract term.

Goodwill represents the excess of the consideration transferred over the fair value of the net assets acquired and has been assigned to the Brooks Life Sciences segment. Goodwill is primarily the result of expected synergies from combining the operations of Cool Lab with the Company's operations and is deductible for tax purposes.

The Company recorded a liability of $0.7 million in the purchase price allocation that represented a pre-acquisition contingency incurred on the acquisition date. The obligation is related to a rebate that is due to a particular customer if the annual product sales volume metrics exceed threshold amounts under the provisions of the contract with this customer assumed by the Company. Fair value of such liability was determined based on a probability weighted discounted cash flow model. The carrying amount of the liability was $0.0 million and $0.8 million, respectively, at September 30, 2019 and 2018.

The operating results of Cool Lab have been reflected in the results of operations for the Brooks Life Sciences segment. During fiscal year 2019, revenue and net income from Cool Lab recognized in the Company's results of operations were $4.1 million and $0.1 million, respectively. During fiscal year 2018, revenue and net loss from Cool Lab recognized in the Company's results of operations were $3.7 million and $0.2 million, respectively. During fiscal year 2017, revenue and net loss from Cool Lab recognized in the Company's results of operations were $3.7 million and $0.3 million, respectively. During fiscal year ended September 30, 2019, 2018 and 2017, the net income included charges of amortization expense $1.6 million, $1.6 million and $1.2 million respectively, related to acquired intangible assets. During fiscal year ended September 30, 2017, the net loss also included charges of $0.4 million related to the step-up in value of the acquired inventories. During fiscal year 2017, the Company also incurred $0.4 million in non-recurring transaction costs with respect to the Cool Lab acquisition.

The Company did not present a pro forma information summary for its consolidated results of operations for the fiscal years ended September 30, 2017 and 2016 as if the acquisition of Cool Lab occurred on October 1, 2015 because such results were immaterial.

Other

On August 22, 2017, the Company acquired certain assets and liabilities of RURO, Inc., ("RURO"), a U.S.-based provider of sample management software solutions across multiple end markets, including academic research, government, pharmaceutical, biotech, and healthcare. The acquired FreezerPro® web-based software platform together with an exclusive license to sell and distribute RURO's BioBankPro® software has allowed the Company to complement its existing informatics offerings within the Brooks Life Sciences segment and extend its informatics solutions to address laboratories, biobanks or enterprises that manage biological samples.

The aggregate purchase price of $5.5 million consisted of a cash payment of $5.2 million and a liability to RURO of $0.4 million. The Company allocated the purchase price of $5.5 million to the assets acquired and liabilities assumed related to the acquisition at their fair values as of the acquisition date, of which $0.1 million was ascribed to accounts receivable, $4.0 million to intangible assets, $1.6 million to goodwill assigned to the Brooks Life Sciences segment and $0.2 million to deferred revenue. Fair values of intangible assets acquired of $4.0 million consisted of customer relationship intangible assets of $3.1 million and completed technology of $0.9 million.

At the closing of the acquisition, a cash payment of $0.5 million was placed into escrow which was ascribed to the purchase price. The escrow was related to satisfaction of the sellers' indemnification obligations with respect to their representations and warranties and other indemnities.

The operating results of the acquisition have been reflected in the results of operations for the Brooks Life Sciences segment. The Company did not present a pro forma information summary for its consolidated results of operations for fiscal years ended September 30, 2017 and 2016 as if the acquisition occurred on October 1, 2015 because such results were immaterial.

5. Marketable Securities

The Company invests in marketable securities that are classified as available-for-sale and recorded at fair value in the Company's Consolidated Balance Sheets. Marketable securities reported as current assets represent investments that mature within one year from the balance sheet date. Long-term marketable securities represent investments with maturity dates greater than one year from the balance sheet date.

Unrealized gains and losses are excluded from earnings and reported as a separate component of accumulated other comprehensive income until the security is sold or matures. Gains or losses realized from sales of marketable securities are computed based on the specific identification method and recognized as a component of "Other expenses, net" in the accompanying Consolidated Statements of Operations. During fiscal year 2019, the Company sold marketable securities with fair values and amortized cost of $49.4 million and $49.5 million, respectively, and recognized net losses of $0.1 million. The Company collected cash proceeds of $48.9 million from the sale of marketable securities and reclassified unrealized net holding losses of approximately $0.1 million from accumulated other comprehensive income into "Other expenses, net" in the accompanying Consolidated Statements of Operations as a result of these transactions. During fiscal year 2018, the Company sold marketable securities with a fair value and amortized cost of $1.6 million each and recognized nominal net losses. The Company collected cash proceeds of approximately $1.6 million from the sale of marketable securities and reclassified unrealized net holding losses of $0.1 million from accumulated other comprehensive income into "Other expenses, net" in the accompanying Consolidated Statements of Operations as a result of these transactions.

The following is a summary of the amortized cost and the fair value, including accrued interest receivable, as well as unrealized holding gains (losses) on the short-term and long-term marketable securities as of September 30, 2019 and 2018 (in thousands):

	Amortized Cost	Gross Unrealized Losses	Gross Unrealized Gains	Fair Value
September 30, 2019:				
U.S. Treasury securities and obligations of U.S. government agencies	$ 31,863	$ (2)	$ 5	$ 31,866
Bank certificates of deposits	750	—	—	750
Corporate securities	4,317	—	1	4,318
Other debt securities	35	—	—	35
	$ 36,965	$ (2)	$ 6	$ 36,969
September 30, 2018:				
U.S. Treasury securities and obligations of U.S. government agencies	$ 30,142	$ (65)	$ —	$ 30,077
Bank certificates of deposits	5,148	—	1	5,149
Corporate securities	14,763	(30)	—	14,733
Municipal securities	2,797	(17)	—	2,780
Other debt securities	779	—	—	779
	$ 53,629	$ (112)	$ 1	$ 53,518

The fair values of the marketable securities by contractual maturities at September 30, 2019 are presented below (in thousands).

	Fair Value
Due in one year or less	$ 34,124
Due after one year through five years	—
Due after five years through ten years	—
Due after ten years	2,845
Total marketable securities	$ 36,969

Expected maturities could differ from contractual maturities because the security issuers may have the right to prepay obligations without prepayment penalties.

The Company reviews the marketable securities for impairment at each reporting period to determine if any of the securities have experienced an other-than-temporary decline in fair value. The Company considers factors, such as the length of time and extent to which the market value has been less than the cost, the financial condition and near-term prospects of the issuer, the Company's intent to sell, or whether it is more likely than not it will be required to sell the investment before recovery of its amortized cost basis. If the Company believes that an other-than-temporary decline in fair value has occurred, it writes down the investment to fair value and recognizes the credit loss in earnings and the non-credit loss in accumulated other comprehensive income. There were $12.0 million of marketable securities in an unrealized loss position as of September 30, 2019. As of September 30, 2018, aggregate fair value of the marketable securities in unrealized loss position was $43.0 million and was comprised primarily of U.S. Treasury securities, corporate securities, and municipal securities. Aggregate unrealized losses for these securities were insignificant as of September 30, 2018 and are presented in the table above. The securities in unrealized loss position as of September 30, 2019 and 2018 were not considered other-than-temporarily impaired and, as such, the Company did not recognize impairment losses during the periods then ended. The unrealized losses were attributable to changes in interest rates that impacted the value of the investments.

6. Property, Plant and Equipment

Property, plant and equipment were as follows as of September 30, 2019 and 2018 (in thousands):

	September 30,	
	2019	2018
Buildings, land, and land use right	$ 50,583	$ 47,745
Computer equipment and software	61,603	56,982
Machinery and equipment	89,481	55,794
Furniture and fixtures	7,423	4,842
Leasehold improvements	30,612	19,433
Capital projects in progress	11,701	5,796
	251,403	190,592
Less: accumulated depreciation and amortization	(150,734)	(130,604)
Property, plant and equipment, net	$ 100,669	$ 59,988

Depreciation expense was $19.3 million, $12.5 million and $10.1 million, respectively, for the fiscal years ended September 30, 2019, 2018 and 2017. The Company recorded $1.9 million of additions to property, plant and equipment for which cash payments had not yet been made as of September 30, 2019.

7. Goodwill and Intangible Assets

Goodwill represents the excess of net book value over the estimated fair value of net tangible and identifiable intangible assets of a reporting unit. Goodwill is tested for impairment annually or more often if impairment indicators are present at the reporting unit level. The Company elected April 1st as its annual goodwill impairment assessment date. If the existence of events or circumstances indicates that it is more likely than not that fair values of the reporting units are

below their carrying values, the Company performs additional impairment tests during interim periods to evaluate goodwill for impairment.

In accordance with ASC 350*,* the Company initially assesses qualitative factors to determine whether the existence of events or circumstances indicates that it is more likely than not that the fair value of a reporting unit is less than its carrying value. If the Company determines, based on this assessment, that it is more likely than not that the fair value of the reporting unit is less than its carrying value, it performs a quantitative goodwill impairment test by comparing the reporting unit's fair value with its carrying value. An impairment loss is recognized for the amount by which the reporting unit's carrying value exceeds its fair value, up to the total amount of goodwill allocated to the reporting unit. No impairment loss is recognized if the fair value of the reporting exceeds its carrying value.

The Company completed its annual goodwill impairment test as of April 1, 2019 for its five reporting units, including Automation Solutions, Contamination Control Solutions and Global Semiconductor Services within the Brooks Semiconductor Solutions Group segment, as well as Sample Management and GENEWIZ within the Brooks Life Sciences segment. Based on the test results, the Company determined that no adjustment to goodwill was necessary. The Company conducted a qualitative assessment for three reporting units within the Brooks Semiconductor Solutions Group segment and determined that it was more likely than not that their fair values were more than their carrying values. As a result of the analysis, the Company did not perform the quantitative assessment for these reporting units and did not recognize any impairment losses. The Company performed the quantitative goodwill impairment test for the two reporting units within the Brooks Life Sciences segment. The Company determined that no adjustment to goodwill was necessary for these two reporting units. The Sample Management reporting unit's fair value significantly exceeded book value. The GENEWIZ reporting unit, which was recently acquired, had a fair value slightly above its book value.

The following table sets forth the changes in the carrying amount of goodwill by reportable segment since September 30, 2017 (in thousands):

	Brooks Semiconductor Solutions Group	Brooks Life Sciences	Other	Total
Gross goodwill, at September 30, 2017	$ 629,278	$ 166,820	$ 26,014	$ 822,112
Accumulated goodwill impairments	(588,944)	—	(26,014)	(614,958)
Goodwill, net of accumulated impairments, at September 30, 2017	40,334	166,820	—	207,154
Acquisitions and adjustments	7,629	41,093	—	48,722
Gross goodwill, at September 30, 2018	636,907	207,913	26,014	870,834
Accumulated goodwill impairments	(588,944)	—	(26,014)	(614,958)
Goodwill, net of accumulated impairments, at September 30, 2018	47,963	207,913	—	255,876
Acquisitions and adjustments	(116)	232,842	—	232,726
Gross goodwill, at September 30, 2019	636,791	440,755	26,014	1,103,560
Accumulated goodwill impairments	(588,944)	—	(26,014)	(614,958)
Goodwill, net of accumulated impairments, at September 30, 2019	$ 47,847	$ 440,755	$ —	$ 488,602

During fiscal year 2019, the Company recorded a goodwill increase of $232.7 million primarily related to the acquisition of GENEWIZ.

The components of the Company's identifiable intangible assets as of September 30, 2019 and 2018 are as follows (in thousands):

	September 30, 2019			September 30, 2018		
	Cost	Accumulated Amortization	Net Book Value	Cost	Accumulated Amortization	Net Book Value
Patents	$ 5,302	$ 4,628	$ 674	$ 5,302	$ 4,325	$ 977
Completed technology	88,288	38,778	49,510	44,829	28,934	15,895
Trademarks and trade names	25,340	5,807	19,533	6,298	2,953	3,345
Customer relationships	265,451	84,048	181,403	142,489	62,750	79,739
Other intangibles	231	183	48	—	—	—
	$ 384,612	$ 133,444	$ 251,168	$ 198,918	$ 98,962	$ 99,956

Amortization expense for intangible assets was $35.2 million, $24.2 million and $17.1 million, respectively, for the fiscal years ended September 30, 2019, 2018 and 2017.

Estimated future amortization expense for the intangible assets as of September 30, 2019 is as follows (in thousands):

Fiscal year ended September 30,	
2020	$ 41,381
2021	37,494
2022	34,390
2023	31,267
2024	26,456
Thereafter	80,180
	$ 251,168

8. Equity Method and Other Investments

The Company accounts for certain of its investments using the equity method of accounting and records its proportionate share of the investee's earnings (losses) in its results of operations with a corresponding increase (decrease) in the carrying value of the investment.

BioCision, LLC

As of September 30, 2016, the Company held a 20% equity interest in BioCision, LLC, or BioCision, a privately-held company based in Larkspur, California, which was accounted for as an equity method investment.

The Company held a term loan receivable from BioCision as of September 30, 2016. The term loan was provided to BioCision to support its working capital requirements. The term loan had an aggregate principal amount of $1.5 million and bore an annual interest rate of 10%.

The Company also held five-year convertible debt securities with a warrant agreement to purchase BioCision's preferred units as of September 30, 2016. The convertible debt securities and the warrant were purchased by the Company in fiscal year 2015 for a total purchase price of $5.0 million. The convertible debt securities were accruing interest at the annual rate of 9%, and all principal and accrued interest were due at maturity. The convertible debt securities and the warrant were recorded at fair value during each reporting period, and the remeasurement gains and losses were recognized as a component of "Other expenses, net" in the Company's Consolidated Statements of Operations.

On November 28, 2016, BioCision established Cool Lab as its subsidiary upon transferring certain assets related to cell cryopreservation solutions. The Company acquired a 100% equity interest of the subsidiary on that date for an aggregate purchase price of $15.2 million, consisting of a cash payment of $4.8 million, a liability to the seller of $0.1 million, and non-cash consideration of $10.3 million measured at fair value on the acquisition date.

The carrying value of the equity method investment in BioCision was $1.2 million on November 28, 2016. The Company recorded a loss associated with BioCision of $0.5 million from October 1, 2016 through the acquisition date. The equity method investment in BioCision was measured at fair value of $3.1 million at the acquisition date, and as a result the Company recognized a gain of $1.8 million upon the redemption of the equity method investment in its Consolidated Statements of Operations during fiscal year ended September 30, 2017. On November 28, 2016, convertible debt, warrant and the term loan with carrying values of $5.8 million, less than $0.1 million and $1.6 million, respectively, were measured at their fair values of $5.6 million, less than $0.1 million and $1.6 million, respectively. As a result of such measurement, the Company recognized an aggregate loss of $0.2 million upon the settlement of these financial instruments in "Other expenses, net" in its Consolidated Statements of Operations during the year ended September 30, 2017. Please refer to Note 4, "Acquisitions" for further information on the acquisition transaction.

9. Supplementary Balance Sheet Information

The following is a summary of accounts receivable at September 30, 2019 and 2018 (in thousands):

	September 30, 2019	September 30, 2018
Accounts receivable	$ 169,317	$ 126,350
Less allowance for doubtful accounts	(3,644)	(1,113)
Less allowance for sales returns	(71)	(45)
Accounts receivable, net	$ 165,602	$ 125,192

The allowance for doubtful accounts activity for the fiscal years ended September 30, 2019, 2018 and 2017 is as follows (in thousands):

Description	Balance at Beginning of Period	Provisions	Reversals of Bad Debt Expense	Write-offs and Adjustments	Balance at End of Period
2019 Allowance for doubtful accounts	$ 1,113	$ 3,405	$ (693)	$ (181)	$ 3,644
2018 Allowance for doubtful accounts	1,381	708	(724)	(252)	1,113
2017 Allowance for doubtful accounts	1,543	—	(131)	(31)	1,381

The allowance for sales returns activity for the fiscal years ended September 30, 2019, 2018 and 2017 is as follows (in thousands):

Description	Balance at Beginning of Period	Provisions	Write-offs and Adjustments	Balance at End of Period
2019 Allowance for sales returns	$ 45	$ 26	$ —	$ 71
2018 Allowance for sales returns	81	(36)	—	45
2017 Allowance for sales returns	101	(20)	—	81

The following is a summary of inventories at September 30, 2019 and 2018 (in thousands):

	September 30, 2019	September 30, 2018
Inventories		
Raw materials and purchased parts	$ 67,176	$ 57,527
Work-in-process	13,684	19,547
Finished goods	18,585	19,912
Total inventories	$ 99,445	$ 96,986

The activity for excess and obsolete inventory reserves is as follows for the fiscal years ended September 30, 2019, 2018 and 2017 (in thousands):

Description	Balance at Beginning of Period	Provisions	Inventory Disposals and Adjustments	Balance at End of Period
2019 Reserves for excess and obsolete inventory	$ 14,953	$ 5,865	$ (4,520)	$ 16,298
2018 Reserves for excess and obsolete inventory	17,734	4,455	(7,236)	14,953
2017 Reserves for excess and obsolete inventory	19,663	4,858	(6,787)	17,734

The activity for valuation allowance for deferred tax assets is as follows for the fiscal years ended September 30, 2019, 2018 and 2017 (in thousands):

Description	Balance at Beginning of Period	Charged to Provisions	Charged to Other Accounts	Balance at End of Period
2019 Valuation allowance for deferred tax assets	$ 18,581	$ (3,475)	$ 987	$ 16,093
2018 Valuation allowance for deferred tax assets	92,297	(72,842)	(874)	18,581
2017 Valuation allowance for deferred tax assets	104,802	(10,881)	(1,624)	92,297

The Company establishes reserves for estimated cost of product warranties based on historical information. Product warranty reserves are recorded at the time product revenue is recognized, and retrofit accruals are recorded at the time retrofit programs are established. The Company's warranty obligation is affected by product failure rates, utilization levels, material usage, service delivery costs incurred in correcting a product failure and supplier warranties on parts delivered to the Company. The following is a summary of product warranty and retrofit activity on a gross basis, excluding amounts related to discontinued operations, for the fiscal years ended September 30, 2019, 2018 and 2017 (in thousands):

	Amount
Balance at September 30, 2016	$ 4,159
Accruals for warranties during the year	6,683
Costs incurred during the year	(5,363)
Balance at September 30, 2017	5,479
Accruals for warranties during the year	5,209
Costs incurred during the year	(4,348)
Balance at September 30, 2018	6,340
Accruals for warranties during the year	8,688
Costs incurred during the year	(7,853)
Balance at September 30, 2019	$ 7,175

10. Line of Credit

On May 26, 2016, the Company and certain of its subsidiaries entered into a credit agreement with Wells Fargo Bank, N.A. ("Wells Fargo"). The credit agreement provided for a five-year senior secured revolving line of credit (the ‘‘line of credit") of $75.0 million. The agreement included sub-limits of up to $25.0 million for letters of credit and $7.5 million of swing loans at the time there is more than one lender under the credit agreement.

On October 4, 2017, the Company entered into a $200.0 million Senior Secured Term Loan Facility (the "term loan") with Morgan Stanley Senior Funding, Inc., JPMorgan Chase Bank, N.A. and Wells Fargo Securities, LLC (collectively, the "lenders"). Coincident with the entry into the term loan agreement, the Company amended certain terms and conditions of the credit agreement and entered into an arrangement with Wells Fargo and JPMorgan Chase Bank, N.A. Based on the amended terms of the credit agreement, the line of credit continues to provide for revolving credit financing of up to $75.0 million, subject to borrowing base availability. Borrowing base availability under the amended line of credit excludes collateral related to fixed assets and is redetermined periodically based on certain percentage of certain eligible U.S. assets, including accounts receivable and inventory. The line of credit matures on October 4, 2022 and expires no less than 90 days prior to the term loan expiration.

The sub-limits for letters of credit were reduced to $7.5 million under the amended terms of the credit agreement. All outstanding borrowings under the credit agreement are guaranteed by the Company and Brooks Life Sciences, Inc. (fka BioStorage Technologies, Inc.), its wholly-owned subsidiary ("guarantor"), and subordinated to the obligations under the term loan which are secured by a first priority lien on substantially all of the assets of the Company and the Guarantor, other than accounts receivable and inventory.

There were no amounts outstanding under the line of credit as of September 30, 2019 and September 30, 2018. The Company records commitment fees and other costs directly associated with obtaining line of credit financing as deferred financing costs, which are amortized over the term of the related financing arrangement. Deferred financing costs were $0.4 million and $0.5 million at September 30, 2019 and September 30, 2018, respectively. The line of credit contains certain customary representations and warranties, a financial covenant and affirmative and negative covenants as well as events of default. The Company was in compliance with the line of credit covenants as of September 30, 2019 and September 30, 2018.

11. Debt

Term Loans

On October 4, 2017, the Company entered into a $200.0 million term loan with the lenders pursuant to the terms of a credit agreement. The term loan was issued at $197.6 million, or 98.8% of its par value, resulting in a discount of $2.4 million, or 1.2%, which represented loan origination fees paid at the closing.

On November 15, 2018, the Company entered into an incremental amendment (the "First Amendment") to the existing credit agreement. Under the First Amendment, the Company obtained an incremental term loan in an aggregate principal amount of $350.0 million. The proceeds of the incremental term loan were used to finance a portion of the purchase price for the Company's acquisition of GENEWIZ. The incremental term loan was issued at $340.5 million, or 97.3% of its par value, resulting in a discount of $9.5 million, or 2.7%, which represented financing cost of the incremental term loan. Except as provided in the First Amendment, the incremental term loan was subject to the same terms and conditions as set forth in the existing credit agreement.

On February 15, 2019, the Company entered into the second amendment to the credit agreement (the "Second Amendment") and syndicated the incremental term loan to a group of new lenders which met the criteria of a debt extinguishment. The Company wrote off the carrying value of the incremental term loan of $340.1 million as of February 15, 2019 and recorded the syndicated incremental term loan at its present value for $349.1 million and a loss on debt extinguishment for $9.1 million. The syndicated incremental term loan was issued at $345.2 million, or 98.9% of its par value resulting in a discount of $4.0 million which represented financing costs which are presented as a reduction of the incremental term loan principal balance in the accompanying unaudited Consolidated Balance Sheets and was accreted over the life of the incremental term loan. Except as provided in the Second Amendment with respect to an increase of the applicable interest rates, the syndicated incremental term loan was subject to the same terms and conditions as the initial incremental term loan.

On July 1, 2019, the Company completed the sale of its semiconductor cryogenics business and used $348.3 million of the proceeds from the Disposition to extinguish the outstanding balance of the incremental term loan. In addition, the Company used $147.0 million of the proceeds from the Disposition to extinguish a portion of the outstanding balance of the term loan. The Company recorded a loss on debt extinguishment of $5.2 million for the two term loans.

The Company's obligations under the term loan are also guaranteed by Brooks Life Sciences, Inc. (fka BioStorage Technologies, Inc.) as the guarantor, subject to the terms and conditions of the credit agreement. The Company and the guarantor granted the lenders a perfected first priority security interest in substantially all of the assets of the Company and the guarantor to secure the repayment of the term loan.

The loan principal amount under the credit agreement may be increased by an aggregate amount equal to $75.0 million plus any voluntary repayments of the term loans plus any additional amount such that the secured leverage ratio of the Company is less than 3.00 to 1.00.

Subject to certain conditions stated in the credit agreement, the Company may redeem the term loan at any time at its option without a significant premium or penalty, except for a repricing transaction, as defined in the credit agreement. The Company is required to redeem the term loan at the principal amount then outstanding upon occurrence of certain events, including (i) net proceeds received from the sale or other disposition of the Company's or the guarantor' assets, subject to certain limitations, (ii) casualty and condemnation proceeds received by the Company or the guarantor, subject to certain exceptions, (iii) net proceeds received by the Company or the guarantor from the issuance of debt or disqualified capital stock after October 4, 2017. Commencing on December 31, 2018, the Company was required to make principal payments equal to the excess cash flow amount, as defined in the credit agreement. Such prepayments are equal to 50% of the preceding year excess cash flow amount reduced by voluntary prepayments of the term loan, subject to certain limitations.

The deferred financing costs are accreted over the term of the loan using the effective interest rate method and are included in "Interest expense" in the accompanying unaudited Consolidated Statements of Operations. At September 30, 2019, deferred financing costs were $0.5 million.

The credit agreement contains certain customary representations and warranties, covenants and events of default. If any of the events of default occur and are not waived or cured within applicable grace periods, any unpaid amounts under the credit agreement will bear an annual interest rate at 2.00% above the rate otherwise applicable under the terms and conditions of such agreement. The credit agreement does not contain financial maintenance covenants. As of September 30, 2019, the Company was in compliance with all covenants and conditions under the credit agreement.

In connection with the GENEWIZ acquisition, the Company assumed three five-year term loans for a total of $3.3 million and two one-year short term loans for a total of $3.2 million. The three five-year term loans were initiated during 2016 and mature in 2021. The principal payments are payable in eight installments equal to 12.5% of the initial principal amount of the term loans on December 14th and June 14th of each year. The three five-year term loans were secured by GENEWIZ to fund equipment procurement and new building related payments and the interest rates are equal to the LIBOR plus 3.1%. The two one-year term loans were secured by GENEWIZ to fund operations. Both of the one-year term loans were initiated in 2018 and matured in 2019. The interest rates of these two loans were 4.56% and 4.35%. There are no deferred financing costs related to either the five-year term loans or the one-year term loans. At September 30, 2019, the Company had an aggregate outstanding principal balance of $1.7 million for the three five-year term loans. Both of the two one-year short term loans matured and were repaid in full as of September 30, 2019.

During the year ended September 30, 2019, the weighted average stated interest rate paid on all outstanding debt was 5.3%. During the year ended September 30, 2019, the Company incurred aggregate interest expense of $21.9 million in connection with the borrowings, including $1.1 million of deferred financing costs amortization.

As of September 30, 2019, the estimated fair value of the outstanding principal balance of the debt on the Company's balance sheet approximates its carrying value. The fair value of the term loan was determined based on observable market inputs and classified within Level 2 of the fair value hierarchy due to a lack of an active market for this term loan or a similar loan instrument.

The following are the future minimum principal payment obligations under all of the Company's outstanding debt as of September 30, 2019 (in thousands):

	Amount
Fiscal year ended September 30,	
2020	$ 829
2021	826
2022	—
2023	—
2024	—
Thereafter	50,000
Total outstanding principal balance	51,655
Unamortized deferred financing costs	(511)
	51,144
Current portion of long-term debt	829
Non-current portion of long-term debt	$ 50,315

Capital Lease Obligations

In connection with the GENEWIZ acquisition, the Company assumed five capital lease obligations related to leases of equipment. Three of the capital leases were initiated in 2016 and mature in 2021 and two of them were initiated in 2017 and mature in 2022. The outstanding principal balance of these obligations is included within "Other long-term liabilities" on the Company's Consolidated Balance Sheets. See below for the future minimum principal payment obligations under these capital lease obligations as of September 30, 2019 (in thousands):

	Amount
Fiscal year ended September 30,	
2020	$ 1,176
2021	1,126
2022	358
Total outstanding principal balance	$ 2,660

12. Income Taxes

The components of the income tax provision (benefit) from continuing operations for the fiscal years are as follows (in thousands):

	Year Ended September 30,		
	2019	2018	2017
Current income tax provision (benefit):			
Federal	$ 963	$ —	$ —
State	510	917	402
Foreign	15,860	7,608	7,499
Total current income tax provision	17,333	8,525	7,901
Deferred income tax provision (benefit):			
Federal	(8,633)	(48,815)	(4,247)
State	(2,138)	(5,518)	(249)
Foreign	(6,673)	(1,443)	(25)
Total deferred income tax provision (benefit)	(17,444)	(55,776)	(4,521)
Income tax provision (benefit)	$ (111)	$ (47,251)	$ 3,380

The components of income (loss) from continuing operations before income taxes and equity in earnings of equity method investments for the fiscal years are as follows (in thousands):

	Year Ended September 30,		
	2019	**2018**	**2017**
Domestic	$ (37,160)	$ 3,122	$ (13,211)
Foreign	46,603	17,344	27,731
	$ 9,443	$ 20,466	$ 14,520

The differences between the income tax provision (benefit) on income (loss) from continuing operations including income from equity in earnings (losses) of equity method investments and income taxes computed using the applicable U.S. statutory federal tax rates for the fiscal years ended September 30, 2019, 2018 and 2017 are as follows (in thousands):

	Year Ended September 30,		
	2019	**2018**	**2017**
Income tax provision computed at federal statutory rate	$ 1,983	$ 5,014	$ 4,923
State income taxes, net of federal benefit	(630)	692	137
Foreign income taxed at different rates	550	920	(1,644)
Impact of investments in subsidiaries	(536)	(729)	(965)
Change in deferred tax asset valuation allowance	(2,264)	(75,918)	319
Net increase (reduction) in uncertain tax positions	720	220	731
Global intangible low taxed income, net of foreign tax credits	942	—	—
Impact of U.S. federal tax rate change	—	15,287	—
Compensation	(1,103)	(701)	579
Tax credits	(2,741)	(1,633)	(1,151)
Merger costs	572	1,405	—
Other taxes	764	70	98
Non-deductible expenses	174	176	220
Transition tax	2,836	8,027	—
Deferred state rate change due to acquisition	(1,360)	—	—
Other	(18)	(81)	133
Income tax provision (benefit)	$ (111)	$ (47,251)	$ 3,380

The Company has not provided deferred income taxes on the outside basis differences of its foreign subsidiaries. The Company maintains its assertion of indefinite reinvestment as of September 30, 2019. The foreign earnings are expected to be reinvested in foreign operations and acquisitions. Unremitted foreign earnings total approximately $190 million. We did not calculate estimated deferred tax liabilities related to these earnings because such calculations would not be practicable. The taxes on these earnings would primarily consist of foreign withholding taxes and minimal U.S. state income taxes. It is not practicable to estimate the tax impact of the reversal of the outside basis difference, or the repatriation of cash due to the complexity of its hypothetical calculation.

The significant components of the net deferred tax assets and liabilities as of September 30, 2019 and 2018 are as follows (in thousands):

	September 30,	
	2019	2018
Accruals and reserves not currently deductible	$ 14,286	$ 11,699
Federal, state and foreign tax credits	5,952	27,923
Other assets	2,487	175
Equity compensation	5,360	5,926
Net operating loss carryforwards	18,987	16,790
Deferred revenue	4,038	2,882
Inventory reserves and valuation	5,626	6,520
Deferred tax assets	56,736	71,915
Depreciation and intangible amortization	(57,634)	(19,476)
Deferred tax liabilities	(57,634)	(19,476)
Valuation allowance	(16,093)	(18,581)
Net deferred tax asset (liability)	$ (16,991)	$ 33,858

The deferred tax assets on the balance sheet for September 30, 2019 also includes a $1.5 million deferred tax charge related to the company's intercompany profit elimination.

ASC Topic 740, *Income Taxes*, requires that all available evidence, both positive and negative, be considered in determining, based on the weight of that evidence, whether a valuation allowance is needed. The weight given to the potential effect of negative and positive evidence should be commensurate with the extent to which it can be objectively verified. The more negative evidence that exists, (a) the more positive evidence is necessary and (b) the more difficult it is to support a conclusion that a valuation allowance is not needed for some portion or the entire deferred tax asset. A cumulative loss in recent years is considered a significant piece of negative evidence that is difficult to overcome in assessing the need for a valuation allowance.

The Company evaluates the realizability of its deferred tax assets by tax-paying component and assesses the need for a valuation allowance on an annual and quarterly basis. The Company evaluates the profitability of each tax-paying component on a historic cumulative basis and a forward-looking basis in the course of performing this analysis. The Company evaluated all positive and negative evidence in concluding it was appropriate to establish a full valuation allowance against U.S. net deferred tax assets during fiscal year 2016. The Company maintained this position throughout fiscal year 2017 and the first quarter of fiscal year 2018.

After evaluating all the relevant positive and negative evidence as of March 31, 2018, the Company concluded that it was more likely than not that a substantial portion of the U.S. deferred tax assets would be realized. In the second quarter of fiscal year 2018 the Company reached a significant level of cumulative profitability in the U.S., coupled with an improved outlook of U.S. earnings. During the full fiscal year 2018, the Company reduced its U.S. valuation against its U.S. net deferred tax assets resulting in a tax benefit of $77.2 million. The remaining portion of the Company's U.S. valuation allowance is related to the realizability of certain state tax credits and net operating loss carry-forwards. The Company continues to maintain valuation allowances against net deferred tax assets in certain foreign tax-paying components as of the end of fiscal year 2018.

As of September 30, 2019, the Company has federal, state and foreign net operating loss carry-forwards of approximately $26.4 million, $21.8 million and $52.3 million, respectively. Included in the federal gross net operating loss carry-forwards are $21.7 million of losses that can be carried forward indefinitely, while the remaining losses expire at various dates through 2038.

As of September 30, 2019, the Company had federal research and development tax credit carry-forwards of $1.6 million. These credit carry-forwards will expire at various dates beginning in 2037 through 2038. The Company also has $6.8 million of state credits which begin to expire in 2020, while some of these credits have an unlimited carryover period.

During the fiscal year 2018, the Tax Cuts and Jobs Act ("Tax Reform") was enacted in the U.S., making significant tax law changes affecting the Company.

In accordance with international tax reform regulations, the Company recorded a toll charge in the U.S. on its previously untaxed accumulated foreign earnings. The Company recorded a tax impact of $8.0 million, net of foreign tax credits, related to the toll charge during the fiscal year ended September 30, 2018. The Company completed final calculations in accordance with Staff Accounting Bulletin No.118 during the first quarter of fiscal year 2019 and recorded a reduction in the toll charge of $1.1 million. During the third quarter of fiscal year 2019, the U.S. government issued final regulations that clarified certain rules related to the toll charge that impacted fiscal year taxpayers. As a result of this clarification, the Company recorded an increase to the toll charge of $4.1 million. After all adjustments had been recorded, the Company realized a toll charge of $11.0 million, net of foreign tax credits.

The Company has performed studies to determine if there are any annual limitations on the federal net operating losses under the Section 382 of the Internal Revenue Code of 1986, as amended, or the Internal Revenue Code. As a result of these studies, the Company has determined that ownership changes have occurred primarily in connection with acquisitions when the Company has issued stock to the sellers, as well as ownership changes in the subsidiaries acquired by the Company. Certain limitations have been calculated, and the benefits of the net operating losses that will expire before utilization have not been recorded as deferred tax assets in the accompanying Consolidated Balance Sheets. Limitations on current year use of net operating loss carryovers have also been recorded in the tax provision.

The Company maintains liabilities for unrecognized tax benefits. These liabilities involve judgment and estimation, and they are monitored based on the best information available. A reconciliation of the beginning and ending amount of the consolidated liability for unrecognized income tax benefits during the fiscal years ended September 30, 2019, 2018 and 2017 is as follows (in thousands):

	Total
Balance at September 30, 2016	$ 5,427
Additions for tax positions in current year	1,869
Reduction for tax positions in prior year	(3,485)
Net reductions from lapses in statutes of limitations	(431)
Foreign exchange rate adjustment	(2)
Balance at September 30, 2017	3,378
Additions for tax positions in current year	874
Reduction for tax positions in prior year	(656)
Reductions from lapses in statutes of limitations	(353)
Balance at September 30, 2018	3,243
Additions for tax positions in current year	901
Additions for tax positions in prior year	13,400
Reductions from lapses in statutes of limitations	(68)
Reductions from settlements with taxing authorities	(166)
Balance at September 30, 2019	$ 17,310

All of the unrecognized tax benefits for the fiscal year ended September 30, 2019 would impact the effective tax rate if recognized. The Company recognizes interest related to unrecognized benefits as a component of the income tax provision (benefit), of which $1.1 million, $0.1 million and $0.1 million, respectively, was recognized for the fiscal years ended September 30, 2019, 2018 and 2017. The Company recorded $13.4 million of unrecognized tax benefit with the acquisition of GENEWIZ. All liabilities associated with the unrecognized tax benefits recorded with the acquisition of GENEWIZ are part of an indemnification agreement with the sellers.

The Company is subject to U.S. federal income tax and state, local and international income taxes in various jurisdictions. The amount of income taxes paid is subject to the Company's interpretation of applicable tax laws in the jurisdictions in which it files.

In the normal course of business, the Company is subject to income tax audits in various global jurisdictions in which it operates. The years subject to examination vary for the U.S. and international jurisdictions, with the earliest tax year being 2012. Based on the outcome of these examinations or the expiration of statutes of limitations for specific jurisdictions, it is reasonably possible that the related unrecognized tax benefits could change from those recorded in the Company's Consolidated Balance Sheets. The Company currently anticipates that it is reasonably possible that the unrecognized tax benefits will be reduced by approximately $0.1 million in the next 12 months.

13. Derivative Instruments

The Company has transactions and balances denominated in currencies other than the U.S. dollar. Most of these transactions or balances are denominated in Euros, British Pounds and a variety of Asian currencies. These transactions and balances, including short-term advances between the Company and its subsidiaries, subject the Company's operations to exposure from exchange rate fluctuations. The impact of currency exchange rate movement can be positive or negative in any period. The Company mitigates the impact of potential currency transaction gains and losses on short-term intercompany advances through timely settlement of each transaction, generally within 30 days.

The Company also enters into foreign exchange contracts to reduce its exposure to currency fluctuations. Under forward contract arrangements, the Company typically agrees to purchase a fixed amount of one currency in exchange for a fixed amount of another currency on specified dates with maturities of three months or less. These transactions do not qualify for hedge accounting. Net gains and losses related to these contracts are recorded as a component of "Other expenses, net" in the accompanying Consolidated Statements of Operations and are as follows for the fiscal years ended September 30, 2019, 2018 and 2017 (in thousands):

	Fiscal Year Ended September 30,		
	2019	2018	2017
Realized gains (losses) on derivatives not designated as hedging instruments	$ 3,656	$ (330)	$ (545)

The fair value of derivative instruments are as follows at September 30, 2019 and 2018 (in thousands):

	Fair Value of Assets		Fair Value of Liabilities	
As of September 30,	**2019**	**2018**	**2019**	**2018**
Derivatives not designated as hedging instruments				
Foreign exchange contracts	$ 17	$ 170	$ (340)	$ (177)
Total	$ 17	$ 170	$ (340)	$ (177)

The fair values of the forward contracts described above are recorded in the Company's accompanying Consolidated Balance Sheets as "Prepaid expenses and other current assets" and "Accrued expenses and other current liabilities".

14. Postretirement Benefits

Defined Benefit Pension Plans

The Company has three active defined benefit pension plans (collectively, the "Plans"), including legacy Taiwan Plan, the legacy Switzerland Plan, and the newly acquired Tec-Sem Plan. The Plans cover substantially all of the Company's employees in Switzerland and Taiwan. Retirement benefits are generally earned based on years of service and the level of compensation during active employment, but the level of benefits varies within the Plans. Eligibility is determined in accordance with local statutory requirements.

The Company uses September 30th as a measurement date to determine net periodic benefit costs, benefit obligations and the value of plan assets for all plans. The following tables set forth the funded status and amounts recognized in the Company's Consolidated Balance Sheets as of September 30, 2019 and 2018 (in thousands):

	September 30, 2019	September 30, 2018
Benefit obligation at beginning of fiscal year	$ 11,144	$ 3,565
Benefit obligation through acquisition	—	7,852
Service cost	599	382
Interest cost	118	75
Actuarial loss	831	(165)
Benefits paid	(811)	(685)
Employee contributions	273	191
Settlements paid	—	—
Curtailment gain	—	—
Foreign currency translation	(239)	(71)
Benefit obligation at end of fiscal year	$ 11,915	$ 11,144
Fair value of assets at beginning of fiscal year	$ 7,078	$ 2,225
Fair value of assets through acquisition	—	5,052
Actual return on plan assets	(179)	69
Disbursements	(811)	(685)
Employer contributions	370	266
Employee contributions	273	191
Settlements paid	—	—
Foreign currency translation	(157)	(40)
Fair value of assets at end of fiscal year	$ 6,574	$ 7,078
Accrued benefit obligation	$ 5,341	$ 4,066

The accumulated benefit obligation of the Plans is $11.4 million and $10.6 million, respectively, at September 30, 2019 and 2018. All Plans have an accumulated benefit obligation and projected benefit obligation in excess of plans' assets at September 30, 2019.

The following table provides pension-related amounts and their classification within the accompanying Consolidated Balance Sheets as of September 30, 2019 and 2018 (in thousands):

	September 30, 2019	September 30, 2018
Accrued compensation and benefits	$ 366	$ 431
Long-term pension liability	4,975	3,635
	$ 5,341	$ 4,066

The Company bases its determination of pension expense on a market-related valuation of assets, which reduces year-to-year volatility. This market-related valuation recognizes investment gains or losses over a five-year period from the year in which they occur. Investment gains or losses represent the difference between the expected return calculated using the market-related value of assets and the actual return on assets. Since the market-related value of assets recognizes gains or losses over a five-year period, the future value of assets will be impacted as previously deferred gains or losses are recognized. At September 30, 2019 and 2018, the Company had cumulative unrecognized net actuarial gains of $0.9 million and loss of less than $0.1 million, respectively, which are amortized into net periodic benefit cost over the average remaining service period of active Plans' participants. The Company had cumulative unrecognized investment gains of $0.5 million at both September 30, 2019 and 2018, under the Plans which remain to be recognized in the calculation of the market-related values of assets.

The components of the Company's net pension cost for the fiscal years ended September 30, 2019, 2018 and 2017 are as follows (in thousands):

	Year Ended September 30,		
	2019	2018	2017
Service cost	$ 599	$ 382	$ 268
Interest cost	118	75	22
Amortization of losses	(18)	5	7
Expected return on plan assets	(74)	(66)	(130)
Net periodic pension cost	$ 625	$ 396	$ 167
Settlement gain	—	—	(259)
Total pension cost (gain)	$ 625	$ 396	$ (92)

The following changes in Plans' assets and benefit obligations were recognized in other comprehensive income (loss) as of September 30, 2019 and 2018 (in thousands):

	September 30,	
	2019	2018
Net gain	$ (854)	$ (191)
Amortization of net loss	30	(7)
Total recognized in other comprehensive income (loss)	(824)	(198)
Total recognized in net periodic pension cost and other comprehensive income (loss).	$ (198)	$ 593

The settlement gain of $0.3 million realized during fiscal year ended September 30, 2017 was recorded as a reduction of accumulated other comprehensive income (loss) and the pension cost during the period then ended. Please refer to Note 15, "Stockholders' Equity", for further information on these reclassifications and their impact on the accumulated other comprehensive income and other comprehensive income during each fiscal year.

Weighted-average assumptions used to determine the projected benefit obligation for the fiscal years ended September 30, 2019, 2018 and 2017 are as follows:

	Year Ended September 30,		
	2019	2018	2017
Discount rate	0.55 %	1.04 %	0.88 %
Expected return on plan assets	1.01 %	1.06 %	1.75 %
Expected rate of compensation increases	1.12 %	1.19 %	1.54 %

In selecting the appropriate discount rates for the Plans, the Company uses country-specific information, adjusted to reflect the duration of the particular plan. The expected return on plan assets is based on an evaluation of fixed income yield curves and equity return assumption studies applied to the Plans' asset allocations.

Plan Assets

The fair value of plan assets for the two Swiss Plans and the Taiwan Plan were $6.5 million and $0.1 million, respectively, at September 30, 2019. The assets of the Swiss Plans are invested in a collective fund with multiple employers through a Swiss insurance company, which is a customary practice for Swiss pension plans. The Company does not have any rights or an investment authority over the Plan's assets which are invested primarily in highly rated debt securities.

The assets of the Taiwan Plan are invested with a trustee selected by the Taiwan government, and the Company has no investment authority over the Plan's assets.

The allocation of the Plans' assets at September 30, 2019 is as follows:

	September 30, 2019
Cash and cash equivalents	1 %
Debt securities	48
Equity securities	20
Other	31
	100 %

The fair values of pension assets by asset category and by level at September 30, 2019 are as follows (in thousands):

	As of September 30, 2019			
	Level 1	Level 2	Level 3	Total
Swiss Life collective foundation	$ —	$ 6,486	$ —	$ 6,486
Taiwan collective trust	—	88	—	88
Total	$ —	$ 6,574	$ —	$ 6,574

The fair values of pension assets by asset category and by level at September 30, 2018 are as follows (in thousands):

	As of September 30, 2018			
	Level 1	Level 2	Level 3	Total
Swiss Life collective foundation	$ —	$ 6,754	$ —	$ 6,754
Taiwan collective trust	—	324	—	324
Total	$ —	$ 7,078	$ —	$ 7,078

Please refer to Note 22, "Fair Value Measurements" for a description of the levels of inputs used to determine fair value measurements.

Benefit payments expected to be paid over the next five fiscal years and thereafter are as follows (in thousands):

Fiscal year ended September 30,	
2020	$ 366
2021	370
2022	373
2023	377
2024	381
Thereafter	3,474

The Company expects to contribute $0.4 million to the Plans in fiscal year 2020 to meet the minimum funding requirements of the Plans.

Defined Contribution Plans

The Company sponsors a defined contribution plan that meets the requirements of Section 401(k) of the Internal Revenue Code. All United States employees who meet minimum age and service requirements are eligible to participate in the plans. The plans allow employees to invest, on a pre-tax basis, a percentage of their annual salary and bonus subject to statutory limitations. The Company matches a portion of their contributions on a pre-tax basis up to a maximum amount of 4.5% of deferred pay. The expense recognized for the defined contribution plans was $4.6 million, $3.4 million and $3.0 million, respectively, for the fiscal years ended September 30, 2019, 2018 and 2017.

15. Stockholders' Equity

Preferred Stock

Total number of shares of preferred stock authorized for issuance was 1,000,000 shares at September 30, 2019 and 2018, respectively. Preferred stock has a par value of $0.01 per share and may be issued at the discretion of the Board of Directors without stockholder approval with such designations, rights and preferences as the Board of Directors may determine. There were no shares of preferred stock issued or outstanding at September 30, 2019 or 2018, respectively.

Accumulated Other Comprehensive Income

The following is a summary of the components of accumulated other comprehensive income, net of tax, at September 30, 2019, 2018 and 2017 (in thousands):

	Currency Translation Adjustments	Unrealized Gains (Losses) on Available-for-Sale Securities	Pension Liability Adjustments	Total
Balance at September 30, 2016	$ 15,389	$ (3)	$ (220)	$ 15,166
Other comprehensive income (loss) before reclassifications	(221)	(10)	514	283
Amounts reclassified from accumulated other comprehensive income	—	12	(248)	(236)
Balance at September 30, 2017	15,168	(1)	46	15,213
Other comprehensive income (loss) before reclassifications	(1,651)	(110)	124	(1,637)
Amounts reclassified from accumulated other comprehensive income	—	(1)	12	11
Balance at September 30, 2018	13,517	(112)	182	13,587
Other comprehensive (loss) income before reclassifications	(9,333)	244	(882)	(9,971)
Amounts reclassified from accumulated other comprehensive income	—	(140)	35	(105)
Balance at September 30, 2019	$ 4,184	$ (8)	$ (665)	$ 3,511

Unrealized net holding gains (losses) on available-for-sale marketable securities are reclassified from accumulated other comprehensive income into results of operations at the time of the securities' sale, as described in Note 5, "Marketable Securities." Gains (losses) related to defined benefit pension plan settlements are reclassified from accumulated other comprehensive income into results of operations at the time of the settlement, as described in Note 14, "Postretirement Benefits." Defined benefit pension plan curtailments are recognized as reclassifications from accumulated other comprehensive income and corresponding reductions in pension liabilities and net pension cost, as described in Note 14, "Postretirement Benefits."

16. Equity Incentive Plans

The Company's equity incentive plans are intended to attract and retain employees and provide an incentive for them to contribute to the Company's long-term growth and achievement of its long-range performance goals. The equity incentive plans consist of plans under which employees may be granted options to purchase shares of the Company's stock, restricted stock and other equity incentives. Restricted stock awards generally have a three-year vesting period. At September 30, 2019, a total of 1,954,021 shares were reserved and available for future grant under the equity incentive plans.

2015 Equity Incentive Plan

In accordance with the 2015 Equity Incentive Plan (the "2015 Plan"), the Company may grant (i) restricted stock and other stock-based awards, (ii) nonqualified stock options, and (iii) options intended to qualify as incentive stock options under Section 422 of the Internal Revenue Code. All employees of the Company or any affiliate of the Company, independent directors, consultants and advisors are eligible to participate in the 2015 Plan. The 2015 Plan provides for the

issuance of a maximum of 5,000,000 shares of common stock in addition to the stock option and restricted stock awards granted out of the 2000 Plan that were canceled or forfeited after February 5, 2015 upon expiration of the 2000 Plan on March 31, 2015.

Restricted Stock Activity

The following table summarizes restricted stock unit activity for the fiscal year ended September 30, 2019:

	Shares	Weighted Average Grant-Date Fair Value
Outstanding at September 30, 2018	2,194,512	$ 17.20
Granted	792,315	30.47
Vested	(1,055,018)	13.04
Forfeited	(149,083)	26.11
Outstanding at September 30, 2019	1,782,726	24.63

The weighted average grant date fair value of restricted stock units granted during fiscal years 2019, 2018 and 2017 was $30.47, $33.28 and $14.43 per share, respectively. The fair value of restricted stock units vested during fiscal years 2019, 2018 and 2017 was $34.8 million, $22.0 million and $15.0 million, respectively. During fiscal years 2019, 2018 and 2017, the Company remitted $15.3 million, $7.3 million and $4.7 million, respectively, for withholding taxes on vested restricted stock units, of which $0.0 million, $0.0 million and $0.1 million, respectively, was paid by the Company. During fiscal years 2019, 2018 and 2017, the Company received $15.3 million, $7.3 million and $4.6 million, respectively, in cash proceeds from employees to satisfy their tax obligations as a result of share issuances.

As of September 30, 2019, the future unrecognized stock-based compensation expense related to restricted stock units expected to vest is $20.8 million and is expected to be recognized over an estimated weighted average amortization period of 1.6 years.

The Company grants restricted stock units that vest over a required service period and /or achievement of certain operating performance goals. Restricted stock units granted with performance goals may also have a required service period following the achievement of all or a portion of the goals. The following table reflects restricted stock units and stock awards granted during fiscal years ended September 30, 2019, 2018 and 2017:

	Total Units	Time-Based Units	Stock Grants	Performance-Based Units
Year ended September 30, 2019	792,315	330,006	38,920	423,389
Year ended September 30, 2018	535,289	213,893	36,774	284,622
Year ended September 30, 2017	1,018,570	386,713	43,519	588,338

Among the total restricted stock units granted, 134,993 and 124,124 shares, respectively, were granted to the employees who belong to the discontinued operations in the year ended September 30, 2018, and 2017.

Time-Based Grants

Restricted stock units granted with a required service period typically have three-year vesting schedules in which one-third of awards vest at the first anniversary of the grant date, one-third vest at the second anniversary of the grant date and one-third vest at the third anniversary of the grant date, subject to the award holders meeting service requirements.

Stock Grants

The stock awards granted to the members of the Company's Board of Directors include stock awards, restricted stock awards and deferred stock and restricted stock units.

Stock awards granted during fiscal year 2019 were vested upon issuance. Restricted stock awards granted during fiscal year 2018 and 2017 were subject to a one-year vesting period.

Certain members of the Board of Directors have elected to defer receiving their annual stock awards and related quarterly dividends until they attain a certain age or cease to provide services as the Company's Board members. Annual deferred restricted stock units granted during fiscal year 2019 vested upon issuance. Annual deferred restricted stock units granted during fiscal years 2018 and 2017 are subject to a one-year vesting period.

Performance-Based Grants

Performance-based restricted stock units are earned based on the achievement of performance criteria established by the Human Resources and Compensation Committee and approved by the Board of Directors. The criteria for performance-based awards are weighted and have threshold, target and maximum performance goals.

Performance-based awards granted in fiscal year 2019, 2018 and 2017 allow participants to earn 100% of restricted stock units if the Company's performance meets its target goal for each applicable financial metric, and up to a maximum of 200% if the Company's performance for such metrics meets the maximum or stretch goal. Performance below the minimum threshold for each financial metric results in award forfeitures. Performance goals will be measured over a three-year period for each year's awards and at the end of the period to determine the number of units earned by recipients who continue to meet the service requirement. Around the third anniversary of each year's awards' grant date, the Company's Board of Directors determines the number of units earned for participants who continue to meet the service requirements on the vest date.

Employee Stock Purchase Plan

The Company maintains an employee stock purchase plan that allows its employees to purchase shares of common stock at a price equal to 85% of the fair market value of the Company's stock at the beginning or the end of the semi-annual period, whichever is lower. On February 8, 2017, the stockholders approved the 2017 Employee Stock Purchase Plan (the "2017 Plan") to replace the 1995 Employee Stock Purchase Plan (the "1995 Plan") which was terminated upon the expiration of the offering period ending on July 31, 2017. The 2017 Plan allows for purchases by employees of up to 1,250,000 shares of the Company's common stock. As of September 30, 2019, 992,284 shares of common stock remain available for purchase under the 2017 Plan. During fiscal year ended September 30, 2019, the Company issued 131,042 shares under the 2017 Plan. During fiscal years 2018, the Company issued 126,674 shares under the 2017 Plan.

17. Restructuring and Other Charges

Fiscal Year 2019 Activities

During fiscal year 2019, the Company incurred restructuring charges of $1.9 million primarily related to the elimination of redundancies and cost elimination within our Brooks Life Sciences segment.

During fiscal year 2019, the Brooks Life Sciences segment incurred restructuring charges of $0.7 million related to the continued action to eliminated redundancies.

During fiscal year 2019, the Brooks Semiconductor Solutions Group segment incurred restructuring charges of $0.6 million related to the continued action to eliminated redundancies.

During the fourth quarter of fiscal year 2019, the Company initiated the first phase of an action to eliminate costs within our Brooks Life Science segment's sample management business. During the fourth quarter of fiscal year 2019, the Brooks Life Science segment incurred costs of $0.6 million related to severance.

Fiscal Year 2018 Activities

During fiscal year 2018, the Company incurred restructuring charges of $0.7 million, primarily related to the planned closure of its Denmark facility and reduction in force at Tec-Sem discussed below.

During the fourth quarter of fiscal year 2018, the Company initiated an action to consolidate the operations at its Denmark facility into its operations at its Manchester, UK facility to eliminate cost redundancies. The $0.3 million charge resulted from the Denmark action was related to Brooks Life Sciences segment.

During the fourth quarter of fiscal year 2018, the Company also initiated a post-acquisition reduction in force plan at Tec-Sem to maximize synergies with the Company's existing infrastructure. The $0.3 million charge resulted from the Tec-Sem action was related to the Brooks Semiconductor Solutions Group segment.

Fiscal Year 2017 Activities

During fiscal year 2017, the Company recorded restructuring charges of $3.1 million related to severance, including $2.5 million attributable to the Brooks Semiconductor Solutions Group segment, $0.4 million attributable to the Brooks Life Sciences segment and $0.3 million attributable to the company-wide restructuring action.

The restructuring charges in the Brooks Semiconductor Solutions Group segment consisted of $1.5 million of charges related to the actions initiated during fiscal year 2017 to streamline field service operations and optimize the cost structure and improve productivity, and $1.0 million of charges related to the actions initiated prior to fiscal year 2017 primarily related to consolidate the Jena, Germany repair facility into the Chelmsford, Massachusetts repair operation.

Restructuring charges of $0.3 million were related to the company-wide restructuring action initiated in fiscal year 2016 to streamline business operations, improve competitiveness and overall profitability.

The following is a summary of activity related to the Company's restructuring and other charges, excluding amounts related to the discontinued operations, for the fiscal years ended September 30, 2019, 2018 and 2017 (in thousands):

	Activity - Year Ended September 30, 2019			
	Balance September 30, 2018	Expenses	Payments	Balance September 30, 2019
Total restructuring liabilities related to workforce termination benefits	$ 659	$ 1,894	$ (1,513)	$ 1,040

	Activity - Year Ended September 30, 2018			
	Balance September 30, 2017	Expenses	Payments	Balance September 30, 2018
Total restructuring liabilities related to workforce termination benefits	$ 1,708	$ 714	$ (1,763)	$ 659

	Activity - Year Ended September 30, 2017			
	Balance September 30, 2016	Expenses	Payments	Balance September 30, 2017
Total restructuring liabilities related to workforce termination benefits	$ 5,939	$ 3,144	$ (7,375)	$ 1,708

Accrued restructuring costs of $1.0 million as of September 30, 2019 are expected to be paid during fiscal year 2020.

18. Earnings per Share

The calculations of basic and diluted net income (loss) per share and basic and diluted weighted average shares outstanding are as follows for the fiscal years ended September 30, 2019, 2018 and 2017 (in thousands, except per share data):

	Year Ended September 30,		
	2019	2018	2017
Income from continuing operations	$ 9,554	$ 67,717	$ 10,687
Income from discontinued operations, net of tax	427,862	48,747	51,925
Net income	437,416	116,464	62,612
Net loss attributable to noncontrolling interest	—	111	—
Net income attributable to Brooks Automation, Inc.	$ 437,416	$ 116,575	$ 62,612
Weighted average common shares outstanding used in computing basic earnings per share	71,992	70,489	69,575
Dilutive restricted stock units	394	448	910
Weighted average common shares outstanding used in computing diluted earnings per share	72,386	70,937	70,485
Basic net income per share attributable to Brooks Automation, Inc. common stockholders:			
Income from continuing operations	$ 0.13	$ 0.96	$ 0.15
Income from discontinued operations, net of tax	5.95	0.69	0.75
Basic net income per share attributable to Brooks Automation, Inc.	$ 6.08	$ 1.65	$ 0.90
Diluted net income per share attributable to Brooks Automation, Inc. common stockholders:			
Income from continuing operations	$ 0.13	$ 0.95	$ 0.15
Income from discontinued operations, net of tax	5.91	0.69	0.74
Diluted net income per share attributable to Brooks Automation, Inc. common stockholders	$ 6.04	$ 1.64	$ 0.89
Dividend declared per share	$ 0.40	$ 0.40	$ 0.40

Restricted stock units of 9,439, 9,927 and 9,500, respectively, during fiscal year 2019, 2018 and 2017 were excluded from the computation of diluted earnings per share as their effect would be anti-dilutive based on the treasury stock method.

19. Revenue from Contracts with Customers

Disaggregated Revenue

The Company disaggregates revenue from contracts with customers in a manner that depicts how the nature, amount, timing, and uncertainty of revenue and cash flows are affected by economic factors. The Company disaggregates revenue based on the transfer of control of the underlying performance obligations, the geographic location in which customer orders are placed and by reporting unit.

The Company transfers control of its performance obligations at a point in time or over time, depending on the nature of the product or service being provided. Revenue from contracts with customers is attributed to geographic areas based on locations in which the customer orders are placed. The Company reports financial results for two reportable segments which consist of Brooks Semiconductor Solutions Group segment and Brooks Life Sciences segment. The Company also consists of five reporting units, including three reporting units within the Brooks Semiconductor Solutions Group reportable segment and two reporting units within the Brooks Life Sciences reportable segment. The following is a

reconciliation of revenue disaggregated in a manner discussed above to segment revenue for the fiscal year ended September 30, 2019 (in thousands):

	Brooks Semiconductor Solutions Group	Brooks Life Sciences	Total
Fiscal Year Ended September 30, 2019			
Point in time	$ 442,876	$ 97,240	$ 540,116
Over time	3,793	236,939	240,732
	$ 446,669	$ 334,179	$ 780,848

The following is revenue by geographic location and reporting unit for the fiscal year ended September 30, 2019 (in thousands):

	Year Ended September 30, 2019
Geographic Location	
North America	$ 327,250
Asia/Pacific/Other	312,237
United Kingdom	48,764
Rest of Europe	92,597
	$ 780,848
Reporting Unit	
Automation Solutions	$ 286,188
Contamination Control Solutions	118,318
Global Semiconductor Services	42,163
Brooks Semiconductor Solutions Group	446,669
Sample Management	207,916
GENEWIZ	126,263
Brooks Life Sciences	334,179
Total	$ 780,848

Contract Balances

Accounts Receivable, Net. Accounts receivable represent rights to consideration in exchange for products or services that have been transferred by the Company, when payment is unconditional and only the passage of time is required before payment is due. Accounts receivable do not bear interest and are recorded at the invoiced amount. The Company maintains an allowance for doubtful accounts representing its best estimate of probable credit losses related to its existing accounts receivable and their net realizable value. The Company determines the allowance for doubtful accounts based on a number of factors, including an evaluation of customer credit worthiness, the age of the outstanding receivables, economic trends and historical experience. Accounts receivable, net were $165.6 million and $125.2 million at September 30, 2019 and October 1, 2018, respectively.

Contract Assets. Contract assets represent rights to consideration in exchange for products or services that have been transferred by the Company, when payment is conditional on something other than the passage of time. These amounts typically relate to contracts within the Brooks Life Sciences segment where the right to payment is not present until completion of the contract or the achievement of specified milestones and the value of the products or services transferred exceed this constraint. Contract assets are classified as current. Contract asset balances which are included within “Prepaid expenses and other current assets” on the Company’s Consolidated Balance Sheet, were $14.0 million and $12.8 million at September 30, 2019 and October 1, 2018, respectively.

Deferred Commissions. Deferred commissions represent a direct and incremental cost of obtaining a contract. These amounts primarily relate to sales commissions within the Brooks Life Sciences segment and are deferred and amortized over a 60 month period, which represents the average period of contract performance. The Company classifies deferred

commissions as noncurrent as the original amortization period of this asset is greater than one year. Deferred commissions balances are included within “Other assets” on the Company’s Consolidated Balance Sheet. Deferred commissions were $0.8 million and $1.5 million at September 30, 2019 and October 1, 2018, respectively. The Company recorded $0.7 million of amortization expense related to deferred commissions for the year ended September 30, 2019.

Contract Liabilities. Contract liabilities represent the Company’s obligation to transfer products or services to a customer for which consideration has been received, or for which an amount of consideration is due from the customer. Contract assets and liabilities are reported on a net basis at the contract level, depending on the contracts position at the end of each reporting period. Contract liabilities are included within “Deferred revenue” on the Company’s Consolidated Balance Sheet. Contract liabilities were $29.4 million and $28.7 million at September 30, 2019 and October 1, 2018, respectively. Revenue recognized from the contract liability balance at October 1, 2018 was $23.6 million for the year ended September 30, 2019.

Remaining Performance Obligations. Remaining performance obligations represent the transaction price of unsatisfied or partially satisfied performance obligations within contracts with an original expected contract term that is greater than one year and for which fulfillment of the contract has started as of the end of the reporting period. The aggregate amount of transaction consideration allocated to remaining performance obligations as of September 30, 2019 was $28.4 million. The following table summarizes when the Company expects to recognize the remaining performance obligations as revenue, the Company will recognize revenue associated with these performance obligations as transfer of control occurs (in thousands):

	As of September 30, 2019		
	Less than 1 Year	Greater than 1 Year	Total
Remaining Performance Obligations	$ 22,461	$ 5,954	$ 28,415

Cost to Obtain and Fulfill a Contract

The Company capitalizes sales commissions when incurred if they are (i) incremental costs of obtaining a contract, (ii) expected to be recovered and (iii) have an expected amortization period that is greater than one year. As part of the Company’s cumulative effect adjustment, incremental costs associated with obtaining a contract were capitalized and have been classified as deferred commissions within the Company’s Consolidated Balance Sheet. These amounts primarily relate to sales commissions within the Brooks Life Sciences segment and are being amortized over a 60-month period, which represents the average period of contract performance. The Company did not capitalize any sales commissions during the fiscal year ended September 30, 2019 as the amount of sales commissions that qualified for capitalization during the reporting period was insignificant. Sales commissions incurred during the reporting period have been expensed as incurred. These costs are recorded within “Selling, general, and administration expenses”. The Company has concluded that none of its costs incurred in fulfillment of customer contracts meet the capitalization criteria. The Company will account for shipping and handling activities as fulfillment activities and recognize the associated expense when transfer of control of the product has transferred to the customer.

20. Significant Customers

No customers accounted for more than 10% of the Company’s consolidated revenue during the fiscal years ended September 30, 2019, 2018 and 2017. No customers accounted for more than 10% of the Company’s total receivables during the fiscal year ended September 30, 2019 and 2018.

21. Segment and Geographic Information

Operating segments are defined as components of an enterprise that engage in business activities for which discrete financial information is available and regularly reviewed by the chief operating decision maker in deciding how to allocate resources and to assess performance. The Company’s Chief Executive Officer is the Company’s chief operating decision maker.

The Company operates in two reportable segments: Brooks Semiconductor Solutions Group segment and Brooks Life Sciences segment. Brooks Life Sciences consists of two operating segments aggregated into one reportable segment.

The Brooks Semiconductor Solutions Group segment provides a variety of products, services and solutions that enable improved throughput and yield in controlled operating environments, as well as an extensive range of support services. The solutions include atmospheric and vacuum robots, robotic modules, tool automation systems, and contamination control of wafer carrier front opening unified pods. The support services include repair services, diagnostic support services, and installation services in support of the products, which enable customers to maximize process tool uptime and productivity. This segment also provides end-user customers with spare parts and productivity enhancement upgrades to maximize tool productivity.

The Brooks Life Sciences segment provides comprehensive life cycle sample management solutions for life science and bioscience customers including complete end-to-end “cold chain of custody” solutions and sample-based laboratory services such as genomic sequencing and gene synthesis to advance scientific research and support drug development. The segment’s product offerings include automated cold sample management systems for compound and biological sample storage, equipment for sample preparation and handling, consumables, and informatics that help customers manage samples throughout their research discovery and development work flows. The segment’s service offerings include sample storage, genomic sequencing, gene synthesis, laboratory processing services, laboratory analysis, and other support services provided to a wide range of life science customers, including pharmaceutical companies, biotechnology companies, biorepositories and research institutes.

The Company considers adjusted operating income, which excludes charges related to amortization of completed technology, the acquisition accounting impact on inventory contracts acquired and restructuring related charges as the primary performance metric when evaluating the business.

In conjunction with the acquisition of GENEWIZ during the quarter ended December 31, 2018, the Company reassessed its segment reporting structure and determined that GENEWIZ represents a separate operating segment based on ASC 280, Segment Reporting (“ASC 280”). As permitted by ASC 280, the Company elected to aggregate the Sample Management operating segment and the GENEWIZ operating segment as a single reportable segment titled Brooks Life Sciences. The aggregation was based on similarities in long-term forecasted economic characteristics, particularly adjusted operating income, similarity in services they offer, the customers they serve, the nature of their service delivery models, and their regulatory environments. The Company believes that the aggregated presentation is more useful to investors and other financial users. Management formally assesses the long-term financial outlook of its operating segments on an annual basis as part of its strategic planning process and more frequently on an informal basis. The customer bases of the operating segments overlap, serving life science and bioscience customers in the pharmaceutical and bio-technology companies as well as academic and government institutions. Both of these operating segments provide services relating to the biological samples needed to advance non-clinical and clinical research, serving scientific and business operations functions. In a typical customer workflow, a biological sample is collected, processed and analyzed with results interpreted and used to make scientific judgements. Critical or valuable samples are then annotated and stored for many years in environments where they can be easily retrieved for additional study. These operating segments provide services across this workflow. Both of these operating segments offer services meeting the standards of Good Manufacturing Practices set forth by the U.S. Food and Drug Administration.

The following is the summary of the financial information for the Company's reportable segments for the fiscal years ended September 30, 2019, 2018 and 2017 (in thousands):

	Year Ended September 30, 2019		
	2019	2018	2017
Revenue:			
Brooks Semiconductor Solutions Group	$ 446,669	$ 435,018	$ 378,790
Brooks Life Sciences	334,179	196,542	148,709
Total revenue	$ 780,848	$ 631,560	$ 527,499
Operating income:			
Brooks Semiconductor Solutions Group	$ 69,961	$ 62,511	$ 42,741
Brooks Life Sciences	20,631	3,795	3,217
Reportable segment adjusted operating income	90,592	66,306	45,958
Amortization of completed technology	10,424	4,877	3,915
Acquisition accounting impact on inventory contracts acquired	184	1,896	523
Restructuring related charges	285	—	—
Amortization of acquired intangible assets	24,737	19,339	13,228
Restructuring charges	1,894	714	3,144
Other unallocated corporate expenses	7,030	8,071	10,829
Total operating income	46,038	31,409	14,319
Interest income	1,449	1,881	464
Interest expense	(22,250)	(9,520)	(408)
Gain on settlement of equity method investment	—	—	1,847
Loss on extinguishment of debt	(14,339)	—	—
Other expenses, net	(1,455)	(3,304)	(1,702)
Income before income taxes	$ 9,443	$ 20,466	$ 14,520

Assets:	Brooks Semiconductor Solutions Group	Brooks Life Sciences	Total
September 30, 2019	$ 259,641	$ 909,154	$ 1,168,795
September 30, 2018	264,452	410,581	675,033

The following is a reconciliation of the Company's reportable segments' segment assets to the amounts presented in the accompanying Consolidated Balance Sheets as of September 30, 2019 and 2018 (in thousands):

	September 30, 2019	September 30, 2018
Segment assets	$ 1,168,795	$ 675,033
Cash, cash equivalents, restricted cash, and marketable securities	342,140	251,226
Deferred tax assets	5,064	43,798
Assets held for sale	—	125,200
Total assets	$ 1,515,999	$ 1,095,257

Revenue from external customers is attributed to geographic areas based on locations in which customer orders are placed. Net revenue by geographic area for the fiscal years ended September 30, 2019, 2018 and 2017 are as follows (in thousands):

	Year Ended September 30,		
	2019	2018	2017
North America	$ 327,250	$ 233,243	$ 174,432
Asia / Pacific/ Other	312,237	262,706	255,825
Europe:			
United Kingdom	48,764	51,690	37,283
Rest of Europe	92,597	83,921	59,959
	$ 780,848	$ 631,560	$ 527,499

The majority of the Company's net revenue in North America is generated in the United States which amounted to $325.3 million, $232.7 million and $172.9 million, respectively, during fiscal years ended September 30, 2019, 2018 and 2017.

The geographic location of an OEM is not indicative of where the products will eventually be used. The geographic area for the orders is determined by the onward sale of an OEM system which incorporates the sub-systems and/or components.

Property, plant and equipment by geographic area as of September 30, 2019 and 2018 are as follows (in thousands):

	September 30,	
	2019	2018
North America	$ 72,401	$ 50,614
Asia / Pacific/ Other	15,628	492
Europe:		
United Kingdom	5,019	5,494
Rest of Europe	7,621	3,388
	$ 100,669	$ 59,988

Property, plant and equipment located in the United States amounted to $72.3 million and $50.5 million, respectively, at September 30, 2019 and 2018.

22. Fair Value Measurements

The fair value measurement guidance establishes a fair value hierarchy which requires an entity to maximize the use of observable inputs and minimize the use of unobservable inputs when measuring fair value. The following levels of inputs may be used to measure fair value:

Level 1 Inputs: Quoted prices in active markets for identical assets or liabilities as of the reporting date. Active markets are those in which transactions for the asset and liability occur in sufficient frequency and volume to provide pricing information on an ongoing basis.

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

Level 3 Inputs: Unobservable inputs that are significant to the fair value of the assets or liabilities and reflect an entity's own assumptions in pricing assets or liabilities since they are supported by little or no market activity.

The Company measures certain assets, including the cost and equity method investments, at fair value on a nonrecurring basis when they are deemed to be other-than-temporarily impaired. The fair values of these investments are determined based on valuation techniques using the best information available, and may include quoted market prices,

market comparables, and discounted cash flow projections. An impairment charge is recorded when the cost of the investment exceeds its fair value and this condition is determined to be other-than-temporary.

Financial Assets and Liabilities Measured at Fair Value on a Recurring Basis

The following tables summarize assets and liabilities measured and recorded at fair value on a recurring basis in the accompanying Consolidated Balance Sheets as of September 30, 2019 and 2018 (in thousands):

		Fair Value Measurements at Reporting Date Using		
Description	**September 30, 2019**	**Quoted Prices in Active Markets for Identical Assets (Level 1)**	**Significant Other Observable Inputs (Level 2)**	**Significant Unobservable Inputs (Level 3)**
Assets:				
Cash equivalents	$ 16,164	$ 6,188	$ 9,976	$ —
Available-for-sale securities	36,969	—	36,969	—
Foreign exchange contracts	17	—	17	—
Total Assets	$ 53,150	$ 6,188	$ 46,962	$ —
Liabilities:				
Foreign exchange contracts	$ 340	$ —	$ 340	$ —
Total Liabilities	$ 340	$ —	$ 340	$ —

		Fair Value Measurements at Reporting Date Using		
Description	**September 30, 2018**	**Quoted Prices in Active Markets for Identical Assets (Level 1)**	**Significant Other Observable Inputs (Level 2)**	**Significant Unobservable Inputs (Level 3)**
Assets:				
Cash equivalents	$ 50,572	$ 50,572	$ —	$ —
Available-for-sale securities	53,518	—	53,518	—
Foreign exchange contracts	170	—	170	—
Total Assets	$ 104,260	$ 50,572	$ 53,688	$ —
Liabilities:				
Foreign exchange contracts	$ 177	$ —	$ 177	$ —
Total Liabilities	$ 177	$ —	$ 177	$ —

Cash Equivalents

Cash equivalents of $6.2 million and $50.6 million, respectively, at September 30, 2019 and 2018 consist of money market funds and are classified within Level 1 of the fair value hierarchy because they are valued using quoted market prices in active markets. Cash equivalents of $10.0 million as of September 30, 2019 consist primarily of treasury bills and agency bonds and are classified within Level 2 of the fair value hierarchy because they are not actively traded.

Available-For-Sale Securities

Available-for-sale securities of $37.0 million and $53.5 million, respectively, at September 30, 2019 and 2018 consist of U.S. Treasury Securities, Municipal Securities, Bank Certificate of Deposits, U.S Corporate Securities and Other Debt Securities. The securities are valued using matrix pricing and benchmarking and classified within Level 2 of the fair value hierarchy because they are not actively traded. Matrix pricing is a mathematical technique used to value securities by relying on the securities' relationship to other benchmark quoted prices.

Foreign Exchange Contracts

Foreign exchange contract assets and liabilities amounted to less than $0.1 million and $0.3 million, respectively, at September 30, 2019. Foreign exchange contract assets and liabilities amounted to $0.2 million each at September 30, 2018.

Foreign exchange contract assets and liabilities are measured and reported at fair value based on observable market inputs and classified within Level 2 of the fair value hierarchy due to a lack of an active market for these contracts.

Term Loan

As of September 30, 2019, estimated fair value of the term loan outstanding principal balance approximates its carrying value. The fair value was determined based on observable market inputs and classified within Level 2 of the fair value hierarchy due to a lack of an active market for this term loan or a similar loan instrument.

Financial Assets and Liabilities Measured at Fair Value on a Nonrecurring Basis

During fiscal year 2019 and 2018, the Company did not record any material other-than-temporary impairments on financial assets required to be measured at fair value on a nonrecurring basis.

23. Commitments and Contingencies

Operating Leases Commitments

The Company leases manufacturing and office facilities and certain equipment under non-cancelable operating leases with lease expiration dates through 2029. Rent expense under the operating leases, excluding costs recorded as a component of restructuring charges, was $9.6 million, $5.3 million and $4.0 million, respectively, for the fiscal years ended September 30, 2019, 2018 and 2017.

Future minimum lease commitments on non-cancelable operating leases payments as of September 30, 2019 are as follows (in thousands):

Year Ended September 30,	Net Payments
2020	$ 8,898
2021	5,845
2022	3,845
2023	3,166
2024	2,520
Thereafter	4,249
	$ 28,523

Letters of Credit

At September 30, 2019, the Company had $1.3 million of letters of credit outstanding related primarily to customer advances and other performance obligations. These arrangements guarantee the refund of advance payments received from the Company's customers in the event that the product is not delivered or warranty obligations are not fulfilled in accordance with the contract terms. These obligations could be called by the beneficiaries at any time before the expiration date of the particular letter of credit if the Company fails to meet certain contractual requirements. None of these obligations were called during fiscal years ended September 30, 2019, and the Company currently does not anticipate any of these obligations to be called in the near future.

Purchase Commitments

At September 30, 2019, the Company has non-cancelable commitments of $126.5 million, including purchase orders for inventory of $76.9 million, IT-related commitments of $26.6 million, China facility commitments of $19.7 million and other commitments of $3.3 million.

Contingencies

The Company is subject to various legal proceedings, both asserted and unasserted, that arise in the ordinary course of business. The Company cannot predict the ultimate outcome of such legal proceedings or in certain instances provide reasonable ranges of potential losses. However, as of the date of this report, the Company believes that none of these claims will have a material adverse effect on its consolidated financial position or results of operations. In the event of unexpected subsequent developments and given the inherent unpredictability of these legal proceedings, there can be no assurance that the Company's assessment of any claim will reflect the ultimate outcome, and an adverse outcome in certain matters could, from time to time, have a material adverse effect on the Company's consolidated financial position or results of operations in particular quarterly or annual periods.

24. Subsequent Events

Dividend

On November 1, 2019, the Company's Board of Directors declared a cash dividend of $0.10 per share payable on December 20, 2019 to common stockholders of record as of December 6, 2019. Dividends are declared at the discretion of the Company's Board of Directors and depend on the Company's actual cash flow from operations, its financial condition and capital requirements, as well as any other factors the Company's Board of Directors may consider relevant. Future dividend declarations, as well as the record and payment dates for such dividends, will be determined by the Company's Board of Directors on a quarterly basis.

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

Not applicable.

Item 9A. ***Controls and Procedures***

Evaluation of Disclosure Controls and Procedures

Under the supervision and with the participation of our management, including our chief executive officer and chief financial officer, we conducted an evaluation of our disclosure controls and procedures, as such term is defined under Rule 13a 15(e) promulgated under the Exchange Act. Disclosure controls and procedures are designed to ensure that information required to be disclosed by us in the reports we file or submit under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms and that such information is accumulated and communicated to management, including the chief executive officer and chief financial officer, as appropriate, to allow timely decisions regarding required disclosure. Based upon this evaluation, our chief executive officer and our chief financial officer concluded that because of the material weaknesses identified in our internal control over financial reporting discussed below, our disclosure controls and procedures were not effective as of September 30, 2019, the end of the period covered by this annual report.

Management's Report on Internal Control Over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting. Internal control over financial reporting is defined in Rules 13a 15(f) and 15d 15(f) under the Exchange Act, as a process designed by, or under the supervision of our chief executive and chief financial officers and effected by our board of directors, management and other personnel to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with GAAP and includes those policies and procedures that:

- pertain to the maintenance of records that in reasonable detail accurately and fairly reflect the transactions and disposition of our assets;
- provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with GAAP, and that our receipts and expenditures are being made only in accordance with authorization of our management and directors; and
- provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of our assets that could have a material effect on the financial statements.

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

Under the supervision and with the participation of our management, including our chief executive officer and chief financial officer, we conducted an assessment of the effectiveness of our internal control over financial reporting as of September 30, 2019. In making this assessment, we used the criteria set forth in Internal Control - Integrated Framework (2013) issued by the Committee of Sponsoring Organizations (COSO) of the Treadway Commission. Based on our assessment, our management concluded that, as of September 30, 2019, our internal control over financial reporting was not effective because of the material weaknesses discussed below. A material weakness is a deficiency, or a combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of our annual or interim financial statements will not be prevented or detected on a timely basis.

We did not maintain effective controls related to the accuracy of revenue recorded at a business unit within our Brooks Life Sciences segment. Specifically, we did not maintain effective controls to verify the accuracy of the price and quantity data for customer transactions entered into the business unit's billing system, and to verify that the invoices generated from the billing system were based on the appropriate amounts. These control deficiencies resulted in immaterial adjustments to revenue and related accounts and disclosures in the interim and annual consolidated financial statements

for the years ended September 30, 2019, 2018, and 2017, which were corrected as an immaterial out of period adjustment in the fourth quarter of 2019. Additionally, these control deficiencies could have resulted in misstatements of the revenue and accounts receivable account balances at this individual business unit that would have resulted in a material misstatement to the annual or interim consolidated financial statements that would not be prevented or detected. Accordingly, our management has determined that these control deficiencies constitute a material weakness.

We also did not design and maintain effective controls related to the occurrence and cutoff of revenue on products shipped to customers from contract manufacturers for a business unit within our Brooks Semiconductor Solutions Group segment. Specifically, we did not design and maintain effective controls to verify that revenue from product shipments from contract manufacturers in this business unit were evaluated for proper revenue recognition at the point of transfer of control. Management determined that this control deficiency resulted in an audit adjustment related to the revenue, cost of sales and the corresponding balance sheet accounts of our consolidated financial statements for the fiscal year ended September 30, 2019. Additionally, this control deficiency could have resulted in misstatements of the aforementioned accounts and disclosures at this individual business unit that would have resulted in a material misstatement to the annual or interim consolidated financial statements that would not be prevented or detected. Accordingly, our management has determined that this control deficiency constitutes a material weakness.

We excluded GENEWIZ Group from our assessment of internal control over financial reporting as of September 30, 2019 because it was acquired by the Company in a purchase business combination during fiscal year 2019. The total assets and total revenues of GENEWIZ Group, represent 9% and 16%, respectively, of the related consolidated financial statement amounts as of and for the year ended September 30, 2019.

Our independent registered public accounting firm, PricewaterhouseCoopers LLP, has expressed an adverse opinion on the effectiveness of our internal control over financial reporting. PricewaterhouseCoopers LLP's report appears in Item 8, "Financial Statements and Supplementary Date" above.

Changes in Internal Control Over Financial Reporting

There were no changes in internal control over financial reporting during the fiscal fourth quarter ended September 30, 2019, that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Remediation Plan

We are committed and are taking steps necessary to remediate the control deficiencies that constituted the material weaknesses described above by implementing changes to our internal control over financial reporting. Management has been implementing and continues to implement measures to ensure that the control deficiencies contributing to the material weaknesses are remediated, such that these controls are implemented and operating effectively. The remediation actions in the Brooks Life Sciences segment are expected to include: (i) implementing a new billing system and enterprise resource planning system (ERP) which will reduce the complexity of this billing process, (ii) improving the oversight of the accuracy of invoice processing and (iii) improving process documentation and training related to the billing and oversight process. The remediation actions in the Brooks Semiconductor Solutions Group are expected to include (i) enhanced documentation of inventory cut-off procedures related to contract manufacturing sites (ii) additional employee training and (iii) additional cut-off review procedures for transactions occurring near the end of a reporting period.

Item 9B. ***Other Information***

None.

PART III

Item 10. *Directors, Executive Officers and Corporate Governance*

The information required by this Item 10 is contained in our definitive proxy statement for our 2020 annual meeting of shareholders to be filed by us within 120 days after the close of our fiscal year, or the 2020 Proxy Statement, under the captions "Proposal No. 1-Election of Directors," "Other Matters-Standards of Conduct," "Other Matters-Stockholder Proposals and Recommendations for Director" and "Corporate Governance" and is incorporated herein by reference.

Item 11. *Executive Compensation*

The information required by this Item 11 is contained under the captions "Corporate Governance," "Director Compensation" and "Executive Officers" in the 2020 Proxy Statement to be filed by us within 120 days after the close of our fiscal year and is incorporated herein by reference.

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

The information required by this Item 12 is contained under the captions "Security Ownership of Certain Beneficial Owners" and "Equity Compensation Plan Information" in the 2020 Proxy Statement to be filed by us within 120 days after the close of our fiscal year and is incorporated herein by reference.

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

The information required by this Item 13 is contained under the captions "Related Party Transactions," "Corporate Governance" and "Compensation of Directors" in the 2020 Proxy Statement to be filed by us within 120 days after the close of our fiscal year and is incorporated herein by reference.

Item 14. *Principal Accountant Fees and Services*

The information required by this Item 14 is contained under the caption "Independent Auditor Fees and Other Matters" in the 2020 Proxy Statement to be filed by us within 120 days after the close of our fiscal year and is incorporated herein by reference.

PART IV

Item 15. *Exhibits and Financial Statement Schedules*

(a) Financial Statements and Financial Statement Schedules

- Consolidated Financial Statements of the Company and the related notes are included under Part II, Item 8, "Financial Statements and Supplementary Data" of this Form 10-K.
- Consolidated Financial Statements of ULVAC Cryogenics, Inc. as of June 30, 2019 and 2018 and for each of the periods ended June 30, 2019, 2018 and 2017 and the related notes are filed as Exhibit 99.2 hereto and incorporated herein by reference in this Form 10-K pursuant to Rule 3-09 of Regulation S-X.
- Other financial statement schedules are omitted because of the absence of conditions under which they are required or because the required information is given in the supplementary Consolidated Financial Statements or notes thereto.

(b) Exhibits

Exhibit No.	Description
2.01*	Sales and Purchase Agreement, dated October 5, 2017, by and among Brooks Automation Limited and the shareholders of 4titude Ltd. (incorporated herein by reference to Exhibit 10.27 of the Company's Annual Report on Form 10-K, filed on November 17, 2017).
2.02*	Agreement of Merger, dated as of September 26, 2018, by and among the Company, GENEWIZ Group, Darwin Acquisition Company, and Shareholder Representative Services L.L.C. (incorporated herein by reference to Exhibit 2.1 to the Company's Current Report on Form 8-K, filed on November 15, 2018).
2.03*	Asset Purchase Agreement, dated August 27, 2018, among the Company, Edwards Vacuum LLC, and for certain sections thereof, Atlas Copco AB (incorporated herein by reference to Exhibit 10.29 to the Company's Annual Report on Form 10-K, filed on November 29, 2018).
2.04	Amendment No. 1, dated as of February 12, 2019, to Asset Purchase Agreement dated as of August 27, 2018, among the Company, Edwards Vacuum LLC, and for certain sections, Atlas Copco AB (incorporated herein by reference to Exhibit 2.1 to the Company's Current Report on Form 8-K, filed on February 13, 2019).
2.05*	Amendment No. 2, dated June 28, 2019, to Asset Purchase Agreement dated as of August 27, 2018, among the Company, Edwards Vacuum LLC, and for certain sections, Atlas Copco AB (incorporated herein by reference to Exhibit 2.1 to the Company's Current Report on Form 8-K, filed on July 5, 2019).
3.01	Restated Certificate of Incorporation of the Company (incorporated herein by reference to Exhibit 3.01 to the Company's Registration Statement on Form S-3 (Reg. No. 333-189582), filed on June 25, 2013).
3.02	Amended and Restated Bylaws, (incorporated herein by reference to Exhibit 3.01 of the Company's Current Report on Form 8-K, filed on February 11, 2008).
3.03	Amendment to Amended and Restated Bylaws of the Company, dated August 1, 2017 (incorporated herein by reference to Exhibit 3.02 of the Company's Quarterly Report on Form 10-Q, filed on August 4, 2017).
4.01	Specimen Certificate for shares of the Company's common stock (incorporated herein by reference to the Company's Registration Statement on Form S-3 (Reg. No. 333-88320), filed on May 15, 2002).

4.02	Description of Securities.
10.01**	Form of Indemnification Agreement for directors and officers of the Company (incorporated herein by reference to Exhibit 10.02 of the Company's Annual Report on Form 10-K, filed on November 17, 2017).
10.02**	Employment Agreement, effective as of April 5, 2010, by and between the Company and Stephen S. Schwartz (incorporated herein by reference to Exhibit 10.01 to the Company's Quarterly Report on Form 10-Q for the fiscal quarter ended March 31, 2010, filed on May 6, 2010).
10.03**	Offer letter, dated September 5, 2013, between the Company and Lindon G. Robertson.
10.04**	Letter Agreement, dated June 4, 2015, between the Company and Lindon G. Robertson (incorporated herein by reference to Exhibit 10.4 to the Company's Current Report on Form 8-K, filed on June 9, 2015).
10.05**	Offer Letter. dated September 27, 2014, as revised, between the Company and Maurice Tenney, III (incorporated herein by reference to Exhibit 10.01 to the Company's Quarterly Report on Form 10-Q for the quarter ended December 31, 2015, filed on February 3, 2016).
10.06**	Amended Offer Letter, dated June 4, 2015, between the Company and Maurice Tenney, III (incorporated herein by reference to Exhibit 10.02 to the Company's Quarterly Report on Form 10-Q for the quarter ended December 31, 2015, filed on February 3, 2016).
10.07**	Separation Agreement, dated September 6, 2019, as amended, between the Company and Maurice H. Tenney, III.
10.08**	Offer Letter, dated June 12, 2014 between the Company and David C. Gray (incorporated herein by reference to Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q for the quarter ended December 31, 2014, filed on February 5, 2015).
10.09**	Letter Agreement, dated November 1, 2016, between the Company and David E. Jarzynka (incorporated herein by reference to Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q for the quarter ended June 30, 2017, filed on August 4, 2017).
10.10**	Offer Letter dated September 12, 2018, between the Company and Amy Liao
10.11**	Form of Non-Competition Agreement (incorporated herein by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K, filed on June 9, 2015).
10.12**	Form of Change in Control Agreement (incorporated herein by reference to Exhibit 10.2 to the Company's Current Report on Form 8-K, filed on June 9, 2015).
10.13**	Second Amended and Restated 2000 Equity Incentive Plan, restated as of May 7, 2013 (incorporated herein by reference to Exhibit 10.01 to the Company's Current Report on Form 8-K, filed on May 9, 2013).
10.14**	2017 Employee Stock Purchase Plan (incorporated herein by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K, filed on February 13, 2017).
10.15**	2015 Equity Incentive Plan (incorporated herein by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K, filed on February 5, 2015).

10.16**	Form of Restricted Stock Unit Award Notice under the 2000 Equity Incentive Plan (incorporated herein by reference to Exhibit 10.18 to the Company's Annual Report on Form 10-K, as filed on November 28, 2011).
10.17**	Form of Restricted Stock Unit Award Notice under the 2015 Equity Incentive Plan (incorporated herein by reference to Exhibit 10.17 of the Company's Annual Report on Form 10-K, filed on November 17, 2017).
10.18**	Executive Performance-Based Variable Compensation Plan (incorporated herein by reference to Exhibit 10.01 to the Company's Current Report on Form 8-K, filed on January 29, 2016).
10.19**	Non-Employee Directors Stock Grant/Restricted Stock Unit Election Form under the 2000 Equity Incentive Plan (incorporated herein by reference to Exhibit 10.42 to the Company's Annual Report on Form 10-K, filed on November 23, 2010).
10.20**	Non-Employee Director Restricted Stock Unit Deferral Election Form under the 2015 Equity Incentive Plan (incorporated herein by reference to Exhibit 10.20 of the Company's Annual Report on Form 10-K, filed on November 17, 2017).
10.21**	Brooks Automation, Inc. Amended and Restated Deferred Compensation Plan, as amended (incorporated herein by reference to Exhibit 10.21 of the Company's Annual Report on Form 10-K, filed on November 17, 2017).
10.22	Credit Agreement, dated as of May 26, 2016, by and among the Company, Brooks Life Sciences, Inc. (fka BioStorage Technologies, Inc.), Wells Fargo Bank, National Association and the Lenders parties thereto (incorporated herein by reference to Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q for the quarter ended June 30, 2016 filed on July 28, 2016).
10.23	Consent and First Amendment to Credit Agreement, dated October 4, 2017, by and among Wells Fargo Bank, National Association, as Administrative Agent, the Company and Brooks Life Sciences, Inc. (fka BioStorage Technologies Inc.) (incorporated herein by reference to Exhibit 10.24 of the Company's Annual Report on Form 10-K, filed on November 17, 2017).
10.24	Guaranty and Security Agreement, dated as of May 26, 2016, by and among Wells Fargo Bank, National Association and the Grantors and members of the Lender Group parties thereto (incorporated herein by reference to Exhibit 10.3 to the Company's Quarterly Report on Form 10-Q for the quarter ended June 30, 2016 filed on July 28, 2016).
10.25	Credit Agreement, dated October 4, 2017, by and among the Company, Morgan Stanley Senior Funding, Inc., and the lenders party thereto (incorporated herein by reference to Exhibit 10.25 of the Company's Annual Report on Form 10-K, filed on November 17, 2017).
10.26	Incremental Amendment, dated as of November 15, 2018, to that certain Credit Agreement dated as of October 4, 2017, among the Company, the several lenders party thereto from time to time and Morgan Stanley Senior Funding, Inc., as administrative agent for the Lenders (incorporated herein by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K, filed on November 15, 2018).
10.27	Amendment No. 2, dated as of February 15, 2019, to Credit Agreement dated as of October 4, 2017, among the Company, the several lenders party thereto from time to time and Morgan Stanley Senior Funding, Inc., as administrative agent for the Lenders (incorporated herein by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K, filed on February 22, 2019).

10.28	Guarantee and Security Agreement, dated October 4, 2017, by and among the Company, Brooks Life Sciences, Inc. (fka BioStorage Technologies, Inc.), Morgan Stanley Senior Funding, Inc., as Administrative Agent for the lenders (incorporated herein by reference to Exhibit 10.26 of the Company's Annual Report on Form 10-K, filed on November 17, 2017).
21.01	Subsidiaries of the Company.
23.01	Consent of PricewaterhouseCoopers LLP
23.02	Consent of PricewaterhouseCoopers Aarata LLC
31.01	Certification of the Company's Principal Executive Officer pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
31.02	Certification of the Company's Principal Financial Officer pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
32	Certification of the Company's Principal Executive Officer and Principal Financial Officer pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
99.1	Report of Independent Auditors of ULVAC Cryogenics, Inc.
99.2	Consolidated Financial Statements of ULVAC Cryogenics, Inc. as of June 30, 2019 and 2018 and for each of the periods ended June 30, 2019, 2018 and 2017.
101	The following material from the Company's Annual Report on Form 10-K, for the year ended September 30, 2019, formatted in iXBRL (Inline eXtensible Business Reporting Language): (i) the Consolidated Balance Sheets; (ii) the Consolidated Statements of Operations; (iii) the Consolidated Statements of Comprehensive Income; (iv) the Consolidated Statements of Cash Flows; (v) the Consolidated Statements of Changes in Equity; and (vi) the Notes to Consolidated Financial Statements. The instance document does not appear in the Interactive Data File because XBRL tags are embedded in the iXBRL document.
104	Cover Page Interactive Data File (formatted as iXBRL and contained in Exhibit 101).

* Certain schedules and exhibits have been omitted from this Exhibit pursuant to Item 601(a)(5) of Regulation S-K. Brooks Automation, Inc. will furnish a copy of any omitted schedule or exhibit to the U.S. Securities and Exchange Commission or its staff upon request

** Management contract, compensatory plan or agreement.

Item 16. ***Form 10-K Summary***

None.

SIGNATURES

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

BROOKS AUTOMATION, INC.

By: /S/ STEPHEN S. SCHWARTZ
Stephen S. Schwartz
President and Chief Executive Officer

Date: December 17, 2019

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

Signature	Title	Date
/S/ STEPHEN S. SCHWARTZ Stephen S. Schwartz	Director, President and Chief Executive Officer (Principal Executive Officer)	December 17, 2019
/S/ LINDON G. ROBERTSON Lindon G. Robertson	Executive Vice President and Chief Financial Officer (Principal Financial Officer)	December 17, 2019
/S/ DAVID PIETRANTONI David Pietrantoni	Vice President - Finance and Corporate Controller (Principal Accounting Officer)	December 17, 2019
/S/ A. CLINTON ALLEN A. Clinton Allen	Director	December 17, 2019
/S/ ROBYN C. DAVIS Robyn C. Davis	Director	December 17, 2019
/S/ JOSEPH R. MARTIN Joseph R. Martin	Director	December 17, 2019
/S/ KRISHNA G. PALEPU Krishna G. Palepu	Director	December 17, 2019
/S/ KIRK P. POND Kirk P. Pond	Director	December 17, 2019
/S/ MICHAEL ROSENBLATT Michael Rosenblatt	Director	December 17, 2019
/S/ ALFRED WOOLLACOTT III Alfred Woollacott III	Director	December 17, 2019
/S/ MARK S. WRIGHTON Mark S. Wrighton	Director	December 17, 2019
/S/ ELLEN M. ZANE Ellen M. Zane	Director	December 17, 2019