VEECO INSTRUMENTS INC
Form 10-K
February 21, 2018
Table of Contents

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 10-K

(Mark One)

x ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the fiscal year ended December 31, 2017

OR

o TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

Commission file number 0-16244

VEECO INSTRUMENTS INC.

(Exact Name of Registrant as Specified in Its Charter)

Delaware	**11-2989601**
(State or Other Jurisdiction of Incorporation or Organization)	(I.R.S. Employer Identification No.)
Terminal Drive **Plainview, New York**	**11803**
(Address of Principal Executive Offices)	(Zip Code)

Registrant s telephone number, including area code:

(516) 677-0200

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

(Title of each class)	**(Name of each exchange on which registered)**
Common Stock, par value $0.01 per share	**The NASDAQ Stock Market**

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

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

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

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

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes x No o

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

Indicate by check mark whether the Registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, 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 x	Accelerated filer o
Non-accelerated filer o (Do not check if a smaller reporting company)	Smaller reporting company o
	Emerging growth company o

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. o

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

The aggregate market value of the common stock held by non-affiliates of the registrant at June 30, 2017 (the last business day of the registrant s most recently completed second quarter) was $1,328,017,475 based on the closing price of $27.85 on the NASDAQ Stock Market on that date.

The number of shares of each of the registrant s classes of common stock outstanding on February 14, 2018 was 48,156,865 shares of common stock, par value $0.01 per share.

DOCUMENTS INCORPORATED BY REFERENCE

Certain portions of the definitive Proxy Statement to be used in connection with the Registrant s 2018 Annual Meeting of Stockholders are incorporated by reference into Part III of this Form 10-K.

Table of Contents

VEECO INSTRUMENTS INC.

INDEX

Table of Contents

This Annual Report on Form 10-K (Form 10-K) contains certain forward-looking information relating to Veeco Instruments Inc. (together with its consolidated subsidiaries, Veeco, the Company, Registrant, we, our, or us, unless the context indicates otherwise) that is based on the b of, and assumptions made by, our management as well as information currently available to management. When used in this Form 10-K, the words believes, anticipates, expects, estimates, targets, plans, intends, will, and similar expressions relating to the future are intende forward-looking information. Discussions containing such forward-looking statements may be found in Part I, Items 1 and 3, Part II, Items 7 and 7A hereof, as well as within this Form 10-K generally. This forward-looking information reflects our current views with respect to future events and is subject to certain risks, uncertainties, and assumptions, some of which are described under the caption Risk Factors in Part I, Item 1A, and elsewhere in this Form 10-K. Should one or more of these risks or uncertainties occur, or should our assumptions prove incorrect, actual results may vary materially from the forward-looking information described in this Form 10-K as believed, anticipated, expected, estimated, targeted, planned, or similarly identified. We do not undertake any obligation to update any forward-looking statements to reflect future events or circumstances after the date of such statements.

PART I

Item 1. Business

Recent Developments

On May 26, 2017, we completed the acquisition of Ultratech, Inc. (Ultratech). Ultratech develops, manufactures, sells, and supports lithography, laser annealing, and inspection equipment for manufacturers of semiconductor devices, including front-end semiconductor manufacturing and advanced packaging. Ultratech also develops, manufactures, sells, and supports atomic layer deposition (ALD) equipment for scientific and industrial applications. Ultratech s customers are primarily located throughout the United States, Europe, China, Japan, Taiwan, Singapore, and Korea. With the addition of Ultratech, we establish ourselves as a leading equipment supplier in the advanced packaging market, forming a strong technology portfolio to address critical advanced packaging applications, as well as greatly increasing our critical mass in the front-end semiconductor market. The results of Ultratech s operations have been included in the consolidated financial statements since the date of acquisition.

Business Description and Overview

Headquartered in Plainview, New York, we were organized as a Delaware corporation in 1989. We develop, manufacture, sell, and support semiconductor process equipment to meet the demands of key global trends such as enhancing mobility, increasing connectivity, and improving energy efficiency. Our primary technologies include metal organic chemical vapor deposition, advanced packaging lithography, wet etch and clean, laser annealing, ion beam, molecular beam epitaxy, wafer inspection, and atomic layer deposition systems. These technologies play an integral role in producing Light Emitting Diodes (LEDs) for solid-state lighting and displays, and in the fabrication and packaging of advanced semiconductor devices. We have sales and service operations across the Asia-Pacific region, Europe, and North America to address our customers needs.

We are focused on:

- Providing differentiated semiconductor process equipment to address customers current production requirements and next generation product development roadmaps;

- Investing to win through focused research and development in markets that we believe provide significant growth opportunities or are at an inflection point in semiconductor process equipment requirements, including LED, power electronics, photonics, front-end semiconductor, and advanced packaging technologies;

- Leveraging our sales channel and local process applications support teams to build strong strategic relationships with technology leaders;

Table of Contents

- Expanding our services portfolio to improve the performance of our systems, including spare parts, upgrades, and consumables to drive growth, reduce our customers cost of ownership, and improve customer satisfaction;

- Cross-selling our product portfolio across our broad customer base and end markets to both maximize sales opportunities and diversify our business;

- Utilizing a combination of outsourced and internal manufacturing strategies to flex manufacturing capacity through industry investment cycles without compromising quality or performance; and

- Pursuing partnerships and acquisitions to expand our product portfolio into new and adjacent markets to drive sales growth.

Our products are sold to semiconductor and advanced packaging device manufacturers in the following four markets: Advanced Packaging, MEMS & RF Filters; LED Lighting, Display & Compound Semiconductor; Front-End Semiconductor; and Scientific & Industrial.

Markets

Our systems are used in the creation of a broad range of microelectronic components, including LEDs, micro-electro mechanical systems (MEMS), radio frequency (RF) filters, power electronics, thin film magnetic heads (TFMHs), laser diodes, 3D NAND logic, and other semiconductor devices. In addition to the creation of microelectronic components, our systems are used in the advanced packaging of such components in applications such as flip chip, Fan out Wafer Level Packaging (FOWLP), and other wafer level packaging approaches. Our customers who manufacture these devices invest in our systems to develop next generation products and deliver more efficient, cost effective, and advanced technological solutions. We operate in a cyclical business environment, and our customers buying patterns are dependent upon industry trends. Our products are sold into multiple markets, and the following discussion focuses on the trends that most influence our business within each of those markets.

Advanced Packaging, MEMS & RF Filters

Advanced Packaging includes a portfolio of wafer-level assembly technologies that enable the miniaturization and performance improvement of electronic products, such as smartphones, smartwatches, and other mobile applications.

Demand for higher performance, increased functionality, smaller form factors, and lower power consumption in mobile devices, consumer electronics, and high performance computing is driving the adoption of advanced packaging technologies. Semiconductor Foundries (Foundries), Independent Device Manufacturers (IDMs) and Outsourced Semiconductor Assembly and Test (OSAT) companies are implementing multiple advanced packaging approaches including FOWLP, recently deployed in high-volume manufacturing, and Through Silicon Via (TSV) to enable stacked memory, 2.5D, and 3D packaging devices. This increasing demand trend in Advanced Packaging is encouraging as our Lithography and Precision Surface Processing (PSP) products enable the process steps for Advanced Packaging.

MEMS devices are used for an increasing number of applications, including accelerometers for automobile airbags, pressure sensors for medical uses, and gyroscopes for a variety of consumer products, such as gaming consoles and mobile devices.

One of the fastest growing MEMS applications has been RF filters for mobile devices, driven by increasingly complex wireless standards, the exponential growth of mobile data, and carrier aggregation. In order to address these growing demands, the number of discrete RF filters in an average smartphone is expected to double from 50 to 100 by 2020. These trends are positive for us, particularly for our PSP products, where our technology is enabling some of the most challenging process steps, as well as our Ion Beam Etch (IBE) and Molecular Beam Epitaxy (MBE) products, which are used to create Bulk Acoustic Wave (BAW) and Surface Acoustic Wave (SAW) RF filters.

LED Lighting, Display & Compound Semiconductor

LED Lighting technology has existed for more than 50 years; however, commercial adoption of LEDs was limited to niche applications until the most recent decade. In the early 1990 s, researchers developed a process utilizing Gallium Nitride (GaN) that created a low cost blue LED to produce white light. With that breakthrough, the LED industry started, and the number of applications for LEDs began to expand.

Since that time, the LED industry has experienced multiple growth cycles brought on by the adoption of LED technology for consumer and commercial applications. The first wave of LED growth was driven by mobile phones, which implemented the use of LED technology for display backlighting. The LED industry experienced its second period of rapid growth as LEDs were adopted for TV display backlighting. The adoption of LEDs for solid state, general lighting gave rise to a third wave of demand. There is a broader fourth wave of compound semiconductor growth including LEDs, driven by ROY LED applications, optical communication and industrial applications requiring laser diodes, 3D sensing vertical-cavity surface emitting lasers (VCSELs), micro-LED displays, 5G RF infrastructure adoption, and power electronics.

Our metal organic chemical vapor deposition (MOCVD) technology is at the core of the manufacturing process for GaN-based LEDs. We have benefited with each growth cycle, as LED producers invest in MOCVD process equipment to capture share in these markets. Demand for our equipment has historically been cyclical in nature, influenced by multiple factors, including: macroeconomic conditions; prices for LED chips; supply and demand dynamics; and our customers manufacturing plans. However, we expect the ongoing adoption of LED lighting to be a major driver in the need for additional MOCVD capacity over the next several years.

MOCVD technology is equally important in the manufacturing of red, orange, and yellow (ROY) LEDs, which are used increasingly for fine-pitch digital signage and automotive lighting applications. For these applications, our MOCVD technology is used to deposit highly uniform Arsenic Phosphide (AsP) films which create amber and red hues. AsP MOCVD technology is also used to produce multiple other devices in the photonics market such as infrared LEDs and VCSELs used for optical data communication and 3D sensing. In addition to film deposition, photonics manufacturers also employ cleaning and etching process steps. Our PSP wet etch and clean technologies provide such cleaning and processing capabilities to photonics customers.

The Display market refers to LEDs or micro LEDs used directly for displays. Additionally, organic light emitting diode (OLED) displays are part of the Display market and are used in applications such as digital signage, smartphones,

Table of Contents

wearable and tablet displays, and TVs. Our MOCVD systems and MBE source technology is ideally suited for the display market.

The Compound Semiconductor market refers to GaN-on-Silicon based power electronic devices and radio frequency devices. Our MOCVD and PSP technologies are crucial in the manufacturing of GaN-on-Silicon based power electronic devices. Global demand is increasing for advanced power electronics with greater energy efficiency, smaller footprints, higher operating temperatures, faster switching capabilities, and greater reliability. These devices support many needs, including more efficient IT servers, electrical motors, electric vehicles, wind turbines, and photovoltaic power inverters. While silicon-based transistors are widely used in power electronic devices today, GaN-on-Silicon based power electronics developed on MOCVD tools can potentially deliver higher performance (e.g., smaller power supply form factors, higher efficiency, and faster switching speeds). In addition to depositing the critical GaN layer with our MOCVD products, our PSP products address multiple etch and clean steps required to manufacture these advanced power electronics devices. In recent years, global industry leaders in power electronics have focused on research and development programs to commercialize this new technology. Device manufacturers will likely begin to transition from development to production of these devices over the next couple of years; we can benefit from this transition as our customers invest in process equipment to support this production ramp-up.

The Radio Frequency device portion of the Compound Semiconductor market is driven by demand for RF power amplifiers in mobile devices. Our PSP products are used for process steps such as metal lift off and photo resist strip for RF devices such as heterojunction bipolar transistors (HBTs) used in smartphones.

Front-End Semiconductor

Front-End Semiconductor refers to early process steps where transistors are formed directly on silicon. There are many different process steps in forming integrated circuits, such as Deposition, Etching, Masking, and Doping, where the microchips are created but still remain on the silicon wafer. Our Laser Spike Anneal products are well suited to assist our customers in the doping process. Our IBE for front-end semiconductor applications has been demonstrated in Spin Torque Transfer Magnetic Random Access Memory (STT-MRAM) applications. MRAM has many benefits over traditional random access memory such as its non-volatility, speed, endurance, and power consumption. Our Ion Beam Deposition (IBD) products are well suited for the manufacture of Extreme Ultraviolet (EUV) mask blanks. Our ability to precisely deposit high quality films with extremely low particulate levels make our IBD technology ideal for manufacturing defect-free EUV photomask blanks. The front-end semiconductor industry is expected to adopt EUV lithography to meet future device requirements. Future growth will depend on overall adoption of EUV technology. And lastly, our 3D inspection products are used for shape inspection of 3D topographies in memory and logic applications, which helps our customers improve their lithography and deposition processes.

Scientific & Industrial

The Scientific and Industrial markets include advanced materials research and a broad range of manufacturing applications including high-power fiber lasers, infrared detectors, thin film magnetic heads on HDDs, and optical coatings.

Our MBE systems are used by scientific research organizations and universities to drive new discoveries in the areas of materials science. MBE enables precise epitaxial crystal growth for a wide variety of materials, which supports the development of new performance materials used for emerging technologies. MBE technology is also used in the

Table of Contents

manufacturing of products such as high-power lasers and infrared sensors. Our tools create highly uniform Gallium-Arsenide (GaAs) or Indium-Phosphide (InP) film layers, which are critical to the performance of these devices. Our PSP products are also used in the manufacture of infrared sensors.

Our Ion Beam Deposition, Ion Beam Etch, Physical Vapor Deposition (PVD), and lapping and dicing tools are used in data storage applications, including HDDs that will continue to provide significant value for mass storage and will remain an important part of large capacity storage applications. This is especially true for data center applications where large volumes of data storage are required to serve an increasingly mobile population. In addition, our IBD tools are used to produce high quality optical films for multiple applications including laser mirrors, optical filters, and anti-reflective coatings. Our tools deposit thin layers of advanced materials on various substrates to alter how light is reflected and transmitted.

Our ALD tools are sold into a variety of Scientific & Industrial market applications such as optical, semi/nano-electronics, MEMS, nanostructures, and biomedical.

System products

Metal Organic Chemical Vapor Deposition Systems

We are the world s leading supplier of MOCVD systems. MOCVD production systems are used to make GaN-based devices (such as blue and green LEDs) and AsP-based devices (such as ROY LEDs), which are used in television and computer display backlighting, general illumination, large area signage, specialty illumination, power electronics, and many other applications. Our TurboDisc® EPIK® line of MOCVD systems enables cost per wafer savings for our customers with a combined advantage of best operating uptime, low maintenance costs, and best-in-class wafer uniformity and yield. In 2016, we introduced the TurboDisc K475i AsP MOCVD system, which offers best-in-class productivity and yields for ROY LEDs, infra-red LEDs, and high-efficiency triple junction photovoltaic solar cell applications. Our Propel PowerGaN MOCVD System (Propel) enables the development of highly-efficient GaN-based power electronic devices that have the potential to accelerate the industry s transition from research and development to high volume production. The Propel system offers 200mm technology and incorporates single-wafer reactor technology for outstanding film uniformity, yield, and device performance.

Advanced Packaging Lithography

We have a leading position in the Advanced Packaging lithography equipment market. The Advanced Packaging market is driven by the need for improved performance, reduced power consumption, and smaller geometries for mobile and automotive applications. In turn, these applications continue to demand increasingly complex packaging techniques from IDMs, Foundries, and OSATs. Our Advanced Packaging tools are designed to optimize productivity for leading-edge 200mm and 300mm Advanced Packaging applications by enabling extremely reliable, cost-effective, high-volume manufacturing solutions. Our best-in-class yield coupled with outstanding resolution and depth of focus

addresses all leading edge requirements for Advanced Packaging applications such as redistribution layers (RDLs), Copper Pillar, Micro-Bump, FOWLP, interposers, and TSVs to provide the lowest cost of ownership in the industry.

Precision Surface Processing Systems (Wet Etch and Clean)

Our PSP systems offer single wafer wet etch, clean, and surface preparation solutions which target high growth segments in advanced packaging, MEMS, LEDs, and compound semiconductor markets. The WaferStorm platform is based on PSP s unique ImmJET technology, which provides improved performance at a lower cost of ownership than conventional wet bench-only or spray-only approaches. This highly flexible platform targets solvent based cleaning applications that require a significant level of process control and flexibility. The WaferEtch® platform provides highly uniform, selective etching with onboard end point detection for improved process control and yield in bumping applications. In addition, PSP has developed a state-of-the-art solution with the WaferEtch platform to address the

Table of Contents

requirements of TSV reveal, in which the backside of a wafer is thinned to reveal the copper interconnects. PSP s TSV technology offers a significant cost of ownership reduction compared with dry etch processing by replacing up to four separate process steps.

Laser Annealing Systems

The progression of Moore s law has led semiconductor manufacturers to implement a variety of material and process changes to overcome the technical hurdles related to shrinking of feature sizes in integrated circuits. Along with new materials and smaller dimensions have come new process challenges. One such challenge has been new constraints on thermal annealing processes. One example is the thermal annealing of dopants for activation, in order to form the transistor junction, critical to the function and performance of a complementary metal-oxide semiconductor (CMOS) logic integrated circuit. In this and other thermal process steps, traditional lamp-based annealing techniques have challenges meeting the thermal budget (time/temperature regime) required by new materials and designs. Our Laser Spike Anneal (LSA) systems meet the industry demand for millisecond time-scale annealing, heating the wafer up to temperatures just below the Silicon melting point over a range of ultra-short timeframes (microseconds to milliseconds), enabling thermal annealing solutions at the 65nm technology node and below. This advanced annealing technology provides solutions to the difficult challenge of fabricating ultra-shallow junctions and highly activated source/drain contacts at these advanced logic nodes. In addition, our proprietary hardware design enables outstanding temperature uniformity across the wafer and die, by minimizing the pattern-density effect, thus reducing absorption variations.

We have also developed a next generation melt anneal technology targeted for annealing advanced logic devices at 7nm and below. As FinFET devices scale below the 10nm node, achieving the performance targets has become a challenge. To continue the roadmap, the industry is looking at new materials and the use of thermal processes that require nanosecond time-scale thermal annealing with temperatures exceeding the melting point. To help address this concern we have developed a unique (and patented) approach to nanosecond-scale thermal annealing. Our design utilizes two lasers; a millisecond laser as a low thermal budget localized preheat and a nanosecond laser on top of the millisecond laser to

Table of Contents

raise the peak temperature to the melt temperature of the material being processed beyond silicon melt. Similar to LSA, the melt system architecture is targeted to reduce pattern effects and increase the process window. It is believed that nanosecond annealing will be required to meet the device targets at 7nm and below; the initial application being explored by customers is contact annealing aimed to improve reduce source/drain contact resistance, which has become a performance bottleneck at the most advanced FinFET nodes, and as devices continue to scale, we see the application space for our melt product expanding.

Ion Beam Etch and Deposition Systems

Our NEXUS® IBD systems utilize ion beam technology to deposit precise layers of thin films. IBD systems deposit high purity thin film layers and provide excellent uniformity and repeatability. Our NEXUS IBE systems utilize a charged particle beam consisting of ions to etch precise, complex features. The NEXUS systems may be included on our cluster system platform to allow either parallel or sequential deposition/etch processes. These systems are used primarily by data storage, semiconductor, and telecommunications device manufacturers in the fabrication of discrete and integrated microelectronic devices.

Our SPECTOR® Ion Beam Sputtering system was developed for high precision coatings and offers manufacturers state of the art optical thickness monitoring, improved productivity, and target material utilization, for cutting-edge optical interference coating applications. We also provide a broad array of ion beam sources. These technologies are applicable in the HDD industry as well as for optical coatings and other end markets.

Molecular Beam Epitaxy Systems

Molecular beam epitaxy is the process of precisely depositing epitaxially-aligned atomically-thin crystalline layers, or epilayers, of elemental materials onto a substrate in an ultra-high vacuum environment. We are the leading supplier of MBE systems worldwide.

Our MBE systems, sources, and components are used to develop and manufacture compound semiconductor devices in a wide variety of applications such as high-power fiber lasers, infrared detectors, mobile phones, radar systems, high efficiency solar cells, and basic materials science research. For many compound semiconductors, MBE is the critical step of the fabrication process, ultimately determining device functionality and overall performance. We offer a full complement of MBE systems customized for the specific end application depositing on single 3 substrates up to fully automated production systems that can deposit on seven 6 substrates simultaneously. The GENxplor® MBE system creates high quality epitaxial layers and is ideal for cutting-edge research on a wide variety of materials including gallium arsenide, antimonides, nitrides, and oxides. The GENxcel® MBE system extends the same performance of the GENxplor to 4 diameter substrates.

3D Wafer Inspection Systems

As the semiconductor industry continues its pursuit of increased productivity and performance by shrinking device dimensions along Moore s law, manufacturers are running into bottlenecks limited by fundamental materials properties and lithographic resolution. The industry has opted for 3D integration schemes to circumvent these limitations (e.g. Vertical NAND, HAR DRAM, Logic FinFET). The high volume manufacturing ramp of these 3D schemes requires low cost, high performance 3D wafer inspection systems. The Superfast 3D Wafer Inspection System is a Coherent Gradient Sensing (CGS) based 3D wafer inspection system that enables the wafer fab to inspect the patterned wafer at key processing steps, enabling statistical process control as well as advanced process control (APC) for topography, displacement, and stress.

Atomic Layer Deposition and Other Deposition Systems

ALD is a thin-film deposition method in which a film is deposited on a substrate uniformly with precise control down to the atomic scale. Veeco offers a full suite of ALD systems for non-semiconductor front-end production applications across a wide range of markets and applications such as energy, optical, electronics, MEMS, nanostructures, and biomedical.

Other deposition systems including Physical Vapor Deposition, Diamond-Like Carbon Deposition, and Chemical Vapor Deposition Systems. In addition, our Optium® products generally are used in back-end applications in data storage fabrication facilities where TFMHs or sliders are fabricated. This equipment includes lapping tools, which enable precise material removal within three nanometers, which is necessary for advanced TFMHs. We also manufacture dicing tools that cut wafers into row bars and TFMHs.

Sales and Service

We sell our products and services worldwide primarily through various strategically located facilities in the United States, Europe, and the Asia-Pacific region. We believe that our customer service organization is a significant factor in our success. We provide service and support on a warranty, service contract, and an individual service-call basis. We believe that offering timely support creates stronger relationships with customers and provides us with a significant competitive advantage. Revenue from the sales of parts, upgrades, service, and support represented approximately 27%, 28%, and 22% of our net sales for the years ended December 31, 2017, 2016, and 2015, respectively. Parts and upgrade sales represented approximately 22%, 22%, and 18% of our net sales for those years, respectively, and service and support sales were 5%, 6%, and 4% respectively.

Table of Contents

Customers

We sell our products to many of the world s LED, MEMS, OSAT, HDD, and semiconductor manufacturers, as well as research centers and universities. We rely on certain principal customers for a significant portion of our sales. Sales to OSRAM Opto Semiconductors accounted for more than 10% of our total net sales for both 2017 and 2016; sales to San an Optoelectronics Co. and KAISTAR Lighting (Xiamen) Co. each accounted for more than 10% of our total net sales in 2015. If any principal customer discontinues its relationship with us or suffers economic difficulties, our business prospects, financial condition, and operating results could be materially and adversely affected.

Research and Development

Our research and development functions are focused on the timely creation of new products and enhancements to existing products, both of which are necessary to maintain our competitive position. We collaborate with our customers to align our technology and product roadmaps to customer requirements. Our research and development activities take place at our facilities in San Jose, California; Waltham, Massachusetts; St. Paul, Minnesota; Somerset, New Jersey; Plainview, New York; Horsham, Pennsylvania; and Singapore.

Our research and development expenses were approximately $82.0 million, $81.0 million, and $78.5 million, or approximately 17%, 24%, and 16% of net sales for the years ended December 31, 2017, 2016, and 2015, respectively. These expenses consisted primarily of salaries, project materials, and other product development and enhancement costs.

Suppliers

We outsource certain functions to third parties, including the manufacturing of some of our MOCVD and Ultratech systems. While we primarily rely on one supplier for the manufacturing of these systems, we maintain a minimum level of internal manufacturing capability for these systems. Refer to Item 1A, Risk Factors, for a description of risks associated with our reliance on suppliers and outsourcing partners.

Backlog

Our backlog consists of orders for which we received a firm purchase order, a customer-confirmed shipment date within twelve months, and a deposit when required. Our backlog increased to $334.3 million at December 31, 2017 from $209.2 million at December 31, 2016. During the year ended December 31, 2017, we increased backlog by approximately $41.6 million relating to backlog acquired from Ultratech, while adjusting for a decrease in backlog of approximately $2.0 million relating to orders that no longer met our booking criteria.

Competition

In each of the markets that we serve, we face substantial competition from established competitors, some of which have greater financial, engineering, and marketing resources than we do, as well as from smaller competitors. In addition, many of our products face competition from alternative technologies, some of which are more established than those used in our products. Significant factors for customer selection of our tools include system performance, accuracy, repeatability, ease of use, reliability, cost of ownership, and technical service and support. None of our competitors compete with us across all of our product lines.

Our principal competitors include: Advanced Micro-Fabrication Equipment (AMEC); Aixtron; Canon Anelva; Grand Plastics Technology Corporation; Leybold Optics; Mattson Technology; Riber; Rudolph Technologies; Scientech; Screen Semiconductor Solutions; and Shanghai Micro Electronics Equipment.

Intellectual Property

Our success depends in part on our proprietary technology, and we have over 800 patents in the United States and other countries and have additional applications pending for new inventions.

Table of Contents

We have patents and exclusive and non-exclusive licenses to patents owned by others covering certain of our products, which we believe provide us with a competitive advantage. We have a policy of seeking patents on inventions concerning new products and improvements as part of our ongoing research, development, and manufacturing activities. We believe that there is no single patent or exclusive or non-exclusive license to patents owned by others that is critical to our operations, as the success of our business depends primarily on the technical expertise, innovation, customer satisfaction, and experience of our employees.

Refer to Item 1A, Risk Factors, for a description of risks associated with intellectual property.

Employees

At December 31, 2017 we had 1,014 employees, of which there were 280 in manufacturing and testing, 99 in sales and marketing, 214 in service and product support, 260 in engineering and research and development, and 161 in information technology, general administration, and finance. The success of our future operations depends on our ability to recruit and retain engineers, technicians, and other highly skilled professionals who are in considerable demand. We feel that we have adequate programs in place to attract, motivate, and retain our employees. We monitor industry practices to make sure that our compensation and employee benefits remain competitive. We believe that our employee relations are good. Refer to Item 1A, Risk Factors, for a description of risks associated with employee retention and recruitment.

Table of Contents

Financial Information about Segments and Geographic Areas

We operate as a single reportable segment and report our financial results in four geographic regions: the United States; China; Europe, Middle East, and Africa (EMEA); and Rest of World (ROW). Refer to Note 18, Segment Reporting and Geographic Information, in the Notes to the Consolidated Financial Statements for financial data pertaining to our geographic operations. Refer to Item 1A, Risk Factors, for a description of risks relating to our geographic operations.

Available Information

Our corporate website address is www.veeco.com. All filings we make with the Securities and Exchange Commission (SEC), including our Annual Report on Form 10-K, our Quarterly Reports on Form 10-Q, our Current Reports on Form 8-K, our proxy statements and any amendments thereto filed or furnished pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended, are available for free in the Investor Relations section of our website as soon as reasonably practicable after they are filed with or furnished to the SEC. Our SEC filings are available to be read or copied at the SEC s Public Reference Room at 100 F Street, N.E., Washington, D.C. 20549. Information about the operation of the Public Reference Room can be obtained by calling the SEC at 1-800-SEC-0330. Our filings can also be obtained for free on the SEC s website at www.sec.gov. The reference to our website address does not constitute inclusion or incorporation by reference of the information contained on our website in this Form 10-K or other filings with the SEC, and the information contained on our website is not part of this document.

Item 1A. Risk Factors

Key Risk Factors That May Impact Future Results

Stockholders should carefully consider the risk factors described below. Any of these factors, many of which are beyond our control, could materially and adversely affect our business, financial condition, operating results, cash flow, and stock price.

Unfavorable market conditions may adversely affect our operating results.

Conditions of the markets in which we operate are volatile and have in the past, and may in the future, deteriorate significantly. We have experienced and may continue to experience customer rescheduling and, to a lesser extent, cancellations of orders for our products. Adverse market conditions relative to our products could result in:

- reduced demand for our products;

- rescheduling and cancellations of orders for our products, resulting in negative backlog adjustments;

- increased price competition leading to lower margin for our products;

- increased competition from sellers of used equipment or lower-priced alternatives to our products;

- increased inventory obsolescence;

- an increase in uncollectable amounts due from our customers resulting in increased reserves for doubtful accounts and write-offs of accounts receivable;

- disruptions in our supply chain as we reduce our purchasing volumes and limit our contract manufacturing operations; and

- higher operating costs as a percentage of revenues.

If the markets in which we participate experience deteriorations or downturns, this could negatively impact our sales and revenue generation, margins, operating expenses, and profitability.

Table of Contents

We are exposed to the risks of operating a global business.

Most of our sales are to customers located outside of the United States, and we expect sales from non-U.S. markets to continue to represent a significant portion of our sales in the future. Our non-U.S. sales and operations are subject to risks inherent in conducting business outside the United States, many of which are outside our control including:

- political and social attitudes, laws, rules, regulations, and policies within countries that favor local companies over U.S. companies, including government-supported efforts to promote the development and growth of local competitors;

- differing legal systems and standards of trade which may not honor our intellectual property rights and which may place us at a competitive disadvantage;

- pressures from foreign customers and foreign governments for us to increase our operations and sourcing in the foreign country;

- multiple conflicting and changing governmental laws and regulations, including varying labor laws, tax regulations, import/export controls, changes to trade treaties, possible trade wars, and other trade barriers and uncertainties;

- reliance on various information systems and information technology to conduct our business, which may be vulnerable to cyberattacks by third parties or breached due to employee error, misuse, or other causes that could result in business disruptions, loss of or damage to intellectual property, transaction errors, processing inefficiencies, or other adverse consequences should our security practices and procedures prove ineffective;

- regional economic downturns, varying foreign government support, and unstable political environments;

- difficulties in managing a global enterprise, including staffing, managing distributors and representatives, and repatriating cash;

- longer sales cycles and difficulties in collecting accounts receivable; and

- different customs and ways of doing business.

These challenges, many of which are associated with sales into the Asia-Pacific region, have had and may continue to have a material adverse effect on our business.

We may be unable to effectively enforce and protect our intellectual property rights.

Our success depends in part upon the protection of our intellectual property rights. We rely primarily on patent, copyright, trademark, and trade secret laws, as well as nondisclosure and confidentiality agreements and other methods, to protect our proprietary information, technologies, processes, and brand identity. We own various U.S. and international patents and have additional pending patent applications relating to certain of our products and technologies. The process of seeking patent protection is lengthy and expensive, and we cannot be certain that pending or future applications will actually result in issued patents or that issued patents will be of sufficient scope or strength to provide meaningful protection or commercial advantage. In addition, our intellectual property rights may be circumvented, invalidated, or rendered obsolete by the rapid pace of technological change, or through efforts by others to reverse engineer our products or design around patents that we own. Policing unauthorized use of our products and technologies is difficult and time consuming and the laws of other countries may not protect our proprietary rights as fully or as readily as U.S. laws. Given these limitations, our success will depend in part upon our ability to innovate ahead of our competitors.

In addition, our outsourcing strategy requires that we share certain portions of our technology with our outsourcing partners, which poses additional risks of infringement and trade secret misappropriation. Infringement of our rights by a third party, possibly for purposes of developing and selling competing products, could result in uncompensated lost market and revenue opportunities. Similar exposure could result in the event that former employees seek to compete with us through their unauthorized use of our intellectual property and proprietary information. We cannot be certain that the protective steps and measures we have taken will prevent the misappropriation or unauthorized use of our proprietary information and technologies, nor can we be certain that applicable intellectual property laws, regulations, and policies will not be changed in a manner detrimental to the sale or use of our products.

Table of Contents

Litigation may be required to enforce our intellectual property rights, protect our trade secrets, and to determine the validity and scope of proprietary rights of others. As a result of any such litigation, we could lose our ability to enforce one or more patents, incur substantial costs, and jeopardize relationships with current or prospective customers or suppliers. Any action we take to enforce or defend our intellectual property rights could absorb significant management time and attention, and could otherwise negatively impact our operating results.

We may be subject to claims of intellectual property infringement by others.

We receive communications from time to time from other parties asserting the existence of patent or other rights which they believe cover certain of our products. We also periodically receive notice from customers who believe that we are required to indemnify them for damages they may incur related to infringement claims made against these customers by third parties. Our customary practice is to evaluate such assertions and to consider the available alternatives, including whether to seek a license, if appropriate. However, we cannot ensure that licenses can be obtained or, if obtained, will be on acceptable terms or that costly litigation or other administrative proceedings will not occur. If we are not able to resolve a claim, negotiate a settlement of the matter, obtain necessary licenses on commercially reasonable terms, or successfully prosecute and defend our position, our business, financial condition and results of operations could be materially and adversely affected.

We may be unable to successfully integrate the Ultratech business and may not realize the anticipated benefits of the acquisition.

On May 26, 2017, we completed the acquisition of Ultratech, Inc., merging two companies that formerly operated as independent public companies. Significant management attention and resources have been devoted, and will need to be devoted, to integrating our respective business operations and practices. The success of our acquisition of Ultratech will depend in part on our ability to realize the anticipated benefits and revenue and cost synergies associated with this business combination, which is subject to the following risks, among others:

- whether the combined businesses will perform as expected;

- the possibility that we paid more for the acquisition of Ultratech than the value we will derive from the acquisition;

- complexities associated with managing the combined businesses, including difficulties addressing possible differences in corporate cultures and management philosophies and the challenge of integrating complex systems, technology, networks, and other assets of each of the companies in a seamless manner that minimizes any adverse impact on customers, suppliers, employees, and other business partners;

- the potential loss of customers and strategic partners who may not wish to continue their relationships with the combined company; and

- potential unknown liabilities and unforeseen or unanticipated costs.

In connection with the accounting for the Ultratech acquisition, we recorded goodwill and other intangible assets of approximately $539 million. Under U.S. generally accepted accounting principles, we must assess, at least annually and potentially more frequently, whether the value of the goodwill and other indefinite-lived intangible assets have been impaired. Finite-lived intangible assets will be assessed for impairment in the event of an impairment indicator. Any reduction or impairment in the value of goodwill and other intangible assets will result in a charge against earnings, which could materially and adversely affect our results of operations and financial performance.

The price of our common shares is volatile and could further decline.

The stock market in general and the market for technology stocks in particular has experienced significant volatility. The trading price of our common shares has declined, and could continue to decline, independent of the overall market, and shareholders could lose all or a substantial part of their investment. The market price of our common shares could fluctuate significantly in response to several factors, including among others:

- difficult macroeconomic conditions, unfavorable geopolitical events, and general stock market uncertainties, such as those occasioned by a global liquidity crisis and a failure of large financial institutions;

Table of Contents

- the emergence of competitors and competing technologies;
- receipt of large orders or cancellations of orders for our products;
- issues associated with the performance and reliability of our products;
- actual or anticipated variations in our results of operations;
- announcements of financial developments or technological innovations;
- our failure to meet the performance estimates of investment research analysts;
- changes in recommendations and financial estimates by investment research analysts;
- strategic transactions, such as acquisitions, divestitures, and spin-offs;
- the commencement of, and rulings on, litigation and legal proceedings;
- the dilutive impact of our Convertible Senior Notes; and
- the occurrence of major catastrophic events.

As with many technology companies, the price of our common shares has fluctuated significantly in the past and is likely to be volatile in the future. Securities class action litigation is often brought against a company following periods of volatility in the market price of its securities. If similar litigation were to be pursued against us, it could result in substantial costs and a diversion of management s attention and resources, which could materially and adversely affect our financial condition, results of operations, and liquidity.

We face significant competition.

We face significant competition throughout the world, which may increase as certain markets in which we operate continue to evolve. Some of our competitors have greater financial, engineering, manufacturing, and marketing resources than us. Other competitors are located in regions with lower labor costs and other reduced costs of operation. In addition, our ability to compete in foreign countries against local manufacturers may be hampered by nationalism, social attitudes, laws, regulations, and policies within such countries that favor local companies over U.S. companies or that are otherwise designed to promote the development and growth of local competitors. Furthermore, we face competition from smaller emerging equipment companies whose strategy is to provide a portion of the products and services we offer, with a focused approach on innovative technology for specialized markets. New product introductions or enhancements by us or our competitors could cause a decline in sales or loss of market acceptance of our existing or prior generation products. Increased competitive pressure could also lead to intensified price competition resulting in lower margins.

To remain competitive, we may enter into strategic alliances with customers, suppliers, and other third parties to explore new market opportunities and possible technological advancements. These alliances may require significant investments of capital and other resources and often involve the exchange of sensitive confidential information. The success of these alliances may depend on factors over which we have limited control and will likely require ongoing cooperation and good faith efforts from our strategic partners. Strategic alliances are inherently subject to significant risks, and the inability to effectively manage these risks could materially and adversely affect our business and operating results.

We operate in industries characterized by rapid technological change.

Each of the industries in which we operate is subject to rapid technological change. Our ability to remain competitive depends on our ability to enhance existing products and develop and manufacture new products in a timely and cost effective manner and to accurately predict technology transitions. New product development commitments must be made well in advance of sales, and we must anticipate the future demand for products when selecting which development programs to fund and pursue. Our financial results depend on the successful introduction of new products, many of which require the achievement of increasingly stringent technical specifications. We may not be successful in selecting, developing, manufacturing, and marketing new products and new technologies or in enhancing our existing products. Our performance may be adversely affected if we are unable to accurately predict evolving market trends and related customer needs and to effectively allocate our resources among new and existing products and technologies.

Table of Contents

We are also exposed to potential risks associated with unexpected product performance issues. Our product designs and manufacturing processes are complex and could contain unexpected product defects, especially when products are first introduced. Unexpected product performance issues could result in significant costs and damages, including increased service and warranty expenses, the need to provide product replacements or modifications, reimbursement for damages caused by our products, product recalls, related litigation, product write-offs, and disposal costs. These costs could be substantial and our reputation could be harmed, resulting in a reduced demand for our products and a negative effect on our business, financial condition, and results of operations.

Our sales to manufacturers are highly dependent on sales of consumer electronics applications, which can experience significant volatility due to seasonal and other factors.

The demand for LEDs, HDDs, semiconductors, and other devices is highly dependent on sales of consumer electronics, such as televisions, computers, tablets, digital video recorders, smartphones, cell phones, and other mobile devices. Manufacturers of LEDs are among our largest customers and account for a substantial portion of our revenue. Factors that could influence the levels of spending on consumer electronic products include consumer confidence, access to credit, volatility in fuel and other energy costs, conditions in the residential real estate and mortgage markets, labor and healthcare costs, and other macroeconomic factors affecting consumer spending behavior. These and other economic factors have had and could continue to have a material adverse effect on the demand for our customers products and, in turn, on our customers demand for our products and services. Furthermore, manufacturers of LEDs have in the past overestimated their potential for market share growth. If this growth is overestimated, we may experience cancellations of orders in backlog, rescheduling of customer deliveries, obsolete inventory, and liabilities to our suppliers for products no longer needed.

In addition, the demand for our customers products can be even more volatile and unpredictable due to the possibility of competing technologies, such as flash memory as an alternative to HDDs. Unpredictable fluctuations in demand for our customers products or rapid shifts in demand from our customers products to alternative technologies could materially and adversely impact our future results of operations.

We have a concentrated customer base, located primarily in a limited number of regions, which operate in highly concentrated industries.

Our customer base continues to be highly concentrated. Orders from a relatively limited number of customers have accounted for, and likely will continue to account for, a substantial portion of our net sales, which may lead customers to demand pricing and other terms less favorable to us. Customer consolidation activity involving some of our largest customers could result in an even greater concentration of our sales in the future. Management changes at key customer accounts could result in a loss of future sales due to vendor preferences or other reasons and may introduce new challenges in managing customer relationships.

If a principal customer discontinues its relationship with us or suffers economic setbacks, our business, financial condition, and operating results could be materially and adversely affected. Our ability to increase sales in the future will depend in part upon our ability to obtain orders from new customers and we cannot be certain that we will be successful in these efforts. In addition, because a relatively small number of large manufacturers, many of whom are our customers, dominate the industries in which they operate, it may be especially difficult for us to replace these customers if we lose their business. A significant portion of orders in our backlog are orders from our principal customers.

Table of Contents

In addition, a substantial investment is required by customers to install and integrate capital equipment into a production line. As a result, once a manufacturer has selected a particular vendor to supply capital equipment, the manufacturer will often attempt to consolidate its other capital equipment requirements with the same vendor. Accordingly, if a customer selects a competitor s product over ours, we could experience difficulty selling to that customer for a significant period of time.

Furthermore, we do not have long-term contracts with our customers. As a result, our agreements with our customers do not provide assurance of future sales, and we are exposed to competitive price pressures on new orders we attempt to obtain.

Our customer base is also highly concentrated in terms of geography, and the majority of our sales are to customers located in a limited number of countries. Dependence upon sales emanating from a limited number of regions increases our risk of exposure to local difficulties and challenges, such as those associated with regional economic downturns, political instability, fluctuating currency exchange rates, natural disasters, social unrest, pandemics, terrorism, and acts of war. Our reliance upon customer demand arising primarily from a limited number of countries could materially and adversely impact our future results of operations.

A further reduction or elimination of foreign government subsidies and economic incentives may adversely affect the future order rate for our MOCVD equipment.

We generate a significant portion of our revenue in China. In recent years, the Chinese government has provided various incentives to encourage the development of the LED industry, including subsidizing a portion of the purchase cost of MOCVD equipment. These subsidies have enabled and encouraged certain customers in this region to purchase more of our MOCVD equipment than these customers might have purchased without these subsidies. The availability and amount of these subsidies has been reduced over time and may end at some point in the future. A further reduction or elimination of these incentives may result in a reduction in future orders for our MOCVD equipment in this region, which could materially and adversely affect our business, financial condition, and results of operations. In addition, in an effort to promote Chinese competition, the Chinese government could impose restrictions on the receipt of these subsidies, including requirements that the purchased equipment be sourced locally.

A related risk pertains to the fact that many customers use or had planned to use Chinese government subsidies, in addition to other incentives from the Chinese government, to build new manufacturing facilities or to expand existing manufacturing facilities. Delays in the start-up of these facilities or the cancellation of construction plans altogether, together with other related issues pertaining to customer readiness, could adversely impact the timing of our revenue recognition, could result in order cancellations, a reduction in our order backlog, and could have other negative effects on our business, financial condition, and results of operations.

The cyclicality of the industries we serve directly affects our business.

Our business depends in large part upon the capital expenditures of manufacturers in the LED, mobile communication, data storage, and other device markets. We are subject to the business cycles of these industries, the timing, length, and volatility of which are difficult to predict. These industries have historically been highly cyclical and have experienced significant economic downturns in the last decade. As a capital equipment provider, our revenue depends in large part on the spending patterns of these customers, who often delay expenditures or cancel or reschedule orders in reaction to variations in their businesses or general economic conditions. In downturns, we must be able to quickly and effectively

align our costs with prevailing market conditions, as well as motivate and retain key employees. However, because a portion of our costs are fixed, our ability to reduce expenses quickly in response to revenue shortfalls may be limited. Downturns in one or more of these industries have had and will likely have a material adverse effect on our business, financial condition, and operating results. Alternatively, during periods of rapid growth, we must be able to acquire and develop sufficient manufacturing capacity to meet customer demand and attract, hire, assimilate, and retain a sufficient number of qualified people. Our net sales and operating results may be negatively affected if our customers experience economic downturns or slowdowns in their businesses.

Table of Contents

The timing of our orders, shipments, and revenue recognition may cause our quarterly operating results to fluctuate significantly.

We derive a substantial portion of our net sales in any fiscal period from the sale of a relatively small number of high-priced systems. As a result, the timing of recognition of revenue for a single transaction could have a material effect on our sales and operating results for a particular fiscal period. As is typical in our industry, orders, shipments, and customer acceptances often occur during the last few weeks of a quarter. As a result, a delay of only a week or two can impact which period revenue is reported and can cause volatility in our revenue for a given reporting period. Our quarterly results have fluctuated significantly in the past and we expect this trend to continue. If our orders, shipments, net sales, or operating results in a particular quarter do not meet expectations, our stock price may be adversely affected as well.

Our sales cycle is long and unpredictable.

Historically, we have experienced long and unpredictable sales cycles (the period between our initial contact with a potential customer and the time that we recognize revenue for resulting sales to that customer). Our sales cycle can exceed twelve months. The timing of an order often depends on our customer s capital expenditure budget, over which we have no control. In addition, the time it takes us to build a product to customer specifications typically ranges from three to six months. When coupled with the fluctuating amount of time required for shipment, installation, and final acceptance, our sales cycles often vary widely, and these variations can cause fluctuations in our operating results. As a result of our lengthy sales cycles, we may incur significant research, development, selling, general, and administrative expenses before we generate revenue for these products. We may never generate the anticipated revenue if a customer cancels or otherwise changes its purchase plans, which could have an adverse effect on our business.

Our backlog is subject to customer cancellation or modification which could result in decreased sales, increased inventory obsolescence, and liabilities to our suppliers for products no longer needed.

Customer purchase orders may be cancelled or rescheduled by the customer, sometimes with limited or no penalties, which may result in increased or unrecoverable costs for the Company. We adjust our backlog for such cancellations, contract modifications, and delivery delays that result in a delivery period in excess of one year, among other items. A downturn in one or more of our businesses could result in an increase in order cancellations and postponements.

We write-off excess and obsolete inventory based on historical trends, future usage forecasts, and other factors including the amount of backlog we have on hand. If our backlog is canceled or modified, our estimates of future product demand may prove to be inaccurate, in which case we may have understated the write-off required for excess and obsolete inventory. In the future, if we determine that our inventory is overvalued, we will be required to recognize associated costs in our financial statements at the time of such determination. In addition, we place orders with our suppliers based on our customers orders. If our customers cancel their orders with us, we may not be able to cancel our orders with our suppliers. Any such charges could be materially adverse to our results of operations and financial condition.

Our failure to estimate customer demand accurately could result in inventory obsolescence, liabilities to our suppliers for products no longer needed, and manufacturing interruptions or delays which could affect our ability to meet customer demand.

The success of our business depends in part on our ability to accurately forecast and supply equipment and services that meet the rapidly changing technical and volume requirements of our customers. To meet these demands, we depend on the timely delivery of parts, components, and subassemblies from our suppliers. Uncertain worldwide economic conditions and market instabilities make it difficult for us (and our customers) to accurately forecast future product demand. If actual demand for our products is different than expected, we may purchase more or fewer parts than necessary or incur costs for canceling, postponing, or expediting delivery of parts. If we overestimate the demand for our products, excess inventory could result which could be subject to heavy price discounting, which could become obsolete, and which could subject us to liabilities to our suppliers for products no longer needed. Similarly, we may be harmed in the event that our competitors overestimate the demand for their products and engage in heavy price discounting practices as a result. In addition, the volatility of demand for capital equipment increases capital and other risks for companies in our supply chain.

Table of Contents

Furthermore, certain key parts may be subject to long lead-times or may be obtainable only from a single supplier or limited group of suppliers, and some sourcing and assembly is provided by suppliers located in countries other than the United States. We may experience significant interruptions in our manufacturing operations, delays in our ability to timely deliver products or services, increased costs, or customer order cancellations as a result of:

- the failure or inability of our suppliers to timely deliver quality parts;
- volatility in the availability and cost of materials;
- difficulties or delays in obtaining required import or export approvals;
- information technology or infrastructure failures;
- natural disasters such as earthquakes, tsunamis, floods, or storms; or
- other causes such as regional economic downturns, pandemics, political instability, terrorism, or acts of war, that could result in delayed deliveries, manufacturing inefficiencies, increased costs, or order cancellations.

In addition, in the event of an unanticipated increase in demand for our products, our need to rapidly increase our business and manufacturing capacity may be limited by working capital constraints of our suppliers, which may cause or exacerbate interruptions in our manufacturing and supply chain operations. Any or all of these factors could materially and adversely affect our business, financial condition, and results of operations.

Our failure to successfully manage our outsourcing activities or failure of our outsourcing partners to perform as anticipated could adversely affect our results of operations.

To better align our costs with market conditions, increase the percentage of variable costs relative to total costs, and to increase productivity and operational efficiency, we have outsourced certain functions to third parties, including the manufacture of several of our systems. While we maintain some level of internal manufacturing capability for these systems, we rely heavily on our outsourcing partners to perform their contracted functions to allow us flexibility to adapt to changing market conditions, including periods of significantly diminished order volumes. If our outsourcing partners do not perform as required, or if our outsourcing model does not allow us to realize the intended cost savings and flexibility, our results of operations (and those of our third party providers) may be adversely affected. Disputes and possibly litigation involving third party providers could result and we could suffer damage to our reputation. Dependence on contract manufacturing and outsourcing may

also adversely affect our ability to bring new products to market. Although we attempt to select reputable providers, it is possible that one or more of these providers could fail to perform as we expect. If we do not effectively manage our outsourcing strategy or if third party providers do not perform as anticipated, we may not realize the benefits of productivity improvements and we may experience operational difficulties, increased costs, manufacturing and installation interruptions or delays, inefficiencies in the structure and operation of our supply chain, loss of intellectual property rights, quality issues, increased product time-to-market, and an inefficient allocation of our human resources, any or all of which could materially and adversely affect our business, financial condition, and results of operations.

We rely on a limited number of suppliers, some of whom are our sole source for particular components.

Certain of the parts, components, and sub-assemblies included in our products are obtained from a single source or a limited group of suppliers. Our inability to develop alternative sources, as necessary, could result in a prolonged interruption in our ability to supply related products, a failure on our part to meet the demands our customers, and a significant increase in the price of related products, which could adversely affect our business, financial condition, and results of operations.

Our inability to attract, retain, and motivate employees could have a material adverse effect on our business.

Our success depends in part upon our ability to attract, retain, and motivate employees, including those in executive, managerial, finance, engineering, and marketing positions, as well as highly skilled and qualified technical personnel. Attracting, retaining, and motivating such qualified personnel may be difficult due to challenging industry conditions, competition for such personnel by other technology companies, consolidations and relocations of operations, and workforce reductions, and there can be no assurance that we will be successful in recruiting or retaining key personnel. We have entered

Table of Contents

into employment agreements with certain key personnel but our inability to attract, retain, and motivate key personnel could have a material adverse effect on our business, financial condition, and results of operations.

We are exposed to risks associated with business combinations, acquisitions, and strategic investments.

We have completed several significant acquisitions and investments in the past and we will consider new opportunities in the future. Acquisitions and investments involve numerous risks, many of which are unpredictable and beyond our control, including the following:

- difficulties and increased costs in integrating the personnel, operations, technologies, and products of acquired companies;

- diversion of management s attention and disruption of ongoing businesses;

- the inability to complete proposed transactions as anticipated, resulting in obligations to pay professional and other expenses, including any applicable termination fees;

- potential loss of key employees of acquired companies, especially if a relocation or change in responsibilities is involved;

- difficulties in managing geographically dispersed operations in a cost effective manner;

- the failure to realize expected synergies;

- unknown, underestimated, and undisclosed commitments or liabilities;

- increased amortization expenses relating to intangible assets; and

- other adverse effects on our business, including the potential impairment and write-down of amounts capitalized as intangible assets and goodwill as part of the acquisition, as a result of such matters as technological advancements or worse-than-expected performance by the acquired company.

As discussed above with respect to our recent acquisition of Ultratech, our inability to effectively manage these risks could materially and adversely affect our business, financial condition, and results of operations. In addition, if we issue equity securities to pay for an acquisition or investment, the ownership percentage of our then-current shareholders would be reduced and the value of the shares held by these shareholders could be diluted, which could adversely affect the price of our stock. If we use cash to pay for an acquisition or investment, the payment could significantly reduce the cash that would be available to fund our operations or other purposes, which could have a negative effect on our business.

We may be unable to obtain required export licenses for the sale of our products.

Products which are either manufactured in the United States or based on U.S. technology are subject to the U.S. Export Administration Regulations (EAR) when exported to and re-exported from international jurisdictions, in addition to the local jurisdiction s export regulations applicable to individual shipments. Currently, our MOCVD, MBE, and certain other systems and products are controlled for export under the EAR. Licenses or proper license exceptions may be required for the shipment of our products to certain customers or countries. Obtaining an export license or determining whether an export license exception exists often requires considerable effort by us and cooperation from the customer, which can add time to the order fulfillment process. We may be unable to obtain required export licenses or unable to qualify for export license exceptions and, as a result, we may be unable to export products to our customers. The administrative processing, potential delay and risk of ultimately not obtaining required export approvals pose a particular disadvantage to us relative to our non-U.S. competitors who are not required to comply with U.S. export controls. Non-compliance with the EAR or other applicable export regulations could result in a wide range of penalties including the denial of export privileges, fines, criminal penalties, and the seizure of commodities. In the event that an export regulatory body determines that any of our shipments violate applicable export regulations, we could be fined significant sums and our export capabilities could be restricted, which could have a material adverse impact on our business.

Table of Contents

Our operating results may be adversely affected by tightening credit markets.

As a global company with worldwide operations, we are subject to volatility and adverse consequences associated with economic downturns in different parts of the world. In the event of a downturn, many of our customers may delay or further reduce their purchases of our products and services. If negative conditions in the credit markets prevent our customers from obtaining credit or necessary financing, product orders in these channels may decrease, which could result in lower revenue. In addition, we may experience cancellations of orders in backlog, rescheduling of customer deliveries, and attendant pricing pressures. If our suppliers face challenges in obtaining credit, in selling their products, or otherwise in operating their businesses, their ability to continue to supply materials to us may be negatively affected.

In addition, we finance some of our sales through trade credit. In addition to ongoing credit evaluations of our customers financial condition, we seek to mitigate our credit risk by obtaining deposits and letters of credit on certain of our sales arrangements. We could suffer significant losses if a customer whose accounts receivable we have not secured fails or is otherwise unable to pay us, or if financial institutions providing letters of credit become insolvent. A loss in collections on our accounts receivable would have a negative impact on our financial condition and results of operations.

We may be exposed to liabilities under the Foreign Corrupt Practices Act and other similar laws.

We are subject to the Foreign Corrupt Practices Act of 1977 (FCPA) and other laws that prohibit improper payments or offers of payments to foreign government officials, as defined by the statute, for the purpose of obtaining or retaining business. In addition, many of our customers have policies limiting or prohibiting us from providing certain types or amounts of entertainment, meals, or gifts to their employees. It is our policy to implement safeguards to discourage these practices by our employees and representatives. However, our safeguards may prove to be ineffective and our employees, consultants, sales agents, or distributors may engage in conduct for which we may be held responsible. In addition, we may acquire a company that has engaged in unlawful conduct in the past, and be held responsible for this conduct through successor liability principles. Violations of the FCPA or similar laws or similar customer policies may result in severe criminal or civil sanctions or the loss of supplier privileges to a customer and we may be subject to other liabilities, which could negatively affect our business, financial condition, and results of operations.

We are subject to internal control evaluations and attestation requirements of Section 404 of the Sarbanes-Oxley Act and any delays or difficulties in satisfying these requirements or negative reports concerning our internal controls could adversely affect our future results of operations and our stock price.

Pursuant to Section 404 of the Sarbanes-Oxley Act of 2002, we must include in our Annual Report on Form 10-K a report by management on the effectiveness of our internal control over financial reporting. Ongoing compliance with this requirement is complex, costly, time-consuming, and is subject to significant judgment. If our internal controls are ineffective or if our management does not timely assess the adequacy of such internal controls, our ability to file timely and accurate periodic reports may be impeded. Any delays in filing may cause us to face the following risks and concerns, among others:

- concern on the part of our customers, partners, investors, and employees about our financial condition and filing delay status, including the potential loss of business opportunities;

- significant time and expense required to complete delayed filings and the distraction of our senior management team and board of directors as we work to complete delayed filings;

- investigations by the SEC and other regulatory authorities of the Company and our management;

- limitations on our ability to raise capital;

- suspension or termination of our stock listing on The NASDAQ Stock Market and the removal of our stock as a component of certain stock market indices; and

- general reputational harm.

Any or all of the foregoing could result in the commencement of stockholder lawsuits against the Company. Any such litigation, as well as any proceedings that could arise as a result of a filing delay and the circumstances which gave rise to it, may be time consuming and expensive, may divert management attention from the conduct of our business, could have a

Table of Contents

material adverse effect on our business, financial condition, and results of operations, and may expose us to costly indemnification obligations to current or former officers, directors, or other personnel, regardless of the outcome of such matters, which may not be adequately covered by insurance.

Changes in accounting pronouncements or taxation rules or practices may adversely affect our financial results.

Changes in accounting pronouncements or taxation rules or practices can have a significant effect on our reported results. New accounting pronouncements and taxation rules can have a material impact on effective tax rates, results of operations, and our financial condition. On December 22, 2017, President Trump signed into law the statute commonly referred to as the Tax Cuts and Jobs Act (2017 Tax Act), which makes broad and complex changes to the U.S. tax code. As we collect and prepare necessary data, and interpret the 2017 Tax Act and any additional guidance issued by the IRS or other standard-setting bodies, we may make adjustments to the provisional amounts in accordance with Staff Accounting Bulletin No. 118 (SAB 118), which provides SEC staff guidance for the application of ASC 740 in the reporting period in which the 2017 Tax Act was signed into law. This change could materially affect our financial position and tax attributes carryforward. In addition, varying interpretations of accounting pronouncements or taxation practices, and the questioning of our current or past practices (such as those associated with our transfer pricing), may adversely affect our reported financial results.

Our income taxes may change.

We are subject to income tax on a jurisdictional or legal entity basis and significant judgment is required in certain instances to allocate our taxable income to a jurisdiction and to determine the related income tax expense and benefits. Losses in one jurisdiction generally may not be used to offset profits in other jurisdictions. As a result, changes in the mix of our earnings (or losses) between jurisdictions, among other factors, could alter our overall effective income tax rate, possibly resulting in significant tax rate increases.

We are regularly audited by various tax authorities. Income tax audit assessments or changes in tax laws, regulations, or other interpretations may result in increased tax provisions which could materially affect our operating results in the period or periods in which such determinations are made or changes occur.

In addition, our effective tax rate could increase if we determine that it is no longer more likely than not that we are able to realize our remaining net deferred tax assets, if we are unable to generate sufficient future taxable income in certain jurisdictions, or if we are otherwise required to increase our valuation allowances against our deferred tax assets.

We may be required to take additional impairment charges on assets.

We are required to assess goodwill and indefinite-lived intangible assets annually for impairment, or on an interim basis whenever certain events occur or circumstances change, such as an adverse change in business climate or a decline in the overall industry, that would more likely than not reduce the fair value below its carrying amount. We are also required to test our long-lived assets, including acquired intangible assets and property, plant, and equipment, for recoverability and impairment whenever there are indicators of impairment such as an adverse change in

business climate.

As part of our long term strategy, we may pursue future acquisitions of other companies or assets which could potentially increase our assets. Adverse changes in business conditions could materially impact our estimates of future operations and result in impairment charges to these assets. A significant decline in the market price of our common stock could indicate a decline in the fair value of our reporting unit such that goodwill becomes impaired. If our assets are impaired, our financial condition and results of operations could be materially and adversely affected.

We have indebtedness in the form of convertible senior notes which could adversely affect our financial position, prevent us from implementing our strategy, and dilute the ownership interest of our existing shareholders.

In January of 2017, we issued $345 million of 2.70% Convertible Senior Notes due 2023 (Convertible Senior Notes). The Convertible Senior Notes are convertible into Company common stock at an initial conversion rate of 24.98 shares of Company common stock per $1,000 principal amount of the Convertible Senior Notes. The Company is obligated to repurchase the Convertible Senior Notes upon the occurrence of certain events described in the indenture relating to the Convertible Senior Notes. The degree to which we are leveraged could have negative consequences, including but not limited to the following:

Table of Contents

- we may be more vulnerable to economic downturns, less able to withstand competitive pressures, and less flexible in responding to changing business and economic conditions;

- our ability to obtain additional financing in the future for working capital, capital expenditures, acquisitions, general corporate, and other purposes may be limited;

- a substantial portion of our cash flows from operations in the future may be required for the payment of the principal amount of our existing indebtedness when it becomes due; and

- we may elect to make cash payments upon any conversion of the Convertible Senior Notes, which would reduce our cash on hand.

Our ability to meet our payment obligations under the Convertible Senior Notes depends on our ability to generate significant cash flow in the future. This, to some extent, is subject to general economic, financial, competitive, legislative, regulatory, and other factors that are beyond our control. There can be no assurance that our business will generate cash flow from operations, or that additional capital will be available to us, in an amount sufficient for us to meet our debt payment obligations and to fund other liquidity needs. If we are unable to generate sufficient cash flow to service our debt obligations, we may need to refinance or restructure our debt, sell assets, reduce or delay capital investments, or seek to raise additional capital. If we were unable to implement one or more of these alternatives, we may be unable to meet our debt payment obligations, which could have a material adverse effect on our business, results of operations, and financial condition.

Furthermore, if the Convertible Senior Notes are converted into shares of Company common stock, the issuance of additional shares of Company common stock would dilute the ownership interest of our existing shareholders and could have a dilutive effect on our net income per share to the extent that the price of our common stock exceeds the conversion price of the Convertible Senior Notes. In addition, any sales in the public market of our common stock issuable upon conversion of the Convertible Senior Notes could adversely affect prevailing market prices of our common stock.

The accounting method for convertible debt securities that may be settled in cash, such as the Convertible Senior Notes, could have a material effect on our reported financial results.

Under Accounting Standards Codification 470-20, Debt with Conversion and Other Options (ASC 470-20), an entity must separately account for the liability and equity components of certain convertible debt instruments (such as the Convertible Senior Notes) that may be settled entirely or partially in cash upon conversion in a manner that reflects the issuer s economic interest cost. The effect of ASC 470-20 on the accounting for the Convertible Senior Notes is that the equity component is required to be included in the additional paid-in capital section of stockholders equity on our consolidated balance sheet, and the value of the equity component would be treated as original issue discount for purposes of accounting for the debt component of the Convertible Senior Notes. As a result, we will be required to record a greater amount of non-cash interest expense in current periods presented as a result of the amortization of the discounted carrying value of the Convertible Senior Notes to their face amount over the term of the Convertible Senior Notes. We will report lower net income in our financial results because ASC 470-20 will require interest to include both the current period s amortization of the debt discount and the instrument s coupon interest, which could adversely affect our

financial results, the trading price of our common stock, and the trading price of the Convertible Senior Notes.

In addition, under certain circumstances convertible debt instruments (such as the Convertible Senior Notes) that may be settled entirely or partly in cash can be accounted for utilizing the treasury stock method, the effect of which is that the shares issuable upon conversion of the Convertible Senior Notes are not included in the calculation of diluted earnings per share except to the extent that the conversion value of the Convertible Senior Notes exceeds their principal amount. Under the treasury stock method, for diluted earnings per share purposes, the transaction is accounted for as if the number of shares of common stock that would be necessary to settle such excess, if we elected to settle such excess in shares, are issued. We cannot be sure that the accounting standards in the future will continue to permit the use of the treasury stock method or that we will continue to expect to settle the principal balance in cash. If we are unable to use the treasury stock method in accounting for the shares issuable upon conversion of the Convertible Senior Notes, our diluted earnings per share could be adversely affected.

Table of Contents

We are subject to foreign currency exchange risks.

We are exposed to foreign currency exchange rate risks that are inherent in our anticipated sales, sales and purchase commitments, and assets and liabilities that are denominated in currencies other than the U.S. dollar. Although we attempt to mitigate our exposure to fluctuations in currency exchange rates, hedging activities may not always be available or adequate to mitigate the impact of our exchange rate exposure. Failure to sufficiently hedge or otherwise manage foreign currency risks properly could materially and adversely affect our financial condition, results of operations, and liquidity.

Our previously announced share repurchase program could affect the price of our common stock and increase volatility and may be suspended or terminated at any time, which may result in a decrease in the trading price of our common stock.

Repurchases pursuant to our share repurchase program could affect our stock price and increase its volatility. The existence of a share repurchase program could also cause our stock price to be higher than it would be in the absence of such a program and could potentially reduce the market liquidity for our stock. There can be no assurance that any share repurchases will enhance stockholder value because the market price of our common stock may decline below the levels at which we repurchased shares of common stock. Although our share repurchase program is intended to enhance long term stockholder value, short term stock price fluctuations could reduce the program s effectiveness. Furthermore, the program does not obligate the Company to repurchase any dollar amount or number of shares of common stock, and may be suspended or discontinued at any time and any suspension or discontinuation could cause the market price of our stock to decline.

If we are subject to cyber-attacks we could incur substantial costs and, if such attacks are successful, we could incur significant liabilities, reputational harm, and disruption to our operations.

We manage, store, and transmit proprietary information and sensitive data relating to our operations. We may be subject to breaches of the information technology systems we use for these purposes. Experienced computer programmers and hackers may be able to penetrate our network security and misappropriate and compromise our confidential information (and third party confidential information), create system disruptions, or cause shutdowns. Computer programmers and hackers also may be able to develop and deploy viruses, worms, and other malicious software programs that attack our systems or our products, or that otherwise exploit security vulnerabilities.

The costs to address the foregoing security problems and security vulnerabilities before or after a cyber-incident could be significant. Our remediation efforts may not be successful and could result in interruptions, delays, a cessation of service, and a loss of existing or potential customers, impeding our sales, manufacturing, distribution, and other critical functions. In addition, breaches of our security measures and the unapproved dissemination of proprietary information or sensitive data about us, our customers or other third parties, could expose us, our customers and others to a risk of loss or misuse of this information, result in litigation and potential liability for us, damage our reputation, and otherwise harm our business.

We have adopted certain measures that may have anti-takeover effects which may make an acquisition of our Company by another company more difficult.

We have adopted, and may in the future adopt, certain measures that may have the effect of delaying, deferring, or preventing a takeover or other change in control of our Company, which a holder of our common stock might not consider to be in the holder s best interest. These measures include:

- blank check preferred stock;
- a classified board of directors; and
- certain other certificate of incorporation and bylaws provisions.

Our board of directors has the authority to issue up to 500,000 shares of preferred stock and to fix the rights (including voting rights), preferences and privileges of these shares (blank check preferred). Such preferred stock may have rights, including economic rights, senior to our common stock. As a result, the issuance of the preferred stock could have a material adverse

Table of Contents

effect on the price of our common stock and could make it more difficult for a third party to acquire a majority of our outstanding common stock.

Our board of directors is divided into three classes with each class serving a staggered three-year term. The existence of a classified board makes it more difficult for our shareholders to change the composition of our board of directors, and therefore the Company s policies, in a relatively short period of time.

We have adopted certain certificate of incorporation and bylaws provisions which have anti-takeover effects. These include: (a) requiring certain actions to be taken at a meeting of shareholders rather than by written consent, (b) requiring a super-majority of shareholders to approve certain amendments to our bylaws, (c) limiting the maximum number of directors, and (d) providing that directors may be removed only for cause. These measures and those described above may have the effect of delaying, deferring, or preventing a takeover or other change in control of our Company that a holder of our common stock might consider to be in the holder s best interest.

In addition, we are subject to the provisions of Section 203 of the General Corporation Law of the State of Delaware, which prohibits a Delaware corporation from engaging in any business combination, including mergers and asset sales, with an interested stockholder (generally, a 15% or greater 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. The operation of Section 203 may have anti-takeover effects, which could delay, defer, or prevent a takeover attempt that a holder of our common stock might consider to be in the holder s best interest.

Despite the above measures, an activist shareholder could undertake action to implement governance, strategic, or other changes to the Company which a holder of our common stock might not consider to be in the holder s best interest. Such activities could interfere with our ability to execute our strategic plans, be costly and time consuming, disrupt our operations, and divert the attention of management and our employees.

We are subject to risks of non-compliance with environmental, health, and safety regulations.

We are subject to environmental, health, and safety regulations in connection with our business operations, including but not limited to regulations related to the development, manufacture and use of our products, recycling and disposal of related materials, and the operation and use of our facilities and real property. Failure or inability to comply with existing or future environmental and safety regulations, which vary from jurisdiction to jurisdiction, could result in significant remediation liabilities, the imposition of fines, and the suspension or termination of research, development, or use of certain of our products, each of which could have a material adverse effect on our business, financial condition, and results of operations. In addition, some of our operations involve the storage, handling, and use of hazardous materials that may pose a risk of fire, explosion, or environmental release. Such events could result from acts of terrorism, natural disasters, or operational failures and may result in injury or loss of life to our employees and others, local environmental contamination, and property damage. These events might cause a temporary shutdown of an affected facility, or portion thereof, and we could be subject to penalties or claims as a result. Each of these events could have a material adverse effect on our business, financial condition, and results of operations.

Regulations related to conflict minerals will force us to incur additional expenses, may make our supply chain more complex, and may harm our relationships with customers.

Under the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 (the Dodd-Frank Act), the SEC adopted requirements for companies that manufacture products that contain certain minerals and metals, known as conflict minerals. These rules require public companies to perform diligence and to report annually to the SEC whether such minerals originate from the Democratic Republic of Congo and adjoining countries. The implementation of these requirements could adversely affect the sourcing, availability, and pricing of minerals we use in the manufacture of our products. In addition, we have incurred and will continue to incur additional costs to comply with the disclosure requirements, including costs related to determining the source of any of the relevant minerals used in our products. Given the complexity of our supply chain, we may not be able to ascertain the origins of these minerals used in our products through the due diligence procedures that we implement, which may harm our reputation. We may also face difficulties in satisfying customers who require that our products be certified as conflict mineral free, which could harm our relationships with these customers and lead to a loss of revenue. These requirements could limit the pool of suppliers that can provide conflict-free minerals, and we may be unable

Table of Contents

to obtain conflict-free minerals at competitive prices, which could increase our costs and adversely affect our manufacturing operations and our profitability.

We have significant operations in locations which could be materially and adversely impacted in the event of a natural disaster, an act of terrorism, or other significant disruption.

Our operations in the United States, in the Asia-Pacific region, and in other areas could be subject to natural disasters or other significant disruptions, including earthquakes, tsunamis, fires, hurricanes, floods, water shortages, other extreme weather conditions, medical epidemics, power shortages and blackouts, telecommunications failures, and other natural and manmade disasters or disruptions. In the event of such a natural disaster or other disruption, we could experience disruptions or interruptions to our operations and to the operations of our suppliers, distributors, resellers and customers, destruction of facilities and loss of life, all of which could materially increase our costs and expenses and materially and adversely affect our business, financial condition, and results of operations. In addition, various regions of the world in which we do business are subject to the threat of terrorism and acts of war. Any act of terrorism or war that affects the economy or the industries in which we operate could result in significant harm to us, including the loss of life and property, manufacturing and transportation delays, disruptions in our supply chain, the need to comply with enhanced security measures, and other increased costs.

Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

Our corporate headquarters and principal research and development, manufacturing, and sales and service facilities are:

Owned Facilities Location	Approximate Size (sq. ft.)	Use
Plainview, NY	80,000	Corporate Headquarters; R&D; Sales & Service; Administration
Somerset, NJ	80,000	R&D; Manufacturing; Sales & Service; Administration
St. Paul, MN	43,000	R&D; Manufacturing; Sales & Service; Administration
Somerset, NJ	38,000	R&D; Sales & Service; Administration

Leased Facilities Location	Approximate Size (sq. ft.)	Use	Lease Expires
San Jose, CA	100,000	R&D; Manufacturing; Sales & Service; Administration	2021
Somerset, NJ	57,000	Warehouse	2020
Kingston, NY (1)	52,000	Manufacturing	2018
Horsham, PA	49,000	R&D; Manufacturing; Sales & Service; Administration	2024
Singapore	23,000	R&D; Manufacturing; Sales & Service; Administration	2023

Waltham, MA	19,000	R&D; Sales & Service; Administration	2023
Hsinchu City, Taiwan	13,000	Sales & Service; Administration	2020
Shanghai, China	10,000	Sales & Service; Administration	2020

(1) Manufacturing site has been consolidated into Somerset, we expect to vacate this location during 2018.

In addition to the above, we lease a small office in Edina, Minnesota and Malta, New York for sales and service and our foreign sales and service subsidiaries lease office space in Germany, Japan, Malaysia, Philippines, South Korea, Thailand, and United Kingdom. We believe our facilities are adequate to meet our current needs.

Item 3. Legal Proceedings

On September 21, 2017, Blueblade Capital Opportunities LLC et al., on behalf of purported beneficial owners of 440,100 shares of Ultratech common stock, filed an action against Ultratech in Delaware Court of Chancery requesting an appraisal of the value of their Ultratech stock pursuant to 8 Del. C. §262. We believe that the merger price, which was the product of

Table of Contents

arms-length negotiations, was fair and reasonable, and intend to contest the appraisal claim. Discovery in the matter has commenced and a trial on the action is scheduled to begin in December 2018.

On April 12, 2017, we filed a patent infringement complaint in the U.S. District Court for the Eastern District of New York against SGL Carbon, LLC and SGL Carbon SE (collectively, SGL), alleging infringement of patents relating to wafer carrier technology used in MOCVD equipment. The complaint alleges that SGL infringes Veeco s patents by making and selling certain wafer carriers to Veeco s competitor, Advanced Micro-Fabrication Equipment, Inc. (AMEC). On November 2, 2017, the U.S. District Court granted our motion for a preliminary injunction prohibiting SGL from shipping wafer carriers using our patented technology without our express authorization.

On July 13, 2017, AMEC filed a patent infringement complaint against Veeco Instruments Shanghai Co., Ltd. (Veeco Shanghai) with the Fujian High Court in China, alleging that our MOCVD products infringed a Chinese utility model patent relating to the synchronous movement engagement mechanism in a chemical vapor deposition reactor and seeking injunctive relief and monetary damages against Veeco Shanghai. On December 7, 2017, without providing notice to us and without hearing our position on alleged infringement, the Fujian High Court issued a preliminary injunction, applicable in China, that requires Veeco Shanghai to stop importing, making, selling, and offering to sell Veeco EPIK 700 model MOCVD systems and to stop importing, selling, and offering to sell wafer carriers used as supplies for the EPIK 700 MOCVD system.

On February 8, 2018, Veeco, AMEC, and SGL announced that they had mutually agreed to settle the pending litigation among the parties and to amicably resolve all pending disputes, including AMEC s lawsuit against Veeco before the Fujian High Court in China and Veeco s lawsuit against SGL before the U.S. District Court for the Eastern District of New York. As part of the settlement, all legal actions worldwide (in court, patent offices, and otherwise), between Veeco, AMEC, and SGL, and their affiliates, will be dismissed and/or otherwise withdrawn. As a result, all business processes, including sales, service, and importation, will be continued.

We are involved in various other legal proceedings arising in the normal course of business. We do not believe that the ultimate resolution of these matters will have a material adverse effect on its consolidated financial position, results of operations, or cash flows.

Item 4. Mine Safety Disclosures

Not Applicable.

Table of Contents

PART II

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

Our common stock is quoted on The NASDAQ Stock Market under the symbol VECO. The 2017 and 2016 high and low closing bid prices by quarter are as follows:

	2017		2016	
	High	Low	High	Low
First Quarter	$ 30.05	$ 24.85	$ 20.64	$ 16.89
Second Quarter	34.20	27.40	19.72	15.79
Third Quarter	32.95	18.60	20.98	15.91
Fourth Quarter	22.25	11.90	29.95	19.75

On February 14, 2018, the closing price for our common stock on The NASDAQ Stock Market was $18.70, and we had 124 shareholders of record.

We have not paid dividends on our common stock. The Board of Directors will determine future dividend policy based on our consolidated results of operations, financial condition, capital requirements, and other circumstances.

Issuer Purchases of Equity Securities

Share repurchase activity during the three months ended December 31, 2017 is as follows:

Period		Total Number of Shares Purchased	Average Price Paid Per Share	Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs	Approximate Dollar Value of Shares That May Yet Be Purchased Under the Plans or Programs
		(in thousands, except average price paid per share)			
October 2, 2017	October 29, 2017		$		$
October 30, 2017	December 3, 2017				
December 4, 2017	December 31, 2017	203	14.83	203	96,982

During fiscal year 2017, 2016, and 2015, we repurchased 0.2 million shares, 0.7 million shares, and 0.5 million shares of our common stock for $3.0 million, $13.1 million, and $9.2 million, respectively, through our share repurchase programs. On December 11, 2017, our Board of Directors authorized a program to repurchase up to $100 million of the Company s outstanding common stock to be completed through

December 11, 2019, after completion of the previous program on October 28, 2017. Repurchases may be made from time to time on the open market or in privately negotiated transactions in accordance with applicable federal securities laws. The timing and amount of future repurchases, if any, will depend upon market conditions, SEC regulations, and other factors. The repurchases would be funded using available cash balances and cash generated from operations. The program does not obligate us to acquire any particular amount of common stock and may be modified or suspended at any time at our discretion.

Table of Contents

Stock Performance Graph

ASSUMES $100 INVESTED ON DEC. 31, 2012

ASSUMES DIVIDENDS REINVESTED

FISCAL YEAR ENDING DEC. 31

2012	2013	2014	2015	2016	2017

Veeco Instruments Inc.	100.00	111.60	118.28	69.72	98.85	50.36
S&P Smallcap 600	100.00	141.31	149.45	146.50	185.40	209.94
RDG MidCap Technology	100.00	161.83	159.04	138.67	123.87	132.83

Table of Contents

Item 6. Selected Financial Data

The information set forth below should be read in conjunction with the Results of Operations section included in Item 7, Management s Discussion and Analysis of Financial Condition and Results of Operations.

	Year ended December 31,				
	2017 (1)	2016	2015	2014 (2)	2013
	(in thousands, except per share data)				
Statement of Operations Data:					
Net sales	$ 484,756	$ 332,451	$ 477,038	$ 392,873	$ 331,749
Operating income (loss)	(63,778)	(120,402)	(23,232)	(79,209)	(71,812)
Income (loss) from continuing operations, net of tax	(44,793)	(122,210)	(31,978)	(66,940)	(42,263)
Basic income (loss) per common share from continuing operations	(1.01)	(3.11)	(0.80)	(1.70)	(1.09)
Diluted income (loss) per common share from continuing operations	(1.01)	(3.11)	(0.80)	(1.70)	(1.09)

(1) During the second quarter of 2017, the Company acquired Ultratech. The results of operations of Ultratech have been included in the consolidated financial statements since that date.

(2) During the fourth quarter of 2014, the Company acquired PSP. The results of operations of PSP have been included in the consolidated financial statements since that date.

	December 31,				
	2017	2016	2015	2014	2013
	(in thousands)				
Balance Sheet Data:					
Cash and cash equivalents	$ 279,736	$ 277,444	$ 269,232	$ 270,811	$ 210,799
Short-term investments	47,780	66,787	116,050	120,572	281,538
Working capital	373,536	357,999	379,904	387,254	485,452
Total assets	1,387,287	758,532	890,789	929,455	947,969
Long-term debt (less current installments)	275,630	826	1,193	1,533	1,847
Total equity	840,713	594,595	714,615	738,932	780,230

Table of Contents

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

Executive Summary

On May 26, 2017, we completed the acquisition of Ultratech. Ultratech develops, manufactures, sells, and supports lithography, laser annealing, and inspection equipment for manufacturers of semiconductor devices, including front-end semiconductor manufacturing and advanced packaging. Ultratech also develops, manufactures, sells, and supports ALD equipment for scientific and industrial applications. Ultratech s customers are primarily located throughout the United States, Europe, China, Japan, Taiwan, Singapore, and Korea. With the addition of Ultratech, we establish ourselves as a leading equipment supplier in the advanced packaging market, forming a strong technology portfolio to address critical advanced packaging applications, as well as greatly increasing our critical mass in the front-end semiconductor market. The results of Ultratech s operations have been included in the consolidated financial statements since the date of acquisition.

We categorize our revenue by the key market segments into which we sell. Our four key markets are: Advanced Packaging, MEMS & RF Filters; LED Lighting, Display & Compound Semiconductor; Front-End Semiconductor; and Scientific & Industrial.

We are a technology company that develops, manufactures, sells, and supports semiconductor process equipment aligned to meet the demands of key global trends such as enhanced mobility, increased connectivity, and energy efficiency. Our primary technologies include metal organic chemical vapor deposition, advanced packaging lithography, wet etch and clean, laser annealing, ion beam, molecular beam epitaxy, wafer inspection, and atomic layer deposition systems. These technologies play an integral role in producing LEDs for solid-state lighting and displays, and in the fabrication and packaging of advanced semiconductor devices. With equipment designed to optimize performance, yield, and cost of ownership, we hold technology leadership positions in all of these served markets.

Sales in the Advanced Packaging, MEMS & RF Filter markets were driven by Lithography and PSP systems, as the market continues to be influenced by the mobility trend and increasing functionality in mobile devices. Advanced Packaging opportunities slowed in 2017 as customers temporarily delayed adoption of fan-out wafer level packaging (FOWLP) in favor of cheaper flip chip solutions. Our versatile PSP product architecture has allowed us to continue to generate solid business in the MEMS and RF Filter portion of this category. We remain well positioned for future growth in these markets, supported by trends such as mobile connectivity, automotive electronics, big data processing and 5G infrastructure deployment, as well as the longer term growth of FOWLP and other Advanced Packaging applications.

Sales in the LED Lighting, Display & Compound Semiconductor market were driven by the continued shipment of MOCVD and PSP systems to customers in China, Malaysia, and Europe. The largest applications for LEDs are solid state lighting, followed by TV displays. Over the past several quarters, demand has increased for larger LCD TV displays, which require relatively more LEDs to backlight than smaller display sizes. More recently, we have seen an increase in demand in non general-lighting applications such as 3D sensors, VCSELs, laser diodes, and RF devices. Our broad portfolio of MOCVD and PSP technologies have been developed to support these significant industry trends, driving an increase in demand for our MOCVD and PSP equipment. Our product mix in the LED market is expected to shift, and we expect to see a decline in gross margins in the first half of 2018. We expect margins in the second half of 2018 to be higher than the first half.

Sales in the Front-End Semiconductor market were primarily driven by Laser Annealing systems, an IBD Photomask system for EUV applications, and IBE systems sold into STT-MRAM applications. We see strong interest from customers for our laser melt anneal systems

which are being qualified in 7nm and 5nm applications, as well as our 3D inspection systems which are being evaluated at several high volume manufacturing fabs.

Sales in the Scientific & Industrial markets were supported by shipments of Ion Beam systems for optical coatings and data storage applications, as well as shipments of MBE systems to universities and laboratories. While equipment demand from each individual market may fluctuate quarter to quarter, the diverse customer base has historically provided a relatively stable revenue stream for the Company.

Table of Contents

Results of Operations

Years Ended December 31, 2017 and 2016

The following table presents revenue and expense line items reported in our Consolidated Statements of Operations for 2017 and 2016 and the period-over-period dollar and percentage changes for those line items. Our results of operations are reported as one business segment, represented by our single operating segment, including the Ultratech business acquired.

				(dollars in thousands)					
Net sales	$	484,756	100%	$	332,451	100%	$	152,305	46%
Cost of sales		300,438	62%		199,593	60%		100,845	51%
Gross profit		184,318	38%		132,858	40%		51,460	39%
Operating expenses, net:									
Research and development		81,987	17%		81,016	24%		971	1%
Selling, general, and administrative		100,250	21%		77,642	23%		22,608	29%
Amortization of intangible assets		35,475	7%		19,219	6%		16,256	85%
Restructuring		11,851	2%		5,640	2%		6,211	110%
Acquisition costs		17,786	4%			0%		17,786	*
Asset impairment		1,139	0%		69,520	21%		(68,381)	(98)%
Other, net		(392)	(0)%		223	0%		(615)	*
Total operating expenses, net		248,096	51%		253,260	76%		(5,164)	(2)%
Operating income (loss)		(63,778)	(13)%		(120,402)	(36)%		56,624	*
Interest income (expense), net		(17,122)	(4)%		958	0%		(18,080)	*
Income (loss) before income taxes		(80,900)	(17)%		(119,444)	(36)%		38,544	*
Income tax expense (benefit)		(36,107)	(7)%		2,766	1%		(38,873)	*
Net income (loss)	$	(44,793)	(9)%	$	(122,210)	(37)%	$	77,417	*

* Not meaningful

Net Sales

The following is an analysis of sales by market and by region:

				(dollars in thousands)					
Sales by market									
	$	253,785	52%	$	144,675	44%	$	109,110	75%

LED Lighting, Display & Compound Semiconductor								
Advanced Packaging, MEMS & RF Filters		69,353	14%		68,304	21%	1,049	2%
Scientific & Industrial		120,788	25%		111,198	33%	9,590	9%
Front-End Semiconductor		40,830	9%		8,274	2%	32,556	393%
Total	$	484,756	100%	$	332,451	100%	$ 152,305	46%
Sales by geographic region								
United States	$	94,936	20%	$	85,637	26%	$ 9,299	11%
China		107,844	22%		85,834	26%	22,010	26%
EMEA		76,636	16%		83,410	25%	(6,774)	(8)%
Rest of World		205,340	42%		77,570	23%	127,770	165%
Total	$	484,756	100%	$	332,451	100%	$ 152,305	46%

Table of Contents

Total sales increased across all market categories for the year ended December 31, 2017 against the comparable prior year period, driven by ongoing improvements in LED industry conditions, as well as additional sales of approximately $65.5 million from the Ultratech business acquired in May 2017, primarily in the Front-End Semiconductor and Advanced Packaging, MEMS, and RF Filters markets. Pricing was not a significant driver of the change in total sales. By geography, sales increased in the United States, China, and Rest of World regions, offset by a slight decrease in the EMEA region. The most significant increase occurred in the Rest of World region, which was attributable to the increased sales in the LED Lighting, Display & Compound Semiconductor market in Malaysia, as well as additional sales from the Ultratech business acquired. Sales into Malaysia for the year ended December 31, 2017 was approximately $78.2 million, compared to $6.6 million for the year ended December 31, 2016. Sales in China increased principally due to increased sales in the LED Lighting, Display, and Compound Semiconductor market. We expect there will continue to be year-to-year variations in our future sales distribution across markets and geographies.

Orders increased to $570.7 million in 2017, an increase of $196.5 million, or 53% compared with 2016. The LED Lighting, Display, and Compound Semiconductor and Scientific & Industrial markets increased 51% and 56%, respectively, driven by overall improvements in industry conditions. The Advanced Packaging, MEMS, and RF Filters and Front-End Semiconductor markets increased 52% and 49%, respectively, driven by the additional bookings from the Ultratech acquisition.

One of the performance measures we use as a leading indicator of the business is the book-to-bill ratio. The ratio is defined as orders recorded in a given period divided by revenue recognized in the same period. A ratio greater than one indicates we are adding orders faster than we are recognizing revenue. In 2017, the ratio was 1.2, a rise compared to the 2016 ratio of 1.1. Our backlog at December 31, 2017 was $334.3 million, which was higher than the ending backlog at December 31, 2016 of $209.2 million. During the year ended December 31, 2017, we increased backlog by approximately $41.6 million relating to backlog acquired from Ultratech, while adjusting for a decrease in backlog of approximately $2.0 million relating to orders that no longer met our bookings criteria. For certain sales arrangements, we require a deposit for a portion of the sales price prior to manufacturing a system for a customer. At December 31, 2017 and 2016, we had customer deposits of $41.5 million and $22.2 million, respectively.

Gross Profit

In 2017, gross profit increased compared to 2016 due to an increase in sales volume, including the acquisition of Ultratech, partially offset by decreased gross margins. Gross margins decreased principally due to an inventory fair value step-up that was recorded in connection with the purchase accounting relating to the Ultratech acquisition. Our product mix in the LED market is expected to shift, and we expect to see a decline in gross margins in the first half of 2018. We expect margins in the second half of 2018 to be higher than the first half.

Research and development

The markets we serve are characterized by continuous technological development and product innovation, and we invest in various research and development initiatives to maintain our competitive advantage and achieve our growth objectives. Research and development expenses remained relatively flat in 2017 compared to 2016, as the addition of the acquired Ultratech related research and development projects was offset by our decision to reduce investments in certain technology, as well as decreases in other personnel-related expenses and professional fees, as a result of our initiative to streamline operations, enhance efficiency, and reduce costs.

Selling, general, and administrative

Selling, general, and administrative expenses increased primarily due to the addition of the acquired Ultratech related selling, general, and administrative costs, as well as increased professional and legal fees.

Amortization expense

The increase in amortization expense is a result of the additional intangibles acquired as part of the acquisition of Ultratech, offset by the lower amortization resulting from the impairment of the certain technology assets in the prior year

Table of Contents