ENTEGRIS INC
Form 10-K
February 17, 2017
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, 2016
or
o TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the transition period from to
Commission file number: 001-32598

Entegris, Inc.
(Exact name of registrant as specified in its charter)

Delaware	41-1941551
(State or Other Jurisdiction of Incorporation or Organization)	(I.R.S. Employer Identification No.)

129 Concord Road, Billerica, Massachusetts 01821
(Address of principal executive offices and zip code)
(978) 436-6500
(Registrant's telephone number, including area code)
Securities registered pursuant to Section 12(b) of the Act:

Title of Class	Name of Exchange on which Registered
Common Stock, $0.01 Par Value	The Nasdaq Global Select Market

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

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Indicate by check mark if the registrant is a well known seasoned issuer, as defined in Rule 405 of the Securities Act. x Yes o No
Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or 15(d) of the Act. o Yes x No
Indicate by check mark whether the registrant: (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes 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 (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes x No o
Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§229.405) is not contained herein and will not be contained, to the best of registrant's knowledge, in definitive proxy or information

statements incorporated by reference in Part III of Form 10-K or any amendment to this Form 10-K. o

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer or a smaller reporting company. (Check one):

Large Accelerated Filer x	Accelerated Filer o
Non-Accelerated Filer o (Do not check if a smaller reporting company)	Smaller reporting company o

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

Table of Contents

The aggregate market value of voting stock held by non-affiliates of the registrant, based on the last sale price of the Common Stock on July 2, 2016, the last business day of registrant's most recently completed second fiscal quarter, was $1,819,711,619. Shares held by each officer and director of the registrant and by each person who owned 10 percent or more of the outstanding Common Stock have been excluded from this computation in that such persons may be deemed to be affiliates of the registrant. This determination of affiliate status for this purpose is not necessarily a conclusive determination for other purposes.

As of February 14, 2017, 141,220,481 shares of the registrant's Common Stock were outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's Definitive Proxy Statement for its 2017 Annual Meeting of Stockholders scheduled to be held on May 24, 2017, or the 2017 Proxy Statement, which will be filed with the Securities and Exchange Commission, or SEC, not later than 120 days after December 31, 2016, are incorporated by reference into Part III of this Annual Report on Form 10-K. With the exception of the portions of the 2017 Proxy Statement expressly incorporated into this Annual Report on Form 10-K by reference, such document shall not be deemed filed as part of this Annual Report on Form 10-K.

Table of Contents

ENTEGRIS, INC.
INDEX TO ANNUAL REPORT ON FORM 10-K
FOR THE FISCAL YEAR ENDED DECEMBER 31, 2016

	Caption	Page
PART I		
Item 1.	Business	1
Item 1A.	Risk Factors	10
Item 1B.	Unresolved Staff Comments	21
Item 2.	Properties	21
Item 3.	Legal Proceedings	22
Item 4.	Mine Safety Disclosures	22
PART II		
Item 5.	Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities	24
Item 6.	Selected Financial Data	26
Item 7.	Management's Discussion and Analysis of Financial Condition and Results of Operations	27
Item 7A.	Quantitative and Qualitative Disclosures About Market Risk	45
Item 8.	Financial Statements and Supplementary Data	45
Item 9.	Changes in and Disagreements with Accountants on Accounting and Financial Disclosure	45
Item 9A.	Controls and Procedures	45
Item 9B.	Other Information	47
PART III		
Item 10.	Directors, Executive Officers and Corporate Governance	48
Item 11.	Executive Compensation	48
Item 12.	Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters	48
Item 13.	Certain Relationships and Related Transactions, and Director Independence	49
Item 14.	Principal Accountant Fees and Services	49
PART IV		
Item 15.	Exhibits and Financial Statement Schedules	50
	Signatures	54
	Exhibit Index	55
	Index to Financial Statements	F-1

Table of Contents

PART I

Item 1. Business.

THE COMPANY

Entegris, Inc. (“Entegris”, “the Company”, “us”, “we”, or “our”) is a leading global developer, manufacturer and supplier of microcontamination control products, specialty chemicals and advanced materials handling solutions for manufacturing processes in the semiconductor and other high-technology industries. Entegris seeks to leverage its unique breadth of capabilities to create value for its customers by developing mission-critical solutions to maximize manufacturing yields and enable higher device performance.

To produce faster and more powerful semiconductors, manufacturing technology has been rapidly moving to smaller process nodes, adopting new device architecture, such as FinFET transistors and 3D-NAND, and utilizing new and innovative manufacturing materials. Maximizing yields in this increasingly complex manufacturing environment requires the effective development and application of these new materials, a reliable and consistent supply, contamination-free transportation, storage and delivery, seamless integration into the semiconductor manufacturing process, and even higher levels of purity and contaminant control throughout the entire process.

Entegris is uniquely positioned to deliver advanced and specialty materials, free from contamination, with optimized packaging and delivery solutions, and in-process filtration and purification to ensure that liquid chemistries and gases are free from contaminants before reaching the wafer. Our technology portfolio includes approximately 20,000 standard and customized products and solutions to achieve the highest levels of purity and performance that are essential to the manufacture of semiconductors, flat panel displays, light emitting diodes, or LEDs, high-purity chemicals, solar cells, gas lasers, optical and magnetic storage devices, and critical components for aerospace, glass manufacturing and biomedical applications. The majority of our products are consumed at various times throughout the manufacturing process, with demand driven in part by the level of semiconductor and other manufacturing activity.

Our business is organized and operated in three operating segments which align with the key elements of the advanced semiconductor manufacturing ecosystem. The Specialty Chemicals and Engineered Materials (SCEM) segment provides high-performance and high-purity process chemistries, gases, and materials and safe and efficient delivery systems to support semiconductor and other advanced manufacturing processes. The Advanced Materials Handling (AMH) segment develops solutions to monitor, protect, transport, and deliver critical liquid chemistries and substrates for a broad set of applications in the semiconductor industry and other high-technology industries. The Microcontamination Control (MC) segment offers solutions to purify critical liquid chemistries and gases used in semiconductor manufacturing processes and other high-technology industries. While these segments have separate products and technical know-how, they share a single, global sales force, unified core systems and processes, global technology centers, strategic and technology roadmaps, and a focus on a common set of customers. The Company leverages its expertise from these three segments technologies to create new and increasingly integrated solutions for its customers.

SEMICONDUCTOR INDUSTRY BACKGROUND

Semiconductors, or integrated circuits, are key components in modern electronic devices such as computers, smart phones, tablets, home appliances, digital cameras, televisions, light bulbs and automobiles. The manufacture of semiconductors requires hundreds of highly complex and sensitive manufacturing steps, during which a variety of materials are repeatedly applied to a silicon wafer to build integrated circuits on the wafer surface. We provide specialty materials and chemicals utilized in many of these process steps, offer a broad range of products to monitor, protect, transport, and deliver these critical process materials during the manufacturing process and provide systems to purify liquid chemistry and gases throughout the manufacturing process. The process steps that rely most heavily on our products are described below.

Deposition. The two main deposition processes are physical vapor deposition, where a thin film is deposited on a wafer surface in a low-pressure gas environment, and chemical vapor deposition, where a thin film is deposited on a wafer surface using a gas medium and a chemical bonding process. In addition, electro-plating technology is used for the deposition of low resistance conductive materials such as copper. Our advanced precursor materials and electro-plating chemicals are utilized to enable the composition, uniformity and thickness of deposited films and our

filtration and purification products are used to remove defects and contaminants from liquids and gases used during the deposition process. These products are critical to ensuring the performance of the semiconductor circuit and, consequently, the manufacturing yield.

Chemical Mechanical Planarization (CMP). CMP is a polishing process used by semiconductor manufacturers to planarize, or flatten, many of the layers of material that have been deposited upon silicon wafers. We offer a broad range of products used by semiconductor manufacturers during and immediately following the CMP process. Our formulated cleaning chemistries remove residue from wafer surfaces after the CMP process, and prevent subsequent corrosion. Our filtration and purification systems are used to filter liquid slurries and cleaning chemistries in order to remove oversized particles and contaminants that can cause defects on a wafer's surface. Our roller brushes are used in conjunction with our cleans chemistries to clean the wafer after completion

Table of Contents

of the CMP process in order to prepare the wafer for subsequent operations and our pad conditioners are used to prepare the surface of the CMP polishing pad prior to every polishing cycle.

Photolithography. Photolithography is a process repeated many times that uses light to print, or pattern, complex circuit patterns onto the wafer. To print the projected optical pattern, the wafer is coated with a thin film of light-sensitive material, called photoresist. Light is projected to expose the photoresist, which is then developed (somewhat like photographic film) to create a stenciled image pattern. Our liquid filtration and liquid dispense systems play a vital role in assuring the pure, accurate and uniform dispense of photoresists onto the wafer so that manufacturers can achieve acceptable yields in the manufacturing process, and our gas microcontamination control systems eliminate airborne contaminants that can disrupt effective photolithography processes.

Etch and Resist Strip. During the etch process, specific areas of the film that have been deposited on the surface of a wafer are removed to leave a desired circuit pattern. After the etch process, the hardened resist needs to be completely removed. Our formulated chemical solutions remove photo resists and post-etch residues, and our gas filters and purifiers help assure the purity of the process gas streams used in the etch process. We expect an increased need for wet chemistries capable of selectively removing material at advanced technology nodes to drive demand for selective wet etch formulations.

Ion Implant. Ion implantation is a key technology for forming transistors and is used many times during semiconductor fabrication. During ion implantation, wafers are bombarded by a beam of electrically-charged ions, called dopants, which change the electrical properties of the exposed surface films. Our Safe Delivery Source® (SDS®) and VAC® (Vacuum Actuated Cylinders) gas delivery systems assure the safe, effective and efficient delivery of the toxic gases necessary for the implant process. In addition, our proprietary low temperature plasma coating processes for core components are critical elements of ion implantation equipment.

Wet Cleaning. Ultra-high purity chemicals and photoresists of precise composition are used to clean the wafers before and after several of the processes described above, to pattern circuit images and to remove photoresists after etch. The cleaning chemicals must be maintained at very high purity levels without the presence of foreign material such as particles, ions or organic contaminants in order to maintain manufacturing yields and avoid defective products. Our proprietary formulated cleaning chemistries are used in these wet cleaning processes and our liquid filters and purifiers assure the purity of these chemicals.

Transportation and Protection. Our wafer and reticle carriers are high-purity “micro-environments” that carry wafers between each of the above process steps, protecting them from damage and contamination during transportation. Front-end wafer processing can involve hundreds of steps and take several weeks. As a result, a batch of 25 fully processed wafers, the standard number of wafers that can be transported in one of our 200 mm and 300 mm products, can be worth several million dollars. It is essential that the wafer be well protected to minimize the risk of any damage. Our products enable semiconductor manufacturers to: minimize contamination (often measured in parts per trillion); protect semiconductor devices from electrostatic discharge and shock; avoid process interruptions; prevent damage or abrasion to wafers and materials during automated processing caused by contact with other materials or equipment; prevent damage due to abrasion or vibration of work-in-process and finished goods during transportation to and from customer and supplier facilities; and eliminate the dangers associated with handling toxic chemicals.

Many of the processes used to manufacture semiconductors are also used to manufacture photovoltaic cells, LEDs, flat panel displays and magnetic storage devices resulting in the need for similar filtration, purification, control and measurement capabilities. We seek to leverage our products, technologies and expertise to address these important market opportunities.

INDUSTRY TRENDS

Semiconductor manufacturing continues to increase in complexity as new materials and new process technologies have been introduced to enable future generations of higher-performing and smaller devices and to achieve productivity gains for manufacturers. At advanced technology nodes, there has been an increasing need for innovative materials and the reliable, consistent and quality-controlled supply of these materials. These critical materials must be pure during the various stages of manufacture, from delivery to the manufacturer to point-of-use on the wafer. Manufacturers are requiring a greater level of integration of these materials into the manufacturing process and fab operation. We expect these trends to continue and to increase the need and demand for our advanced materials, our

products designed to monitor, protect, transport, and deliver critical materials and our purification solutions. We have been collaborating with our customers to develop new materials, to develop enhanced methods of filtration and purification and to introduce advanced materials packaging and monitoring capabilities that will address the challenges of the advanced technology nodes.

Our semiconductor customers have become increasingly focused on materials handling solutions that enable them to safely store, handle, process and transport critical materials throughout the manufacturing process to minimize the potential for damage or degradation to their materials and to protect their investment in processed wafers. We believe that these trends provide opportunities for us to utilize our unique breadth of capabilities to provide innovative materials, materials management, purification, wafer transport, and process solutions to semiconductor customers to enable them to successfully manage this growing complexity.

The market for semiconductors has grown significantly over the past few decades. This trend is expected to continue as the Internet of Things, the connectivity of a broad range of devices, such as home devices, automobiles and smart grids, grows. We believe that the Internet of Things will drive growth in the demand for semiconductors and create significant opportunities for our products.

Table of Contents

Emerging applications relating to the autonomous car, cloud computing, machine learning and artificial intelligence, and virtual reality, along with existing applications in data processing, wireless communications, broadband infrastructure, personal computers, handheld electronic devices and other consumer electronics, are also expected to drive demand for semiconductors, and in turn, our products.

Our customers require greater capabilities from their key materials suppliers. For example, our customers require that their suppliers demonstrate a focus on sustainability, scalability, and flexible manufacturing, with increasing importance on quality control capabilities. We have responded to these demands by deploying resources to enable us to align with the requirements of our customers and drive operational excellence. We believe these trends will allow us to leverage our manufacturing and operational capabilities, along with our broad technology portfolio, to become an increasingly important strategic supplier to our customers.

The semiconductor industry is currently undergoing consolidation, with a number of major firms merging or being acquired, and we have seen our customer base within the semiconductor industry consolidate. While we continue to strengthen our relationships in the semiconductor industry, we seek to leverage our products, technologies and expertise in serving semiconductor applications to address adjacent market opportunities, including in manufacturing processes for flat panel displays, high-purity chemicals, solar cells, optical magnetic storage devices and products for life sciences.

An additional factor that could spur future industry growth is semiconductor industry development in China, which currently represents a relatively small portion of global semiconductor production. Expansion and growth of the semiconductor industry in China could increase the need and demand for our products.

OUR BUSINESS STRATEGY

Our objective is to be a leading global provider of advanced materials and material handling and contamination control solutions used in processing and manufacturing in high-technology industries. We intend to leverage our market-leading position and strengthen our core business in the semiconductor industry. We will also build upon our position as a worldwide developer, manufacturer and supplier of advanced specialty materials, filtration and purification solutions, delivery systems, and materials packaging solutions to grow our business in other high value-added manufacturing process markets. Our strategy includes the following key elements:

Technology Leadership. We continuously improve our products as our customers' needs evolve. As semiconductor devices become smaller and more powerful, and new materials and processes are deployed to produce them, we seek to expand our technological capabilities by developing advanced products that address the requirements for greater purification, protection and transport of high value-added materials and by developing advanced chemical materials for use in critical fabrication processes. For example, we have introduced sub-10 nanometer and 7 nanometer filtration products, advanced deposition materials for next generation transistor and interconnect technologies, advanced reticle pods for extreme ultra-violet or EUV photolithography applications, advanced 300 mm wafer carriers and advanced coatings to meet the rigorous demands of the advanced technology nodes faced by our customers.

Leveraging our Expertise. We leverage our broad expertise across our portfolio of advanced materials, materials handling and purification capabilities to create innovative new solutions to address unmet customer needs. For example, our industry-leading post-CMP cleaning chemistry is developed and manufactured by our SCEM segment, packaged with our ultra clean container and connector system made by our AMH segment, and delivered to the process tools through fluid handling systems also made by AMH segment. In the process tool, these chemistries may go through one or several purification systems made by our MC segment to eliminate particles and contaminants. Another example of the results of this strategy is our advanced deposition materials business, where we leverage our ability to synthesize unique molecules, our knowledge of how to purify these materials, and our capability to safely transport these materials and deliver them onto the wafer at the highest throughput. We believe our diverse expertise in areas of increasing importance to semiconductor manufacturers is a competitive advantage.

Comprehensive and Diverse Product Offerings. As semiconductor manufacturers are driving towards more advanced technology nodes, our customers are seeking suppliers who can provide a broad range of reliable, flexible and cost-effective products and materials, as well as the technological and application design expertise necessary to enhancing their productivity, quality, and yield. We believe our comprehensive offering of materials and products creates a competitive advantage as it enables us to meet a broad range of customer needs and provide a single source

of flexible product offerings for semiconductor device and capital equipment manufacturers as they seek to consolidate their supplier relationships and pursue advanced technology nodes.

Global Presence. We have established a global infrastructure of design, manufacturing, distribution, service and technical support facilities to meet the needs of our global customers. We have, for example, expanded our manufacturing operations in Taiwan and South Korea to support our important customers in these regions, established new sales and service offices in China in anticipation of a growing semiconductor manufacturing base in that country, expanded our presence in Singapore to enhance our global and regional management of supply chain and manufacturing processes, and increased our investment in advanced technology centers in Taiwan and South Korea. We service our customer relationships in Asia, Europe and the Middle East predominantly via direct sales and support personnel and to a lesser extent through selected independent sales representatives and distributors.

Table of Contents

Operational Excellence. We have established leading-edge manufacturing plants located in the United States, France, Malaysia, Japan, South Korea and Taiwan that possess the advanced manufacturing capabilities described under Manufacturing below. Our strategy is to develop our advanced manufacturing capabilities into a competitive advantage with our customers by focusing on the following priorities:

- use of manufacturing equipment and facilities incorporating leading-edge technology including advanced cleanroom and cleaning procedures;
- implementation of standardized manufacturing systems stressing optimization of equipment effectiveness, predictive maintenance, and direct labor productivity;
- implementation of automated quality systems that provide both process monitoring and process control throughout the manufacturing process as well as predictive quality data to mitigate against potential quality excursions;
- implementation of supply chain management systems that assure a reliable and responsive supply of high-quality raw materials;
- conduct of manufacturing operations to assure the safety of our employees and of the individuals using our products; and
- maintaining an agile manufacturing organization that is capable of rapid design and development of prototypes of new and derivative products, as well as quickly responding to customer feedback concerning prototypes and that has the ability to quickly commercialize and ramp production of prototypes accepted by our customers.

Strong Relationships with Broad Customer Base. We have strong relationships with our customers, which include leading semiconductor manufacturers, original equipment manufacturers (OEMs), and semiconductor materials suppliers. These relationships provide us with significant collaboration opportunities at the product design stage, which facilitate our ability to introduce new products and applications. For example, we work with our key customers in the development of advanced manufacturing processes to identify and respond to their requests for current and future generations of products for emerging applications requiring cleaner materials, as well as systems that maintain the integrity and stability of materials during transport through the manufacturing process. We believe that our large customer base will continue to be an important source of new product development opportunities. Due to the specialized nature of our products, manufacturing complexity, qualification requirements in customers' fabrication processes, high customer re-formulation and qualification change costs, and extensive proprietary products, we believe our supply position with our customers is strong.

Adjacent Markets. We leverage our expertise in the semiconductor industry by developing products for other industries that employ similar technologies and production processes and that utilize materials integrity management, high-purity fluids and integrated dispense systems. For example, outside of the semiconductor industry, our products are used in manufacturing processes for flat panel displays, high-purity chemicals, solar cells, optical magnetic storage devices and products for life sciences. We plan to continue to identify and develop products that address needs in adjacent markets. We believe that by utilizing our technology to provide manufacturing solutions across multiple industries, we are able to increase the total available market for our products and reduce, to an extent, our exposure to the cyclicality of any particular market.

Strategic Acquisitions, Partnerships and Related Transactions. We will continue to pursue strategic acquisitions and business partnerships that enable us to address gaps in our product offerings, secure new customers, diversify into complementary product markets, broaden our technological capabilities and product offerings and achieve benefits of increased scale. The ATMI acquisition is an example of this strategy, bringing a whole new portfolio of technologies and materials products to serve our semiconductor customers. Further, as the dynamics of the markets that we serve shift, we will reevaluate our existing businesses and in the event that we conclude that a business is not able to provide value-added solutions to its markets in a manner that contributes to achieving our financial objectives, we expect to restructure or replace that business. Finally, we are continuously evaluating opportunities for strategic alliances, such as the strategic alliance with Enthone, joint development programs and collaborative marketing efforts with key customers and other industry leaders.

OUR SEGMENTS

As discussed, our business is organized and operated in three operating segments which align with the key elements of the advanced semiconductor manufacturing ecosystem: Specialty Chemicals and Engineered Materials (SCEM);

Advanced Materials Handling (AMH); and Microcontamination Control (MC). The Company leverages its expertise from these three segments to create new and increasingly integrated solutions for its customers. The following is a detailed description of our three segments:

SPECIALTY CHEMICALS AND ENGINEERED MATERIALS SEGMENT

The SCEM segment provides high-performance and high-purity process chemistries, gases, and materials and safe and efficient delivery systems to support semiconductor and other advanced manufacturing processes. Utilized in critical semiconductor manufacturing processes such as deposition, cleaning, and integration of complex materials, these products enable enhanced device performance. When used in conjunction with products from our MC and AMH segments, these materials provide unique solutions to advance semiconductor manufacturing processes.

Table of Contents

Specialty Gas Products. Our specialty gas solutions provide advanced safety and process capabilities to semiconductor manufacturers. Our SDS cylinders store and deliver hazardous gases, such as arsine, phosphine, germanium and boron trifluoride, at sub-atmospheric pressure through the use of our proprietary carbon-based adsorbent materials. These products minimize potential leaks during transportation and use, providing significant safety and environmental improvements over traditional high-pressure cylinders, and allow more process gas to be stored in the cylinder, providing significantly higher rates of productivity than traditional methods of gas delivery. New generations of SDS products further dramatically increase the gas storage capacity, reducing tool down time and, therefore, resulting in significant cost savings for our customers. We also offer VAC, a complementary technology to SDS where select implant gases are stored under high pressure but delivered sub-atmospherically.

Specialty Materials Products. Specialty materials products are made from specialized graphite, silicon carbide and/or a variety of unique, high purity coatings and serve as critical components in semiconductor manufacturing equipment at various stages of the semiconductor manufacturing process, including dry or plasma etch, chemical vapor deposition and ion implant. Our POCO® premium graphite is used to make precision consumable electrodes for electrical discharge machining, hot glass contact materials for use in glass product manufacturing and forming, and a number of graphite consumable products for various industrial applications, including aerospace, optical, medical devices and printing. Our high-performance specialty coatings, such as our Pegasus™ coatings, provide corrosion and erosion resistance and desired conductivity, minimize particle generation and prevent contamination on critical components used in semiconductor and other high-technology manufacturing operations.

Advanced Deposition Materials Products. Our advanced deposition materials include advanced liquid, gaseous and solid precursors which are incorporated in chemical vapor deposition (CVD) and atomic layer deposition (ALD) processes by the semiconductor industry, such as our UltraPur™ 4MS and UltraPur™ TEOS products. We offer containers that allow for reliable storage and delivery of low volatility solid and liquid precursors required in ALD processes. When combined with our proprietary corrosion resistant coatings and filtration solutions from our MC segment, our advanced deposition materials enable the industry’s highest purity levels, resulting in improved device performance.

Surface Preparation and Integration Products. We offer a range of materials used to prepare and integrate the surface of a semiconductor wafer during the manufacturing process. For example, our Viaform® product (a trademark of and exclusively licensed from Enthone Inc. (Enthone), a subsidiary of Alent plc (acquired by Platform Specialty Products Corporation in late 2015)) includes inorganic and proprietary organic molecules that provide the wiring for copper interconnects and allows manufacturers to eliminate processing steps. We also offer CMP cleaning solutions for applications such as semiconductor post-etch residue removal, wafer etching, organics removal, negative resist removal, edge bead removal, and corrosion prevention. Our wet chemistries solutions, combined with filtration solutions from our MC segment and fluid handling solutions from our AMH segment, provide enhanced purity resulting in improved capability and consistency in our customers' processes. Our line of consumable PVA roller brush products are used to clean the wafer following the CMP process and our line of pad conditioners, based on our silicon carbide capabilities, offer unique preparation solutions for each distinct CMP pad application, with significant improvement in CMP pad life.

ADVANCED MATERIALS HANDLING SEGMENT

The AMH segment develops solutions to monitor, protect, transport, and deliver critical liquid chemistries and substrates for a broad set of applications in the semiconductor industry and other high-technology industries. These systems and products improve our customers’ yields by protecting wafers from abrasion, degradation and contamination during manufacturing and transportation and by assuring the consistent, clean and safe delivery of advanced chemicals from the chemical manufacturer to the point-of-use in the semiconductor fab. The effective management and maintenance of the entire fluidics system, from initial production of process chemistry, to transportation and dispensing onto the wafer, is critical to enhance device yield.

Wafer Solutions. We lead the market with our high-volume line of Ultrapak® and Crystalpak® products, for wafers ranging from 100 to 200 mm, which ensure the clean and secure transport of wafers. We also offer a front-opening shipping box, or FOSB, for the transportation and automated interface of 300 mm wafers.

We provide front opening unified pods, or FOUPs, wafer transport and process carriers and standard mechanical interface pods, or SMIF pods, which meet a spectrum of industry standard wafer handling needs, in sizes up to

300mm. These microenvironment products safely and accurately deliver wafers to the various process fabrication steps and are optimized with filtration products from our MC segment to ensure the purest ambient environment around the wafer.

Chemical Containers. We produce a wide range of flexible packaging and polymer containers that chemical companies use to ship process chemistries to semiconductor fabs. Our packaging ensures the purity of the chemistry during transportation to enhance yields for the fab. We optimize the compatibility and performance of these products on chemistries through close collaboration with our SCEM segment. We have a broad portfolio of packaging products, from low-volume containers to transport high-value photoresist chemistries, such as our NOWPak® products, to large intermediate bulk containers, or IBCs, for high volume chemical consumption, such as our FluoroPure® products.

Table of Contents

Fluidics. We are a leader in high-purity fluid transfer products such as valves, fittings, tubing, pipe, custom fabricated products and associated connection systems, such as our PrimeLock® connections, for high-purity chemical applications. Our comprehensive product line provides our semiconductor manufacturers, process tool makers and chemical customers with a single-source provider for their process chemical management needs throughout the manufacturing process.

Our patented digital valve control technology improves chemical uniformity on wafers and improves ease of optimized system operation. Our IntelliGen® integrated high-precision liquid dispense systems enable the uniform application of advanced chemistries during the wafer fabrication process, integrating our valve control and filter device technologies from our MC segment, so that filtering and dispensing of photochemicals can occur at different rates, conserving high-value chemistry and reducing defects on wafers.

The AMH segment collaborates closely with the SCEM segment in developing products that are compatible with advanced chemistries to enhance yield, while integrating liquid filtration technology from our MC segment to deliver the most consistent, defect-free chemistry.

MICROCONTAMINATION CONTROL SEGMENT

The MC segment offers solutions to purify critical liquid chemistries and gases used in semiconductor manufacturing processes and other high-technology industries. The design and performance of our liquid chemistry and gas filtration and purification products are critical to the semiconductor manufacturing process because they directly reduce defects and improve manufacturing yield. Our proprietary filters remove chemical and nanometer-sized contaminants and bubbles from the different fluids and gases used in the manufacturing process, including photolithography, deposition, planarization and surface etching and cleaning. Our products prevent defects that could result contamination altering the physical and electrical properties of our customers' products.

Liquid Microcontamination Control Products. We offer a variety of unique products that are optimized to control contaminants in our customers' liquid processes. Our Torrento® series of filters is an example of one line of our products used in leading-edge applications for the filtration of aggressive acid and base chemistries for both semiconductor fabs as well as specialty chemical manufacturers including our SCEM segment. Our Impact® series of filters are used in point-of-use photochemical dispense applications, including those provided by our AMH segment, where the delivery of superior flow rate performance and reduced microbubble formation is critical.

Gas Microcontamination Control Products. Our metal filters, such as stainless steel and nickel filters, reduce out gassing and improve corrosion resistance. Our purifiers chemically react with and absorb contaminants, such as oxygen and water, to prevent contamination, and our vent diffusers reduce particle contamination and processing cycle times. Our GateKeeper® gas purifiers leverage technology developed from our SCEM segment and effectively remove gaseous contaminants down to part-per-trillion levels. Our Chambergard™ gas diffusers provide semiconductor equipment manufacturers with the capability to rapidly vent their tools to atmosphere without adding particles to the wafers under process.

Other products. We also offer our eVOLV™ wet chemical process to recycle electronic waste and recover precious metals and other high-value materials from discarded printed circuit boards and semiconductor chips.

OUR CUSTOMERS AND MARKETS

Our most significant customers include semiconductor device manufacturers, OEMs that provide equipment to semiconductor device manufacturers, gas and chemical manufacturing companies, leading wafer grower companies and manufacturers of high-precision electronics. We also sell our products to flat panel display OEMs, materials suppliers and manufacturers, primarily in in Japan, Korea, China and other parts of Asia.

In our other high-technology markets, our customers include manufacturers and suppliers in the solar and life science industries and, for our Poco Graphite products, electrical discharge machining customers, glass and glass container manufacturers, aerospace manufacturers and manufacturers of biomedical implantation devices.

In 2016, 2015 and 2014, net sales to our top ten customers accounted for 45%, 44% and 42%, respectively, of combined net sales. In 2016, 2015 and 2014, one customer, Taiwan Semiconductor Manufacturing Company Limited, accounted for $161.9 million, $134.1 million and $130.9 million of net sales, respectively, or approximately 14%, 12% and 14% of our net sales, respectively, including sales from each of our three reporting segments. International net sales represented 78%, 77% and 75%, respectively, of net sales in 2016, 2015 and 2014. Approximately 2,300

customers purchased products from us during 2016.

We may enter into supply agreements with our customers. These agreements generally have a term of one to three years, but do not contain any long-term purchase commitments. Instead, we work closely with our customers to develop non-binding forecasts of the future volume of orders. However, customers may cancel their orders, change production quantities from forecasted volumes or delay production for a number of reasons beyond our control.

Table of Contents

SALES, MARKETING AND SUPPORT

We sell our products worldwide, primarily through our direct sales force and strategic independent distributors located in all major semiconductor markets. Independent distributors are also used in other semiconductor market territories and for specific market segments. As of December 31, 2016, our sales and marketing force consisted of 478 employees worldwide.

Our unique capabilities and long-standing industry relationships have provided us with the opportunity for significant collaboration with our customers at the product design stage, which has facilitated our ability to introduce new materials and new solutions that meet our customers' needs. We are constantly identifying for our customers a variety of materials, purification and process control challenges that may be addressed by our products. Our sales representatives provide our customers with worldwide support and information about our products and materials.

We believe that our technical support services are important to our sales and marketing efforts. These services include assisting in defining a customer's needs, evaluating alternative products and materials, designing a specific system to perform the desired operation, training users and assisting customers in compliance with relevant government regulations. Additionally, our field applications engineers, located in the United States and approximately ten other countries, work directly with our customers on product qualification and process improvements in their facilities. We maintain a network of service centers, applications laboratories and technology centers located in all key markets internationally and in the United States to support our products and our customers with their advanced development needs, provide local technical service and ensure fast turnaround time.

COMPETITION

The market for our products is highly competitive. While price is an important factor, we compete primarily on the basis of the following factors:

historical customer relationships;
technical expertise;
product quality and performance;
total cost of ownership;
customer service and support;
breadth of product line;
breadth of geographic presence;
advanced manufacturing capabilities; and
after-sales service.

We believe that we compete favorably with respect to all of the factors listed above, but there are no assurances that we will continue to do so. We believe that our key competitive strengths include our broad product line, our strong research and development infrastructure and investment, our manufacturing excellence, our advanced quality control systems, the low total cost of ownership of our products, our ability to provide our customers with quick order fulfillment and our applications expertise in semiconductor manufacturing processes. However, our competitive position varies depending on the market segment and specific product areas within these segments. While we have longstanding relationships with a number of semiconductor and other electronic device manufacturers, we also face significant competition from companies that also have longstanding relationships with other semiconductor and electronic device manufacturers and, as a result, have been able to have their products specified by those customers for use in manufacturers' fabrication facilities.

The competitive landscape is varied, from multinational companies to small regional, narrow-portfolio focused companies. Overall, industry trends are indicating a shift to localized, cost-competitive and consolidated supply chains.

Because of the unique breadth of our capabilities, we believe that there are no global competitors that compete with us across the full range of our product offerings. Many of our competitors are local companies that participate in only a few products or in specific geographies. While there are other larger, broad-based materials suppliers, many are concentrated in specific product areas, such as filtration, specialty chemicals or materials handling. Key competitors include Pall Corporation (which was acquired by Danaher Corporation in 2015), Shin-Etsu Polymer Co., Ltd., Gemu Valves, Inc., Tokyo Keiso Co., Ltd., Mersen (France), Versum Materials, Inc., DuPont Electronic Technologies, Dow Chemical Company (including Rohm and Haas), Air Liquide, Praxair, Inc., SAES Pure Gas, Inc., Donaldson Company, Inc. and Parker Hannifin Corp.

ENGINEERING, RESEARCH AND DEVELOPMENT

We believe that technology is important to success in each of our businesses, and we plan to continue to devote significant resources to engineering, research and development (R&D), balancing efforts between shorter-term market needs and longer-term investments. Our aggregate engineering, research and development expenses in 2016, 2015 and 2014 were $107.0 million, $105.9 million and $87.7 million, respectively. As of December 31, 2016, we had 436 employees in engineering, research and development. We have supplemented and may continue to supplement our internal research and development efforts by licensing technology from unaffiliated third parties and/or acquiring rights with respect to products incorporating externally owned technologies. Our R&D expenses consist of personnel and other direct and indirect costs for internally funded project development, including the use of outside service providers.

Table of Contents

We believe we have a rich pipeline of development projects. For example, our engineering, research and development efforts have been focusing on growth opportunities in areas such as bulk photochemical filtration, new boron mixtures for ion implant, new solid precursors for deposition, specialty coatings for key applications and new CMP pad conditioners. Our engineering, research and development efforts are directed toward developing and improving our technology platforms for semiconductor and advanced processing applications and identifying and developing products for new applications, often working directly with our customers to address their particular needs.

We have engineering, research and development capabilities in California, Connecticut, Minnesota, Massachusetts, Colorado, Texas, Japan, Korea, Taiwan, France, China, Singapore and Malaysia to meet the global needs of our customers. We use sophisticated methodologies to research, develop and characterize our materials and products. Our capabilities to test and characterize our materials and products are focused on continuously reducing risks and threats to the integrity of the critical materials that our customers use in their manufacturing processes.

We participate in Semiconductor Equipment and Materials International (SEMI®), an association of semiconductor equipment suppliers, and leading industry consortia, such as the Interuniversity Microelectronics Centre (imec®) and Semiconductor Manufacturing Technology (SEMATECH), including its Global 450 Consortium (G450C). For example, we have participated with SEMI to develop specifications for the next generation of wafer shipping and handling products and we have worked with a major customer to develop specific wafer handling products for 450 mm wafers.

PATENTS AND OTHER INTELLECTUAL PROPERTY RIGHTS

We believe that, while intellectual property is important for our business, our success also depends upon close customer contact, innovation, technological expertise, responsiveness and worldwide distribution. Additionally, while our intellectual property may delay or deter a competitor in offering a competing product, we do not believe that our portfolio functions as a barrier to entry for any of our competitors. As of December 31, 2016, our combined patent portfolio included 639 current U.S. patents, 1,364 current foreign patents, including counterparts to U.S. filings, 281 pending U.S. patent applications, 86 pending filings under the Patent Cooperation Treaty not yet nationalized and 943 pending foreign patent applications. We rely on a combination of patent, copyright, trademark and trade secret laws and license agreements to establish and protect our proprietary rights. We refresh our intellectual property on an ongoing basis through continued innovation. While we license and will continue to license technology used in the manufacture and distribution of products from third parties, we do not consider any particular patent or license to be material to our business.

We vigorously protect and defend our intellectual property. We require each of our employees, including our executive officers, to enter into standard agreements pursuant to which the employee agrees to keep confidential all of our proprietary information and to assign to us all inventions made while employed by us. We also require all outside scientific collaborators, sponsored researchers, and other advisors and consultants who are provided confidential information to execute confidentiality agreements upon the commencement of the consulting or collaboration relationship in question. These agreements generally provide that all confidential information developed or made known to the entity or individual during the course of the entity’s or individual’s relationship with the Company is to be kept confidential and not disclosed to third parties except in specific limited circumstances.

MANUFACTURING

Our customers rely on our products and materials to assure the integrity of the critical materials used in their manufacturing processes by providing dimensional precision and stability, purity, cleanliness and consistent performance. Our ability to meet our customers’ expectations, combined with our substantial investments in worldwide manufacturing capacity, position us to respond to the increasing demands of the semiconductor industry and other industries that require yield-enhancing materials and solutions.

To meet our customer needs worldwide, we have established an extensive global manufacturing network with manufacturing and coating facilities in the United States, Japan, Taiwan, France, Malaysia and South Korea. Because we work in an industry where contamination control is paramount, we maintain Class 100 to Class 10,000 cleanrooms for manufacturing and assembly. We believe that our worldwide manufacturing operations and our advanced manufacturing capabilities are important competitive advantages. Our advanced manufacturing capabilities include:

injection molding; specialty coating capabilities;

extrusion;
blow molding;
rotational molding;
compression molding;
membrane casting;
cartridge manufacturing;
graphite synthesis;
machining;
assembly;
tool making;
high-purity materials packaging; and
gas delivery systems.

Table of Contents

We have made significant investments in systems and equipment to create innovative products and tool designs, including metrology and 3D printing capabilities for rapid analysis and production prototype of products.
In addition, we use contract manufacturers for certain of our gas microcontamination control and other electronic materials products both in the U.S. and Asia.

RAW MATERIALS

Our products are made from a wide variety of raw materials that are generally available from multiple sources of supply. However, while we seek to have several sources of supply for all of these materials, certain materials included in our products, such as certain liquid filtration membranes in our MC segment, petroleum coke in our specialty materials products in our SCEM segment and polymer resins in our microenvironment products in our AMH segment are obtained from a single source or a limited group of suppliers. Additionally, our specialty gas products in our SCEM segment use a broad range of specialty and commodity chemicals and polymers in the development of its products, including parts and sub-assemblies that are obtained from a single supplier or a limited number of suppliers, or from suppliers in a single country. We have entered into multi-year supply agreements with a number of suppliers for the purchase of raw materials in the interest of supply assurance and to control costs.
Although the Company seeks to reduce dependence on these sole and limited source suppliers, the partial or complete loss of these sources could interrupt our manufacturing operations and result in an adverse effect on the Company's results of operations. Furthermore, a significant increase in the price of one or more of these components could also adversely affect the Company's results of operations.

GOVERNMENTAL REGULATION

Our operations are subject to federal, state and local regulatory requirements relating to environmental, waste management and health and safety matters, including measures relating to the release, use, storage, treatment, transportation, discharge, disposal and remediation of contaminants, hazardous substances and wastes, as well as practices and procedures applicable to the construction and operation of our plants. There can be no assurance that we will not incur material costs and liabilities or that our past or future operations will not result in exposure to injury or claims of injury by employees or the public. Although some risk of costs and liabilities related to these matters is inherent in our business, as with many similar businesses, we believe that our business is operated in substantial compliance with applicable regulations. However, new, modified or more stringent requirements or enforcement policies could be adopted, which could adversely affect us. While we expect that capital expenditures will be necessary to assure that any new manufacturing facility is in compliance with environmental and health and safety laws, we do not expect these expenditures to be material.

EMPLOYEES

As of December 31, 2016, we had 3,542 full-time employees, as well as approximately 185 temporary and part-time employees. Of our employees, 436 work in engineering, research and development and 478 work in sales and marketing. Given the variability of business cycles in the semiconductor industry and the quick response time required by our customers, it is critical that we be able to quickly adjust the size of our production staff to maximize efficiency. Therefore, we use skilled temporary labor as required.
None of our employees are represented by a labor union or covered by a collective bargaining agreement other than statutorily mandated programs in certain European countries.

FINANCIAL INFORMATION ABOUT OUR OPERATING SEGMENTS

For a discussion of revenue and segment profitability with respect to each of our reporting segments, see Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations - Segment Analysis below, which is incorporated herein by reference. See also note 15 to our consolidated financial statements. Approximately 78%, 77% and 75% of our net sales were made to customers outside North America in 2016, 2015 and 2014, respectively. Industry and geographic segment information is also discussed in note 15 to the Entegris, Inc. consolidated financial statements included in response to Item 8 below, which is incorporated herein by reference.

OUR HISTORY

The Company was incorporated in Delaware on March 17, 2005 in connection with a merger between Entegris, Inc., a Minnesota corporation, and Mykrolis Corporation, a Delaware corporation. On April 30, 2014, the Company acquired ATMI, Inc., a Delaware corporation based in Danbury, CT, referred to throughout this report as ATMI and the ATMI

acquisition. In 2016, Entegris celebrated its 50th year of helping customers solve their critical materials challenges and enhance their manufacturing yields, tracing its corporate origins back to Fluoroware, Inc., which began operating in 1966.

Table of Contents

AVAILABLE INFORMATION

Our Internet address is www.entegris.com. On this web site, under the “Investors-Financial Information-SEC Filings” section, we post the following filings as soon as reasonably practicable after they are electronically filed with, or furnished to, the U.S. Securities and Exchange Commission (SEC): our annual, quarterly, and current reports on Forms 10-K, 10-Q, and 8-K; our proxy statements; any amendments to those reports or statements, and Form SD. All such filings are available on our web site free of charge. The SEC also maintains a web site (www.sec.gov) that contains reports, proxy and information statements, and other information regarding issuers that file electronically with the SEC. The content on our website, and any other website, as referred to in this Form 10-K is not incorporated by reference into this Form 10-K unless expressly noted.

Item 1A. Risk Factors.

You should carefully consider the following risks and other information in this Annual Report on Form 10-K in evaluating us and our common stock.

Any of the following risks could materially and adversely affect our financial condition, results of operations or cash flows. Our operations could be affected by various risks, many of which are beyond our control. Based on current information, we believe that the following list identifies the most significant risk factors that could affect our financial condition, results of operations or cash flows. There may be additional risks and uncertainties that adversely affect our financial condition, results of operations or cash flows in the future that are not presently known, are not currently believed to be material, or are not identified below because they are common to all businesses. Past financial performance may not be a reliable indicator of future performance and historical trends should not be used to anticipate results or trends in future periods. For more information, see “Cautionary Statement” in Item 7 of this Annual Report on Form 10-K.

Risks Relating to our Business and Industry

THE SEMICONDUCTOR INDUSTRY HAS HISTORICALLY BEEN HIGHLY CYCLICAL AND INDUSTRY DOWNTURNS COULD REDUCE OUR NET SALES AND PROFITS.

Our business depends on the purchasing patterns of semiconductor manufacturers, which, in turn, depend on the current and anticipated demand for semiconductors and products utilizing semiconductors. The semiconductor industry has historically been highly cyclical with periodic significant downturns, which often have resulted in significantly decreased expenditures by semiconductor manufacturers. Even moderate cyclicality can cause our operating results to fluctuate significantly from one period to the next. We have in the past experienced significant revenue deterioration and incurred significant operating losses due to a severe downturn in the semiconductor industry. We are unable to predict the ultimate duration and severity of future downturns for the semiconductor industry.

Furthermore, in periods of reduced demand, we must continue to maintain a satisfactory level of engineering, research and development expenditures, continue to invest in our infrastructure and maintain the ability to respond to any significant increases in demand, if they occur. Changes in order patterns have a more immediate impact on our revenues because we typically do not have significant backlog. We expect the semiconductor industry to continue to be cyclical. During downturns our revenue is reduced and there is likely to be an increase in pricing pressure and shifts in product and customer mix, all of which may affect gross margin and net income. Such fluctuations in our results could cause our stock price to decline significantly. We believe that period-to-period comparisons of our results of operations may not be meaningful, and you should not rely upon them as indicators of our future performance.

In addition, there may not be new high-opportunity applications to drive growth in the semiconductor industry, as was the case in earlier market cycles. Accordingly, the semiconductor industry may experience lower growth rates during any recovery cycle than has historically been the case and its longer-term performance may reflect this lower growth rate.

WE MAY BE UNABLE TO MEET DEMAND IN RESPONSE TO THE SEMICONDUCTOR INDUSTRY’S RAPID DEMAND SHIFTS OR ACCURATELY FORECAST DEMAND FOR OUR PRODUCTS, WHICH COULD CAUSE A REDUCTION IN OUR MARKET SHARE AND ADVERSELY AFFECT OUR BUSINESS, FINANCIAL CONDITION AND OPERATING RESULTS.

Our ability to increase sales of our products, particularly our capital equipment products, depends in part upon our ability to ramp up our manufacturing capacity for such products in a timely manner, often in as little as a few months, and to quickly mobilize our supply chain. If we are unable to expand our manufacturing capacity on a timely basis or manage such expansion effectively, our customers could seek such products from other suppliers, and our market share could be reduced. Because demand shifts in the semiconductor industry are rapid and difficult to foresee, we may not be able to increase capacity quickly enough to respond to any such increase in demand.

We typically operate our business on a just-in-time shipment basis with a modest level of backlog and we order supplies and plan production based on internal forecasts of demand. We have, in the past, and may again in the future, fail to accurately forecast

Table of Contents

demand for our products, in terms of both volume and product type. This has led to, and may in the future lead to, delays in product shipments, disappointment of customer expectations, or, alternatively, an increased risk of excess inventory and of inventory obsolescence. If we fail to accurately forecast demand for our products, our business, financial condition and operating results could be materially and adversely affected.

IF WE ARE UNABLE TO CONTINUE OUR TECHNOLOGICAL INNOVATION AND INTRODUCTION OF NEW PRODUCTS, WE WILL NOT BE ABLE TO SUCCESSFULLY COMPETE.

The semiconductor industry is subject to rapid technological change, changing customer requirements and frequent new product introductions. As a result, the life cycle of our products is difficult to determine. We believe that our future success will depend upon our ability to continue to develop mission-critical solutions to maximize our customers' manufacturing yields and enable higher performance of end-market materials or devices. This requires that we successfully anticipate and respond to technological changes in manufacturing processes in a cost-effective and timely manner. A failure to develop new products or enhancements to our existing products or the inability to timely manufacture and ship these products or enhancements in sufficient volume could harm our business prospects and significantly reduce our sales. In addition, if new products have reliability or quality problems, we may experience reduced orders, higher manufacturing costs, delays in acceptance and payment, additional service and warranty expense, and damage to our reputation.

OUR SALES ARE CONCENTRATED ON A SMALL NUMBER OF KEY CUSTOMERS AND, THEREFORE, OUR NET SALES AND PROFITABILITY MAY MATERIALLY DECLINE IF ONE OR MORE OF OUR KEY CUSTOMERS DOES NOT CONTINUE TO PURCHASE OUR EXISTING AND NEW PRODUCTS.

We depend and expect to continue to depend on a limited number of customers for a large portion of our business, and changes in several customers' orders could have a significant impact on our operating results. Our top ten customers accounted for 45%, 44% and 42% of our net sales in 2016, 2015 and 2014, respectively. Our net sales and profitability may decline significantly if any one of our key customers decides to purchase significantly less from us or to terminate its relationship with us entirely. We could also lose our key customers or significant sales to our key customers because of factors beyond our control, such as a significant disruption in our customers' businesses generally or in a specific product line, a change in the manufacturing sourcing policies or practices of these customers or the timing of customer inventory adjustments. For example, our SCEM segment customers' and their customers' aggressive management of inventory has adversely affected its results of operations in the past and may adversely affect future results of operations. Given the generally fixed nature of our costs, if our customers delay or cancel their orders or reduce ordered quantities from forecasted volumes, we may be required to hold inventory for longer than anticipated, our profitability may be reduced, our ability to fund our operations may be restricted, our revenue may incur unanticipated reductions or be delayed and our gross margins may decline.

Our customers could stop incorporating our products into their products with limited advance notice to us and suffer little or no penalty for doing so. The semiconductor industry is currently undergoing consolidation, with a number of major firms merging or being acquired. If any of our customers merge or are acquired, we may experience lower overall sales from the merged or surviving companies. Because we develop long-term relationships with key customers in the product areas we serve, and because we have a long product design and development cycle for most new products, which are then subject to lengthy customer product qualification periods, we may be unable to quickly replace these customers, if at all.

COMPETITION FROM NEW OR EXISTING COMPANIES COULD HARM OUR FINANCIAL CONDITION, RESULTS OF OPERATIONS AND CASH FLOW.

We operate in a highly competitive industry. We compete against many domestic and foreign companies that have substantially greater manufacturing, financial, research and development and marketing resources than we do. In addition, some of our competitors may have better-established relationships with our existing customers than we do, which may enable them to have their products specified for use more frequently and more quickly by these customers. We also face competition from the manufacturing operations of our current and potential customers, who continually evaluate the benefits of internal manufacturing versus outsourcing. As more OEMs dispose of their manufacturing operations and increase the outsourcing of their products to liquid and gas delivery system and other component companies, we may face increasing competitive pressures to grow our business and portfolio of products in order to

maintain our market share. If we are unable to maintain our competitive position, we could experience downward pressure on prices, fewer customer orders, reduced margins, the inability to take advantage of new business opportunities and a loss of market share, which could have a material adverse effect on our results of operations. Further, we expect that existing and new competitors will improve the design of their existing products and will introduce new products with enhanced performance characteristics. The introduction of new products or more efficient production of existing products by our competitors could diminish our market share and increase pricing pressure on our products. Further, if we do not respond to pressure from our customers to lower prices, shorten delivery times and enhance product capability, we could lose customers or orders.

IF WE ARE UNABLE TO OBTAIN FUTURE BUSINESS OPPORTUNITIES ASSOCIATED WITH NEW PRODUCT INITIATIVES AND RELATED CAPITAL INVESTMENT PROJECTS, OUR REVENUE AND PROFITABILITY MAY DECLINE.

Table of Contents

In the semiconductor market, while the development period for a product can be very long, the first company to introduce an innovative product meeting an identified customer need will often have a significant advantage over offerings of competitive products. For this reason, we may make significant cash expenditures to engineer, research, develop and market new products and make significant capital investments in technology and manufacturing capacity in advance of future business developing and without any purchase commitment from our customers. For example, we incurred $107.0 million, $105.9 million and $87.7 million for engineering, research and development expense in 2016, 2015 and 2014, respectively.

Following development, it may take a number of years for sales of a new product to reach a substantial level, if ever. A product concept may never progress beyond the development stage or may only achieve limited acceptance in the marketplace. If this occurs, we do not receive a direct return on our expenditures, we may not realize any indirect benefits, we may lose market share and our revenue and profitability may decline. For example, while we made significant cash expenditures and capital investments to develop the capability to manufacture shippers and FOUPs for 450 mm wafers, the size and timing of the development of the market for 450 mm wafer shippers and FOUPs remains uncertain. As major semiconductor manufacturers have delayed the implementation of 450 mm manufacturing and others have announced that they would not initiate 450 mm manufacturing until after 2020, we cannot assure you that we will be able to successfully sell significant quantities of our 450 mm shipper and FOUP products or realize a return on our investment in the near term or ever.

WE MAY ACQUIRE OTHER BUSINESSES, FORM JOINT VENTURES OR DIVEST BUSINESSES THAT COULD NEGATIVELY AFFECT OUR PROFITABILITY, REQUIRE US TO INCUR DEBT AND DILUTE YOUR OWNERSHIP OF THE COMPANY.

As part of our business strategy and as we have in the past, we expect to continue to address gaps in our product offerings, diversify into complementary product markets or pursue additional technology and customers through acquisitions, joint ventures or other types of collaborations. We also expect to adjust our portfolio of businesses to meet our ongoing strategic objectives. As a result, we may enter markets in which we have no or limited prior experience and may encounter difficulties in divesting businesses that no longer meet our objectives. Competition for acquiring attractive businesses in our industry is substantial. In executing this part of our business strategy, we may experience difficulty in identifying suitable acquisition candidates or in completing selected transactions at appropriate valuations. Alternatively, we may be required to undertake multiple transactions at the same time in order to take advantage of acquisition opportunities that do arise. This could strain our ability to effectively execute and integrate these transactions. We would consider a variety of financing alternatives for each acquisition which could include borrowing funds, reducing our cash balances or issuing additional shares of our common stock to complete an acquisition. This could impair our liquidity and dilute your ownership of the Company. Further, we may not be able to successfully integrate any acquisitions that we do make into our existing business operations, and we could assume unknown or contingent liabilities or experience negative effects on our reported results of operations from dilutive results from operations and/or from future potential impairment of acquired assets, including goodwill, related to future acquisitions. We may experience difficulties in retaining key employees or customers of an acquired business, and our management’s attention could be diverted from other business issues. We may not identify or complete these transactions in a timely manner, on a cost-effective basis or at all, and we may not realize the benefits of any acquisition or joint venture.

WE MAY NOT EFFECTIVELY PENETRATE NEW MARKETS.

Part of our business strategy is to leverage our expertise in our core competencies for growth in new and adjacent markets, such as photovoltaic cells, LEDs, flat panel displays, lithium ion batteries, magnetic storage devices and life sciences. Our ability to grow our business could be limited if we are unable to execute on this strategy.

WE FACE THE RISK OF PRODUCT LIABILITY CLAIMS AND, IN PARTICULAR, CERTAIN OF OUR PRODUCTS ARE USED TO TRANSPORT TOXIC GASES USED IN THE SEMICONDUCTOR MANUFACTURING PROCESS AND A LEAK COULD RESULT IN SIGNIFICANT HARM AND LIABILITY.

The manufacture and sale of our products involve the risk of product liability claims. In addition, a failure of one of our products at a customer site could interrupt the business operations of the customer. For example, while we believe that our SDS and VAC delivery systems are the safest available in the industry, as with any products involved in the

transport and storage of toxic gases, if a leak were to occur during transport or during storage at our customers' location, serious damage could result including injury or death to any person exposed to those toxic gases creating significant product liability for us. There can be no assurance that our insurance will be adequate to satisfy any such liabilities and our financial results or financial condition could be adversely affected.

LOSS OF OUR KEY PERSONNEL, WHO HAVE SIGNIFICANT EXPERIENCE IN THE SEMICONDUCTOR INDUSTRY AND TECHNOLOGICAL EXPERTISE, COULD HARM OUR BUSINESS, WHILE OUR INABILITY TO ATTRACT AND RETAIN NEW QUALIFIED PERSONNEL COULD INHIBIT OUR ABILITY TO OPERATE AND GROW OUR BUSINESS SUCCESSFULLY.

Table of Contents

Many of our key personnel have significant experience in the semiconductor industry and deep technical expertise. The loss of the services of one or several of our key employees or an inability to attract, train and retain qualified and skilled employees, specifically research and development and engineering personnel, could result in the loss of customers or otherwise inhibit our ability to operate and grow our business successfully. In the past, during downturns in the semiconductor industry, we have had to impose salary reductions on senior employees and freeze or eliminate merit increases in an effort to maintain our financial position. These actions may have an adverse effect on employee loyalty and may make it more difficult for us to attract and retain key personnel.

IF WE ARE UNABLE TO PROTECT OUR INTELLECTUAL PROPERTY AND TECHNOLOGY, IF OUR COMPETITORS WERE TO DEVELOP SIMILAR OR SUPERIOR INTELLECTUAL PROPERTY OR TECHNOLOGY, OR, IF OUR INTELLECTUAL PROPERTY OR TECHNOLOGY VIOLATE THIRD-PARTY RIGHTS, OUR BUSINESS AND PROSPECTS COULD BE HARMED.

Our future success and competitive position depend in part upon our ability to obtain and maintain proprietary technology used in our principal product families. We rely, in part, on patent, trade secret and trademark law to protect that technology. We have obtained a number of patents relating to our products and have filed applications for additional patents. We cannot assure you that any of our pending patent applications will be approved, in key jurisdictions or at all, that we will develop additional proprietary technology that is patentable, that any patents owned by or issued to us will provide us with competitive advantages or that these patents will not be challenged, invalidated, circumvented, and rendered unenforceable or otherwise compromised by third parties. In addition, if we do not obtain intellectual property protection in the international jurisdictions we serve, our competitiveness in these markets could be significantly impaired, which would limit our growth and future revenue. While we routinely enter into confidentiality agreements with our employees and with third parties to protect our proprietary information and technology, these agreements may not be enforceable or they may be breached by such employees or third parties, and we may not have adequate remedies for such breaches. Furthermore, our confidential and proprietary information and technology could be independently developed by or become otherwise known to third parties and third parties could design around our patents.

Competitors may misappropriate our intellectual property, and disputes as to ownership of intellectual property may arise. We may institute litigation in order to enforce our patents, copyrights or other intellectual property rights, to protect our trade secrets, to determine the validity and scope of the proprietary rights of others or to defend against claims of infringement. Such litigation could result in substantial costs and diversion of resources and could negatively affect our sales, profitability and prospects regardless of whether we are able to successfully enforce our rights. For example, in January 2011, we settled multiple patent litigations with Pall Corporation (which was acquired by Danaher Corporation in 2015). We prosecuted and defended these cases vigorously and incurred substantial costs in pursuing them. It may become necessary for us to initiate other costly patent litigation against our competitors in order to protect and/or perfect our intellectual property rights. We cannot predict how any existing or future litigation will be resolved or what its impact will be on us.

Our commercial success depends, in part, on our ability to avoid infringing or misappropriating any patents or other proprietary rights owned by third parties. If we are found to infringe or misappropriate a third party’s patent or other proprietary rights, we could be required to pay damages to such third party, alter our products or processes, obtain a license from the third party or cease activities utilizing such proprietary rights, including making or selling products utilizing such proprietary rights. If we are required to obtain a license from a third party, there can be no assurance that we will be able to do so on commercially favorable terms, if at all.

OUR RESULTS OF OPERATIONS COULD BE ADVERSELY AFFECTED BY CLIMATE CHANGE OR NATURAL CATASTROPHES IN THE LOCATIONS IN WHICH WE, OUR CUSTOMERS OR OUR SUPPLIERS OPERATE, SUCH AS THE MARCH 2011 EARTHQUAKE AND TSUNAMI IN JAPAN AND THE JUNE 2012 WILDFIRES IN COLORADO SPRINGS, COLORADO.

We have manufacturing and other operations in locations subject to natural events such as severe weather and earthquakes that could disrupt operations. In addition, our suppliers and customers also have operations in such locations. A natural disaster that results in a prolonged disruption to our operations, or our customers’ or suppliers’ operations, may adversely affect our results of operations and financial condition. Also, climate change poses both

regulatory and physical risks that could harm our results of operations or affect the way we conduct our businesses. While the March 2011 earthquake and tsunami in Japan did not materially impair manufacturing operations at our Yonezawa, Japan plant and while the June 2012 wildfires did not materially impair manufacturing operations at our Colorado Springs plant, there can be no assurance that future such catastrophes will not impact our manufacturing operations or those of our supply chain partners by disrupting our ability to manufacture and deliver products to our customers, resulting in an adverse impact on our business and results of operations.

WE MAY BE SUBJECT TO INFORMATION TECHNOLOGY SYSTEM FAILURES, NETWORK DISRUPTIONS AND BREACHES IN DATA SECURITY.

Information technology system failures, network disruptions and breaches of data security from cyber-attacks, employee social media use on our computers or through failure of our internet service providers and other cloud computing service providers to

Table of Contents

successfully secure their own systems could disrupt our operations, cause customer communication and order management issues, cause the unintentional disclosure of customer, employee and proprietary information, and cause disruption in our transaction processing, which could affect our reputation and reporting of financial results. While our management has taken steps to address these concerns by implementing network security, hiring personnel and establishing internal control measures, there can be no assurance that a system failure or data security breach will not have a material adverse effect on our financial condition and operating results.

Risks Related to Our Indebtedness

WE HAVE A SUBSTANTIAL AMOUNT OF INDEBTEDNESS, WHICH COULD ADVERSELY AFFECT OUR FINANCIAL HEALTH AND OUR ABILITY TO OBTAIN FINANCING IN THE FUTURE, REACT TO CHANGES IN OUR BUSINESS AND MAKE PAYMENTS ON THE INDEBTEDNESS.

As of December 31, 2016, we have an aggregate principal amount of approximately $594 million of outstanding total indebtedness, comprised of our 6% senior unsecured notes due April 1, 2022 (“Notes”) and our senior secured term loan facility due 2021 (“Term Loan”). In addition, we have approximately $75 million of unutilized capacity under a senior secured asset-based revolving credit facility (“ABL Facility”), which is subject to a borrowing base.

Our high level of debt could have important consequences, including:

- making it more difficult for us to satisfy our obligations with respect to the Notes, the Term Loan and the ABL Facility;
- limiting our ability to obtain additional financing to fund future working capital, capital expenditures, acquisitions or other general corporate requirements;
- requiring a substantial portion of our cash flow to be dedicated to debt service payments instead of other purposes, thereby reducing the amount of cash flow available for working capital, capital expenditures, acquisitions and other general corporate purposes;
- increasing our vulnerability to adverse changes in general economic, industry and competitive conditions;
- exposing us to the risk of increased interest rates as certain of our borrowings, including borrowings under the Term Loan and the ABL Facility include variable interest rates;
- limiting our flexibility in planning for and reacting to changes in the industry in which we compete;
- preventing us from raising funds necessary to repurchase all Notes tendered to us upon the occurrence of certain changes of control, which could constitute a default under the indenture governing the Notes;
- placing us at a disadvantage compared to other, less leveraged competitors or competitors with comparable debt at more favorable interest rates; and
- increasing our cost of borrowing.

In addition, the indenture that governs the Notes and the credit agreements governing our Term Loan and our ABL Facility contain restrictive covenants that will limit our ability to engage in activities that may be in our long-term best interest. Our failure to comply with those covenants could result in an event of default which, if not cured or waived, could result in the acceleration of substantially all of our debt.

DESPITE OUR CURRENT LEVEL OF INDEBTEDNESS, WE MAY STILL BE ABLE TO INCUR SUBSTANTIALLY MORE DEBT, WHICH COULD FURTHER EXACERBATE THE RISKS TO OUR FINANCIAL CONDITION DESCRIBED ABOVE AND PREVENT US FROM FULFILLING OUR OBLIGATIONS UNDER OUR EXISTING INDEBTEDNESS.

We may incur significant additional indebtedness in the future. Although the indenture that governs the Notes and the credit agreements governing our Term Loan and our ABL Facility contain restrictions on the incurrence of additional indebtedness, these restrictions are subject to a number of qualifications and exceptions, such as indebtedness to finance working capital, capital expenditures, investments or acquisitions, or for other purposes, and the additional indebtedness incurred in compliance with these restrictions could be substantial. For example, our Term Loan provides that we have the right to request additional loans and commitments, and to the extent that the aggregate amount of such additional loans and commitments exceeds $225 million, the incurrence thereof will be subject to our secured net leverage ratio being less than a specified ratio, or in the case of unsecured loans or other unsecured debt, or loans or other debt secured by junior liens, our total net leverage ratio being less than a specified ratio. If we incur any additional indebtedness that ranks equally with the Notes, subject to collateral arrangements, the holders of that

debt will be entitled to share ratably with the holders of the Notes and the lenders under the Term Loan and the ABL Facility in any proceeds distributed in connection with any insolvency, liquidation, reorganization, dissolution or other winding up of our Company. These restrictions also will not prevent us from incurring obligations that do not constitute indebtedness. If new debt is added to our current debt levels, the related risks that the Company now faces could intensify.

Table of Contents

WE MAY NOT BE ABLE TO GENERATE SUFFICIENT CASH TO SERVICE OUR INDEBTEDNESS AND MAY BE FORCED TO TAKE OTHER ACTIONS, WHICH MAY NOT BE SUCCESSFUL, TO SATISFY OUR OBLIGATIONS UNDER OUR INDEBTEDNESS.

Our ability to make scheduled payments on or refinance our debt obligations depends on our financial condition and operating performance and the condition of the capital markets, which are subject to prevailing economic, industry and competitive conditions, as well as certain financial, business, legislative, regulatory and other factors beyond our control. We may be unable to maintain a level of cash flow from operating activities sufficient to permit us to pay the principal, premium, if any, and interest on our indebtedness. If our cash flow and capital resources are insufficient to fund our debt service obligations, we could face substantial liquidity problems, be forced to reduce or delay investments and capital expenditures, dispose of material assets or operations, seek additional debt or equity capital or restructure or refinance our indebtedness, and our financial position and results of operations could be materially and adversely affected.

Any refinancing of our debt could be at higher interest rates and may require us to comply with more onerous covenants, which could further restrict our business operations. We may not be able to effect any such alternative measures on commercially reasonable terms or at all and, even if successful, those alternative actions may not allow us to meet our scheduled debt service obligations. Our ability to dispose of assets and use the proceeds from those dispositions is restricted by the agreements governing our indebtedness and we may not be able to consummate those dispositions or to obtain proceeds in an amount sufficient to meet any debt service obligations then due.

If we cannot make scheduled payments on our debt, we will be in default and holders of the Notes could declare all outstanding principal and interest to be due and payable, the lenders under the Term Loan and the ABL Facility could terminate their commitments to loan money, our secured lenders could foreclose against the assets securing their borrowings and we could be forced into bankruptcy or liquidation.

THE TERMS OF OUR CREDIT AGREEMENTS GOVERNING OUR TERM LOAN AND OUR ABL FACILITY AND THE INDENTURE GOVERNING THE NOTES RESTRICT OUR CURRENT AND FUTURE OPERATIONS, PARTICULARLY OUR ABILITY TO RESPOND TO CHANGES OR TO TAKE CERTAIN ACTIONS.

The credit agreements governing our Term Loan and our ABL Facility and the indenture that governs the Notes contain a number of restrictive covenants that impose significant operating and financial restrictions on us and may limit our ability to engage in acts that may be in our long-term best interest, including restrictions on our ability to:

- incur certain liens;
- incur additional indebtedness and guarantee indebtedness;
- pay dividends or make other distributions in respect of, or repurchase or redeem, capital stock;
- prepay, redeem or repurchase certain debt;
- make investments, loans, advances and acquisitions;
- sell or otherwise dispose of assets, including capital stock of our subsidiaries;
- enter into transactions with affiliates;
- alter the businesses we conduct;
- enter into agreements restricting our subsidiaries' ability to pay dividends; and
- consolidate, merge or sell all or substantially all of our assets.

In addition, the restrictive covenants in the credit agreement governing our ABL Facility may, at certain times, require us to maintain a fixed charge coverage ratio. Our ability to meet this financial ratio can be affected by events beyond our control.

Our failure to comply with these covenants could result in an event of default that, if not cured or waived, could result in the acceleration of some or all of our indebtedness, which could lead to bankruptcy, reorganization or insolvency. These restrictions may affect our ability to grow in accordance with our plans and could adversely affect our ability to:

- finance our operations;
- make needed capital expenditures;
- make strategic acquisitions or investments or enter into joint ventures;

- withstand a future downturn in our business, the industry or the economy in general;
- compete effectively and engage in business activities, including future opportunities, that may be in our best interest; and
- plan for or react to market conditions or otherwise execute our business strategies.

A LOWERING OR WITHDRAWAL OF THE RATINGS ASSIGNED TO OUR DEBT SECURITIES BY RATING AGENCIES MAY INCREASE OUR FUTURE BORROWING COSTS AND REDUCE OUR ACCESS TO CAPITAL.

The Notes have been rated by Standard & Poor's and Moody's. There is no assurance that such credit ratings will remain in effect for any given period of time. Rating agencies also may lower, suspend or withdraw ratings on the Notes or our other debt in the

Table of Contents

future. Any lowering, suspension or withdrawal of such ratings may have an adverse effect on the market prices or marketability of our indebtedness and make it more difficult or more expensive for us to obtain additional debt financing.

Manufacturing Risks

OUR DEPENDENCE ON SINGLE AND LIMITED SOURCE SUPPLIERS COULD AFFECT OUR ABILITY TO MANUFACTURE OUR PRODUCTS.

We rely on single or limited source suppliers for some plastic polymers, filtration membranes, petroleum coke and certain other materials, such as chemicals and gases, which are critical to the manufacturing of our products. At times, we have experienced a limited supply of certain raw material polymers as well as the need to substitute polymers, resulting in delays, increased costs and risks associated with qualifying products made from such new polymers with our customers. An industry-wide increase in demand for these polymers or the discontinuation of such polymers could affect our ability to acquire sufficient quantities. If we are unable to obtain an adequate quantity of such supplies, our manufacturing operations may be interrupted. Obtaining alternative sources would likely result in increased costs and shipping delays, which could decrease profitability and damage our relationships with current and potential customers. Prices for polymers can vary widely. In a volatile oil price environment, some suppliers have added and may in the future add surcharges to the prices of the polymers we purchase. While we have long-term arrangements with certain key suppliers of polymers that fix our price for purchases up to specified quantities, if our polymer requirements exceed the quantities specified, we could be exposed to higher material costs. If the cost of polymers increases and we are unable to correspondingly increase the sales price of our products, our profit margins will decline.

Our filtration products incorporate a wide variety of filter membranes designed to meet specific customer filtration needs, not all of which are produced internally. In the event that a manufacturer of outsourced membrane discontinues supply or production, we may be required to identify and qualify an alternative filter membrane for that application to incorporate into our products. This could require extensive lead times and increased costs which may cause us to lose sales and cause our profit margins to decline.

Our graphite synthesis process requires petroleum coke that meets specified criteria. While there are multiple suppliers for this petroleum coke, the sources are limited and our required criteria may cause the price of this petroleum coke to increase.

The unavailability or reduced availability of the materials or resources we use for our SCEM segment products may require us to reduce production of these products or may require us to incur additional costs in order to obtain an adequate supply of these materials or resources. The occurrence of any of these events could adversely affect our business and results of operations.

OUR MANUFACTURING PROCESSES ARE BECOMING INCREASINGLY COMPLEX, AND OUR PRODUCTION COULD BE DISRUPTED IF WE ARE UNABLE TO AVOID MANUFACTURING DIFFICULTIES.

Our manufacturing processes are complex and require the use of expensive and technologically sophisticated equipment and materials. These processes are frequently modified to improve manufacturing yields and product quality. We have, on occasion, experienced manufacturing difficulties, such as occasional critical equipment breakdowns and the introduction of impurities in the manufacturing process, which cause lower manufacturing yields, make our products unmarketable and/or delay deliveries to customers. A number of our product lines are manufactured at only one or two facilities in different countries, and any disruption could impact our sales until another facility could commence or expand production of such products. We could experience these or other manufacturing difficulties, which might result in a loss of customers and exposure to warranty and product liability claims.

WE MAY LOSE SALES IF WE ARE UNABLE TO TIMELY PROCURE, REPAIR OR REPLACE CAPITAL EQUIPMENT NECESSARY TO MANUFACTURE MANY OF OUR PRODUCTS.

If our existing equipment fails, or we are unable to obtain new equipment quickly enough to satisfy any increased demand for our products, we may lose sales to competitors. In particular, we do not maintain duplicate tools or equipment for most of our important products. Fixing or replacing complex tools is time consuming, and we may not be able to replace a damaged tool in time to meet customer requirements. In addition, from time to time we may

upgrade or add new manufacturing equipment that may require substantial lead times to build and qualify. Delays in building and qualifying new equipment could result in a disruption of our manufacturing processes and prevent us from meeting our customers' requirements, which could lead our customers to seek seek other suppliers.

WE ARE SUBJECT TO A VARIETY OF ENVIRONMENTAL LAWS THAT COULD CAUSE US TO INCUR SIGNIFICANT LIABILITIES AND EXPENSES.

Failure to comply with the wide variety of federal, state, local and non-U.S. regulatory requirements affecting our business relating to the release, use, storage, treatment, transportation, discharge, disposal and remediation, of, and human exposure to, hazardous chemicals, which have tended to become stricter over time, could result in future liabilities or the suspension of production. For example, the Frank R. Lautenberg Chemical Safety for the 21st Century Act modified the Toxic Control Substances Act ("TSCA") by requiring Environmental Protection Agency ("EPA") to prioritize and evaluate the environmental and health risks of existing

Table of Contents

chemicals and providing EPA with greater authority to regulate chemicals posing unreasonable risks. According to this statute, EPA is required to make an affirmative finding that a new chemical will not pose an unreasonable risk before such chemical can go into production. As a result, TSCA has been updated so that it operates in a similar fashion to the Registration, Evaluation, and Authorization of Chemicals ("REACH") legislation in Europe. Regulations similar to REACH have been enacted in South Korea and Taiwan. Any such changes to these and similar regulations promulgated by other countries could increase our cost of doing business and have a negative impact on our financial condition, results of operations and cash flows. Furthermore, the nature of our business exposes us to risk of liability for environmental contamination if hazardous materials are released into the environment, which could result in substantial losses, reputational harm, increase in our insurance cost or otherwise adversely impact our results of operations. In addition, compliance with present or future laws could restrict our ability to expand our facilities or to build or acquire new facilities or require us to acquire costly control equipment, incur other significant expenses, such as costs of remediation of contamination found on any site that we may acquire, or to modify our manufacturing processes.

IF WE ARE UNABLE TO SUCCESSFULLY MANAGE OUR MANUFACTURING OPERATIONS, OUR ABILITY TO DELIVER PRODUCTS TO OUR CUSTOMERS COULD BE DISRUPTED AND OUR BUSINESS, FINANCIAL CONDITION AND RESULTS OF OPERATIONS COULD BE ADVERSELY AFFECTED.

In order to enhance the efficiency and cost effectiveness of our manufacturing operations, and to better serve customers located in various countries, as we have in the past, we may in the future move several product lines from one of our plants to another and consolidate manufacturing operations in certain of our plants. If we are unable to establish stable processes to efficiently and effectively produce high quality products in relocated manufacturing processes in the destination plant, production may be disrupted and we may not be able to deliver these products to meet customer orders in a timely manner, which may cause us to lose credibility with our customers and harm our business. Even if we successfully move our manufacturing processes, there is no assurance that the cost savings and efficiencies we anticipate will be achieved.

International Risks

WE CONDUCT A SIGNIFICANT AMOUNT OF OUR SALES AND MANUFACTURING ACTIVITY OUTSIDE THE UNITED STATES, WHICH SUBJECTS US TO ADDITIONAL BUSINESS RISKS AND MAY CAUSE OUR PROFITABILITY TO DECLINE DUE TO INCREASED COSTS.

Sales to customers outside the United States accounted for approximately 78%, 77% and 75% of our net sales in 2016, 2015 and 2014, respectively. We anticipate that international sales will continue to account for a majority of our net sales. In addition, a number of our key domestic customers derive a significant portion of their revenues from sales in international markets. We also manufacture a significant portion of our products outside the United States and are dependent on international suppliers for many of our parts and raw materials. We intend to continue to pursue opportunities in both sales and manufacturing internationally. Our international operations are subject to a number of risks and potential costs that could adversely affect our revenue and profitability, including:

- unexpected changes in regulatory requirements that could impose additional costs on our operations or limit our ability to operate our business;
- greater difficulty in collecting our accounts receivable and longer payment cycles than are typical in domestic operations;
- changes in labor conditions and difficulties in staffing and managing foreign operations;
- expense and complexity of complying with U.S. and foreign import and export regulations;
- liability for foreign taxes assessed at rates higher than those applicable to our domestic operations;
- unanticipated government actions, such as trade wars; and
- political and economic instability.

In the past, we have incurred costs or experienced disruptions due to the factors described above and we expect to do so in the future. For example, our operations in Asia, and particularly South Korea, Taiwan and Japan, have been negatively impacted in the past as a result of regional economic instability. In addition, Taiwan and South Korea account for a growing portion of the world's semiconductor manufacturing. There have historically been strained relations between China and Taiwan and there are continuing tensions between North Korea and other countries,

including South Korea and the United States. Any adverse developments in those relations could significantly disrupt the worldwide production of semiconductors, which may lead to reduced sales of our products. Furthermore, we incur additional legal compliance costs associated with our international operations and could become subject to legal penalties in foreign countries if we do not comply with local laws and regulations, which may be substantially different from those in the United States. In a number of foreign countries, some companies engage in business practices that are prohibited by U.S. law applicable to us, such as the Foreign Corrupt Practices Act. Although we implement policies and procedures designed to ensure compliance with these laws, there can be no assurance that all of our employees, contractors and agents, as well as those companies to which we outsource certain of our business operations, including those based in countries where practices that violate such U.S. laws may be customary or common, will not take actions in violation of our

Table of Contents

policies. Any such violation, even if prohibited by our policies, could have an adverse effect on our business and results of operations.

WE WILL LOSE SALES IF WE ARE UNABLE TO OBTAIN GOVERNMENT AUTHORIZATION TO EXPORT CERTAIN OF OUR PRODUCTS OR TO IMPORT CERTAIN OF OUR PRODUCTS INTO FOREIGN MARKETS, AND WE WILL BE SUBJECT TO LEGAL AND REGULATORY CONSEQUENCES IF WE DO NOT COMPLY WITH APPLICABLE EXPORT AND IMPORT CONTROL LAWS AND REGULATIONS.

Exports of certain of our products are subject to export controls imposed by the U.S. Government and administered by the U.S. Departments of State and Commerce. In certain instances, these regulations may require pre-shipment authorization from the administering department. Certain of our products are subject to the Export Administration Regulations ("EAR") administered by the Department of Commerce's Bureau of Industry and Security, which requires a license depending on the type and end use of the product, the final destination, the identity of the end user and whether a license exception might apply and the International Traffic in Arms Regulations ("ITAR") administered by the Department of State's Directorate of Defense Trade Controls, for which a license is often required. Failure to comply with these regulations could result in the prohibition of our ability to export altogether, which could materially and adversely affect our business.

Products developed and manufactured in our foreign locations are subject to export controls of the applicable foreign nation. Obtaining export licenses can be difficult, time-consuming and costly. Failure to obtain export licenses could significantly reduce our revenue and materially and adversely affect our business, financial condition and results of operations. The absence of comparable restrictions on competitors in other countries may adversely affect our competitive position.

In addition, certain countries require import and other special licenses in order for certain of our products to be imported into or sold in that country. Our inability to satisfy these requirements in a timely manner has in the past prevented, and may continue to prevent us from meeting our customers' expectations in these countries and to lose sales. For example, in response to recent explosions at gas storage facilities in Singapore and China, the import of gas canisters and chemicals viewed as dangerous have come under increased regulatory scrutiny by governmental officials. This increased regulation may impair the ability of our SCEM segment to import those products into Singapore and China and may cause us to lose sales.

CHANGES IN TAXATION OR ADVERSE TAX RULINGS COULD ADVERSELY AFFECT OUR RESULTS OF OPERATIONS.

We have facilities in many foreign countries and, as a result, are subject to taxation at various rates and audit by a number of taxing authorities. Our results of operations could be affected by changes in applicable tax rates or audits by the taxing authorities in countries in which we operate, changes in laws and regulations governing calculation and location of earned profit and taxation thereof, changes in laws and regulations affecting our ability to realize deferred tax assets on our balance sheet and changes in laws and regulations relating to the repatriation of cash into the United States. Each quarter we forecast our tax liability based on our forecast of our performance for the year. If that performance forecast changes, our forecasted tax liability may change.

We have undertaken a number of complex internal reorganizations of our foreign subsidiaries in order to rationalize and streamline our foreign operations, focus our management efforts on certain local opportunities and take advantage of favorable business conditions in certain localities. While we have exercised diligence in undertaking this internal reorganization, there can be no assurance that this reorganization, or any future internal reorganization, will not result in adverse tax consequences in the United States or in foreign countries in which we have operations. This could adversely impact our profitability from foreign operations and result in a material reduction in our results of operations.

As we purchase raw materials and components from foreign countries in an effort to reduce the cost of our products or to obtain the highest quality materials, our products manufactured from these materials and components may be burdened by import taxes and duties, and these additional costs may put our products at a competitive disadvantage.

FLUCTUATIONS IN THE VALUE OF THE U.S. DOLLAR IN RELATION TO OTHER CURRENCIES MAY LEAD TO LOWER NET INCOME AND SHAREHOLDERS' EQUITY OR MAY CAUSE US TO RAISE PRICES, WHICH COULD RESULT IN REDUCED NET SALES.

Foreign currency exchange rate fluctuations could have an adverse effect on our net sales, results of operations and shareholders' equity. Foreign currency fluctuations against the U.S. dollar could require us to increase prices to foreign customers, which could result in lower net sales by us to such customers. Alternatively, if we do not adjust the prices for our products in response to foreign currency fluctuations, our profitability could decline. In addition, sales made by our foreign subsidiaries are generally denominated in the currency of the country in which these products are sold, and the currency we receive in payment for such sales could be less valuable at the time of receipt versus the time of sale as a result of foreign currency exchange rate fluctuations.

VOLATILITY IN THE GLOBAL ECONOMY COULD ADVERSELY AFFECT OUR RESULTS.

Financial markets in the United States, Europe and Asia have been experiencing extreme disruption in recent years, including, among other things, volatility in securities prices, severely diminished liquidity and credit availability, rating downgrades of

Table of Contents

sovereign debt, declining valuation of certain investments, declines in consumer confidence, declines in economic growth, volatility in unemployment rates, and uncertainty about economic stability. In the past such conditions have had a significant adverse impact on our industry, our financial condition and results of operations. There may be further changes in the global economy, which could lead to further challenges in our business and negatively impact our financial results. For example, the U.K. vote in favor of leaving the European Union may cause instability in European economies and may negatively impact the outlook for the global economy. Tightness of credit in financial markets could adversely affect the ability of our customers and suppliers to obtain financing for significant purchases and operations and could result in a decrease in orders and spending for our products and services. We are unable to predict the likely duration and severity of any disruption in European or global financial markets and adverse economic conditions and the effects they may have on our business and financial condition. If uncertain economic conditions return or deteriorate, our business and results of operations could be further materially and adversely affected.

TERRORIST ATTACKS, SUCH AS THE ATTACKS THAT OCCURRED IN NEW YORK AND WASHINGTON, D.C. ON SEPTEMBER 11, 2001, AND OTHER ACTS OF VIOLENCE OR WAR MAY AFFECT THE MARKETS IN WHICH WE OPERATE OR OUR OPERATIONS AND ADVERSELY AFFECT OUR ABILITY TO MANUFACTURE PRODUCTS AND OUR PROFITABILITY.

Terrorist attacks may negatively affect our operations and any security we issue. There can be no assurance that there will not be future terrorist attacks against the United States or U.S. businesses. These attacks or other armed conflicts may directly impact our physical facilities or those of our suppliers or customers. Our primary facilities include headquarters, research and development and manufacturing facilities in the United States; sales, research and development and manufacturing facilities in Japan, South Korea, Taiwan and Malaysia; and sales and service facilities in Europe and Asia. Attacks may also disrupt the global insurance and reinsurance industries with the result that we may not be able to obtain insurance at historical terms and levels for our facilities. Furthermore, such attacks may make travel and the transportation of our supplies and products more difficult and more expensive and may ultimately affect the sales of our products in the United States and overseas. As a result of terrorism, the United States may enter into additional armed conflicts, which could have a further impact on our domestic and international sales, our supply chain, our production capacity and our ability to deliver products to our customers. The consequences of these armed conflicts and the associated instability are unpredictable, and we may not be able to foresee events that could have an adverse effect on our business and any security we issue.

Risks Related to Owning our Common Stock

THE PRICE OF OUR COMMON STOCK HAS BEEN VOLATILE IN THE PAST AND MAY BE VOLATILE IN THE FUTURE.

The price of our common stock has been volatile in the past and may be volatile in the future. In 2016, the closing price of our stock on The NASDAQ Global Select Market (“NASDAQ”) ranged from a low of $10.60 to a high of $18.55, and, as in past years, the price of our common stock may show greater volatility.

The trading price of our common stock is subject to significant volatility in response to various factors, some of which are beyond our control or may be unrelated to our operating results, and which may adversely affect the market price of our common stock, including the following: the failure to meet the published expectations of securities analysts; changes in financial estimates by securities analysts; press releases or announcements by, or changes in market values of, comparable companies; volatility in the markets for high-technology stocks, general stock market price and volume fluctuations, which are particularly common among securities of high-technology companies; stock market price and volume fluctuations attributable to inconsistent trading volume levels; the public perception of equity values of publicly traded companies and the other risks and uncertainties described in this Annual Report on Form 10-K and in our other filings with the SEC. Future decreases in our stock price may adversely impact our ability to raise sufficient additional capital in the future, if needed.

IF OUR COMMON STOCK TRADES BELOW BOOK VALUE OR OUR BUSINESS OUTLOOK ERODES, WE COULD BE REQUIRED TO RECORD MATERIAL IMPAIRMENT LOSSES FOR OUR LONG-LIVED ASSETS, INCLUDING PROPERTY, PLANT AND EQUIPMENT AND OUR IDENTIFIABLE INTANGIBLES.

In accordance with U.S. generally accepted accounting principles, we review our long-lived assets whenever events or changes in circumstances indicate that the carrying amount of such assets may not be recoverable. If the carrying amount of an asset or group of assets exceeds its undiscounted cash flows, the asset will be written down to its fair value. The evaluation of the recoverability of long-lived assets requires us to make significant estimates and assumptions, including, but not limited to, the identification of the asset group at the lowest level of independent cash flows and the primary asset of the group, and long-range forecasts of revenue, reflecting management's assessment of general economic and industry conditions, operating income, depreciation and amortization and working capital requirements.

Due to the inherent uncertainty involved in making these assumptions and estimates, actual results could differ from our estimates and the conclusion that an asset group's carrying value is recoverable, or that an asset is impaired, including the extent of the

Table of Contents

impairment, may not be accurate. Due to the uncertain economic environment within the semiconductor industry, we continually monitor circumstances and events to determine whether asset impairment testing is warranted.

It is possible that in the future we may no longer be able to conclude that there is no impairment of our long-lived assets, nor that we can we provide assurance that material impairment charges of long-lived assets will not occur in future periods.

OUR ANNUAL AND QUARTERLY OPERATING RESULTS ARE SUBJECT TO FLUCTUATIONS AS A RESULT OF RAPID DEMAND SHIFTS AND OUR MODEST LEVEL OF BACKLOG, AND IF WE FAIL TO MEET THE EXPECTATIONS OF SECURITIES ANALYSTS OR INVESTORS, THE MARKET PRICE OF OUR COMMON STOCK MAY DECREASE SIGNIFICANTLY.

Our sales and profitability can vary significantly from quarter to quarter and year to year. Because our expense levels are relatively fixed in the short-term, an unanticipated decline in revenue in a particular quarter could significantly reduce our net income, or lead to a net loss, in that quarter. In addition, we make a substantial portion of our shipments shortly after we receive the order, and therefore we operate with a relatively modest level of backlog. As a consequence of the just-in-time nature of shipments and the modest level of backlog, our results of operations may decline quickly and significantly in response to changes in order patterns or rapid decreases in demand for our products. We anticipate that fluctuations in operating results will continue in the future. Such fluctuations in our results could cause us to fail to meet the expectations of securities analysts or investors, which could cause the market price of our common stock to decline substantially. We believe that period-to-period comparisons of our results of operations may not be meaningful, and you should not rely upon them as indicators of our future performance.

IF WE FAIL TO MAINTAIN AN EFFECTIVE SYSTEM OF INTERNAL CONTROLS, WE MAY NOT BE ABLE TO ACCURATELY REPORT OUR FINANCIAL RESULTS. AS A RESULT, CURRENT AND POTENTIAL STOCKHOLDERS COULD LOSE CONFIDENCE IN OUR FINANCIAL REPORTING, WHICH WOULD HARM THE TRADING PRICE OF OUR STOCK.

Effective internal controls are necessary for us to provide reliable financial reports. We have in the past discovered, and may in the future identify, material weaknesses in internal controls over financial reporting, which represent a reasonable possibility that a material misstatement of our annual or interim financial statements would not have been prevented or detected. If we fail to implement and maintain our controls over our financial reporting, or encounter difficulties implementing improvements in our controls, we may not meet our reporting obligations. Any failure in our internal controls that leads to a material weakness could also cause investors to lose confidence in our reported financial information, which could have a negative impact on the trading price of our stock.

CHANGES IN THE SECURITIES LAWS AND REGULATIONS HAVE IN THE PAST INCREASED OUR COSTS AND MAY DO SO IN THE FUTURE.

The Sarbanes-Oxley Act of 2002 and the Dodd-Frank Wall Street Reform and Consumer Protection Act, as well as related rules and listing standards promulgated by the Securities and Exchange Commission and the NASDAQ, effected, at least in part, in response to the turmoil over the past several years in the securities and credit markets, as well as the global economy, required changes in some of our corporate governance, securities disclosure and compliance practices. Compliance with these rules and listing standards has increased our legal and financial and accounting costs, and we expect these increased costs to continue indefinitely. While these costs are no longer increasing, they may increase in the future.

PROVISIONS IN OUR CHARTER DOCUMENTS AND DELAWARE LAW MAY DELAY OR PREVENT AN ACQUISITION OF US, WHICH COULD DECREASE THE VALUE OF YOUR SHARES.

Our restated certificate of incorporation and by-laws and Delaware law contain provisions that could make it harder for a third party to acquire us without the consent of our board of directors. These provisions include limitations on actions by our stockholders by written consent.

Our restated certificate of incorporation makes us subject to the anti-takeover provisions of Section 203 of the Delaware General Corporation Law. In general, Section 203 prohibits publicly held Delaware corporations to which it applies from engaging in a “business combination” with an “interested stockholder” for a period of three years after the date of the transaction in which the person became an interested stockholder, unless the business combination is approved in a prescribed manner. This provision could discourage others from bidding for our shares of common

stock and could, as a result, reduce the likelihood of an increase in the price of our common stock that would otherwise occur if a bidder sought to buy our common stock.

Our restated certificate of incorporation provides that our board of directors is authorized to issue from time to time, without further stockholder approval, up to 5,000,000 shares of preferred stock in one or more series and to fix and designate the rights, preferences, privileges and restrictions of the preferred stock, including dividend rights, conversion rights, voting rights, redemption rights and terms of redemption and liquidation preferences. Such shares of preferred stock could have preferences over our common stock with respect to dividends and liquidation rights. Our issuance of preferred stock may have the effect of delaying or preventing a change in control. Our issuance of preferred stock could decrease the amount of earnings and assets available for distribution

Table of Contents

to the holders of common stock or could adversely affect the rights and powers, including voting rights, of the holders of common stock. The issuance of preferred stock could have the effect of decreasing the market price of our common stock.

YOUR PERCENTAGE OWNERSHIP IN US MAY BE DILUTED BY FUTURE ISSUANCES OF CAPITAL STOCK, WHICH COULD REDUCE YOUR INFLUENCE OVER MATTERS ON WHICH STOCKHOLDERS VOTE.

Subject to applicable NASDAQ standards, our board of directors has the authority, without action or vote of our stockholders, to issue all or any part of our authorized but unissued shares. Issuances of common stock or the exercise of employee and director stock options would dilute your percentage ownership interest, which will have the effect of reducing your influence over matters on which our stockholders vote. In addition, we may issue substantial quantities of our common stock in order to effect acquisitions which would also dilute your ownership interest. If the issuances are made at prices that reflect a discount from the then current trading price of our common stock, your interest in the book value of our common stock might be diluted.

Item 1B. Unresolved Staff Comments.

Not Applicable.

Item 2. Properties.

Our principal executive offices are located in Billerica, Massachusetts. We also have manufacturing, research and equipment cleaning facilities in the United States, Japan, France, Taiwan, South Korea, Singapore and Malaysia. Information about our principal facilities is set forth below:

Location	Principal Function	Approximate Square Feet	Leased/ Owned	Reporting Segment
Bedford, Massachusetts	Research & Manufacturing	80,000	Owned	MC & SCEM
Billerica, Massachusetts[(1)]	Executive Offices, Research & Manufacturing	175,000	Leased	MC & SCEM
Bloomington, MN	Research & Manufacturing	68,000	Leased	AMH
Burnet, TX	Research & Manufacturing	77,000	Owned	SCEM
Chaska, Minnesota	Executive Offices, Research & Manufacturing	186,000	Owned	AMH
Colorado Springs, CO	Manufacturing	82,000	Owned	AMH
Colorado Springs, CO	Manufacturing	40,000	Leased	AMH
Danbury, CT	Research & Manufacturing	73,000	Leased	SCEM
Decatur, Texas	Manufacturing	359,000	Owned	SCEM
Hsin-chu, Taiwan	Executive Offices, Sales Research & Manufacturing	109,000	Leased	MC, SCEM & AMH
Yangmei City, Taiwan	Manufacturing	40,000	Leased	AMH
JangAn, South Korea	Manufacturing	127,000	Owned	SCEM & AMH
Kulim, Malaysia	Manufacturing	195,000	Owned	SCEM & AMH
Montpellier, France	Cleaning Services	53,000	Owned	AMH
Suwon, South Korea	Executive Offices & Research	42,000	Leased	MC & SCEM
Tokyo, Japan	Executive Offices, Sales & Research	27,000	Leased	MC, SCEM & AMH
Wonju City, South Korea	Manufacturing	39,000	Owned	AMH
Yonezawa, Japan	Manufacturing	185,000	Owned	MC & AMH

[(1)] This lease has been extended through September 30, 2026 and is subject to one five-year renewal option.

We lease approximately 13,000 square feet of research and development and manufacturing office space located in San Diego, California, approximately 31,000 square feet of manufacturing space located in Franklin, Massachusetts, an aggregate of approximately 23,000 square feet of manufacturing space in Anseong, South Korea, approximately 15,000 square feet of office space in Round Rock, Texas, and approximately 3,300 square feet of office space in Tempe, Arizona.

We lease approximately 10,000 square feet for our Asia manufacturing management offices in Singapore. In addition, we maintain a worldwide network of sales, service, repair or cleaning centers in the United States, Germany, France, Israel, Japan, Malaysia, Taiwan, Singapore, China and South Korea. Leases for our facilities expire through December 2024. We currently expect to be able to extend the terms of expiring leases or to find suitable replacement facilities on reasonable terms.

We believe that our facilities are well-maintained and suitable for their respective operations. All of our facilities are generally utilized within a normal range of production volume.

Table of Contents

Item 3. Legal Proceedings.

As of December 31, 2016, we were not involved in any legal proceedings that we believe will have a material impact on our consolidated financial position, results of operations or cash flows. From time to time the Company may be a party to litigation involving claims against the Company arising in the ordinary course of our business. We are not aware of any material potential litigation or claims against us which would have a material adverse effect upon our financial statements.

Item 4. Mine Safety Disclosures.

Not applicable.

EXECUTIVE OFFICERS OF THE REGISTRANT

The following is a list of our Executive Officers and their ages, as of January 31, 2017. All of the Executive Officers listed below were elected to serve until the first Directors Meeting following the 2017 Annual Stockholders Meeting.

Name	Age	Office	First Appointed To Office*
Bertrand Loy	51	President & Chief Executive Officer	2001
Gregory B. Graves	56	Executive Vice President, Chief Financial Officer & Treasurer	2002
Sue Lee	40	Senior Vice President, Secretary & General Counsel	2016
John J. Murphy	64	Senior Vice President, Human Resources	2005
Todd Edlund	54	Executive Vice President & Chief Operating Officer	2007
Clint Haris	44	Senior Vice President & General Manager, Microcontamination Control	2016
William Shaner	48	Senior Vice President & General Manager, Advanced Materials Handling	2007
Stuart Tison	53	Senior Vice President & General Manager, Specialty Chemicals and Engineered Materials	2016
Corey Rucci	57	Vice President, Business Development	2014
Gregory Marshall	59	Senior Vice President, Quality, EH&S and Entegris Business Support	2011
Michael D. Sauer	51	Vice President, Controller & Chief Accounting Officer	2011

* With either the Company or a predecessor company

Bertrand Loy has been our Chief Executive Officer, President and a director since November 2012. Mr. Loy served as our Executive Vice President and Chief Operating Officer since 2008. From August 2005 until July 2008, he served as our Executive Vice President and Chief Administrative Officer in charge of our global supply chain and manufacturing operations. He served as the Vice President and Chief Financial Officer of Mykrolis from January 2001 until August 2005. Prior to that, Mr. Loy served as the Chief Information Officer of Millipore Corporation during 1999 and 2000. From 1995 until 1999, he served as the Division Controller and Head of Manufacturing for Millipore's Laboratory Water Division. From 1989 until 1995, Mr. Loy served Sandoz Pharmaceuticals (now Novartis) in a variety of financial, audit and controller positions located in Europe, Central America and Japan. Mr. Loy served as a director of BTU International, Inc. (supplier of advanced thermal processing equipment) until its acquisition in January 2015. He also serves as a director of Harvard Bioscience, Inc. (scientific equipment) since November 2014 and has been a director for SEMI (Semiconductor Equipment and Materials International) (global high-technology manufacturing trade association) since July 2013.

Gregory B. Graves has served as our Executive Vice President and Chief Financial Officer since July 2008. Prior to that he served as Senior Vice President and Chief Financial Officer since April 2007. Prior to April 2007, he served as Senior Vice President, Strategic Planning & Business Development since the effectiveness of the merger with Mykrolis. Mr. Graves served as the Chief Business Development Officer of Entegris Minnesota since September 2002 and from September 2003 until August 2004 he also served as Senior Vice President of Finance. Prior to joining Entegris Minnesota, Mr. Graves held positions in investment banking and corporate development, including at U.S. Bancorp Piper Jaffray from June 1998 to August 2002 and at Dain Rauscher from October 1996 to May 1998.

Sue Lee has been our Senior Vice President, Secretary and General Counsel since April 2016. Prior to joining Entegris, Ms. Lee was general counsel and corporate secretary with CYREN, a network security firm since 2013. From 2010 to 2013, Ms. Lee served as general counsel for Harmonix Music Systems, a former MTV company. Prior

to that, Ms. Lee was vice president of business and legal affairs for MTV Networks and counsel at Genzyme Corporation. Prior to going in-house in 2005, Ms. Lee was an attorney at the law firm, Cleary Gottlieb Steen & Hamilton, in New York.

Table of Contents

John J. Murphy joined us as our Senior Vice President, Human Resources in October 2005. He served as the Senior Vice President Human Resources of HNTB, an engineering and architectural services firm, from February 2004 until October 2005 and as Corporate Vice President, Human Resources of Cadence Design Systems, Inc. from May 2000 through October 2003. Prior to that Mr. Murphy held senior human resources positions with Williams Companies, L.M. Ericsson Telephone Company and General Electric Company.

Todd Edlund has been our Executive Vice President and Chief Operating Officer since July 2016. Prior to that he was our Senior Vice President and Chief Operating Officer since November 2014. After the merger with ATMI, Mr. Edlund served as Senior Vice President and General Manager of our Critical Materials Handling business and prior to the merger with ATMI, he was the Vice President and General Manager of our Contamination Control Solutions division since December 2007. He served as the Vice President and General Manager of our Liquid Systems business unit from 2005 to 2007, and prior to that as Entegris Minnesota's Vice President of Sales for semiconductor markets from 2003 to 2005. Prior to 2003, Mr. Edlund held a variety of positions with our predecessor companies since 1995.

Clint Haris has been our Senior Vice President, Microcontamination Control since July 2016. Prior to that, Mr. Haris served as our Vice President, Liquid Microcontamination Control since August 2014. Prior to joining Entegris, Mr. Haris served in a variety of executive roles at Brooks Automation Inc. including Senior Vice President, Life Science Systems from 2010 to 2014 and Senior Vice President and General Manager, Systems Solutions from 2009 to 2010.

William Shaner has been our Senior Vice President, Advanced Materials Handling since July 2016. Prior to that, Mr. Shaner served as our Senior Vice President, Global Operations since February 2014 and as our Vice President and General Manager, Microenvironments division since 2007. He has served in a variety of sales, marketing, business development and engineering roles since joining Entegris in 1995.

Stuart Tison has been our Senior Vice President, Specialty Chemicals and Engineered Materials since July 2016. Prior to that, Mr. Tison served as Vice President, Specialty Gas Solutions since February 2015, as Vice President, Business Development since January 2010 and as Vice President, Corporate Development since July 2007. Prior to that he served Celerity, Inc. as Vice President, Engineering and served Entegris predecessor companies Mykrolis and Millipore in a variety of sales, marketing, business development and engineering roles.

Gregory Marshall has been our Senior Vice President, Quality, EH&S and Entegris Business Support since August 2016. Prior to that Mr. Marshall served as our Vice President, Quality and EH&S since March 2010 and our Global Director of Quality since the merger with Mykrolis Corporation, prior to which he served as the Director of Quality for Mykrolis. Prior to joining Mykrolis, Mr. Marshall served as the Director of US Quality for Kokusai Semiconductor Equipment Corporation.

Corey Rucci assumed his current position of Vice President, Business Development in February 2014. Prior to that he served as Vice President and General Manager of our Specialty Materials Division since 2011 and as General Manager of Poco Graphite, Inc. (POCO) since 2008 when we acquired POCO. Prior to joining Entegris, Mr. Rucci served POCO as the President and Chief Operating Officer since 2007, Chief Operating Officer since 2005, Chief Financial Officer since 2001 and Vice President of Business Development since 1998. Prior to that he worked at UNOCAL Corp. for 17 years in a variety of accounting, marketing and business development roles.

Michael D. Sauer has been our Vice President, Controller and Chief Accounting Officer since June 2012. Prior to that, he served as the Corporate Controller since 2008. From the time of the merger with Mykrolis until April 2008, Mr. Sauer served as Director of Treasury and Risk Management. Mr. Sauer joined Fluoroware, Inc., a predecessor to Entegris Minnesota in 1988 and held a variety of finance and accounting positions until 2001 when he became the Director of Business Development for Entegris Minnesota, the successor to Fluoroware, serving in that position until the merger with Mykrolis.

Table of Contents

PART II

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

Market Information and Holders:

Entegris' Common Stock, $0.01 par value, trades on the NASDAQ Global Select Market under the symbol "ENTG". The following table sets forth the high and low sales prices of the Company shares for each full quarterly period during 2016 and 2015. As of February 14, 2017 there were 1,198 shareholders of record. On February 14, 2017, the last sale price reported on the Nasdaq Global Select Market for our common stock was $21.60 per share.

	2016		2015	
	Low	High	Low	High
First quarter	$10.37	$13.80	$11.90	$13.94
Second quarter	$12.79	$14.77	$13.02	$15.11
Third quarter	$13.97	$17.73	$12.63	$15.20
Fourth quarter	$14.73	$18.95	$12.36	$14.32

Dividend Policy:

The Company has never declared or paid any cash dividends on its capital stock. The Company currently intends to retain all available earnings for use in its business operations and does not anticipate paying any cash dividends in the foreseeable future. Furthermore, the credit agreements governing our Term Loan and our ABL Facility and the indenture that governs the Notes contain restrictions that limit our ability to pay dividends.

Issuer Sales of Unregistered Securities During the Past Three Years:

None

Table of Contents

Comparative Stock Performance

The following graph compares the cumulative total shareholder return on the common stock of Entegris, Inc. from December 31, 2011 through December 31, 2016 with the cumulative total return of (1) The NASDAQ Composite Index, and (2) The Philadelphia Semiconductor Index, assuming $100 was invested at the close of trading December 31, 2011 in Entegris, Inc. common stock, the NASDAQ Composite Index and the Philadelphia Semiconductor Index and that all dividends are reinvested.

	December 31, 2011	December 31, 2012	December 31, 2013	December 31, 2014	December 31, 2015	December 31, 2016
Entegris, Inc.	$100.00	$105.15	$132.76	$151.32	$152.00	$205.04
NASDAQ Composite	100.00	117.45	164.57	188.84	201.98	219.89
Philadelphia Semiconductor Index	100.00	107.20	152.05	199.79	196.56	254.21

Issuer Purchases of Equity Securities:

On February 5, 2016, the Company’s Board of Directors authorized a repurchase program covering up to an aggregate of $100 million of the Company’s common stock in open market transactions and in accordance with one or more pre-arranged stock trading plans to be established in accordance with Rule 10b5-1 under the Securities Exchange Act of 1934, as amended. The authorization expired on February 15, 2017. This repurchase program represents a renewal and replacement of the repurchase program originally authorized by the Board of Directors on February 5, 2016, which expired February 15, 2017.

Table of Contents

The following table provides information concerning shares of the Company's Common Stock $0.01 par value purchased during the three months ended December 31, 2016:

Period	(a) Total Number of Shares Purchased	(b) Average Price Paid per Share	(c) Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs	(d) Maximum Number (or Approximate Dollar Value) of Shares that May Yet Be Purchased Under the Plans or Programs
October 2 through October 31, 2016	30,000	$15.82	30,000	$95,952,609
November 1 through November 30, 2016	100,994	$17.74	100,994	$94,161,285
December 1 through December 31, 2016	95,105	$18.23	95,105	$92,427,294
Total	226,099	$17.69	226,099	$92,427,294

Item 6. Selected Financial Data.

The table that follows presents selected financial data for each of the last five years from the Company's consolidated financial statements and should be read in conjunction with the Company's Consolidated Financial Statements and the related Notes and with "Management's Discussion and Analysis of Financial Condition and Results of Operations" included elsewhere in this Annual Report on Form 10-K. The selected financial data set forth below as of December 31, 2016 and 2015 and for the years ended December 31, 2016, 2015 and 2014 are derived from our audited financial statements included in this Annual Report on Form 10-K. All other selected financial data set forth below is derived from our audited financial statements not included in this Annual Report on Form 10-K. Our historical results are not necessarily indicative of our results of operations to be expected in the future.

Table of Contents

(In thousands, except per share amounts)	Year ended December 31, 2016	Year ended December 31, 2015	Year ended December 31, 2014	Year ended December 31, 2013	Year ended December 31, 2012
Operating Results					
Net sales	$1,175,270	$1,081,121	$962,069	$693,459	$715,903
Gross profit	508,691	470,231	376,683	294,214	307,383
Selling, general and administrative expenses	201,901	198,914	231,833	137,123	147,405
Engineering, research and development expenses	106,991	105,900	87,711	55,320	50,940
Amortization of intangible assets	44,263	47,349	37,067	9,347	9,594
Contingent consideration fair value adjustment	—	—	(1,282)	(1,813)	—
Operating income	155,536	118,068	21,354	94,237	99,444
Income (loss) before income taxes and equity in net income (loss) of affiliate	119,999	92,185	(13,392)	96,195	99,703
Income tax expense (benefit)	22,852	10,202	(21,572)	21,669	30,881
Net income	97,147	80,296	7,887	74,526	68,825
Earnings Per Share Data					
Diluted earnings per share	$0.68	$0.57	$0.06	$0.53	$0.50
Weighted average shares outstanding – diluted	142,050	141,121	140,062	139,618	138,412
Operating Ratios – % of net sales					
Gross profit	43.3 %	43.5 %	39.2 %	42.4 %	42.9 %
Selling, general and administrative expenses	17.2	18.4	24.1	19.8	20.6
Engineering, research and development expenses	9.1	9.8	9.1	8.0	7.1
Amortization of intangible assets	3.8	4.4	3.9	1.3	1.3
Contingent consideration fair value adjustment	—	—	(0.1)	—	—
Operating income	13.2	10.9	2.2	13.6	13.9
Income (loss) before income taxes and equity in net income (loss) of affiliate	10.2	8.5	(1.4)	13.9	13.9
Effective tax rate	19.0	11.1	161.1	22.5	31.0
Net income	8.3	7.4	0.8	10.7	9.6
Cash Flow Statement Data					
Depreciation and amortization	$99,886	$101,654	$83,704	$38,815	$37,607
Capital expenditures	65,260	71,977	57,733	60,360	49,929
Net cash provided by operating activities	207,555	120,918	126,423	109,402	115,162
Net cash used in investing activities	(66,686)	(63,638)	(860,295)	(47,029)	(72,467)
Net cash (used in) provided by financing activities	(81,747)	(92,787)	747,648	(3,895)	10,890
Balance Sheet and Other Data					
Current assets	$800,131	$708,787	$763,604	$612,305	$579,324
Current liabilities	261,571	175,550	262,520	97,585	93,263
Working capital	538,560	533,237	501,084	514,720	486,061
Current ratio	3.06	4.04	2.91	6.27	6.21
Long-term debt, including current maturities	584,677	656,044	753,012	—	—
Shareholders' equity	899,218	802,883	748,441	756,843	694,799
Total assets	1,699,532	1,646,697	1,748,307	875,294	811,544
Return on average shareholders' equity – %	11.4 %	10.4 %	1.0 %	10.3 %	10.6 %
Shares outstanding at end of year	141,320	140,716	139,793	138,734	138,458

Table of Contents

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

The following discussion and analysis of the Company's consolidated financial condition and results of operations should be read along with the consolidated financial statements and the accompanying notes to the consolidated financial information included elsewhere in this Annual Report on Form 10-K. This discussion contains forward-looking statements that involve numerous risks and uncertainties, including, but not limited to, those described in the "Cautionary Statements" sections of this Item 7 below. The Company's actual results may differ materially from those contained in any forward-looking statements. You should review the Item 1A "Risk Factors" of this Annual Report on Form 10-K for a discussion of important factors that could cause actual results to differ materially from the results described in or implied by the forward-looking statements contained in the following discussion and analysis.

Cautionary Statements

This Annual Report on Form 10-K and the documents incorporated by reference in this Annual Report on Form 10-K contain "forward-looking statements" within the meaning of the Private Securities Litigation Reform Act of 1995. The information in this Management's Discussion and Analysis of Financial Condition and Results of Operations, except for the historical information, contains forward-looking statements. These forward-looking statements reflect the Company's current views with respect to future events and financial performance. The words "believe," "expect," "anticipate," "intend," "estimate," "forecast," "project," "may," "will," "would," "could," "should" and similar expressions are identify these "forward-looking statements." You should read statements that contain these words carefully because they discuss future expectations, contain projections of future results of operations or of financial position or state other "forward-looking" information. All forecasts and projections in this report are "forward-looking statements," and are based on management's current expectations of the Company's near-term results, based on current information available pertaining to the Company. The important factors listed below, as well as any cautionary language elsewhere in this Annual Report on Form 10-K, provide examples of risks, uncertainties and events that may cause our actual results to differ materially from the expectations described in these forward-looking statements. The risks which could cause actual results to differ from those contained in such "forward looking statements" include, without limitation, the risks described under Item 1A of this Annual Report on Form 10-K for the year ended December 31, 2016 under the headings "Risks Relating to our Business and Industry," "Risks Related to our Indebtedness," "Manufacturing Risks," "International Risks" and "Risks Related to Owning Our Common Stock" as well as in the Company's quarterly reports on Form 10-Q and current reports on Form 8-K as filed with the Securities and Exchange Commission. Any forward-looking statements in this Annual Report on Form 10-K are not guarantees of future performance, and actual results, developments and business decisions may differ from those envisaged by such forward-looking statements, possibly materially. We disclaim any duty to update any forward-looking statements.

Overview

This overview is not a complete discussion of the Company's financial condition, changes in financial condition and results of operations; it is intended merely to facilitate an understanding of the most salient aspects of its financial condition and operating performance and to provide a context for the detailed discussion and analysis that follows, and must be read in its entirety in order to fully understand the Company's financial condition and results of operations.

The Company is a leading global developer, manufacturer and supplier of microfiltration control products, specialty chemicals and advanced materials handling solutions for manufacturing processes in the semiconductor and other high-technology industries. Entegris seeks to leverage its unique breadth of capabilities to create value for its customers by developing mission-critical solutions to maximize manufacturing yields and enable higher device performance.

Our technology portfolio includes approximately 20,000 standard and customized products and solutions to achieve the highest levels of purity and performance that are essential to the manufacture of semiconductors, flat panel displays, light emitting diodes, or LEDs, high-purity chemicals, solar cells, gas lasers, optical and magnetic storage devices, and critical components for aerospace, glass manufacturing and biomedical applications. The majority of our products are consumed at various times throughout the manufacturing process, with demand driven in part by the level of semiconductor and other manufacturing activity. The Company's customers consist primarily of semiconductor

manufacturers, semiconductor equipment and materials suppliers as well as thin film transistor-liquid crystal display (TFT-LCD) and hard disk manufacturers, which are served through direct sales efforts, as well as sales and distribution relationships, in the United States, Asia, Europe and the Middle East.

Our business is organized and operated in three operating segments which align with the key elements of the advanced semiconductor manufacturing ecosystem. The Specialty Chemicals and Engineered Materials (SCEM) segment provides high-performance and high-purity process chemistries, gases, and materials and safe and efficient delivery systems to support semiconductor and other advanced manufacturing processes. The Advanced Materials Handling (AMH) segment develops solutions to monitor, protect, transport, and deliver critical liquid chemistries and substrates for a broad set of applications in the semiconductor industry and other high-technology industries. The Microcontamination Control (MC) segment offers solutions to purify critical liquid chemistries and gases used in semiconductor manufacturing processes and other high-technology industries. While these segments have separate products and technical know-how, they each share a single, global sales force, unified core

Table of Contents

systems and processes, global technology centers, strategic and technology roadmaps, and a focus on a common set of customers. The Company leverages its expertise and technologies from these three segments to create new and increasingly integrated solutions for its customers. See note 15 to the consolidated financial statements for additional information on the Company's three segments.

Key operating factors Key factors, which management believes have the largest impact on the overall results of operations of the Company, include:

- Level of sales Since a significant portion of the Company's product costs (except for raw materials, purchased components and direct labor) are largely fixed in the short-to-medium term, an increase or decrease in sales affects gross profits and overall profitability significantly. Also, increases or decreases in sales and operating profitability affect certain costs such as incentive compensation and commissions, which are highly variable in nature. The Company's sales are subject to the effects of industry cyclicality, technological change, substantial competition, pricing pressures and foreign currency fluctuation.
- Variable margin on sales The Company's variable margin on sales is determined by selling prices and the costs of manufacturing and raw materials. This is affected by a number of factors, which include the Company's sales mix, purchase prices of raw material (especially polymers, membranes, stainless steel and purchased components), domestic and international competition, direct labor costs, and the efficiency of the Company's production operations, among others.
- Fixed cost structure The Company's operations include a number of large fixed or semi-fixed cost components, which include salaries, indirect labor and benefits, facility costs, lease expenses, and depreciation and amortization. It is not possible to vary these costs easily in the short-term as volumes fluctuate. Accordingly, increases or decreases in sales volume can have a large effect on the usage and productivity of these cost components, resulting in a large impact on the Company's profitability.

Overall Summary of Financial Results for the Year Ended December 31, 2016

Total net sales for the year ended December 31, 2016 were $1,175.3 million, up $94.1 million, or 9%, from sales of $1,081.1 million for the year ended December 31, 2015.

Exclusive of favorable foreign currency translation effects of $13.8 million, the Company's sales increased 7%, reflecting an increase in overall demand for the Company's products from semiconductor industry customers, particularly in the sale of advanced deposition materials, wafer and reticle handling solutions, and wet etch and CMP products. The sales increase in 2016 was driven primarily by higher volume and the effect of selling price erosion was nominal. Semiconductor industry demand in 2016 was driven by slightly improved demand from device makers, as wafer starts and semiconductor unit production increased, higher industry fab utilization rates, and increased capital spending levels. The Company believes sales of its products in 2016 exceeded the overall semiconductor industry growth rate.

The Company's gross profit rose by $38.5 million for the year ended December 31, 2016, to $508.7 million, up from $470.2 million for the year ended December 31, 2015. Accordingly, the Company reported a 43.3% gross margin rate compared to 43.5% in 2015. The gross profit and gross margin figures in 2016 included $6.3 million of charges related to impairment of equipment and severance. Excluding those charges, the Company's gross margin for 2016 was 43.8%.

The Company's selling, general and administrative (SG&A) and engineering, research and development (ER&D) expenses increased slightly in 2016, mainly due to higher employee costs which were offset partly by the absence of integration costs incurred in 2015 related to the April 30, 2014 acquisition of ATMI, Inc. (ATMI).

As a result of the aforementioned and other factors discussed below, net income for 2016 was $97.1 million, or $0.68 per diluted share, compared to net income of $80.3 million, or $0.57 per diluted share, in 2015.

During 2016, the Company's operating activities provided cash flow of $207.6 million. Cash and cash equivalents, and short-term investments were $406.4 million at December 31, 2016 compared with $352.0 million at December 31, 2015. The Company had long-term borrowings, including current maturities, of $584.7 million at December 31, 2016 compared with $656.0 million at December 31, 2015.

Subsequent Event

On February 15, 2017, the Company's Board of Directors authorized a repurchase program covering up to an aggregate of $100 million of the Company's common stock in open market transactions and in accordance with one or more pre-arranged stock trading plans to be established in accordance with Rule 10b5-1 under the Securities Exchange Act of 1934, as amended. The authorization expires February 15, 2018. This repurchase program represents a renewal and replacement of the repurchase program originally authorized by the Board of Directors on February 5, 2016, which expired February 15, 2017.

Table of Contents

Critical Accounting Policies

Management's discussion and analysis of financial condition and results of operations are based upon the Company's consolidated financial statements, which have been prepared in accordance with accounting principles generally accepted in the United States. The preparation of these consolidated financial statements requires the Company to make estimates, assumptions and judgments that affect the reported amounts of assets, liabilities, revenues and expenses and related disclosure of contingent assets and liabilities. At each balance sheet date, management evaluates its estimates, including, but not limited to, those related to inventories, long-lived assets (property, plant and equipment, goodwill and identified intangibles), income taxes and business combinations. The Company bases its estimates on historical experience and various other assumptions that are believed to be reasonable under the circumstances. If management made different judgments or utilized different estimates, this could result in material differences in the amount and timing of the Company's results of operations for any period. In addition, actual results could be different from the Company's current estimates, possibly resulting in increased future charges to earnings. The critical accounting policies affected most significantly by estimates, assumptions and judgments used in the preparation of the Company's consolidated financial statements are discussed below.

Inventory Valuation The Company uses certain estimates and judgments to properly value its inventory. The Company's inventories are recorded at the lower of cost or net realizable value. The Company evaluates its ending inventories for obsolescence and excess quantities each quarter. This evaluation includes analysis of inventory levels, historical write-off trends, expected product lives, and historical and projected sales levels by product. Inventories that are considered obsolete are written off or a full allowance is recorded. In addition, allowances are established for inventory quantities in excess of forecasted demand. Inventory allowances were $13.8 million and $13.2 million at December 31, 2016 and 2015, respectively.

The Company's inventories include materials and products subject to technological obsolescence, which are sold in highly competitive industries. If future demand or market conditions are less favorable than current conditions or the Company's projected outlook for sales, inventory write-downs or additional allowances may be required and would be reflected in cost of sales in the period in which the revision is made.

Impairment of Long-Lived Assets As of December 31, 2016, the Company had $321.6 million of net property, plant and equipment and $217.5 million of net intangible assets. The Company routinely considers whether indicators of impairment of the value of its long-lived assets, particularly its manufacturing equipment, and its intangible assets, are present. A long-lived asset (asset group) shall be tested for recoverability whenever events or changes in circumstances (triggering events) indicate that its carrying amount may not be recoverable. The following are examples of such events or changes in circumstances:

a. A significant decrease in the market price of a long-lived asset (asset group);
b. A significant adverse change in the extent or manner in which a long-lived asset (asset group) is being used or in its physical condition;
c. A significant adverse change in legal factors or in the business climate that could affect the value of a long-lived asset (asset group), including an adverse action or assessment by a regulator;
d. An accumulation of costs significantly in excess of the amount originally expected for the acquisition or construction of a long-lived asset (asset group);
e. A current-period operating or cash flow loss combined with a history of operating or cash flow losses or a projection or forecast that demonstrates continuing losses associated with the use of a long-lived asset (asset group); and
f. A current expectation that, more likely than not, a long-lived asset (asset group) will be sold or otherwise disposed of significantly before the end of its previously estimated useful life.

If such indicators are present, it is determined whether the sum of the estimated undiscounted cash flows attributable to the asset group in question is less than its carrying value. If less, an impairment loss is recognized based on the excess of the carrying amount of the assets in the group over its respective fair value. Fair value is determined by discounting estimated future cash flows, appraisals or other methods deemed appropriate. If the asset groups determined to be impaired are to be held and used, the Company recognizes an impairment charge to the extent the fair value attributable to the asset group is less than the assets' carrying value. The fair value of the assets then

becomes the assets' new carrying value, which is depreciated or amortized over the remaining estimated useful life of the assets.

The Company's long-lived assets are grouped with other assets and liabilities at the lowest level (asset groups) for which the identifiable cash flows are largely independent of the cash flows of other assets and liabilities. As described above, the evaluation of the recoverability of long-lived assets requires the Company to make significant estimates and assumptions. These estimates and assumptions primarily include, but are not limited to, the identification of the asset group at the lowest

Table of Contents

level of independent cash flows, the primary asset of the group and long-range forecasts of revenue and costs, reflecting management's assessment of general economic and industry conditions, operating income, depreciation and amortization and working capital requirements.

Due to the inherent uncertainty involved in making estimates, actual results could differ from those estimates. In addition, changes in the underlying assumptions would have a significant impact on the conclusion that an asset group's carrying value is recoverable, or the determination of any impairment charge if it was determined that the asset values were indeed impaired.

Based on current general economic conditions and trends within the semiconductor industry and the absence of any other triggering events, the Company has not been required to perform impairment testing for any of its asset groups. The Company will continue to monitor circumstances and events to determine whether asset impairment testing is warranted. It is possible that in the future the Company may no longer be able to conclude that there is no impairment of its long-lived assets, nor can the Company provide assurance that material impairment charges of long-lived assets will not occur in future periods.

Goodwill Goodwill is not subject to amortization and is tested for impairment annually and whenever events or changes in circumstances indicate that impairment may have occurred. The Company performs its annual impairment test as of August 31. The Company first assesses qualitative factors to determine whether it is more likely than not (that is, a likelihood of more than 50%) that the fair value of a reporting unit is less than its carrying amount, including goodwill. If, after assessing qualitative factors, the Company determines that it is more likely than not that the fair value of a reporting unit is less than its carrying amount, then a two-step impairment test is performed to identify potential goodwill impairment and measure the amount of goodwill impairment loss to be recognized, if any.

As of August 31, 2016, the Company's assessment of qualitative factors informed its conclusion that a goodwill impairment did not occur. The significant qualitative factors considered include a significant increase in the Company's share price, increasing revenues and operating cash flow combined with solid demand in the semiconductor industry driven by the Internet of Things concept, virtual reality applications, autonomous car and artificial intelligence/machine learning. The Company noted that a significant number of its very largest customers purchase from all of the Company's reporting units. For example, approximately 100 customers, accounting for over 60% of net sales, purchase from all of the Company's reporting units.

The assessment of qualitative factors also indicated that two reporting units did not have fair values substantially in excess of their carrying value. One of these reporting units carried an immaterial amount of goodwill. The other reporting unit offers product lines supporting 10 nanometer technology that is gaining acceptance early in 2017. This reporting unit also maintains a significant market share in products that are required in this space of the industry. Through this qualitative assessment, it was determined that it was more likely than not that the fair value exceeded the carrying value and that there was no indication of impairment for these reporting units. All other reporting units had fair values substantially in excess of their carrying value.

In the fourth quarter of 2016, the Company changed its financial segment reporting as described in note 15. The Company performed additional qualitative analysis in connection with this organizational revision, which included changes to its reporting unit structure. Based on the analysis performed during the fourth quarter of 2016, there was no indication of impairment of goodwill and the estimated fair value of each reporting unit substantially exceeded its carrying value.

Income Taxes In the preparation of the Company's consolidated financial statements, the income tax expense, deferred tax assets and liabilities, and reserves for unrecognized tax benefits reflect management's best assessment of estimated current and future taxes to be paid. The Company is subject to income taxes in both the United States and numerous foreign jurisdictions. Significant judgments and estimates are required in determining consolidated income tax expense.

Deferred income taxes arise from temporary differences between the tax basis of assets and liabilities and their reported amounts in the consolidated financial statements, which will result in taxable or deductible amounts in the future. In evaluating the Company's ability to recover its deferred tax assets within the jurisdiction from which they arise, management considers all available positive and negative evidence, including scheduled reversals of deferred tax liabilities, projected future taxable income, tax-planning strategies, and results of recent operations. In projecting

future taxable income, the Company begins with historical results adjusted for the results of discontinued operations and incorporates assumptions about the amount of future state, federal and foreign pretax operating income adjusted for items that do not have tax consequences. The assumptions about future taxable income require significant judgment and are consistent with the plans and estimates management is using to manage the underlying business. In evaluating the objective evidence that historical results provide, the Company considers three years of cumulative operating income.

The Company has deferred tax assets related to certain federal and state credit carryforwards, and foreign net operating loss carryforwards of $31.8 million and $17.0 million as of December 31, 2016 and 2015, respectively. Management believes it is more likely than not that the benefit from a portion of these carryforwards will not be realized. In recognition of this risk, the Company provided a valuation allowance of $14.7 million and $12.7 million as of December 31, 2016 and 2015, respectively, relating to these carryforwards. If the Company's assumptions change and it determines it will be able to realize these

Table of Contents

carryforwards, the tax benefits relating to any reversal of the valuation allowance on the deferred tax assets will be recognized as a reduction of income tax expense.

The calculation of tax liabilities involves dealing with uncertainties in the application of complex tax laws and regulations in a multitude of jurisdictions across our global operations. A tax benefit from an uncertain tax position may be recognized when it is more likely than not that the position will be sustained upon examination, including resolutions of any related appeals or litigation processes, on the basis of the technical merits. Resolution of these uncertainties in a manner inconsistent with management's expectations could have a material impact on the Company's financial condition and operating results.

Business Acquisitions

The Company accounts for acquired businesses using the acquisition method of accounting which requires that the assets acquired and liabilities assumed be recorded at the date of acquisition at their respective fair values. The judgments made in determining the estimated fair value assigned to each class of assets acquired and liabilities assumed, as well as asset lives, can materially impact net income. Accordingly, for significant items, the Company typically obtains assistance from a third-party valuation firm.

There are several methods that can be used to determine the fair value of assets acquired and liabilities assumed in a business combination. For intangible assets, the Company normally utilizes the "income method." This method starts with a forecast of all of the expected future net cash flows attributable to the subject intangible asset. These cash flows are then adjusted to present value by applying an appropriate discount rate that reflects the risk factors associated with the cash flow streams. Some of the more significant estimates and assumptions inherent in the income method (or other methods) include the projected future cash flows (including timing) and the discount rate reflecting the risks inherent in the future cash flows.

Estimating the useful life of an intangible asset also requires judgment. For example, different types of intangible assets will have different useful lives, influenced by the nature of the asset, competitive environment, and rate of change in the industry. Certain assets may even be considered to have indefinite useful lives. All of these judgments and estimates can significantly impact the determination of the amortization period of the intangible asset, and thus net income.

Results of Operations

Year ended December 31, 2016 compared to year ended December 31, 2015

The following table sets forth the results of operations and the relationship between various components of operations, stated as a percent of net sales, for the years ended December 31, 2016 and 2015. The Company's historical financial data was derived from its consolidated financial statements and related notes included elsewhere in this annual report.

(Dollars in thousands)	2016		2015	
		% of net sales		% of net sales
Net sales	$1,175,270	100.0 %	$1,081,121	100.0 %
Cost of sales	666,579	56.7	610,890	56.5
Gross profit	508,691	43.3	470,231	43.5
Selling, general and administrative expenses	201,901	17.2	198,914	18.4
Engineering, research and development expenses	106,991	9.1	105,900	9.8
Amortization of intangible assets	44,263	3.8	47,349	4.4
Operating income	155,536	13.2	118,068	10.9
Interest expense	36,846	3.1	38,667	3.6
Interest income	(318)	—	(429)	—
Other income, net	(991)	(0.1)	(12,355)	(1.1)
Income before income taxes and equity in net loss of affiliate	119,999	10.2	92,185	8.5
Income tax expense	22,852	1.9	10,202	0.9
Equity in net loss of affiliate	—	—	1,687	0.2
Net income	$97,147	8.3	$80,296	7.4

Net sales For the year ended December 31, 2016, net sales were $1,175.3 million, up $94.1 million, or 9%, from sales for the year ended December 31, 2015. An analysis of the factors underlying the increase in net sales is presented in

the following table:

Table of Contents

(In thousands)	
Net sales in 2015	$1,081,121
Organic growth associated with volume and pricing	80,375
Increase associated with effect of foreign currency translation	13,774
Net sales in 2016	$1,175,270

The Company's sales increase was due to improved demand for the Company's products from semiconductor industry customers, reflecting both higher industry fab utilization and semiconductor industry capital spending compared to the year-ago period. This sales increase reflected improved sales of 300mm transport module, liquid chemistry filtration solutions and certain specialty materials products. Exclusive of favorable currency translation effects of $13.8 million for the year, mainly due to the strengthening of the Japanese yen relative to the U.S. dollar, the Company's sales grew 7% in 2016 when compared to 2015.

On a geographic basis, in 2016, total sales to North America were 22%, to Asia Pacific were 56%, to Europe were 9% and to Japan were 13%. In 2015, total sales to North America were 23%, to Asia Pacific were 55%, to Europe were 10% and to Japan were 12%. From 2015 to 2016, net sales to customers in Japan and Asia Pacific increased, 19%, and 12%, respectively, while net sales to customers in North America and Europe were flat.

Demand drivers for the Company’s business primarily consist of semiconductor fab utilization and production (unit-driven) as well as capital spending for new or upgraded semiconductor fabrication equipment and facilities (capital-driven). The Company analyzes sales of its products by these two key drivers. Sales of unit-driven products represented 76% of total sales and sales of capital-driven products represented 24% of total sales in 2016. This compares to a unit-driven to capital-driven ratio of 78%:22% for 2015.

Gross profit Gross profit for 2016 increased by $38.5 million, to $508.7 million, an increase of 8% from $470.2 million for 2015. The gross margin rate for 2016 was 43.3% versus 43.5% for 2015. An analysis of the factors underlying the increase in gross profit is presented in the following table:

(In thousands)	
Gross profit in 2015	$470,231
Growth associated with volume and pricing	44,717
Decrease associated with impairment of equipment and severance related to organization realignment	(6,257)
Gross profit in 2016	$508,691

The gross profit improvements primarily reflect the growth associated with volume and pricing, offset by charges related to the impairment of equipment and severance related to the organization realignment. Excluding the latter item, the Company's gross margin in 2016 was 43.8%.

Selling, general and administrative expenses

Selling, general and administrative expense (SG&A) consists primarily of payroll and related expenses for the sales and administrative staff, professional fees (including accounting, legal and technology costs and expenses), and sales and marketing costs. SG&A expenses for 2016 increased $3.0 million, or 2%, to $201.9 million from $198.9 million in 2015. SG&A expenses, as a percent of net sales, decreased to 17.2% from 18.4% a year earlier, reflecting the increase in net sales.

An analysis of the factors underlying the increase in SG&A is presented in the following table:

(In thousands)	
Selling, general and administrative expenses in 2015	$198,914
Integration costs recorded in prior year	(12,667)
Professional fees	2,335
Employee costs	12,962
Other increases, net	357
Selling, general and administrative expenses in 2016	$201,901

Engineering, research and development expenses

Engineering, research and development (ER&D) expenses related to the support of current product lines and the development of new products and manufacturing technologies increased by $1.1 million, or 1%, to $107.0 million in 2016 compared to $105.9 million in 2015. ER&D expenses as a percent of net sales were 9.1% compared to 9.8% a

year ago, reflecting the increase in net sales, offset by the increase in ER&D expenditure levels, primarily due to higher employee costs.

Table of Contents

The Company’s overall ER&D efforts will continue to focus on the support or extension of current product lines, the development of its technologies to create differentiated and high-value, unit-driven products for the most advanced and demanding semiconductor applications and leveraging its unique and diverse technology portfolio to develop innovative, integrated solutions for unmet customer needs. The Company expects ER&D costs to stay relatively stable as a percentage of net sales.

Amortization of intangible assets Amortization of intangible assets was $44.3 million in 2016 compared to $47.3 million for 2015. The decline reflects the absence of amortization expense for certain identifiable non-compete intangible assets acquired in the ATMI merger that became fully amortized in early 2016.

Interest expense Interest expense was $36.8 million and $38.7 million in the years ended December 31, 2016 and 2015, respectively. Interest expense includes interest associated with debt outstanding issued to help fund the acquisition of ATMI in 2014 and the amortization of debt issuance costs associated with such borrowings.

The decrease in 2016 reflects lower outstanding borrowings due to the Company's payments on its senior secured term loan in 2016, offset partly by higher amortization of debt issuance costs due to the acceleration of actual and expected payments on the Company's senior secured term loan.

Other income, net Other income, net, was $1.0 million in 2016 compared to other expense, net, of $12.4 million in 2015.

In 2016, other income, net, included foreign currency transaction gains of $0.6 million and other gains of $0.4 million. In 2015, other income, net, included foreign currency transaction gains of $9.1 million and a gain of $3.4 million related to the sale of an equity investment.

Income tax expense The Company recorded income tax expense of $22.9 million in 2016 compared to income tax expense of $10.2 million in 2015. The Company’s effective tax expense rate was 19.0% in 2016, compared to an effective tax rate of 11.1% in 2015.

The increase in the effective tax rate in 2016 from 2015 and the variance in both years from the U.S. statutory rate of 35% reflects several factors. The effective tax rates in both years reflects a greater concentration in the Company's geographic composition of income toward jurisdictions with lower tax rates than in the U.S. In addition, the 2015 effective tax rate reflects the benefit of the Malaysian tax holiday which expired December 31, 2015.

Net income Net income was $97.1 million, or $0.68 per diluted share, in 2016 compared to net income of $80.3 million, or $0.57 per diluted share, in 2015. The significant increase reflects the Company's aforementioned operating results described in greater detail above.

Non-GAAP Measures Information The Company’s consolidated financial statements are prepared in conformity with accounting principles generally accepted in the United States (GAAP). The Company also utilizes certain non-GAAP financial measures as a complement to financial measures provided in accordance with GAAP in order to better assess and reflect trends affecting the Company’s business and results of operations. See “Non-GAAP Information” included below in this section for additional detail, including the reconciliation of GAAP measures to the Company’s non-GAAP measures.

The Company’s non-GAAP financial measures are Adjusted EBITDA and Adjusted Operating Income, together with related measures thereof, and non-GAAP Earnings Per Share (EPS).

Adjusted EBITDA increased 13% to $263.7 million in 2016, compared to $232.4 million in 2015. Adjusted EBITDA, as a percent of net sales, was 22.4% in 2016 compared to 21.5% in 2015. Adjusted Operating Income increased 17% to $208.0 million in 2016, compared to $178.1 million in 2015. Adjusted Operating Income, as a percent of net sales, was 17.7% in 2016 compared to 16.5% in 2015. Non-GAAP Earnings Per Share increased 11% to $0.94 in 2016, compared to $0.85 in 2015. The improvement in the Adjusted EBITDA and Adjusted Operating Income reflect the increase in net sales and related increase in gross profit. In addition, Non-GAAP Earnings Per Share was positively affected by a lower adjusted effective tax rate.

Segment Analysis

Table of Contents

The following table and discussion concern the results of operations of the Company's three reportable segments for the years ended December 31, 2016 and 2015.

(In thousands)	2016	2015
Specialty Chemicals and Engineered Materials		
Net sales	$428,328	$418,878
Segment profit	96,060	100,370
Advanced Materials Handling		
Net sales	$384,284	$346,426
Segment profit	73,452	66,419
Microcontamination Control		
Net sales	362,658	315,817
Segment profit	110,042	83,076

Specialty Chemicals and Engineered Materials (SCEM)

For the year ended December 31, 2016, SCEM net sales increased to $428.3 million, up 2%, from $418.9 million in the comparable period last year. The sales increase primarily reflects strong product sales for advanced deposition materials products, with flat sales across the segment's other product lines.

SCEM reported a segment profit of $96.1 million for the year ended December 31, 2016 compared to a $100.4 million segment profit in the year-ago period. The decrease in the SCEM's profit in 2016 reflects lower margins reflecting unfavorable product mix and higher operating expenses of 2%.

Advanced Materials Handling (AMH)

For the year ended December 31, 2016, AMH net sales increased 11% to $384.3 million, from $346.4 million in 2015. The increase primarily reflects strong sales of 300mm transport module, fluid handling solutions and containers.

AMH reported a segment profit of $73.5 million in 2016, up 11% from $66.4 million in 2015. The increase in the AMH's profit in 2016 was due to higher sales and its associated slightly favorable sales mix, offset by a 10% increase in operating expenses.

Microcontamination Control (MC)

For the year ended December 31, 2016, MC net sales increased to $362.7 million, up 15%, from $315.8 million in the comparable period last year. The sales increase primarily reflects strength in liquid chemistry filters for wet, etch and clean and bulk photo applications and strength in gas filter products driven by strong industry tool shipments.

MC reported a segment profit of $110.0 million for the year ended December 31, 2016 compared to a $83.1 million segment profit in the year-ago period. The increase in the MC's profit in 2016 reflects the higher sales and improved plant utilization offset by higher operating expenses of 2%.

Unallocated general and administrative expenses

Unallocated general and administrative expenses for the year ended December 31, 2016 totaled $79.8 million compared to $84.4 million for the year ended December 31, 2015. The $4.7 million decline includes the absence of integration expenses of $12.7 million, offset by the increased employee and severance costs and higher professional fees noted above.

Table of Contents

Results of Operations

Year ended December 31, 2015 compared to year ended December 31, 2014

The following table sets forth the results of operations and the relationship between various components of operations, stated as a percent of net sales, for the years ended December 31, 2015 and 2014. The Company's historical financial data was derived from its consolidated financial statements and related notes included elsewhere in this annual report.

(Dollars in thousands)	2015		2014	
		% of net sales		% of net sales
Net sales	$1,081,121	100.0 %	$962,069	100.0 %
Cost of sales	610,890	56.5	585,386	60.8
Gross profit	470,231	43.5	376,683	39.2
Selling, general and administrative expenses	198,914	18.4	231,833	24.1
Engineering, research and development expenses	105,900	9.8	87,711	9.1
Amortization of intangible assets	47,349	4.4	37,067	3.9
Contingent consideration fair value adjustment	—	—	(1,282)	(0.1)
Operating income	118,068	10.9	21,354	2.2
Interest expense	38,667	3.6	33,355	3.5
Interest income	(429)	—	(1,336)	(0.1)
Other (income) expense, net	(12,355)	(1.1)	2,727	0.3
Income (loss) before income taxes and equity in net loss of affiliate	92,185	8.5	(13,392)	(1.4)
Income tax expense (benefit)	10,202	0.9	(21,572)	(2.2)
Equity in net loss of affiliate	1,687	0.2	293	—
Net income	$80,296	7.4	$7,887	0.8

Net sales For the year ended December 31, 2015, net sales were $1,081.1 million, up $119.1 million, or 12%, from sales for the year ended December 31, 2014. An analysis of the factors underlying the increase in net sales is presented in the following table:

(In thousands)	
Net sales in 2014	$962,069
Organic growth associated with volume and pricing	31,375
Decrease associated with effect of foreign currency translation	(32,665)
Incremental sales associated with acquisition of ATMI, Inc	120,342
Net sales in 2015	$1,081,121

The inclusion of incremental ATMI sales is the key factor underlying the increase. Partly offsetting this is an unfavorable foreign currency translation effects of $32.7 million related to the year-over-year weakening of most international currencies versus the U.S. dollar, most notably the Japanese yen, Taiwanese dollar, Korean won and Euro.

Exclusive of those factors, the Company's sales grew 3% in 2015 when compared to 2014, reflecting an increase in overall demand from the Company's semiconductor industry customers, particularly an increase in the sale of specialty materials products. The Company believes the overall sales increase was primarily volume driven and that the effect of selling price erosion was nominal. Overall demand from the semiconductor industry reflected the following factors: slightly improved demand from device makers, as wafer starts and semiconductor unit production increased; higher industry fab utilization rates; and increased capital spending levels. The Company believes sales of its products in 2015 exceeded overall industry growth rates.

On a geographic basis, in 2015, total sales to North America were 23%, to Asia Pacific were 55%, to Europe were 10% and to Japan were 12%. In 2014, total sales to North America were 25%, to Asia Pacific were 51%, to Europe were 11% and to Japan were 13%. When comparing 2015 to 2014, all regions experienced year-over-year sales increases, primarily reflecting the incremental ATMI sales. From 2014 to 2015, net sales to customers in North America, Japan, and Asia Pacific increased 5%, 8%, and 20%, respectively, generally due to the the inclusion of incremental sales from ATMI, while net sales to customers in Europe decreased 3%. Net sales for Japan were affected

by unfavorable foreign currency translation effects of $32.7 million.

Table of Contents

Demand drivers for the Company’s business primarily consist of semiconductor fab utilization and production (unit-driven) as well as capital spending for new or upgraded semiconductor fabrication equipment and facilities (capital-driven). The Company analyzes sales of its products by these two key drivers. Sales of unit-driven products represented 78% of total sales and sales of capital-driven products represented 22% of total sales in 2015. This compares to a unit-driven to capital-driven ratio of 74%:26% for 2014. The shift toward unit-driven products reflects the inclusion of sales from ATMI, which are primarily unit-driven.

Gross profit Gross profit for 2015 increased by $93.5 million, to $470.2 million, an increase of 25% from $376.7 million for 2014. The gross margin rate for 2015 was 43.5% versus 39.2% for 2014. An analysis of the factors underlying the increase in gross profit is presented in the following table:

(In thousands)	
Gross profit in 2014	$376,683
Charge for fair value mark-up of inventory sold in 2014	48,586
Increase associated with incremental ATMI net sales	59,854
Other	(14,892)
Gross profit in 2015	$470,231

The gross profit and gross margin improvements primarily reflect the inclusion of four additional months of sales from ATMI and the absence of the incremental cost of sales charges of $48.6 million recorded in the second and third quarters of 2014 associated with the sale of inventory acquired in the acquisition with ATMI. Excluding the latter item, the Company's gross margin in 2014 was 44.2%. When compared to the adjusted gross margin for 2014, the 2015 gross margin decline relates to a slightly unfavorable sales mix, higher warranty costs, unfavorable foreign currency translation effects and lower levels of factory utilization, particularly in the latter half of the year, offset in part by the benefit of the Company's organic sales growth.

Selling, general and administrative expenses

Selling, general and administrative expense (SG&A) consists primarily of payroll and related expenses for the sales and administrative staff, professional fees (including accounting, legal and technology costs and expenses), and sales and marketing costs. SG&A expenses for 2015 decreased $32.9 million, or 14%, to $198.9 million from $231.8 million in 2014. SG&A expenses, as a percent of net sales, decreased to 18.4% from 24.1% a year earlier, reflecting the significant decrease in SG&A expenditure levels due to the absence of ATMI merger costs and a reduction in integration expenditures.

An analysis of the factors underlying the decrease in SG&A is presented in the following table:

(In thousands)	
Selling, general and administrative expenses in 2014	$231,833
Increase associated with ATMI infrastructure	15,383
Transaction-related costs incurred in 2014	(26,776)
Deal costs incurred in 2014	(9,125)
Decrease in integration costs	(6,985)
Other decreases, net	(5,416)
Selling, general and administrative expenses in 2015	$198,914

Engineering, research and development expenses

Engineering, research and development (ER&D) expenses related to the support of current product lines and the development of new products and manufacturing technologies increased by $18.2 million, or 21%, to $105.9 million in 2015 compared to $87.7 million in 2014. ER&D expenses as a percent of net sales were 9.8% compared to 9.1% a year ago, reflecting the increase in ER&D expenditure levels, offset by the increase in net sales.

Incremental ER&D expenses of $12.7 million reflecting the inclusion of four additional months of operations at ATMI account for approximately 70% of the increase. The increase for the year December 31, 2015 also reflect higher legacy Entegris ER&D activity levels, including increased employee costs, and customer samples and supplies expense.

Contingent consideration fair value adjustment In the year ended December 31, 2014, the Company recognized an acquisition-related contingent consideration adjustment of $1.3 million reflecting a change in the fair value of the

contingent consideration liability associated with the 2013 Jetalon acquisition.

Amortization of intangible assets Amortization of intangible assets was $47.3 million in 2015 compared to $37.1 million for 2014. The increase reflects the additional amortization associated with the identifiable intangible assets acquired in the ATMI merger.

Table of Contents

Interest expense Interest expense was $38.7 million and $33.4 million in the years ended December 31, 2015 and 2014. Interest expense includes interest associated with debt outstanding issued to help fund the acquisition of ATMI in 2014 and the amortization of debt issuance costs associated with such borrowings. In addition, bridge financing costs of $4.0 million related to the acquisition of ATMI were recorded in the second quarter of 2014.

The increase in 2015 reflects a full year's interest in 2015 compared to eight months' interest in 2014, offset in part by the absence of the aforementioned bridge financing costs included in 2014.

Other (income) expense, net Other income, net, was $12.4 million in 2015 compared to other expense, net, of $2.7 million in 2014.

In 2015, other income, net, included foreign currency transaction gains of $9.1 million and a gain of $3.4 million related to the sale of an equity investment.

In 2014, other expense includes foreign currency transaction losses of $1.1 million and an impairment loss of $1.9 million recorded in connection with an equity investment, partially offset by $0.2 million in net realized gains on the sale of equity investments.

Income tax expense (benefit) The Company recorded income tax expense of $10.2 million in 2015 compared to an income tax benefit of $21.6 million in 2014. The Company’s effective tax expense rate was 11.1% in 2015, compared to an effective tax rate of 161.1% in 2014.

The change in the effective tax rate in 2015 from 2014 and the variance in both years from the U.S. statutory rate reflects several factors. The effective tax rates in both years reflects a greater concentration in the Company's geographic composition of income toward jurisdictions with lower tax rates. In addition, the 2014 effective tax rate reflects the benefit of a foreign dividend, net of the nondeductibility of certain acquisition-related expenditures.

Net income Net income was $80.3 million, or $0.57 per diluted share, in 2015 compared to net income of $7.9 million, or $0.06 per diluted share, in 2014. The significant improvement in operating results, described in greater detail above, mainly reflects the absence in 2015 of the significant costs recorded in connection with the acquisition of ATMI in 2014.

Non-GAAP Measures Information The Company’s consolidated financial statements are prepared in conformity with accounting principles generally accepted in the United States (GAAP). The Company also utilizes certain non-GAAP financial measures as a complement to financial measures provided in accordance with GAAP in order to better assess and reflect trends affecting the Company’s business and results of operations. See “Non-GAAP Information” included below in this section for additional detail, including the reconciliation of GAAP measures to the Company’s non-GAAP measures.

The Company’s non-GAAP financial measures are Adjusted EBITDA and Adjusted Operating Income, together with related measures thereof, and non-GAAP Earnings Per Share (EPS).

Adjusted EBITDA increased 12% to $232.4 million in 2015, compared to $207.9 million in 2014. Adjusted EBITDA, as a percent of net sales, was 21.5% in 2015 compared to 21.6% in 2014. Adjusted Operating Income increased 10% to $178.1 million in 2015, compared to $161.3 million in 2014. Adjusted Operating Income, as a percent of net sales, was 16.5% in 2015 compared to 16.8% in 2014. Non-GAAP Earnings Per Share increased 23% to $0.85 in 2015, compared to $0.69 in 2014. The improvement in the Adjusted EBITDA and Adjusted Operating Income measures reflect the increase in net sales and related increase in gross profit. In addition, Non-GAAP Earnings Per Share was positively affected by a lower adjusted effective tax rate.

Segment Analysis

The following table and discussion concern the results of operations of the Company’s three reportable segments for the years ended December 31, 2015 and 2014.

(In thousands)	2015	2014
Specialty Chemicals and Engineered Materials		
Net sales	$418,878	$292,339
Segment profit	100,370	59,017
Advanced Materials Handling		
Net sales	$346,426	$346,571
Segment profit	66,419	70,464

Microcontamination Control		
Net sales	$315,817	$323,159
Segment profit	83,076	99,019

Table of Contents

Specialty Chemicals and Engineered Materials (SCEM)

For the year ended December 31, 2015, SCEM net sales increased to $418.9 million, up 43%, from $292.3 million in the comparable period last year. The sales increase primarily reflects the inclusion of incremental sales of $105.3 million from ATMI. Offsetting the incremental ATMI sales were unfavorable foreign currency translation effects of approximately $5.2 million, related to the year-over-year weakening of most international currencies versus the U.S. dollar, and slightly lower sales of gas microcontamination control systems products.

SCEM reported a segment profit of $100.4 million for the year ended December 31, 2015 compared to a $59.0 million segment profit in the year-ago period. The increase in the SCEM's profit in 2015 primarily reflects the incremental ATMI sales and related gross profit, offset in part by higher operating expenses.

Advanced Materials Handling (AMH)

For the year ended December 31, 2015, AMH net sales were flat, $346.4 million, from $346.6 million in 2015. The 2015 sales reflects the inclusion of incremental sales of $15.1 million from ATMI. Offsetting these factors were unfavorable foreign currency translation effects of approximately $11.2 million, related to the year-over-year weakening of most international currencies versus the U.S. dollar, and modest reductions in the sales of fluid management and liquid microcontamination control products.

AMH reported a segment profit of $66.4 million in 2015, down 6% from $70.5 million in 2015. The decrease in AMH's profit in 2015 was due to a 15% increase in operating expenses, offset partly by a slightly favorable sales mix.

Microcontamination Control (MC)

For the year ended December 31, 2015, MC net sales decreased to $315.8 million, down 2%, from $323.2 million in the comparable period last year. The sales decrease primarily reflects unfavorable foreign currency translation effects of approximately $16.3 million, related to the year-over-year weakening of most international currencies versus the U.S. dollar, and slightly lower sales of gas microcontamination control systems products.

MC reported a segment profit of $83.1 million for the year ended December 31, 2015 compared to a $99.0 million segment profit in the year-ago period. The decrease in the MC's profit in 2015 reflects lower margins due to reduced plant utilization, particularly in the latter half of the year, and higher operating expenses.

Unallocated general and administrative expenses

Unallocated general and administrative expenses for the year ended December 31, 2015 totaled $84.4 million compared to $122.8 million for the year ended December 31, 2014. The $38.3 million decline includes the absence of transaction-related costs of $26.8 million and deal costs of $9.1 million, as well as a decrease in integration expenses of $7.0 million. These items were offset by incremental ATMI infrastructure expenses of $6.4 million.

Table of Contents

Quarterly Results of Operations

The following table presents selected data from the Company's consolidated statements of operations for the eight quarters ended December 31, 2016. This unaudited information has been prepared on the same basis as the audited consolidated financial statements appearing elsewhere in this annual report. All adjustments that management considers necessary for the fair presentation of the unaudited information have been included in the quarters presented.

QUARTERLY STATEMENTS OF OPERATIONS DATA

	2015				2016			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
(In thousands)								
Net sales	$263,373	$280,709	$270,253	$266,786	$267,024	$303,052	$296,692	$308,502
Gross profit	116,536	128,087	116,310	109,298	114,706	139,205	122,980	131,800
Selling, general and administrative expenses	50,890	50,270	46,730	51,024	47,956	53,597	51,614	48,734
Engineering, research and development expenses	25,800	26,542	26,841	26,717	25,902	28,146	25,720	27,223
Amortization of intangible assets	12,307	11,928	11,673	11,441	11,289	11,062	10,974	10,938
Operating income	27,539	39,347	31,066	20,116	29,559	46,400	34,672	44,905
Net income	14,872	24,448	23,403	17,573	16,212	32,890	21,947	26,098
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
(Percent of net sales)								
Net sales	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %
Gross profit	44.2	45.6	43.0	41.0	43.0	45.9	41.5	42.7
Selling, general and administrative expenses	19.3	17.9	17.3	19.1	18.0	17.7	17.4	15.8
Engineering, research and development expenses	9.8	9.5	9.9	10.0	9.7	9.3	8.7	8.8
Amortization of intangibles	4.7	4.2	4.3	4.3	4.2	3.7	3.7	3.5
Operating income	10.5	14.0	11.5	7.5	11.1	15.3	11.7	14.6
Net income	5.6	8.7	8.7	6.6	6.1	10.9	7.4	8.5

The Company's quarterly results of operations have been, and will likely continue to be, subject to significant fluctuations due to a myriad of factors, many of which are beyond the Company's control. The variability in sales, and its corresponding effect on gross profit, are generally the most important factors underlying the changes in the Company's operating income and net income over the past eight quarters.

Liquidity and Capital Resources

The Company has historically financed its operations and capital requirements through cash flow from its operating activities, long-term loans, lease financing and borrowings under domestic and international short-term lines of credit. In fiscal 2000 and 2009, the Company raised capital via public offerings of its common stock.

Operating activities

Net cash flow provided by operating activities totaled $207.6 million for the year ended December 31, 2016. Cash generated by the Company's operations included net income of $97.1 million, as adjusted for the impact of various non-cash charges, most notably depreciation and amortization of $99.9 million, and share-based compensation expense of $13.4 million. These operating cash flows were partly offset by changes in operating assets and liabilities, mainly due to an increase in accounts receivables and inventories, and an increase in accounts payable and accrued liabilities.

Working capital was $538.6 million at December 31, 2016, which included $406.4 million in cash and cash equivalents, an increase from $533.2 million as of December 31, 2015, which included $349.8 million in cash and cash equivalents.

Accounts receivable increased by $24.3 million during 2016, or $25.3 million after accounting for the effect of foreign currency translation. The net increase reflects the year-over-year increase in fourth quarter sales of the Company's products. The Company's days sales outstanding measure (DSO) stood at 49 days at December 31, 2016 compared to 48 days at the beginning of the year.

Inventories at December 31, 2016 increased by $10.4 million from a year earlier, or $19.9 million after accounting for foreign currency translation and the provision for excess and obsolete inventory. The net increase reflects higher levels of all categories of inventory, due to higher sales and production activity.

Table of Contents

Accounts payable and accrued liabilities were $32.4 million higher than a year ago, or $31.3 million higher after accounting for the effect of foreign currency translation. The increase reflects higher accounts payable associated with increased levels of business activity and higher accrued bonuses in 2016.

Investing activities Cash flow used in investing activities totaled $66.7 million in 2016.

Acquisition of property and equipment totaled $65.3 million, which primarily reflected investments in equipment and tooling. Capital expenditures in 2016 generally reflected more normalized capital spending levels. The Company expects its capital expenditures in 2017 to be approximately $80 to $90 million.

Financing activities Cash flow used in financing activities totaled $81.7 million during 2016. This primarily reflects the Company's payments of $75 million on its senior secured term loan facility. In addition, the Company repurchased shares of the Company's common stock during 2016 at a total cost of $7.6 million under the stock repurchase program authorized by the Company's Board of Directors. The Company received proceeds of $4.8 million in connection with common shares issued under the Company's stock plans less $4.0 million paid for taxes related to the net share settlement of equity awards.

The Company has a senior secured asset-based revolving credit facility maturing April 30, 2019 that provides financing of $75 million, subject to a borrowing base. As of December 31, 2016, the Company had no outstanding borrowings and $0.2 million undrawn on outstanding letters of credit under the senior secured asset-based revolving credit facility.

Through December 31, 2016, the Company was in compliance with all applicable financial covenants included in the terms of its senior unsecured notes, senior secured term loan facility and senior secured asset-based revolving credit facility.

The Company also has a line of credit with two banks that provide for borrowings of Japanese yen for the Company's Japanese subsidiary equivalent to an aggregate of approximately $10.3 million. There were no outstanding borrowings under these lines of credit at December 31, 2016.

At December 31, 2016, the Company's shareholders' equity stood at $899.2 million, up 12% from $802.9 million at the beginning of the year. The 2016 increase reflects net income of $97.1 million, additional paid-in capital of $13.4 million associated with the Company's share-based compensation expense and $0.8 million received in connection with common shares issued under the Company's stock and employee stock purchase plans. These increases to shareholders' equity were partly offset by unfavorable foreign currency translation effects of $7.4 million, mainly associated with the strengthening of the U.S. dollar versus the Korean won, and the repurchase and retirement of the Company's stock of $7.6 million.

As of December 31, 2016, the Company's sources of available funds were its cash and cash equivalents of $406.4 million, funds available under its senior secured asset-based revolving credit facility and international credit facilities and cash flow generated from operations. As of December 31, 2016, the amount of cash and cash equivalents associated with indefinitely reinvested foreign earnings was $265.6 million. These amounts held by foreign subsidiaries are generally subject to U.S. income taxation on repatriation to the United States. Certain of these amounts are associated with indefinitely reinvested foreign earnings and are subject to U.S. income taxation on repatriation to the United States. The Company does not anticipate the need to repatriate funds associated with indefinitely reinvested foreign earnings to the United States to satisfy domestic liquidity needs arising in the ordinary course of business.

The Company believes its existing balances of domestic cash and cash equivalents, available cash and cash equivalents held by foreign subsidiaries not associated with indefinitely reinvested foreign earnings and operating cash flows will be sufficient to meet the Company's domestic cash needs arising in the ordinary course of business for the next twelve months. If available liquidity is not sufficient to meet the Company's operating and debt service obligations as they come due, management would need to pursue alternative arrangements through additional equity or debt financing in order to meet the Company's cash requirements. There can be no assurance that any such financing would be available on commercially acceptable terms, or at all.

New Accounting Pronouncements

Recently adopted accounting pronouncements Refer to Note 1 to the Company's consolidated financial statements for a discussion of accounting pronouncements implemented in 2016. Other than the adoption of ASU 2015-03, there

were no recently issued accounting pronouncements adopted in 2016.

Recently issued accounting pronouncements Refer to Note 1 to the Company's consolidated financial statements for a discussion of accounting pronouncements recently issued but not yet adopted.

Table of Contents

Contractual Obligations

The following table summarizes the maturities of the Company's significant financial obligations as of December 31, 2016:

(In thousands)	Total	2017	2018	2019	2020	2021	Thereafter
Long-term debt[1]	$593,850	$—	$—	$—	$—	$233,850	$360,000
Interest[2]	149,072	29,832	29,832	29,832	29,832	24,344	5,400
Pension obligations	6,330	65	106	145	187	736	5,091
Capital purchase obligations[3]	4,728	4,728	—	—	—	—	—
Operating leases	44,998	9,837	7,356	5,635	4,220	3,860	14,090
Total	$798,978	$44,462	$37,294	$35,612	$34,239	$262,790	$384,581

Unrecognized tax benefits[4]

[1]Debt obligations are classified based on their stated maturity date, regardless of their classification on the Company's consolidated balance sheets.

[2]Interest projections on both variable and fixed rate long-term debt are based on interest rates effective as of December 31, 2016 and do not include $9.2 million for net unamortized discounts and debt issuance costs.

[3]Capital purchase obligations represent commitments for the construction or purchase of property, plant and equipment. They were not recorded as liabilities on the Company's consolidated balance sheet as of December 31, 2016, as the Company had not yet received the related goods or taken title to the property.

[4]The Company had $8.3 million of total gross unrecognized tax benefits at December 31, 2016. The timing of any payments associated with these unrecognized tax benefits will depend on a number of factors. Accordingly, the Company cannot make reasonably reliable estimates of the amount and period of potential cash settlements, if any, with taxing authorities and are not included in the table above.

Non-GAAP Information The Company's consolidated financial statements are prepared in conformity with accounting principles generally accepted in the United States (GAAP).

The Company also provides certain non-GAAP financial measures as a complement to financial measures provided in accordance with GAAP in order to better assess and reflect trends affecting the Company's business and results of operations. Regulation G, "Conditions for Use of Non-GAAP Financial Measures," and other regulations under the Securities Exchange Act of 1934, as amended, define and prescribe the conditions for use of certain non-GAAP financial information. The Company provides non-GAAP financial measures of Adjusted EBITDA and Adjusted Operating Income together with related measures thereof, and non-GAAP Earnings Per Share (EPS).

Adjusted EBITDA, a non-GAAP term, is defined by the Company as net income before (1) equity in net loss of affiliates, (2) income tax expense (benefit), (3) interest expense (4) interest income (5) other (income) expense, net, (6) charge for the fair value write-up of acquired inventory sold, (7) transaction-related costs, (8) deal costs, (9) integration costs, (10) contingent consideration fair value adjustment, (11) severance related to organizational realignment, (12) impairment of equipment, (13) amortization of intangible assets and (14) depreciation. Adjusted Operating Income, another non-GAAP term, is defined by the Company as Adjusted EBITDA exclusive of the depreciation addback noted above. The Company also utilizes non-GAAP measures whereby Adjusted EBITDA and Adjusted Operating Income are each divided by the Company's net sales to derive Adjusted EBITDA Margin and Adjusted Operating Margin, respectively.

Non-GAAP EPS, a non-GAAP term, is defined by the Company as net income before (1) charge for fair value write-up of acquired inventory sold, (2) transaction-related costs, (3) deal costs, (4) integration costs, (5) severance related to organizational realignment, (6) impairment of equipment, (7) contingent consideration fair value adjustment, (8) net (gain) loss on impairment/sale of short-term and equity investment, (9) amortization of intangible assets and (10) the tax effect of those adjustments to net income.

The charge for fair value write-up of acquired inventory sold, transaction-related costs, deal costs and integration costs adjustments underlying Adjusted EBITDA and Non-GAAP EPS relate specifically to the ATMI acquisition.

The Company provides supplemental non-GAAP financial measures to better understand and manage its business and believes these measures provide investors and analysts additional and meaningful information for the assessment of the Company's ongoing results. Management also uses these non-GAAP measures to assist in the evaluation of the performance of its business segments and to make operating decisions.

Management believes the Company's non-GAAP measures help indicate the Company's baseline performance before certain gains, losses or other charges that may not be indicative of the Company's business or future outlook and offer a useful view of

Table of Contents

business performance in that the measures provide a more consistent means of comparing performance. The Company believes the non-GAAP measures aid investors' overall understanding of the Company's results by providing a higher degree of transparency for such items and providing a level of disclosure that will help investors understand how management plans, measures and evaluates the Company's business performance. Management believes that the inclusion of non-GAAP measures provides consistency in its financial reporting and facilitates investors' understanding of the Company's historical operating trends by providing an additional basis for comparisons to prior periods.

Management uses Adjusted EBITDA and Adjusted Operating Income to assist it in evaluations of the Company's operating performance by excluding items that management does not consider as relevant in the results of its ongoing operations. Internally, these non-GAAP measures are used by management for planning and forecasting purposes, including the preparation of internal budgets; for allocating resources to enhance financial performance; for evaluating the effectiveness of operational strategies; and for evaluating the Company's capacity to fund capital expenditures, secure financing and expand its business.

In addition, and as a consequence of the importance of these non-GAAP financial measures in managing its business, the Company's Board of Directors uses non-GAAP financial measures in the evaluation process to determine management compensation.

The Company believes that certain analysts and investors use Adjusted EBITDA, Adjusted Operating Income and non-GAAP EPS as supplemental measures to evaluate the overall operating performance of firms in the Company's industry. Additionally, lenders or potential lenders use Adjusted EBITDA measures to evaluate the Company's creditworthiness.

The presentation of non-GAAP financial measures is not meant to be considered in isolation, as a substitute for, or superior to, financial measures or information provided in accordance with GAAP. Management strongly encourages investors to review the Company's consolidated financial statements in their entirety and to not rely on any single financial measure.

Management notes that the use of non-GAAP measures has limitations:

First, non-GAAP financial measures are not standardized. Accordingly, the methodology used to produce the Company's non-GAAP financial measures is not computed under GAAP and may differ notably from the methodology used by other companies. For example, the Company's non-GAAP measure of Adjusted EBITDA may not be directly comparable to EBITDA or an adjusted EBITDA measure reported by other companies.

Second, the Company's non-GAAP financial measures exclude items such as amortization and depreciation that are recurring. Amortization of intangibles and depreciation have been, and will continue to be for the foreseeable future, a significant recurring expense with an impact upon the Company's results of operations, notwithstanding the lack of immediate impact upon cash flows.

Third, there is no assurance the Company will not have future restructuring activities, gains or losses on sale of equity investments, contingent consideration fair value adjustments or similar items and, therefore, may need to record additional charges (or credits) associated with such items, including the tax effects thereon. The exclusion of these items from the Company's non-GAAP measures should not be construed as an implication that these costs are unusual, infrequent or non-recurring.

Management considers these limitations by providing specific information regarding the GAAP amounts excluded from these non-GAAP financial measures and evaluating these non-GAAP financial measures together with their most directly comparable financial measures calculated in accordance with GAAP. The calculations of Adjusted EBITDA, Adjusted operating income, and non-GAAP EPS, and reconciliations between these financial measures and their most directly comparable GAAP equivalents are presented below in the accompanying tables.

Table of Contents

The reconciliation of GAAP measures to Adjusted Operating Income and Adjusted EBITDA for the years ended December 31, 2016, 2015 and 2014 are presented below:

(Dollars in thousands)	2016	2015	2014
Net sales	$1,175,270	$1,081,121	$962,069
Net income	$97,147	$80,296	$7,887
Adjustments to net income			
Equity in net loss of affiliate	—	1,687	293
Income tax expense (benefit)	22,852	10,202	(21,572)
Interest expense	36,846	38,667	33,355
Interest income	(318)	(429)	(1,336)
Other (income) expense, net	(991)	(12,355)	2,727
GAAP – Operating income	155,536	118,068	21,354
Charge for fair value write-up of acquired inventory sold	—	—	48,586
Transaction-related costs	—	—	26,776
Deal costs	—	—	9,125
Integration costs	—	12,667	19,652
Contingent consideration fair value adjustment	—	—	(1,282)
Severance related to organizational realignment	2,405	—	—
Impairment of equipment	5,826	—	—
Amortization of intangible assets	44,263	47,349	37,067
Adjusted operating income	208,030	178,084	161,278
Depreciation	55,623	54,305	46,637
Adjusted EBITDA	$263,653	$232,389	$207,915
Adjusted operating margin	17.7 %	16.5 %	16.8 %
Adjusted EBITDA – as a % of net sales	22.4 %	21.5 %	21.6 %

The reconciliation of GAAP measures to Non-GAAP Earnings per Share for the years ended December 31, 2016, 2015 and 2014 are presented below:

(Dollars in thousands)	2016	2015	2014
Net income	$97,147	$80,296	$7,887
Adjustments to net income:			
Charge for fair value write-up of acquired inventory sold	—	—	48,586
Transaction-related costs	—	—	26,776
Deal costs	—	—	13,288
Integration costs	—	12,667	19,510
Severance related to organizational realignment	2,405	—	—
Impairment of equipment	5,826	—	—
Contingent consideration fair value adjustment	—	—	(1,282)
Net (gain) loss on impairment/sale of short-term investment or equity investment	(156)	(1,449)	1,710
Amortization of intangible assets	44,263	47,349	37,067
Tax effect of adjustments to net income attributable to Entegris	(16,637)	(18,248)	(56,819)
Non-GAAP net income	$132,848	$120,615	$96,723
Diluted earnings per common share	$0.68	$0.57	$0.06
Effect of adjustments to net income	$0.25	$0.29	$0.63
Diluted non-GAAP earnings per common share	$0.94	$0.85	$0.69

Table of Contents

Item 7A. Quantitative and Qualitative Disclosure About Market Risks

Entegris' principal financial market risks are sensitivities to interest rates and foreign currency exchange rates. The Company's interest-bearing cash equivalents and short-term investments are subject to interest rate fluctuations. The Company's cash equivalents are instruments with maturities of three months or less. A 100 basis point change in interest rates would potentially increase or decrease annual net income by approximately $1.1 million annually.

The cash flows and results of operations of the Company's foreign-based operations are subject to fluctuations in foreign exchange rates. The Company occasionally uses derivative financial instruments to manage the foreign currency exchange rate risks associated with its foreign-based operations. At December 31, 2016, the Company had no net exposure to any foreign currency forward contracts.

Item 8. Financial Statements and Supplementary Data.

The information called for by this item is set forth in the Consolidated Financial Statements covered by the Report of Independent Registered Public Accounting Firm at the end of this report.

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

This item is not applicable.

Item 9A. Controls and Procedures.

DISCLOSURE CONTROLS AND PROCEDURES

Management evaluated the effectiveness of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended, (the Exchange Act)), as of December 31, 2016, the end of the fiscal period covered by this report on Form 10-K. The Securities and Exchange Commission, or SEC, rules define the term "disclosure controls and procedures" to mean a company's controls and other procedures that are designed to ensure that information required to be disclosed in the reports it files or submits under the Exchange Act is recorded, processed, summarized and reported within the time period specified in the SEC's rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by a company in its reports filed under the Exchange Act is accumulated and communicated to the company's management, including its principal executive and principal financial officers, or persons performing similar functions, as appropriate to allow timely decisions regarding required disclosure.

Based on the evaluation of the effectiveness of our disclosure controls and procedures by our management team with the participation of the Chief Executive Officer and the Chief Financial Officer, our Chief Executive Officer and our Chief Financial Officer have concluded that, as of the end of the period covered by this report, our disclosure controls and procedures were effective to provide reasonable assurance that information required to be disclosed in the reports that we file or submit under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the SEC rules and forms and is accumulated and communicated to management, including the principal executive officer and principal financial officer, as appropriate, to allow timely decisions regarding required disclosure.

CHANGES IN INTERNAL CONTROL OVER FINANCIAL REPORTING

There was no change in the Company's internal control over financial reporting during the most recently completed fiscal quarter that has materially affected, or is reasonably likely to materially affect, internal controls over financial reporting.

MANAGEMENT'S ANNUAL REPORT ON INTERNAL CONTROL OVER FINANCIAL REPORTING

Management is responsible for establishing and maintaining an adequate system of internal control over financial reporting of the Company. This system of internal financial reporting controls is designed to provide reasonable assurance that assets are safeguarded and transactions are properly recorded and executed in accordance with management's authorization. The design, monitoring and revision of the system of internal financial reporting controls involves, among other things, management's judgments with respect to the relative cost and expected benefits of specific control measures. The effectiveness of the control system is supported by the selection, retention and training of qualified personnel and an organizational structure that provides an appropriate division of responsibility and formalized procedures. The system of internal accounting controls is periodically reviewed and modified in response to changing conditions. Designated Company employees regularly monitor the adequacy and effectiveness of internal accounting controls.

Because of its inherent limitations, a system of internal control over financial reporting can provide only reasonable assurance and may not prevent or detect misstatements. Further, because of changes in conditions, the effectiveness of internal controls over financial reporting may vary over time. Our system contains control-monitoring mechanisms, and actions are taken to correct deficiencies as they are identified.

Table of Contents

Management conducted an evaluation of the effectiveness of the system of internal control over financial reporting based on the framework in Internal Control—Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO 2013). Based on this evaluation, management concluded that the Company's system of internal control over financial reporting was effective as of December 31, 2016.
KPMG LLP, the independent registered public accounting firm which audited the consolidated financial statements included in this annual report, has issued an attestation report on our internal control over financial reporting.

Table of Contents

Report of Independent Registered Public Accounting Firm
The Board of Directors and Stockholders
Entegris, Inc.:

We have audited Entegris, Inc.'s internal control over financial reporting as of December 31, 2016, based on criteria established in Internal Control - Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). Entegris, Inc.'s management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying "Management's Report on Internal Control over Financial Reporting" appearing under Item 9A of the Company's December 31, 2016 Annual Report on Form 10-K. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit.

We conducted our audit in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audit also included performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

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

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

In our opinion, Entegris, Inc. maintained, in all material respects, effective internal control over financial reporting as of December 31, 2016, based on criteria established in Internal Control - Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States), the consolidated balance sheets of Entegris, Inc. and subsidiaries as of December 31, 2016 and 2015, and the related consolidated statements of operations, comprehensive income (loss), equity and cash flows for each of the years in the three-year period ended December 31, 2016, and our report dated February 17, 2017 expressed an unqualified opinion on those consolidated financial statements.

/s/ KPMG LLP

Minneapolis, Minnesota
February 17, 2017

Item 9B. Other Information.

None.

Table of Contents

PART III

Item 10. Directors, Executive Officers and Corporate Governance.

Except as set forth below, the information required by this Item 10 has been omitted from this report, and is incorporated by reference to the sections “Section 16(a) Beneficial Ownership Reporting Compliance,” “Election of Directors,” “Corporate Governance” in our definitive Proxy Statement for the Entegris, Inc. Annual Meeting of Stockholders to be held on May 24, 2017, and to be filed with the Securities and Exchange Commission pursuant to Regulation 14A within 120 days after the end of our 2016 fiscal year.

Information called for by this item with respect to registrant’s executive officers is set forth under “Executive Officers of the Registrant” in Part I of this report.

At their first meeting following the August 10, 2005 merger described under "Our History" in Item 1 of Part I above, our Board of Directors adopted a code of business ethics, The Entegris, Inc. Code of Business Ethics, applicable to all of our executives, directors and employees as well as a set of corporate governance guidelines. The Entegris, Inc. Code of Business Ethics was amended by the Entegris Board of Directors on July 30, 2014. The amended Entegris, Inc. Code of Business Ethics, the Corporate Governance Guidelines and the charters for our Audit & Finance Committee, Governance & Nominating Committee and our Management Development & Compensation Committee all appear on our website at http://www.Entegris.com under “Investors - Corporate Governance”. The Entegris Code of Business Ethics, Corporate Governance Guidelines and committee charters are also available in print to any shareholder that requests a copy. Copies may be obtained by contacting Sue Lee, our Senior Vice President, Secretary and General Counsel through our corporate headquarters. The Company intends to comply with the requirements of Item 5.05 of Form 8-K with respect to any amendment to or waiver of the provisions of the Entegris, Inc. Code of Business Ethics applicable to the registrant’s Chief Executive Officer, Chief Financial Officer or Chief Accounting Officer by posting notice of any such amendment or waiver at the same location on our website.

Item 11. Executive Compensation.

The information required by this Item 11 has been omitted from this report, and is incorporated by reference to the sections entitled "Compensation of Executive Officers" and "Management Development & Compensation Committee Report" in our definitive Proxy Statement for the Entegris, Inc. Annual Meeting of Stockholders to be held on May 24, 2017, and to be filed with the Securities and Exchange Commission pursuant to Regulation 14A within 120 days after the end of our 2016 fiscal year.

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

Securities Authorized for Issuance Under Equity Compensation Plans:

As of December 31, 2016, our equity compensation plan information is as follows:

Equity Compensation Plan Information

Plan category	Number of securities to be issued upon exercise of outstanding options, warrants and rights (a)	Weighted-average exercise price of outstanding options, warrants and rights (1) (b)	Number of securities remaining available for future issuance under equity compensation plans (excluding securities reflected in column (a)) (2) (c)
Equity compensation plans approved by security holders	4,385,165	$ 11.54	9,391,937
Equity compensation plans not approved by security holders	—	—	—
Total	4,385,165	$ 11.54	9,391,937

(1) The weighted average exercise price does not take into account the shares issuable upon outstanding restricted stock unit vesting, which have no exercise price.

(2) These shares are available under the 2010 Stock Plan for future issuance for stock options, restricted stock units, performance shares and stock awards in accordance with the terms of the 2010 Stock Plan.

The other information called for by this Item 12 has been omitted from this report, and is incorporated by reference to the section entitled “Ownership of Entegris Common Stock” in our definitive Proxy Statement for the Entegris, Inc. Annual Meeting of Stockholders to be held on May 24, 2017, and to be filed with the Securities and Exchange Commission pursuant to Regulation 14A within 120 days after the end of our 2016 fiscal year.

Table of Contents

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

The information required by this Item 13 has been omitted from this report, and is incorporated by reference to the section entitled "Corporate Governance" in our definitive Proxy Statement for the Entegris, Inc. Annual Meeting of Stockholders to be held on May 24, 2017, and to be filed with the Securities and Exchange Commission pursuant to Regulation 14A within 120 days after the end of our 2016 fiscal year.

Item 14. Principal Accountant Fees and Services.

The information required by this Item 14 has been omitted from this report, and is incorporated by reference to the section entitled "Proposal 2 - Ratification of Selection of Independent Registered Public Accounting Firm for 2016" in our definitive Proxy Statement for the Entegris, Inc. Annual Meeting of Stockholders to be held on May 24, 2017, and to be filed with the Securities and Exchange Commission pursuant to Regulation 14A within 120 days after the end of our 2016 fiscal year.

Table of Contents

PART IV

Item 15. Exhibits and Financial Statement Schedules.

(a) The following documents are filed as a part of this report:

1. Financial Statements. The Consolidated Financial Statements listed under Item 8 of this report and in the Index to Consolidated Financial Statements on page F-1 of this report are incorporated by reference herein.

2. Exhibits.

A. The following exhibits are incorporated by reference:

Reg. S-K Item 601(b) Reference	Document Incorporated	Referenced Document on file with the Commission
(2)	Agreement and Plan of Merger, dated as of February 4, 2014, among Entegris, Inc., Atomic Merger Corporation and ATMI, Inc.	Exhibit 2.1 to Entegris, Inc Current Report on Form 8-K filed on February 4, 2014
(3)	By-Laws of Entegris, Inc., as amended December 17, 2008	Exhibit 3 to Entegris, Inc. Annual Report on Form 10-K for the fiscal year ended December 31, 2008
(3)	Amended and Restated Certificate of Incorporation of Entegris, Inc., as amended	Exhibit 3.1 to Entegris, Inc. Annual Report on Form 10-K for the fiscal year ended December 31, 2011
(4)	Form of certificate representing shares of Common Stock, $.01 par value per share	Exhibit 4.1 to Form S-4 Registration Statement of Entegris, Inc. and Eagle DE, Inc. (No. 333-124719)
(4)	Indenture, dated as of April 1, 2014, between Entegris, Inc., as Issuer and Wells Fargo Bank National Association, as Trustee, with respect to $360,000,000 6% Senior Unsecured Notes Due 2022, including the form of note representing the 2022 Senior Unsecured Notes	Exhibit 4.1 to Entegris, Inc. Current Report on Form 8-K filed with the Securities and Exchange Commission on April 2, 2014
(10)	ABL Credit and Guaranty Agreement, dated as of April 30, 2014, among the Company, certain subsidiaries of the Company as guarantors, the lenders party thereto and Goldman Sachs Bank USA as administrative agent and collateral agent	Exhibit 10.1 to Entegris, Inc. Current Report on Form 8-K filed with the Securities and Exchange Commission on May 1, 2014
(10)	Term Loan Credit and Guaranty Agreement, dated as of April 30, 2014, among the Company, certain subsidiaries of the Company as guarantors, the lenders party thereto and Goldman Sachs Bank USA as administrative agent and collateral agent	Exhibit 10.2 to Entegris, Inc. Current Report on Form 8-K filed with the Securities and Exchange Commission on May 1, 2014
(10)	ABL Pledge and Security Agreement, dated as of April 30, 2014, among the Company, certain subsidiaries of the Company as guarantors, the lenders party thereto and Goldman Sachs Bank USA as collateral agent	Exhibit 10.3 to Entegris, Inc. Current Report on Form 8-K filed with the Securities and Exchange Commission on May 1, 2014
(10)	Term Loan Pledge and Security Agreement, dated as of April 30, 2014, among the Company, certain subsidiaries of the Company as guarantors, the lenders party thereto and Goldman Sachs Bank USA as collateral agent	Exhibit 10.4 to Entegris, Inc. Current Report on Form 8-K filed with the Securities and Exchange Commission on May 1, 2014
(10)	ABL Intercreditor Agreement, dated as of April 30, 2014, among Goldman Sachs Bank USA, as ABL Collateral Agent, Goldman Sachs Bank USA, as Term Collateral Agent, and acknowledged by the Company and its wholly owned domestic subsidiaries	Exhibit 10.5 to Entegris, Inc. Current Report on Form 8-K filed with the Securities and Exchange Commission on May 1, 2014
(10)	Entegris, Inc. – 2010 Stock Plan, as amended*	

		Exhibit 10.1 to Entegris, Inc. Quarterly Report on Form 10-Q for the period ended July 3, 2010
(10)	Entegris, Inc. Outside Directors' Stock Option Plan*	Exhibit 10.2 to Entegris, Inc. Registration Statement on Form S-1 (No. 333-33668)
(10)	Entegris, Inc. Amended and Restated Employee Stock Purchase Plan*	Exhibit 4.1 to Entegris, Inc. Registration Statement on Form S-8 (No. 333-211444)

Table of Contents

(10)	Amended and Restated Entegris Incentive Plan*	Exhibit 10.1 to Entegris, Inc. Quarterly Report on Form 10-Q for the period ended June 28, 2008
(10)	Trust Agreement between Entegris, Inc. Fidelity Management Trust Company and Entegris Inc. 401(k) Savings and Profit Sharing Plan Trust, dated December 29, 2007.	Exhibit 10.3 to Entegris, Inc. Annual Report on Form 10-K for the fiscal year ended December 31, 2007
(10)	Entegris, Inc. 2007 Deferred Compensation Plan*	Exhibit 10.2 to Entegris, Inc. Quarterly Report on Form10-Q for the fiscal period ended June 30, 2007
(10)	Amended and Restated Supplemental Executive Retirement Plan for Key Salaried Employees*	Exhibit 10.2 to Entegris, Inc. Annual Report on Form 10-K for the fiscal year ended December 31, 2008
(10)	Amendment to Amended and Restated SERP*	Exhibit 10.15 to Entegris, Inc. Annual Report on Form 10-K for the fiscal year ended December 31, 2009.
(10)	Lease Agreement, dated April 1, 2002 between Nortel Networks HPOCS Inc. and Mykrolis Corporation, relating to Executive office, R&D and manufacturing facility located at 129 Concord Road Billerica, MA	Exhibit 10.1.3 to Mykrolis Corporation's Quarterly Report on Form 10-Q for the quarter ended March 31, 2002
(10)	Amendment of Lease between Entegris, Inc. and KBS Rivertech, LLC dated April 1, 2012	Exhibit 10.1 to Entegris, Inc. Quarterly Report on Form 10-Q for the period ended June 30, 2012
(10)	Second Amendment of Lease, dated March 8, 2016, between Entegris, Inc. and KBS Rivertech, LLC	Exhibit 10.1 to Entegris, Inc. Current Report on Form 8-K filed with the Securities and Exchange Commission on March 11, 2016
(10)	Fluoropolymer Purchase and Sale Agreement, by and between E.I. Du Pont De Nemours and Company and the Registrant, dated January 1, 2011, as amended	Exhibit 10.2 to Entegris, Inc. Quarterly Report on Form 10-Q for the quarter ended April 2, 2011
(10)	Form of Indemnification Agreement between Entegris, Inc. and each of its executive officers and Directors	Exhibit 10.30 to Entegris, Inc. Annual Report on Form 10-K for the fiscal year ended August 27, 2005
(10)	Form of Executive Change of Control Termination Agreement between Entegris, Inc. and certain of its executive officers*	Exhibit 10.31 to Entegris, Inc. Annual Report on Form 10-K for the fiscal year ended August 27, 2005
(10)	Form of Revised Executive Change of Control Termination Agreement between Entegris, Inc. and certain of its executive officers executed in 2015 (other than those executive officers who executed the form previously filed)*	Exhibit 10.1 to Entegris, Inc. Annual Report on Form 10-K filed with the Securities and Exchange Commission on February 29, 2016
(10)	Entegris, Inc. 2010 RSU Unit Award Agreement*	Exhibit 10.1 to Entegris, Inc. Quarterly Report on Form 10-Q for the fiscal period ended April 3, 2010
(10)	Entegris, Inc. 2010 Stock Option Award Agreement*	Exhibit 10.1 to Entegris, Inc. Quarterly Report on Form 10-Q for the fiscal period ended April 3, 2010
(10)	Entegris, Inc. 2011 RSU Unit Award Agreement*	Exhibit 10.2 to Entegris, Inc. Annual Report on Form 10-K for the fiscal year ended December 31, 2012

(10) Entegris, Inc. 2011 Stock Option Award Agreement*	Exhibit 10.3 to Entegris, Inc. Annual Report on Form 10-K for the fiscal year ended December 31, 2012
(10) Entegris, Inc. 2012 RSU Unit Award Agreement*	Exhibit 10.2 to Entegris, Inc. Quarterly Report on Form 10-Q for the fiscal period ended March 31, 2012

Table of Contents

(10)	Entegris, Inc. 2012 Stock Option Grant Agreement*	Exhibit 10.3 to Entegris, Inc. Quarterly Report on Form 10-Q for the fiscal period ended March 31, 2012
(10)	Entegris, Inc. 2013 RSU Unit Award Agreement*	Exhibit 10.1 to Entegris, Inc. Annual Report on Form 10-K filed with the Securities and Exchange Commission on February 26, 2015
(10)	Entegris, Inc. 2013 Stock Option Grant Agreement*	Exhibit 10.2 to Entegris, Inc. Annual Report on Form 10-K filed with the Securities and Exchange Commission on February 26, 2015
(10)	Entegris, Inc. 2014 Performance Award Agreement	Exhibit 10.1 to Entegris, Inc. Quarterly Report on Form 10-Q filed with the Securities and Exchange Commission on October 31, 2014
(10)	Entegris, Inc. 2014 RSU Unit Award Agreement*	Exhibit 10.3 to Entegris, Inc. Annual Report on Form 10-K filed with the Securities and Exchange Commission on February 26, 2015
(10)	Entegris, Inc. 2014 Stock Option Grant Agreement*	Exhibit 10.4 to Entegris, Inc. Annual Report on Form 10-K filed with the Securities and Exchange Commission on February 26, 2015
(10)	Entegris, Inc. 2015 Performance Share Award Agreement*	Exhibit 10.2 to Entegris, Inc. Annual Report on Form 10-K filed with the Securities and Exchange Commission on February 29, 2016
(10)	Entegris, Inc. 2015 RSU Unit Award Agreement*	Exhibit 10.3 to Entegris, Inc. Annual Report on Form 10-K filed with the Securities and Exchange Commission on February 29, 2016
(10)	Entegris, Inc. 2015 Stock Option Grant Agreement*	Exhibit 10.4 to Entegris, Inc. Annual Report on Form 10-K filed with the Securities and Exchange Commission on February 29, 2016
(10)	Executive Employment Agreement, effective November 28, 2012, between the Registrant and Bertrand Loy*	Exhibit 10.1 to Entegris, Inc. Annual Report on Form 10-K for the fiscal year ended December 31, 2012
(10)	Amendment No. 1, dated April 26, 2013, to Executive Change in Control Termination Agreement, between Entegris, Inc. and Bertrand Loy*	Exhibit 99.1 to Entegris, Inc. Current Report on Form 8-K filed with the Securities and Exchange Commission on April 26, 2013
(10)	Severance Protection Agreement, dated May 13, 2011 between Entegris, Inc. and Gregory B. Graves*	Exhibit 10.2 to Entegris, Inc. Quarterly Report on Form 10-Q for the period ended July 2, 2011
(10)	Amendment No. 1, dated as of February 23, 2016, to the Severance Protection Agreement by and between Entegris, Inc, and Gregory B. Graves*	Exhibit 10.3 to Entegris, Inc. Quarterly Report on Form 10-Q filed with the Securities and Exchange Commission on April 28, 2016
(10)	Executive Separation Letter Agreement, dated November 13, 2014, between Registrant and Gregory Morris*	Exhibit 10.5 to Entegris, Inc. Annual Report on Form 10-K filed with the Securities and Exchange Commission on February 26, 2015
(10)	Executive Separation Letter Agreement, dated as of June 13, 2016, by and between Entegris, Inc. and Christian F. Kramer*	Exhibit 10.1 to Entegris, Inc. Quarterly Report on Form 10-Q filed with the Securities and Exchange Commission on July 28, 2016
(10)	Executive Separation Letter Agreement, dated as of February 3, 2016 by and between Entegris, Inc. and Peter W. Walcott*	Exhibit 10.1 to Entegris, Inc. Quarterly Report on Form 10-Q filed with the Securities and Exchange Commission on April 28, 2016

* A “management contract or compensatory plan”

Table of Contents

B. The Company hereby files as exhibits to this Annual Report on Form 10-K the following documents:

Reg. S-K Item 601(b) Reference	Exhibit No.	Documents Filed Herewith
(10)	10.1	Entegris, Inc. - 401(k) Savings and Profit Sharing Plan (2017 Restatement)*
(10)	10.2	Entegris, Inc. 2016 Performance Share Award Agreement*
(10)	10.3	Entegris, Inc. 2016 RSU Unit Award Agreement*
(10)	10.4	Entegris, Inc. 2016 Stock Option Grant Agreement*
(10)	10.5	Agreement to Terminate Executive Change of Control Termination Agreement, dated as of January 16, 2017, by and between Entegris, Inc. and William Shaner
(21)	21	Subsidiaries of Entegris, Inc.
(23)	23	Consent of Independent Registered Public Accounting Firm
(24)	24	Power of Attorney by the Directors of Entegris, Inc.
(31)	31.1	Certification required by Rule 13a-14(a) in accordance with Section 302 of the Sarbanes—Oxley Act of 2002.
(31)	31.2	Certification required by Rule 13a-14(a) in accordance with Section 302 of the Sarbanes—Oxley Act of 2002.
(32)	32.1	Certification required by Rule 13a-14(b) and 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
(32)	32.2	Certification required by Rule 13a-14(b) and 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
(101)	101.INS	XBRL Instance Document
(101)	101.SCH	XBRL Taxonomy Extension Schema Document
(101)	101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document
(101)	101.DEF	XBRL Taxonomy Extension Definition Linkbase Document
(101)	101.LAB	XBRL Taxonomy Extension Label Linkbase Document
(101)	101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document

* A “management contract or compensatory plan”

Table of Contents

SIGNATURES

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

ENTEGRIS, INC.

Date: February 17, 2017 By /s/ BERTRAND LOY
Bertrand Loy
President & Chief Executive Officer

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

SIGNATURE	TITLE	DATE
/s/ BERTRAND LOY Bertrand Loy	President, Chief Executive Officer and Director (Principal executive officer)	February 17, 2017
/s/ GREGORY B. GRAVES Gregory B. Graves	Executive Vice President, Chief Financial Officer & Treasurer (Principal financial officer)	February 17, 2017
/s/ MICHAEL D. SAUER Michael D. Sauer	Vice President, Controller & Chief Accounting Officer (Principal accounting officer)	February 17, 2017
PAUL L.H. OLSON* Paul L.H. Olson	Director, Chairman of the Board	February 17, 2017
MICHAEL A. BRADLEY* Michael A. Bradley	Director	February 17, 2017
MARVIN D. BURKETT* Marvin D. Burkett	Director	February 17, 2017
R. NICHOLAS BURNS* R. Nicholas Burns	Director	February 17, 2017
DANIEL W. CHRISTMAN* Daniel W. Christman	Director	February 17, 2017
JAMES F. GENTILCORE* James F. Gentilcore	Director	February 17, 2017
JAMES P. LEDERER*	Director	February 17, 2017

James P. Lederer

BRIAN F. SULLIVAN*	Director	February 17, 2017

Brian F. Sullivan
*By /s/ SUE LEE
Sue Lee,
Attorney-in-fact

Table of Contents

EXHIBIT INDEX

Reg. S-K Item 601(b) Reference	Exhibit No.	Documents Filed Herewith
(10)	10.1	Entegris, Inc. - 401(k) Savings and Profit Sharing Plan (2017 Restatement)*
(10)	10.2	Entegris, Inc. 2016 Performance Share Award Agreement*
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(23)	23	Consent of Independent Registered Public Accounting Firm
(24)	24	Power of Attorney by the Directors of Entegris, Inc.
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(101)	101.LAB	XBRL Taxonomy Extension Label Linkbase Document
(101)	101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document

* A “management contract or compensatory plan”

Table of Contents

ENTEGRIS, INC.
INDEX TO FINANCIAL STATEMENTS

Report of Independent Registered Public Accounting Firm	F-2
Consolidated Balance Sheets at December 31, 2016 and 2015	F-3
Consolidated Statements of Operations for the Years Ended December 31, 2016, 2015 and 2014	F-4
Consolidated Statements of Comprehensive Income (Loss) for the Years Ended December 31, 2016, 2015 and 2014	F-5
Consolidated Statements of Equity for the Years Ended December 31, 2016, 2015 and 2014	F-6
Consolidated Statements of Cash Flows for the Years Ended December 31, 2016, 2015 and 2014	F-7
Notes to Consolidated Financial Statements	F-9

Table of Contents

Report of Independent Registered Public Accounting Firm

The Board of Directors and Stockholders
Entegris, Inc.:

We have audited the accompanying consolidated balance sheets of Entegris, Inc. and subsidiaries as of December 31, 2016 and 2015, and the related consolidated statements of operations, comprehensive income (loss), equity and cash flows for each of the years in the three year period ended December 31, 2016. These consolidated financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these consolidated financial statements based on our audits.

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

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of Entegris, Inc. and subsidiaries as of December 31, 2016 and 2015, and the results of their operations and their cash flows for each of the years in the three year period ended December 31, 2016, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States), Entegris, Inc.'s internal control over financial reporting as of December 31, 2016, based on criteria established in Internal Control - Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO), and our report dated February 17, 2017 expressed an unqualified opinion on the effectiveness of the Company's internal control over financial reporting.

/s/ KPMG LLP

Minneapolis, Minnesota
February 17, 2017

Table of Contents

ENTEGRIS, INC. AND SUBSIDIARIES
CONSOLIDATED BALANCE SHEETS

(In thousands, except share and per share data)	December 31, 2016	December 31, 2015
ASSETS		
Current assets:		
Cash and cash equivalents	$406,389	$349,825
Short-term investments	—	2,181
Trade accounts and notes receivable, net	165,675	141,409
Inventories, net	183,529	173,176
Deferred tax charges and refundable income taxes	20,140	18,943
Other current assets	24,398	23,253
Total current assets	800,131	708,787
Property, plant and equipment, net	321,562	321,301
Other assets:		
Goodwill	345,269	342,111
Intangible assets, net	217,548	258,942
Deferred tax assets and other noncurrent tax assets	8,022	7,771
Other	7,000	7,785
Total assets	$1,699,532	$1,646,697
LIABILITIES AND EQUITY		
Current liabilities:		
Long-term debt, current maturities	$100,000	$50,000
Accounts payable	61,617	36,916
Accrued payroll and related benefits	54,317	41,891
Other accrued liabilities	29,213	33,968
Income taxes payable	16,424	12,775
Total current liabilities	261,571	175,550
Long-term debt, excluding current maturities	484,677	606,044
Pension benefit obligations and other liabilities	27,220	24,608
Deferred tax liabilities and other noncurrent tax liabilities	26,846	37,612
Commitments and contingent liabilities	—	—
Equity:		
Preferred stock, par value $.01; 5,000,000 shares authorized; none issued and outstanding	—	—
Common stock, par value $.01; 400,000,000 shares authorized; issued and outstanding shares: 141,319,964 and 140,716,420	1,413	1,407
Additional paid-in capital	859,778	848,667
Retained earnings (deficit)	92,303	(416)
Accumulated other comprehensive loss	(54,276)	(46,775)
Total equity	899,218	802,883
Total liabilities and equity	$1,699,532	$1,646,697

See the accompanying notes to consolidated financial statements.

Table of Contents

ENTEGRIS, INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF OPERATIONS

(In thousands, except per share data)	Year ended December 31, 2016	Year ended December 31, 2015	Year ended December 31, 2014
Net sales	$1,175,270	$1,081,121	$962,069
Cost of sales	666,579	610,890	585,386
Gross profit	508,691	470,231	376,683
Selling, general and administrative expenses	201,901	198,914	231,833
Engineering, research and development expenses	106,991	105,900	87,711
Amortization of intangible assets	44,263	47,349	37,067
Contingent consideration fair value adjustment	—	—	(1,282)
Operating income	155,536	118,068	21,354
Interest expense	36,846	38,667	33,355
Interest income	(318)	(429)	(1,336)
Other (income) expense, net	(991)	(12,355)	2,727
Income (loss) before income tax expense (benefit) and equity in net loss of affiliate	119,999	92,185	(13,392)
Income tax expense (benefit)	22,852	10,202	(21,572)
Equity in net loss of affiliate	—	1,687	293
Net income	$97,147	$80,296	$7,887
Basic net income per common share	$0.69	$0.57	$0.06
Diluted net income per common share	$0.68	$0.57	$0.06
Weighted shares outstanding			
Basic	141,093	140,353	139,311
Diluted	142,050	141,121	140,062

See the accompanying notes to consolidated financial statements.

Table of Contents

ENTEGRIS, INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME (LOSS)

(In thousands)	Year ended December 31, 2016	Year ended December 31, 2015	Year ended December 31, 2014
Net income	$ 97,147	$ 80,296	$ 7,887
Other comprehensive (loss) income, net of tax			
Foreign currency translation adjustments	(7,352)	(44,569)	(26,948)
Unrealized gain (loss) on available-for-sale investment	—	611	(1,884)
Reclassification adjustment associated with unrealized loss realized upon impairment of available-for-sale investment	—	—	1,884
Reclassification adjustment associated with the sale of available-for-sale investments	(611)	—	—
Pension liability adjustments, net of income tax expense (benefit) of $82, $(45), and $(71) for year ended December 31, 2016, 2015, and 2014	462	(142)	(150)
Other comprehensive loss	(7,501)	(44,100)	(27,098)
Comprehensive income (loss)	$ 89,646	$ 36,196	$ (19,211)

See the accompanying notes to consolidated financial statements

Table of Contents

ENTEGRIS, INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF EQUITY

(In thousands)	Common shares outstanding	Common stock	Additional paid-in capital	Retained earnings (deficit)	Foreign currency translation adjustments	Available-for-sale investments - Change in net unrealized gains	Defined benefit pension adjustments	Total
Balance at December 31, 2013	138,734	$1,387	$819,632	$(88,599)	$25,280	$ —	$ (857)	$756,843
Shares issued under stock plans	1,059	11	1,069	—	—	—	—	1,080
Share-based compensation expense	—	—	8,887	—	—	—	—	8,887
Tax benefit associated with stock plans	—	—	842	—	—	—	—	842
Pension liability adjustment	—	—	—	—	—	—	(150)	(150)
Foreign currency translation	—	—	—	—	(26,948)	—	—	(26,948)
Net income	—	—	—	7,887	—	—	—	7,887
Balance at December 31, 2014	139,793	1,398	830,430	(80,712)	(1,668)	—	(1,007)	748,441
Shares issued under stock plans	923	9	1,747	—	—	—	—	1,756
Share-based compensation expense	—	—	11,033	—	—	—	—	11,033
Tax benefit associated with stock plans	—	—	5,457	—	—	—	—	5,457
Pension liability adjustment	—	—	—	—	—	—	(142)	(142)
Available-for-sale investment, change in net unrealized gain, net of taxes	—	—	—	—	—	611	—	611
Foreign currency translation	—	—	—	—	(44,569)	—	—	(44,569)
Net income	—	—	—	80,296	—	—	—	80,296
Balance at December 31, 2015	140,716	1,407	848,667	(416)	(46,237)	611	(1,149)	802,883
Shares issued under stock plans	1,123	11	815	—	—	—	—	826
Share-based compensation expense	—	—	13,436	—	—	—	—	13,436
Repurchase and retirement of common stock	(519)	(5)	(3,140)	(4,428)				(7,573)
Pension liability adjustment	—	—	—	—	—	—	462	462
Available-for-sale investment, change in net unrealized loss, net of taxes	—	—	—	—	—	(611)	—	(611)
Foreign currency translation	—	—	—	—	(7,352)	—	—	(7,352)
Net income	—	—	—	97,147	—	—	—	97,147
Balance at December 31, 2016	141,320	$1,413	$859,778	$92,303	$(53,589)	$ —	$ (687)	$899,218

See the accompanying notes to consolidated financial statements.

Table of Contents

ENTEGRIS, INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF CASH FLOWS

(In thousands)	Year ended December 31, 2016	Year ended December 31, 2015	Year ended December 31, 2014
Operating activities:			
Net income	$97,147	$80,296	$7,887
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation	55,623	54,305	46,637
Amortization	44,263	47,349	37,067
Share-based compensation expense	13,436	11,033	8,887
Charge for fair value write-up of acquired inventory sold	—	—	48,586
Provision for deferred income taxes	(16,284)	(13,313)	(44,716)
Charge for excess and obsolete inventory	9,302	8,311	4,513
Excess tax benefit from share-based compensation plans	—	(5,457)	(842)
Amortization of debt issuance costs	3,947	3,344	5,848
Other	9,744	(20,299)	2,209
Changes in operating assets and liabilities, net of effects of acquisitions:			
Trade accounts receivable and notes receivable	(25,298)	5,212	(4,845)
Inventories	(19,871)	(26,670)	(11,608)
Accounts payable and other accrued liabilities	31,294	(28,686)	14,348
Other current assets	185	654	(1,699)
Income taxes payable and refundable income taxes	3,408	4,955	10,975
Other	659	(116)	3,176
Net cash provided by operating activities	207,555	120,918	126,423
Investing activities:			
Acquisition of property and equipment	(65,260)	(71,977)	(57,733)
Acquisition of business, net of cash acquired	—	—	(809,390)
Proceeds from sale or maturities of short-term investments	1,726	7,692	13,778
Proceeds from sale of assets held for sale	—	—	—
Payments for non-compete agreements	—	—	(7,517)
Other	(3,152)	647	567
Net cash used in investing activities	(66,686)	(63,638)	(860,295)
Financing activities:			
Proceeds from long-term debt	—	—	855,200
Payments of long-term debt	(75,000)	(100,000)	(88,650)
Payments for debt issuance costs	—	—	(20,747)
Issuance of common stock from employee stock plans	4,844	4,264	3,559
Taxes paid related to net share settlement of equity awards	(4,018)	(2,508)	(2,479)
Repurchase and retirement of common stock	(7,573)	—	—
Other	—	5,457	765
Net cash (used in) provided by financing activities	(81,747)	(92,787)	747,648
Effect of exchange rate changes on cash and cash equivalents	(2,558)	(4,367)	(8,503)
Increase (decrease) in cash and cash equivalents	56,564	(39,874)	5,273
Cash and cash equivalents at beginning of year	349,825	389,699	384,426
Cash and cash equivalents at end of year	$406,389	$349,825	$389,699

Table of Contents

Supplemental Cash Flow Information

(In thousands)	Year ended December 31, 2016	Year ended December 31, 2015	Year ended December 31, 2014
Non-cash transactions:			
Equipment purchases in accounts payable	$ 5,104	$ 3,757	$ 3,702
Schedule of interest and income taxes paid:			
Interest paid	$ 32,085	$ 35,126	$ 21,919
Income taxes, net of refunds received	35,722	16,060	12,274

See accompanying notes to consolidated financial statements.

Table of Contents

ENTEGRIS, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
DECEMBER 31, 2016

(1) SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Nature of Operations Entegris, Inc. (Entegris or the Company) is a leading global developer, manufacturer and supplier of microfiltration control products, specialty chemicals and advanced materials handling solutions for manufacturing processes in the semiconductor and other high-technology industries.

Principles of Consolidation The consolidated financial statements include the accounts of the Company and its majority-owned subsidiaries. Intercompany profits, transactions and balances have been eliminated in consolidation.

Use of Estimates and Basis of Presentation The preparation of consolidated financial statements in conformity with accounting principles generally accepted in the United States requires management to make judgments, estimates and assumptions that affect the amounts reported in the consolidated financial statements and accompanying notes. On an ongoing basis, Entegris evaluates its estimates, including those related to receivables, inventories, property, plant and equipment, intangible assets, accrued liabilities, income taxes and share-based compensation, among others. Actual results could differ from those estimates.

Cash and Cash Equivalents Cash and cash equivalents include cash on hand and highly liquid debt securities with original maturities of three months or less, which are valued at cost and approximates fair value.

Allowance for Doubtful Accounts An allowance for uncollectible trade receivables is estimated based on a combination of write-off history, aging analysis and any specific, known troubled accounts. The Company maintains an allowance for doubtful accounts that management believes is adequate to cover expected losses on trade receivables.

Inventories Inventories are stated at the lower of cost or market. Cost is determined by the first-in, first-out (FIFO) method.

Property, Plant, and Equipment Property, plant and equipment are carried at cost and are depreciated on the straight-line method over the estimated useful lives of the assets. When assets are retired or disposed of, the cost and related accumulated depreciation are removed from the accounts, and gains or losses are recognized in the same period. Maintenance and repairs are expensed as incurred, while significant additions and improvements are capitalized. Long-lived assets, including property, plant and equipment, are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset or group of assets may not be recoverable based on estimated future undiscounted cash flows. The amount of impairment, if any, is measured as the difference between the net book value and the estimated fair value of the asset(s).

Investments The Company’s nonmarketable investments are accounted for under either the cost or equity method of accounting, as appropriate. All nonmarketable investments are periodically reviewed to determine whether declines, if any, in fair value below cost basis are other-than-temporary. If the decline in fair value is determined to be other-than-temporary, an impairment loss is recorded and the investment is written down to a new cost basis.

Fair Value of Financial Instruments The carrying value of cash equivalents, accounts receivable, accounts payable, accrued payroll and related benefits, and other accrued liabilities approximates fair value due to the short maturity of those instruments.

The fair value of long-term debt, including current maturities, based upon models utilizing market observable (Level 2) inputs and credit risk, was $602 million at December 31, 2016 compared to the carrying amount of long-term debt, including current maturities, of $585 million.

Goodwill and Intangible Assets Goodwill represents the excess of acquisition costs over the fair value of the net assets of businesses acquired. Goodwill is not subject to amortization, but is tested for impairment annually at August 31, the Company's annual testing date, and whenever events or changes in circumstances indicate that impairment may have occurred. The Company compares the carrying value of its reporting units, including goodwill, to their fair value. For reporting units in which the assessment indicates that it is more likely than not that the fair value is more than its carrying value, goodwill is not considered impaired. If the carrying value of the reporting unit exceeds fair value, goodwill is considered impaired.

Based on its annual analysis, the Company determined there was no indication of impairment of goodwill. In the fourth quarter of 2016, the Company changed its financial segment reporting as described in note 15. The Company performed additional analysis in connection with this organizational revision, which included changes to its reporting unit structure. Based on this assessment, there was no indication of impairment of goodwill and the estimated fair value of each reporting unit substantially exceeded its carrying value.

Amortizable intangible assets include, among other items, patented, unpatented and other developed technology and customer-based intangibles, and are amortized using the straight-line method over their respective estimated useful lives of 3 to 15 years.

Table of Contents

The Company reviews intangible assets, along with other long-lived assets - primarily property, plant and equipment - for impairment if changes in circumstances or the occurrence of events suggest the remaining value may not be recoverable. At December 31, 2016, the Company concluded there was no impairment of its intangible assets.

Derivative Financial Instruments The Company records derivatives as assets or liabilities on the balance sheet and measures such instruments at fair value. Changes in fair value of derivatives are recorded each period in the Company’s consolidated statements of operations.

The Company periodically enters into forward foreign currency contracts to reduce exposures relating to rate changes in certain foreign currencies. Certain exposures to credit losses related to counterparty nonperformance exist. However, the Company does not anticipate nonperformance by the counterparties since they are large, well-established financial institutions. None of these derivatives is accounted for as a hedge transaction. Accordingly, changes in the fair value of forward foreign currency contracts are recorded as other (income) expense, net, in the Company’s consolidated statements of operations. The fair values of the Company’s derivative financial instruments are based on prices quoted by financial institutions for these instruments.

Foreign Currency Translation Assets and liabilities of certain foreign subsidiaries are translated from foreign currencies into U.S. dollars at period-end exchange rates, and the resulting gains and losses arising from translation of net assets located outside the U.S. are recorded as a cumulative translation adjustment, a component of accumulated other comprehensive loss in the consolidated balance sheets. Income statement amounts are translated at the weighted average exchange rates for the year. Translation adjustments are not adjusted for income taxes, as substantially all translation adjustments relate to permanent investments in non-U.S. subsidiaries. Gains and losses resulting from foreign currency transactions are included in other(income) expense, net, in the Company's consolidated statements of operations.

Revenue Recognition Revenue and the related cost of sales are generally recognized upon shipment of the products. Revenue for product sales is recognized upon delivery, when persuasive evidence of an arrangement exists, when title and risk of loss have been transferred to the customer, collectability is reasonably assured, and pricing is fixed or determinable. Shipping and handling fees related to sales transactions are billed to customers and are recorded as revenue.

The Company sells its products throughout the world primarily to companies in the microelectronics industry. The Company performs continuing credit evaluations of its customers and generally does not require collateral. Letters of credit may be required from its customers in certain circumstances. The Company provides for estimated returns based on historical and current trends in both sales and product returns.

The Company collects various sales and value-added taxes on certain product and service sales that are accounted for on a net basis.

Shipping and Handling Costs Shipping and handling costs incurred are recorded in cost of sales in the Company's consolidated statements of operations.

Engineering, Research and Development Expenses Engineering, research and development costs are expensed as incurred.

Share-based Compensation The Company measures the cost of employee services received in exchange for the award of equity instruments based on the fair value of the award at the date of grant. Compensation expense is based on the grant date fair value. The cost is recognized using the straight-line attribution method to recognize share-based compensation over the service period of the award. Because share-based compensation expense recognized in the Company's consolidated statements of operations is based on awards ultimately expected to vest, it has been reduced for expected forfeitures, which are estimated at the time of grant with such estimates revised, if necessary, in subsequent periods if actual forfeitures differ from those estimates.

Income Taxes The Company accounts for income taxes under the asset and liability method, which requires the recognition of deferred tax assets and liabilities for the expected future tax consequences of events that have been included in the financial statements. Under this method, deferred tax assets and liabilities are determined on the basis of the differences between the financial statements and tax basis of assets and liabilities using enacted tax rates in effect for the year in which the differences are expected to reverse. The effect of a change in tax rates on deferred tax assets and liabilities is recognized in income tax expense in the period that includes the enactment date.

The Company recognizes deferred tax assets to the extent that it believes these assets are more likely than not to be realized. A valuation allowance is recorded to reduce deferred tax assets when it is more likely than not that the Company would not be able to realize all or part of its deferred tax assets. In making such a determination, the Company considers all available positive and negative evidence, including future reversals of existing temporary differences, projected future taxable income, tax-planning strategies, and results of recent operations. If the Company determines that it would be able to realize its deferred tax assets in the future in excess of their net recorded amount, the Company would make an adjustment to the deferred tax asset valuation allowance, which would reduce the provision for income taxes.

Table of Contents

The Company’s policy for recording interest and penalties associated with audits and unrecognized tax benefits is to record such items as a component of income before taxes. Penalties and interest to be paid or received are recorded in other expense (income), net, in the statement of operations.

Comprehensive Income (Loss) Comprehensive income (loss) represents the change in equity resulting from items other than shareholder investments and distributions. The Company’s foreign currency translation adjustments, unrealized gains and losses on available-for-sale investments, and minimum pension liability adjustments are included in accumulated other comprehensive loss. Comprehensive income (loss) and the components of accumulated other comprehensive loss are presented in the accompanying consolidated statements of comprehensive income (loss) and consolidated statements of equity.

Recent Accounting Pronouncements Adopted in 2016 In April 2015, the Financial Standards Accounting Board (FASB) issued Accounting Standards Update (ASU) No. 2015-03, Simplifying the Presentation of Debt Issuance Costs (ASU No. 2015-03) which requires an entity to present debt issuance costs as a direct deduction from the carrying amount of the related debt liability on the balance sheet. The update requires retrospective application and represents a change in accounting principle. The update became effective January 1, 2016. Based on the balances as of December 31, 2015, in accordance with ASU No. 2015-03, the Company reclassified $11.2 million of unamortized debt issuance costs from other current assets and other noncurrent assets to long-term debt.

Recent Accounting Pronouncements Yet to be Adopted In May 2014, the Financial Standards Accounting Board (FASB) issued ASU No. 2014-09, Revenue from Contracts with Customers (Topic 606) (ASU No. 2014-09). ASU No. 2014-09 outlines a new, single comprehensive model for entities to use in accounting for revenue arising from contracts with customers and supersedes most current revenue recognition guidance, including industry-specific guidance. This new revenue recognition model provides a five-step analysis in determining when and how revenue is recognized. As such, revenue for its contracts will generally be recognized as control transfers to the customer, which is consistent with the revenue recognition model currently used for the majority of the Company's contracts. ASU No. 2014-09 may be applied either retrospectively or through the use of a modified-retrospective method. ASU No. 2014-09 also requires disclosures sufficient to enable users to understand the nature, amount, timing, and uncertainty of revenue and cash flows arising from contracts with customers, including qualitative and quantitative disclosures about contracts with customers. ASU No. 2014-09 is effective for the Company beginning January 1, 2018. The Company is currently assessing the impact that adopting this new accounting guidance will have on its consolidated financial statements and disclosures. To assist in this assessment, and to oversee the eventual adoption of ASU No. 2014-09, the Company has established a cross-functional steering committee. The initial analysis of identifying revenue streams and potential impacts of the new guidance is substantially complete, and the Company is now analyzing the potential magnitude to the consolidated financial statements and related disclosures. Based on its preliminary evaluation of ASU No. 2014-09, the Company does not currently expect it to have a material impact on its results of operations or cash flows in the periods after adoption. The Company has not yet selected a transition approach. The Company expects to complete its assessment of the cumulative effect of adopting ASU No. 2014-09 as well as the selection of a transition approach during the first half of 2017. The evaluation of ASU No. 2014-09 will continue through the date of adoption.

In February 2016, the FASB issued ASU No. 2016-02, Leases (Topic 842). ASU No. 2016-02 requires the identification of arrangements that should be accounted for as leases by lessees. In general, for lease arrangements exceeding a twelve-month term, these arrangements must now be recognized as assets and liabilities on the balance sheet of the lessee. Under ASU No. 2016-02, a right-of-use asset and lease obligation will be recorded for all leases, whether operating or financing, while the income statement will reflect lease expense for operating leases, and amortization and interest expense for financing leases. The balance sheet amount recorded for existing leases at the date of adoption of ASU No. 2016-02 must be calculated using the applicable incremental borrowing rate at the date of adoption. In addition, ASU No. 2016-02 requires the use of the modified retrospective method, which will require adjustment to all comparative periods presented in the consolidated financial statements. ASU No. 2016-02 is effective beginning January 1, 2019. The Company is currently assessing the impact that adopting this new accounting standard will have on its consolidated financial statements and disclosures, and the timing of adoption.

In April 2016, the FASB issued ASU No. 2016-09, Compensation-Stock Compensation (Topic 718), which simplifies several aspects of the accounting for employee share-based payment transactions, including the accounting for tax effects related to share-based payments, forfeitures, and statutory tax withholding requirements, and the classification of tax-related cash flows in the statement of cash flows. ASU No. 2016-09 is effective for the Company beginning January 1, 2017. The Company's current assessment of the pronouncement indicates that the impact upon adoption will not be material to its consolidated financial statements and and related disclosures.

Table of Contents

(2) ACQUISITIONS

ATMI

On April 30, 2014, the Company acquired ATMI, Inc. (the Merger), a Delaware corporation (ATMI), for approximately $1.1 billion in cash pursuant to an Agreement and Plan of Merger (the Merger Agreement), dated as of February 4, 2014. As a result of the Merger, ATMI became a wholly-owned subsidiary of the Company. The Merger was accounted for under the acquisition method of accounting and the results of operations of ATMI are included in the Company's consolidated financial statements as of and since April 30, 2014. Direct costs of $13.3 million associated with the acquisition of ATMI, consisting of professional and consulting fees, and bridge financing costs, were expensed as incurred in the year ended December 31, 2014. These costs are included in selling, general and administrative expense and interest expense, respectively, in the Company's consolidated statements of operations.

ATMI was a leading supplier of high-performance materials, materials packaging and materials delivery systems used worldwide in the manufacture of microelectronic devices. These products consist of “front-end” semiconductor performance materials, sub-atmospheric pressure gas delivery systems for safe handling and delivery of toxic and hazardous gases, and high-purity materials packaging and dispensing systems that allow for the reliable introduction of low volatility liquids and solids to microelectronics processes. The acquisition was executed to expand the Company’s product offering base and technological base, and enhance the leverage of its selling and administrative functions. ATMI’s sales for the year ended December 31, 2013 were approximately $361 million.

The purchase price of ATMI consisted of the following:

(In thousands):	
Cash paid to ATMI shareholders	$1,099,033
Cash paid in settlement of share-based compensation awards	31,451
Total purchase price	1,130,484
Less cash and cash equivalents acquired	321,094
Total purchase price, net of cash acquired	$809,390

Under the terms of the Merger Agreement, the Company paid $34 per share for all outstanding common shares of ATMI (excluding treasury shares). In addition, the Company settled all outstanding share-based compensation awards held by ATMI employees at the same per share price. The acquisition method of accounting requires the Company to include the amount associated with pre-combination service as consideration in the acquisition, reflected in the table immediately above, while the fair value of the unvested portion of the awards in the amount of $21.3 million is recorded as expense, classified as selling, general and administrative expense, in the Company's consolidated statement of operations.

The Merger was funded with existing cash balances as well as funds raised by the Company through the issuance of debt in the form of a senior secured term loan in an aggregate principal amount of $460 million and senior unsecured notes in an aggregate principal amount of $360 million as described in note 7 to the consolidated financial statements.

The following table summarizes the allocation of the purchase price to the fair values assigned to the assets acquired and liabilities assumed at the date of the ATMI acquisition:

(In thousands):	
Accounts receivable and other current assets	$109,965
Inventory	114,200
Property, plant and equipment	124,025
Identifiable intangible assets	297,040
Other noncurrent assets	8,503
Current liabilities	(60,943)
Deferred tax liabilities and other noncurrent liabilities	(124,929)
Net assets acquired	467,861
Goodwill	341,529
Total purchase price, net of cash acquired	$809,390

The final valuation of assets acquired and liabilities assumed was completed in the second quarter of 2015.

The fair value write-up of acquired finished goods inventory was $48.6 million. This amount was recorded as an incremental cost of sales charge, amortized over the expected turn of the acquired inventory, during the year ended December 31, 2014.

Table of Contents

The fair value of acquired property, plant and equipment of $124.0 million is valued at its value-in-use.

The fair value of the acquired identifiable intangible assets is $297.0 million. The acquired intangible assets, all of which are finite-lived, have a weighted average useful life of approximately 8.3 years and are being amortized on a straight-line basis. The intangible assets that comprise the amount include customer relationships of $165.1 million (10-year weighted average useful life), developed technology and related trade names of $120.8 million (6-year weighted average useful life), and other intangible assets of $11.1 million (7.4-year weighted average useful life).

The fair value of acquired identifiable intangible assets was determined using the “income approach” on an individual project basis. In performing these valuations, the key underlying probability-adjusted assumptions of the discounted cash flows were projected revenues, gross margin expectations and operating cost estimates. The valuations were based on the information that was available as of the acquisition date and the expectations and assumptions that have been deemed reasonable by the Company’s management. There are inherent uncertainties and management judgment required in these determinations. The fair value measurements of the assets acquired and liabilities assumed were based on valuations involving significant unobservable inputs, or Level 3 in the fair value hierarchy.

The purchase price of ATMI exceeded the net of the acquisition-date amounts of the identifiable assets acquired and the liabilities assumed by $341.5 million. Cash flows used to determine the purchase price included strategic and synergistic benefits (investment value) specific to the Company, which resulted in a purchase price in excess of the fair value of identifiable net assets. The purchase price also included the fair values of other assets that were not identifiable, not separately recognizable under accounting rules (e.g., assembled workforce) or of immaterial value in addition to a going-concern element that represents the Company's ability to earn a higher rate of return on the group of assets than would be expected on the separate assets as determined during the valuation process. This additional investment value resulted in goodwill. No amount of goodwill is expected to be deductible for income tax purposes.

Subsequent to the Merger, the Company agreed to make severance payments of $7.5 million to ATMI executives. Under the terms of various agreements, the executives are unable to compete with the Company for specified periods. Based on the Company's analysis, the payments associated with these noncompete clauses were capitalized as finite-lived intangible assets to be amortized over periods averaging 1.6 years. The fair value of these noncompete clauses was determined using the “income approach” on an individual executive basis, following a methodology similar to the one described above for acquired identifiable intangible assets.

Pro Forma Results (Unaudited)

The following unaudited pro forma financial information presents the combined results of operations of the Company as if the acquisition of ATMI had occurred as of the beginning of the years presented. The unaudited pro forma financial information is not necessarily indicative of what the Company’s consolidated results of operations actually would have been had the acquisition occurred at the beginning of each year. In addition, the unaudited pro forma financial information does not attempt to project the future results of operations of the combined company.

(In thousands, except per share data) (Unaudited)	Year ended December 31, 2014
Net sales	$1,076,334
Net income	68,279
Per share amounts:	
Net income per common share - basic	$0.49
Net income per common share - diluted	0.49

The unaudited pro forma financial information above gives effect to the following:

a. The elimination of transactions between Entegris and ATMI, which upon completion of the merger would be considered intercompany. This reflects the elimination of intercompany sales and associated intercompany accounts.

b. Incremental amortization and depreciation expense related to the estimated fair value of identifiable intangible assets and property, plant and equipment from the purchase price allocation.

c. Removal of the operating results of ATMI's discontinued operations.

The unaudited pro forma financial information above for the year ended December 31, 2014 excludes the purchase accounting impact of the incremental charge reported in cost of sales for the sale of acquired inventory that was

written-up to fair value of $48.6 million.

Table of Contents

(3) TRADE ACCOUNTS AND NOTES RECEIVABLE

Trade accounts and notes receivable from customers at December 31, 2016 and 2015 consist of the following:

(In thousands)	2016	2015
Accounts receivable	$163,759	$138,473
Notes receivable	4,390	4,254
	168,149	142,727
Less allowance for doubtful accounts	2,474	1,318
	$165,675	$141,409

(4) INVENTORIES

Inventories at December 31, 2016 and 2015 consist of the following:

(In thousands)	2016	2015
Raw materials	$53,109	$51,063
Work-in-process	15,976	11,644
Finished goods [(a)]	114,444	110,469
	$183,529	$173,176

[(a)] Includes consignment inventories held by customers for $16.4 million and $16.1 million at December 31, 2016 and 2015, respectively.

(5) PROPERTY, PLANT AND EQUIPMENT

Property, plant, and equipment at December 31, 2016 and 2015 consists of the following:

(In thousands)	2016	2015	Estimated useful lives in years
Land	$15,903	$14,630	
Buildings and improvements	155,769	155,337	5-35
Manufacturing equipment	248,201	233,473	5-10
Canisters and cylinders	65,100	54,263	3-12
Molds	76,782	82,019	3-5
Office furniture and equipment	107,194	98,291	3-8
Construction in progress	40,136	25,128	
	709,085	663,141	
Less accumulated depreciation	387,523	341,840	
	$321,562	$321,301	

The table below sets forth the depreciation expense for the years ended December 31, 2016, 2015 and 2014:

(In thousands)	2016	2015	2014
Depreciation expense	$55,623	$54,305	$46,637

Table of Contents

(6) GOODWILL AND INTANGIBLE ASSETS

Goodwill activity for each of the Company's two reportable segments that carry goodwill, Specialty Chemicals and Engineered Materials (SCEM) and Advanced Materials Handling (AMH), for the years ended December 31, 2016 and 2015 is shown below:

(In thousands)	SCEM	AMH	Total
December 31, 2014	$293,260	$47,483	$340,743
Addition due to purchase accounting adjustments	4,972	—	4,972
Other, including foreign currency translation	(3,532)	(72)	(3,604)
December 31, 2015	294,700	47,411	342,111
Addition due to purchase accounting adjustments	4,434	—	4,434
Other, including foreign currency translation	(1,276)	—	(1,276)
December 31, 2016	$297,858	$47,411	$345,269

As of December 31, 2016, goodwill amounted to approximately $345.3 million, an increase of $3.2 million from the balance at December 31, 2015. The increase in goodwill in 2016 reflects purchase accounting adjustments to the Company's deferred tax liabilities related to the acquisition of ATMI described in note 2. The increase was partially offset by the foreign currency translation adjustments.

Identifiable intangible assets at December 31, 2016 and 2015 consist of the following:

2016

(In thousands)	Gross carrying Amount	Accumulated amortization	Net carrying value	Weighted average life in years
Developed technology	202,591	126,077	76,514	6.7
Trademarks and trade names	16,661	12,617	4,044	9.9
Customer relationships	216,918	90,581	126,337	10.3
Other	18,585	7,932	10,653	6.5
	$454,755	$ 237,207	$217,548	8.5

2015

(In thousands)	Gross carrying amount	Accumulated amortization	Net carrying value	Weighted average life in years
Developed technology	202,732	102,883	99,849	6.7
Trademarks and trade names	16,676	10,681	5,995	9.9
Customer relationships	218,283	72,948	145,335	10.3
Other	15,135	7,372	7,763	5.7
	$452,826	$ 193,884	$258,942	8.5

The table below sets forth the amortization expense for the years ended December 31, 2016, 2015, and 2014:

(In thousands)	2016	2015	2014
Amortization expense	$44,263	$47,349	$37,067

Table of Contents

The amortization expense for each of the five succeeding years and thereafter relating to intangible assets currently recorded in the Company's consolidated balance sheets is estimated to be the following at December 31, 2016:

Fiscal year ending December 31	(In thousands)
2017	$ 43,101
2018	42,721
2019	40,480
2020	25,694
2021	18,951
Thereafter	46,601
	$ 217,548

(7) DEBT

Long-term debt at December 31, 2016 and 2015 consists of the following:

(In thousands)	December 31, 2016	December 31, 2015
Senior secured term loan facility due 2021	$ 233,850	$ 308,850
Senior unsecured notes due 2022	360,000	360,000
	593,850	668,850
Unamortized discount and debt issuance costs	9,173	12,806
Total long-term debt	584,677	656,044
Less current maturities of long-term debt	100,000	50,000
Long-term debt less current maturities	$ 484,677	$ 606,044

Annual maturities of long-term debt contractually due as of December 31, 2016 are as follows:

Fiscal year ending December 31	(In thousands)
2017	$ —
2018	—
2019	—
2020	—
2021	233,850
Thereafter	360,000
	$ 593,850

As described in note 2 to the consolidated financial statements, the Company issued debt with a principal amount of $820 million to supply the funding required to complete its acquisition of ATMI. Debt issuance costs of $2.3 million paid directly to lending institutions are recorded as a debt discount, while debt issuance costs of $20.7 million paid to third parties are capitalized as debt issuance costs. These debt issuance costs are being amortized as interest expense over the term of the debt instrument using the effective-interest method for the senior secured term loan facility and senior unsecured notes, and the straight-line method for the senior secured asset-based revolving credit facility. In the years ended December 31, 2016, 2015 and 2014, the Company expensed debt issuance costs of $3.9 million, $3.3 million and $5.8 million, respectively, including $4.0 million for bridge financing fees paid for the availability of funding for the acquisition of ATMI in 2014. These amounts are included in interest expense in the Company's consolidated statements of operations.

Senior Secured Term Loan Facility

On April 30, 2014, the Company entered into a term loan credit and guaranty agreement with Goldman Sachs Bank USA, as administrative agent, collateral agent, sole lead arranger, sole bookrunner and sole syndication agent (the Term Loan Facility), that provides senior secured financing of $460 million (which may be increased by up to $225 million in certain circumstances). Borrowings under the Term Loan Facility bear interest at a rate per annum equal to, at the Company’s option, a base rate (such as prime rate or LIBOR) plus, an applicable margin. The Company's interest

rate is 3.52% at December 31,

Table of Contents

2016. In addition to paying interest on outstanding principal under the Term Loan Facility, the Company is required to pay customary agency fees.

During the years ended December 31, 2016 and 2015, the Company made payments of $75.0 million and $100.0 million, respectively, on the Term Loan Facility. As of December 31, 2016, under the terms of the Term Loan Facility, the Company is not obligated to remit payments on the Term Loan Facility in 2017. However, based on management's plans and intent, the Company reflects $100 million as the current maturity of long-term debt in its consolidated balance sheet as of December 31, 2016.

The credit agreement governing the Term Loan Facility requires the Company to prepay outstanding term loans, subject to certain exceptions, with (a) up to 50% of the Company’s annual Excess Cash Flow (as defined in the credit agreement governing the Term Loan Facility) and (b) 100% of the net cash proceeds of (i) certain asset sales and casualty and condemnation events, subject to reinvestment rights and certain other exceptions; and (ii) any incurrence or issuance of certain debt, other than debt permitted under the Term Loan Facility.

The Company may voluntarily prepay outstanding loans under the Term Loan Facility at any time without premium or penalty other than customary “breakage” costs with respect to LIBOR loans.

All obligations under the Term Loan Facility are unconditionally guaranteed by certain of the Company’s existing wholly owned domestic subsidiaries, and are secured, subject to certain exceptions, by substantially all of the Company’s assets and the assets of the Company's subsidiary guarantors.

The Term Loan Facility contains a number of negative covenants that, subject to certain exceptions, restrict the Company’s ability and each of the Company’s subsidiaries' ability to incur additional indebtedness; pay dividends on its capital stock or redeem, repurchase or retire its capital stock or its other indebtedness; make investments, loans and acquisitions; create restrictions on the payment of dividends or other amounts to the Company from the Company’s restricted subsidiaries; engage in transactions with its affiliates; sell assets, including capital stock of its subsidiaries; materially alter the business it conducts; consolidate or merge; incur liens; and engage in sale-leaseback transactions. The credit agreement governing the Term Loan Facility additionally contains certain customary representations and warranties, affirmative covenants and provisions relating to events of default. The Company is in compliance with all of the above covenants at December 31, 2016.

2022 Senior Unsecured Notes

On April 1, 2014, the Company issued $360 million aggregate principal amount of 6% senior unsecured notes due April 1, 2022 (the 2022 Senior Unsecured Notes). The 2022 Senior Unsecured Notes were issued under an indenture dated as of April 1, 2014 (the 2022 Senior Unsecured Notes Indenture) by and among the Company and Wells Fargo Bank, National Association, as trustee (the 2022 Senior Unsecured Notes Trustee). Interest on the 2022 Senior Unsecured Notes is payable semi-annually in arrears on April 1 and October 1, commencing October 1, 2014.

The 2022 Senior Unsecured Notes are guaranteed, jointly and severally, fully and unconditionally, on an unsecured senior basis, by each of the Company’s domestic subsidiaries (the Guarantors) that guarantee indebtedness under the Company’s senior secured term loan facility and senior secured asset-based revolving credit facility (Senior Secured Credit Facilities).

As provided in the Senior Unsecured Notes Indenture, the Company may at its option on one or more occasions redeem all or a part of the 2022 Senior Unsecured Notes at a redemption price equal to (a) 100% of the principal amount of the 2022 Senior Unsecured Notes redeemed plus a make-whole premium if redeemed prior to April 1, 2017, or (b) a percentage of principal amount between a percentage from 100% and 104.5% of the aggregate principal amount of notes to be redeemed depending on the period of redemption, if redeemed on or after April 1, 2017, plus, in each case, accrued and unpaid interest thereto.

Upon a change in control, the Company is required to offer to purchase all of the 2022 Senior Unsecured Notes at a price in cash equal to 101% of the aggregate principal amount thereof, plus accrued and unpaid interest, if any, to, but not including, the date of purchase.

If the Company or its subsidiaries engage in asset sales, the Company generally must either invest the net cash proceeds from such sales in its business within a period of time, prepay debt under the Senior Secured Credit Facilities or make an offer to purchase a principal amount of the 2022 Senior Unsecured Notes equal to the excess net cash proceeds, subject to certain exceptions.

The 2022 Senior Unsecured Notes Indenture contains covenants that, among other things, limit the Company's ability and the ability of the Company's restricted subsidiaries to pay dividends or distributions or redeem or repurchase equity; prepay subordinated debt or make certain investments, loans, advances and acquisitions; incur or guarantee additional debt, or issue certain disqualified stock and preferred stock; create liens; engage in a consolidation or merger, or sell, transfer or otherwise dispose of all or substantially all of their assets; enter into transactions with affiliates; and create restrictions on the payment of dividends or other amounts to the Company from its restricted subsidiaries. The Company is in compliance with all of the above covenants at December 31, 2016.

Table of Contents

The 2022 Senior Unsecured Notes Indenture also provides for events of default which, if certain of them occur, would permit the trustee or the holders of at least 25% in aggregate principal amount of the then total outstanding 2022 Senior Unsecured Notes to declare the principal, premium, if any, interest and any other monetary obligations on all the then-outstanding 2022 Senior Unsecured Notes to be due and payable immediately.

Senior Secured Asset-Based Revolving Credit Facility

The Company has an asset-based credit agreement with Goldman Sachs Bank USA, as administrative agent, collateral agent, sole lead arranger, sole bookrunner and sole syndication agent (the ABL Facility), that provides senior secured financing of $75 million (which may be increased by up to $35 million in certain circumstances), subject to a borrowing base limitation. The borrowing base for the ABL Facility at any time equals the sum of certain percentages of various accounts and inventories and stood at $60.0 million at December 31, 2016. The ABL Facility includes borrowing capacity in the form of letters of credit up to $35 million of the facility, and up to $20 million in U.S. dollars for borrowings on same-day notice, referred to as swingline loans.

Borrowings under the ABL Facility bear interest at a rate per annum equal to, at the Company’s option, a base rate (prime rate or LIBOR), plus an applicable margin. Swingline loans shall bear interest at a rate per annum equal to the base rate plus the applicable margin.

In addition to paying interest on outstanding principal under the ABL Facility, the Company is required to pay a commitment fee of 0.33% per annum in respect of the unutilized commitments thereunder. The Company must also pay customary letter of credit fees and agency fees.

The Company may voluntarily reduce the unutilized portion of the commitment amount and repay outstanding loans at any time. Prepayments of the loans may be made without premium or penalty other than customary “breakage” costs with respect to LIBOR loans.

There is no scheduled amortization under the Company’s ABL Facility. The principal amount outstanding under the ABL Facility is due and payable in full on April 30, 2019. There is no outstanding balance under the ABL Facility at December 31, 2016.

All obligations under the ABL Facility are unconditionally guaranteed by certain of the Company’s existing wholly owned domestic subsidiaries and are secured, subject to certain exceptions, by substantially all of the Company’s assets and the assets of the Company's subsidiaries that have guaranteed the ABL Facility.

The ABL Facility contains a number of negative covenants that, among other things, subject to certain exceptions, restrict the Company’s ability and the ability of each of the Company’s subsidiaries to incur additional indebtedness; pay dividends on its capital stock or redeem, repurchase or retire its capital stock or its other indebtedness; make investments, loans and acquisitions; create restrictions on the payment of dividends or other amounts to the Company from the Company’s restricted subsidiaries; engage in transactions with its affiliates; sell assets, including capital stock of its subsidiaries; materially alter the business it conducts; consolidate or merge; incur liens; and engage in sale-leaseback transactions. The credit agreement governing the ABL Facility additionally contains certain customary representations and warranties, affirmative covenants and provisions relating to events of default. The Company is in compliance with all of the above covenants at December 31, 2016.

Table of Contents

(8) LEASE COMMITMENTS

As of December 31, 2016, the Company was obligated under noncancellable operating lease agreements for certain sales offices and manufacturing facilities, manufacturing equipment, vehicles, information technology equipment and warehouse space. Future minimum lease payments for noncancellable operating leases with initial or remaining terms in excess of one year are as follows:

Fiscal year ending December 31	(In thousands)
2017	$ 9,837
2018	7,356
2019	5,635
2020	4,220
2021	3,860
Thereafter	14,090
Total minimum lease payments	$ 44,998

Total rental expense for all equipment and building operating leases for the years ended December 31, 2016, 2015 and 2014, were $13.3 million, $13.8 million and $13.3 million, respectively.

(9) ASSET RETIREMENT OBLIGATIONS

In connection with the acquisition of ATMI described in note 2, the Company assumed asset retirement obligations (AROs) related to environmental disposal obligations associated with cylinders used to supply customers with ATMI's products, and certain restoration obligations associated with its leased facilities. Prior to the acquisition, the Company also had AROs related certain restoration obligations associated with its leased facilities.

Changes in the carrying amounts of the Company’s AROs for the years ended December 31, 2016 and 2015 are shown below:

(In thousands)	2016	2015
Balance at beginning of year	$11,334	$9,950
Liabilities assumed in ATMI acquisition	—	589
Liabilities settled	(975)	(698)
Liabilities incurred	491	1,094
Accretion expense	188	196
Revision of estimate	491	203
Balance at end of year	$11,529	$11,334

ARO liabilities expected to be settled within twelve months are included in the consolidated balance sheets in other accrued liabilities, while all other ARO liabilities are included in pension benefit obligations and other liabilities in the consolidated balance sheets.

(10) INCOME TAXES

Income (loss) before income taxes for the years ended December 31, 2016, 2015 and 2014 was derived from the following sources:

(In thousands)	2016	2015	2014
Domestic	$(7,328)	$(16,751)	$(118,917)
Foreign	127,327	108,936	105,525
Income (loss) before income tax expense (benefit) and equity in net loss of affiliates	$119,999	$92,185	$(13,392)

Table of Contents

Income tax expense (benefit) for the years ended December 31, 2016, 2015 and 2014 is summarized as follows:

(In thousands)	2016	2015	2014
Current:			
Federal	$7,759	$4,170	$1,574
State	(10)	528	111
Foreign	31,387	18,817	21,459
	39,136	23,515	23,144
Deferred (net of valuation allowance):			
Federal	(8,183)	(11,374)	(41,484)
State	250	(738)	(1,545)
Foreign	(8,351)	(1,201)	(1,687)
	(16,284)	(13,313)	(44,716)
Income tax expense (benefit)	$22,852	$10,202	$(21,572)

Income tax (benefit) expense differs from the expected amounts based upon the statutory federal tax rates for the years ended December 31, 2016, 2015 and 2014 as follows:

(In thousands)	2016	2015	2014
Expected federal income tax at statutory rate	$42,000	$32,265	$(4,687)
State income taxes before valuation allowance, net of federal tax effect	(769)	(576)	(2,115)
Effect of foreign source income	(22,242)	(23,374)	(19,996)
Tax contingencies	1,103	1,483	1,379
Valuation allowance	1,713	1,109	2,106
Non-deductible acquisition costs	—	363	2,176
U.S. federal research credit	(1,676)	(3,905)	(2,085)
Other items, net	2,723	2,837	1,650
Income tax expense (benefit)	$22,852	$10,202	$(21,572)

As a result of commitments made by the Company related to investments in tangible property and equipment, the establishment of a research and development center in 2006 and certain employment commitments, income from certain manufacturing activities in Malaysia has been exempt from tax for years up through 2015. The income tax benefits attributable to the tax status of this subsidiary are $10.2 million ($0.07 cents per diluted share) and $8.0 million ($0.06 cents per diluted share) for the years ended December 31, 2015, and 2014, respectively. The 2016, 2015 and 2014 effective tax rates include additional benefits of $4.3 million, $4.4 million, and $3.3 million, respectively, because the corporate tax rate in Malaysia is lower than the U.S. rate.

In 2012, Entegris' Korean subsidiary made commitments to produce a certain line of products. In return for this commitment, the Company has a tax holiday on income earned on sales of these products for five years and a partial holiday for two additional years. The income tax benefit attributable to this tax holiday are $3.3 million ($0.02 cents per diluted share), $1.5 million ($0.01 cent per diluted share) and $0.2 million ($0.00 cent per diluted share) for the years ended December 31, 2016, 2015 and 2014, respectively. The 2016, 2015 and 2014 effective tax rates include additional benefits of $1.9 million, $0.9 million and $0.2 million, respectively, because the corporate tax rate in Korea is lower than the U.S. rate.

The Company also has made employment and spending commitments to Singapore. In return for those commitments, the Company has been granted a partial tax holiday for eight years starting in 2013. The income tax benefits attributable to the tax status are $2.3 million ($0.02 cents per diluted share), $1.7 million ($0.01 cent per diluted share) and $1.2 million ($0.01 cent per diluted share) for the years ending December 31, 2016, 2015 and 2014, respectively. The 2016, 2015 and 2014 effective tax rates include additional benefits of $6.5 million, $4.6 million and $3.7 million, because the corporate tax rate in Singapore is lower than the U.S. rate.

The 2014 effective tax rate reflects a $2.6 million benefit related to foreign tax credits.

Table of Contents

The significant components of the Company's deferred tax assets and deferred tax liabilities at December 31, 2016 and 2015 are as follows:

(In thousands)	2016	2015
Deferred tax assets attributable to:		
Accounts receivable	$470	$64
Inventory	5,061	5,491
Accruals not currently deductible for tax purposes	3,729	6,661
Net operating loss and credit carryforwards	27,198	12,247
Capital loss carryforward	3,134	2,141
Depreciation	8,395	21,834
Equity compensation	5,134	4,673
Asset impairments	1,467	1,751
Other, net	4,356	3,578
Gross deferred tax assets	58,944	58,440
Valuation allowance	(14,661)	(12,724)
Total deferred tax assets	44,283	45,716
Deferred tax liabilities attributable to:		
Purchased intangible assets	(55,809)	(68,610)
Total deferred tax liabilities	(55,809)	(68,610)
Net deferred tax liabilities	$(11,526)	$(22,894)

Deferred tax assets are generally required to be reduced by a valuation allowance if, based on the weight of available positive and negative evidence, it is more likely than not that some portion or all of the deferred tax assets will not be realized.

As of December 31, 2016 and 2015, the Company had a net U.S. deferred tax liability of $3.5 million and $12.6 million, respectively, which are composed of temporary differences and various tax credit carryforwards. Management believes that it is more likely than not that the benefit from certain state net operating loss carryforwards, state credits, capital asset impairments, and a federal capital loss carryforward will not be realized. In recognition of this risk, management has provided a valuation allowance of $9.6 million and $8.9 million as of December 31, 2016 and 2015, respectively, on the related deferred tax assets. If the assumptions change and management determines the assets will be realized, the tax benefits relating to any reversal of the valuation allowance on deferred tax assets at December 31, 2016 will be recognized as a reduction of income tax expense.

As of December 31, 2016 and 2015, the Company had a net non-U.S. deferred tax asset of $6.6 million and $2.4 million, respectively, for which management determined based upon the available evidence a valuation allowance of $5.0 million and $3.8 million as of December 31, 2016 and 2015, respectively, was required against the non-U.S. gross deferred tax assets. For other non-U.S. jurisdictions, management is relying upon projections of future taxable income to utilize deferred tax assets.

At December 31, 2016, there were approximately $822.0 million of accumulated undistributed earnings of subsidiaries outside the United States, all of which are considered to be reinvested indefinitely. Management has considered its future cash needs and affirms its intention to indefinitely invest such earnings overseas to be utilized for working capital purposes, expansion of existing operations, possible acquisitions and other international items. No U.S. tax has been provided on such earnings. If they were remitted to the Company, applicable U.S. federal and foreign withholding taxes may be partially offset by available foreign tax credits. Management has concluded that it is impracticable to compute the full actual tax impact, but it estimates that $13.0 million of withholding taxes would be incurred if the $822.0 million were distributed.

At December 31, 2016, the Company had state operating loss and credit carryforwards of approximately $5.0 million, which begin to expire in 2019; federal research and development credit carryforwards of approximately $8.5 million, which begin to expire in 2033; federal foreign tax credit carryforward of approximately $8.8 million, which begin to expire in 2019, and foreign operating loss carryforwards of $17.9 million, which begin to expire in 2017.

Benefits from tax positions should be recognized in the financial statements only when it is more likely than not that the tax positions will be sustained upon examination by the appropriate taxing authority that would have full knowledge of all relevant information. A tax position that meets the more-likely-than-not recognition threshold is measured at the largest amount of benefit that is greater than fifty percent likely of being realized upon ultimate settlement. Tax positions that fail to meet the more-likely-than-not recognition threshold should be recognized in the first subsequent financial reporting period in which that threshold is met. Previously recognized tax positions that no longer meet the more-likely-than-not recognition threshold should be derecognized in the first subsequent financial reporting period in which that threshold is no longer met. The provisions also provide guidance on the accounting for and disclosure of unrecognized tax benefits, interest and penalties.

Table of Contents

Reconciliations of the beginning and ending balances of the total amounts of gross unrecognized tax benefits for the years ended December 31, 2016 and 2015 are as follows:

(In thousands)	2016	2015
Gross unrecognized tax benefits at beginning of year	$7,621	$5,984
Increase in tax positions from prior years	14	—
Decreases in tax positions for prior years	—	(51)
Increases in tax positions for current year	1,944	2,067
Settlements	—	(194)
Lapse in statute of limitations	(1,286)	(185)
Gross unrecognized tax benefits at end of year	$8,293	$7,621

The total amount of net unrecognized tax benefits that, if recognized, would affect the effective tax rate was $6.8 million at December 31, 2016.

Penalties and interest paid or received are recorded in other income, net, in the consolidated statements of operations. For the years ended December 31, 2016 and 2015, the Company has accrued interest and penalties related to unrecognized tax benefits of $0.7 million and $0.6 million, respectively. Expenses (benefits) of $0.1 million, $0.1 million and $(0.4) million were recognized as interest and penalties in the consolidated statements of operations for the years ended December 31, 2016, 2015 and 2014, respectively.

The Company files income tax returns in the U.S. and in various state, local and foreign jurisdictions. The statutes of limitations related to the consolidated Federal income tax return and state returns are closed for all years up to and including 2012 and 2012, respectively. With respect to foreign jurisdictions, the statute of limitations varies from country to country, with the earliest open year for the Company’s major foreign subsidiaries being 2010.

Due to the expiration of various statutes of limitations, it is reasonably possible that the Company’s gross unrecognized tax benefit balance may decrease within the next twelve months by approximately $0.6 million.

(11) EQUITY

Share Repurchase Program

On February 5, 2016, the Company's Board of Directors authorized a repurchase program covering up to an aggregate of $100.0 million of the Company's common stock in open market transactions and in accordance with one or more pre-arranged stock trading plans established in accordance with Rule 10b5-1 under the Securities and Exchange Act of 1934, as amended. Under the repurchase program, which expired February 15, 2017, the Company repurchased $7.6 million of shares for the year ended December 31, 2016.

2010 Stock Plan

At December 31, 2009, the Company had outstanding stock awards under five stock incentive plans. On December 17, 2009, the Company’s Board of Directors approved the 2010 Stock Plan, subject to the approval of the Company’s stockholders. On May 5, 2010, the stockholders approved the 2010 Stock Plan. The 2010 Stock Plan replaced the predecessor plans for future stock awards and stock option grants.

Subsequent to the acquisition of ATMI, the Company's Board of Directors approved the absorption of the ATMI, Inc. 2010 Stock Plan (ATMI Plan) into the Company's 2010 Stock Plan for the remainder of the term of the ATMI Plan. 5.7 million additional shares became available for grant by the Company upon absorption of the ATMI Plan.

The 2010 Stock Plan provides for the issuance of stock options and other share-based awards to selected employees, directors, and other individuals or entities that provide services to the Company or its affiliates. The 2010 Stock Plan has a term of ten years. Under the 2010 Stock Plan, the Board of Directors or a committee selected by the Board of Directors will determine for each award, the term, price, number of shares, rate at which each award is exercisable and whether restrictions are imposed on the shares subject to the awards. The exercise price for option awards generally may not be less than the fair market value per share of the underlying common stock on the date granted. The 2010 Stock Plan allows that after December 31, 2009 any stock awards that were awarded from the expired plans mentioned above that are forfeited, expired or otherwise terminated without issuance of such stock award again be available for issuance under the 2010 Stock Plan.

Table of Contents

Stock Options

Stock option activity for the 2010 Stock Plan and predecessor plans for the years ended December 31, 2016, 2015 and 2014 is summarized as follows:

	2016		2015		2014	
(Shares in thousands)	Number of shares	Weighted average exercise price	Number of shares	Weighted average exercise price	Number of shares	Weighted average exercise price
Options outstanding, beginning of year	2,139	$ 10.57	2,034	$ 9.67	1,961	$ 8.20
Granted	549	12.20	411	13.49	651	11.71
Exercised	(633)	8.66	(219)	7.62	(546)	6.56
Expired or Forfeited	(148)	12.32	(87)	10.72	(32)	14.06
Options outstanding, end of year	1,907	$ 11.54	2,139	$ 10.57	2,034	$ 9.67
Options exercisable, end of year	776	$ 10.65	961	$ 9.07	728	$ 7.92

Options outstanding for the Company's stock plans at December 31, 2016 are summarized as follows:

(Shares in thousands)	Options outstanding			Options exercisable	
Range of exercise prices	Number outstanding	Weighted average remaining life in years	Weighted-average exercise price	Number exercisable	Weighted average exercise price
$5.40 to $9.88	540	2.6 years	$ 9.51	429	$ 9.42
$11.71 to $11.71	527	4.0 years	11.71	260	11.71
$12.20 to $12.20	495	6.1 years	12.20	—	—
$13.49 to $13.49	345	5.0 years	13.49	87	13.49
	1,907	4.4 years	11.54	776	10.65

The weighted average remaining contractual term for options outstanding and exercisable for all plans at December 31, 2016 was 4.4 years and 3.2 years, respectively.

For all plans, the Company had shares available for future grants of 9.4 million shares, 10.4 million shares, and 11.6 million shares at December 31, 2016, 2015 and 2014, respectively.

For all plans, the total pre-tax intrinsic value of stock options exercised during the years ended December 31, 2016 and 2015 was $5.1 million and $1.4 million, respectively. The aggregate intrinsic value, which represents the total pre-tax intrinsic value based on the Company's closing stock price of $17.90 at December 31, 2016, which theoretically could have been received by the option holders had all option holders exercised their options as of that date, was $12.1 million and $5.6 million for options outstanding and options exercisable, respectively.

Share-based payment awards in the form of stock option awards for 0.5 million, 0.4 million and 0.7 million options were granted to employees during the years ended December 31, 2016, 2015 and 2014. Compensation expense is based on the grant date fair value. The awards vest annually over a three-year or four-year period and have a contractual term of 7 years. The Company estimates the fair value of stock options using the Black-Scholes valuation model. The Company estimates the fair value of stock options using the Black-Scholes valuation model. Key inputs and assumptions used to estimate the fair value of stock options include the grant price of the award, the expected option term, volatility of the Company's stock, the risk-free rate and the Company's dividend yield. Estimates of fair value are not intended to predict actual future events or the value ultimately realized by employees who receive equity awards, and subsequent events are not indicative of reasonableness of the original estimates of fair value made by the Company.

Table of Contents

The fair value of each stock option grant was estimated at the date of grant using a Black-Scholes option pricing model. The following table presents the weighted-average assumptions used in the valuation and the resulting weighted-average fair value per option granted for the years ended December 31, 2016, 2015 and 2014:

Employee stock options:	2016	2015	2014
Volatility	27.6 %	34.6 %	43.3 %
Risk-free interest rate	1.1 %	1.3 %	1.1 %
Dividend yield	— %	— %	— %
Expected life (years)	4.0	3.9	3.8
Weighted average fair value per option	$2.85	$3.86	$3.99

A historical daily measurement of volatility is determined based on the expected life of the option granted. The risk-free interest rate is determined by reference to the yield on an outstanding U.S. Treasury note with a term equal to the expected life of the option granted. Expected life is determined by reference to the Company's historical experience. The Company determines the dividend yield by dividing the expected annual dividend on the Company's stock by the option exercise price.

Employee Stock Purchase Plan

The Company maintains the Entegris, Inc. Amended and Restated Employee Stock Purchase Plan (ESPP). The ESPP allows employees to elect, at six-month intervals, to contribute up to 10% of their compensation, subject to certain limitations, to purchase shares of common stock at a discount of 15% from the fair market value on the first day or last day of each six-month period. The Company treats the ESPP as a compensatory plan. At December 31, 2016, 2.3 million shares remained available for issuance under the ESPP. Employees purchased 0.3 million shares, 0.3 million shares, and 0.2 million shares, at a weighted-average price of $11.56, $11.21, and $10.57 during the years ended December 31, 2016, 2015 and 2014, respectively.

The table below sets forth the amount of cash received by the Company from the exercise of stock options and employee contributions to the ESPP during the years ended December 31, 2016, 2015 and 2014:

(In thousands)	2016	2015	2014
Exercise of stock options and employee contributions to the ESPP	$4,844	$4,049	$3,117

Restricted Stock Awards

Restricted stock awards are awards of common stock made under the 2010 Stock Plan that are subject to a risk of forfeiture if the awardee terminates employment with the Company prior to the lapse of the restrictions. The value of such stock is determined using the market price on the grant date. Compensation expense for restricted stock awards is generally recognized using the straight-line single-option method. A summary of the Company's restricted stock activity for the years ended December 31, 2016, 2015 and 2014 is presented in the following table:

	2016		2015		2014	
(Shares in thousands)	Number of shares	Weighted average grant date fair value	Number of shares	Weighted average grant date fair value	Number of shares	Weighted average grant date fair value
Unvested, beginning of year	1,882	$ 12.25	1,613	$ 10.53	1,570	$ 8.98
Granted	1,249	12.42	1,043	13.47	834	11.59
Vested	(711)	11.74	(638)	10.13	(686)	8.32
Forfeited	(256)	12.44	(136)	11.26	(105)	10.14
Unvested, end of year	2,164	12.49	1,882	12.25	1,613	10.53

The weighted average remaining contractual term for unvested restricted shares at December 31, 2016 and 2015 was 2.4 years and 2.3 years, respectively.

During the years ended December 31, 2016 and 2015, Entegris, Inc. awarded performance stock for up to 0.2 million shares and 0.2 million shares, respectively, to be issued upon the achievement of performance conditions

(Performance shares) under the Company's 2010 Stock Plan to certain officers and other key employees. Compensation expense is based on the grant date fair value. The awards vest on the third anniversary of the award date. The Company estimates the fair value of the Performance shares using a Monte Carlo simulation process.

Table of Contents

As of December 31, 2016, the total compensation cost related to unvested stock options and restricted stock awards not yet recognized was $2.8 million and $21.4 million, respectively, and is expected to be recognized over the next 2.5 years on a weighted-average basis.

Valuation and Expense Information

The Company recognizes compensation expense for all share-based payment awards made to employees and directors based on their estimated fair values on the date of grant. Share-based compensation expense is based on the value of the portion of share-based payment awards that is ultimately expected to vest during the period. The following table summarizes the allocation of share-based compensation expense related to employee stock options, restricted stock awards and grants under the employee stock purchase plan for the years ended December 31, 2016, 2015 and 2014:

(In thousands)	2016	2015	2014
Cost of sales	$1,579	$1,317	$809
Engineering, research and development expenses	1,124	1,000	705
Selling, general and administrative expenses	10,733	8,716	7,373
Share-based compensation expense	13,436	11,033	8,887
Tax benefit	4,153	3,362	2,746
Share-based compensation expense, net of tax	$9,283	$7,671	$6,141

(12) BENEFIT PLANS

401(k) Plan

The Company maintains the Entegris, Inc. 401(k) Savings and Profit Sharing Plan (the 401(k) Plan) that qualifies as a deferred salary arrangement under Section 401(k) of the Internal Revenue Code. Under the Plan, eligible employees may defer a portion of their pre-tax wages, up to the Internal Revenue Service annual contribution limit. Entegris matches employees' contributions to a maximum match of 4% of the employee's eligible wages. The employer matching contribution expense under the Plan was $4.9 million, $5.0 million and $4.4 million in the fiscal years ended December 31, 2016, 2015 and 2014, respectively.

Defined Benefit Plans

The employees of the Company's subsidiaries in Japan, Taiwan and Germany are covered in defined benefit pension plans. The Company uses a December 31 measurement date for its pension plans.

The tables below set forth the Company's estimated funded status as of December 31, 2016 and 2015:

(In thousands)	2016	2015
Change in benefit obligation:		
Benefit obligation at beginning of year	$8,194	$8,482
Service cost	66	65
Interest cost	91	119
Actuarial (gain) loss	(481)	15
Benefits paid	(1,000)	(1,165)
Curtailments	—	(536)
Other	—	1,412
Foreign exchange impact	203	(198)
Benefit obligation at end of year	7,073	8,194
Change in plan assets:		
Fair value of plan assets at beginning of year	718	380
Return on plan assets	7	19
Employer contributions	6	14
Acquisition	—	331
Foreign exchange impact	12	(26)
Fair value of plan assets at end of year	743	718
Funded status:		
Plan assets less than benefit obligation - Net amount recognized	$(6,330)	$(7,476)

Table of Contents

The curtailments noted above relate to revisions associated with the early termination of personnel in Taiwan.

Amounts recognized in the consolidated balance sheets consist of:

(In thousands)	2016	2015
Noncurrent liability	$(6,330)	$(7,476)
Accumulated other comprehensive loss, net of taxes	681	1,149

Amounts recognized in accumulated other comprehensive loss, net of tax consist of:

(In thousands)	2016	2015
Net actuarial loss	$170	$435
Prior service cost	712	998
Gross amount recognized	882	1,433
Deferred income taxes	(201)	(284)
Net amount recognized	$681	$1,149

Information for pension plans with an accumulated benefit obligation in excess of plan assets:

(In thousands)	2016	2015
Projected benefit obligation	$7,073	$8,194
Accumulated benefit obligation	6,145	6,948
Fair value of plan assets	743	718

The components of the net periodic benefit cost for the years ended December 31, 2016, 2015 and 2014 were as follows:

(In thousands)	2016	2015	2014
Pension benefits:			
Service cost	$66	$65	$64
Interest cost	91	119	111
Expected return on plan assets	(10)	(17)	(8)
Amortization of prior service cost	65	76	18
Amortization of net transition obligation	—	(1)	(1)
Amortization of plan loss	—	28	22
Recognized actuarial net loss	17	14	7
Curtailments	—	160	—
Net periodic pension benefit cost	$229	$444	$213

The estimated amount that will be amortized from accumulated other comprehensive income into net periodic benefit cost in 2017 is as follows:

(In thousands)	
Prior service cost	$64
Net actuarial loss	21
	$85

Assumptions used in determining the benefit obligation and net periodic benefit cost for the Company's pension plans for the years ended December 31, 2016, 2015 and 2014 are presented in the following table as weighted-averages:

	2016	2015	2014
Benefit obligations:			
Discount rate	0.63%	1.10%	1.13%
Rate of compensation increase	2.90%	3.70%	4.41%
Net periodic benefit cost:			
Discount rate	1.70%	1.94%	1.83%
Rate of compensation increase	3.43%	4.41%	3.38%
Expected return on plan assets	1.43%	1.76%	1.35%

Table of Contents

The plans' expected return on assets as shown above is based on management's expectations of long-term average rates of return to be achieved by the underlying investment portfolios. In establishing this assumption, management considers historical and expected returns for the asset classes in which the plans are invested, as well as current economic and capital market conditions. The discount rate primarily used by the Company is based on market yields at the valuation date on government bonds as well as the estimated maturity of benefit payments.

Plan Assets

At December 31, 2016 and 2015, the Company's pension plan assets are deposited in Bank of Taiwan in the form of money market funds, where the Bank of Taiwan is the assigned funding vehicle for the statutory retirement benefit. The fair value measurements of the Company's pension plan assets at December 31, 2016, by asset category are as follows:

(In thousands)		Quoted prices in active markets for identical assets	Significant observable inputs	Significant unobservable inputs
Asset category	Total	(Level 1)	(Level 2)	(Level 3)
Taiwan plan assets (a)	$743	$ 743	—	—

(a) This category includes investments in the government of Taiwan's pension fund. The government of Taiwan is responsible for the strategy and allocation of the investment contributions.

The fair value measurements of the Company's pension plan assets at December 31, 2015, by asset category are as follows:

(In thousands)		Quoted prices in active markets for identical assets	Significant observable inputs	Significant unobservable inputs
Asset category	Total	(Level 1)	(Level 2)	(Level 3)
Taiwan plan assets (a)	$718	$ 718	—	—

(a) This category includes investments in the government of Taiwan's pension fund. The government of Taiwan is responsible for the strategy and allocation of the investment contributions.

Cash Flows

The Company expects to make the following contributions and benefit payments:

(In thousands)	Contributions	Payments
2017	$ 4	$ 65
2018	—	106
2019	—	145
2020	—	187
2021	—	736
Years 2022-2026	—	2,082

(13) FAIR VALUE MEASUREMENTS

Generally accepted accounting principles establish a fair value hierarchy that prioritizes the inputs used to measure fair value. The three levels of the fair value hierarchy are as follows:

Level 1—Quoted prices in active markets accessible at the reporting date for identical assets and liabilities.

Level 2—Quoted prices for similar assets or liabilities in active markets. Quoted prices for identical or similar assets and liabilities in markets that are not considered active or financial instruments for which all significant inputs are observable, either directly or indirectly.

Level 3—Prices or valuations that require inputs that are significant to the valuation and are unobservable.

A financial instrument's level within the fair value hierarchy is based on the lowest level of any input that is significant to the fair value measurement.

Table of Contents

Financial Assets Measured at Fair Value on a Recurring Basis

The following table presents the Company's financial assets and liabilities that are measured at fair value on a recurring basis at December 31, 2016 and 2015.

	December 31, 2016				December 31, 2015			
(In thousands)	Level 1	Level 2	Level 3	Total	Level 1	Level 2	Level 3	Total
Assets:								
Short-term investments:								
Common stock	—	—	—	—	$2,181	—	—	$2,181
Other current assets:								
Foreign exchange forward contracts asset	$—	$4,784	$—	$4,784	$—	$2,463	$—	$2,463
Total assets measured and recorded at fair value	$—	$4,784	$—	$4,784	$2,181	$2,463	$—	$4,644

The following table provides information about derivative positions held by the Company as of December 31, 2016 and 2015:

	December 31, 2016			December 31, 2015		
(In thousands)	Gross amounts of recognized assets	Gross amounts offset in the consolidated balance sheet	Net amount of assets in the consolidated balance sheet	Gross amounts of recognized assets	Gross amounts offset in the consolidated balance sheet	Net amount of assets in the consolidated balance sheet
Foreign exchange forward contracts	$4,784	$0	$4,784	$2,958	$495	$2,463

Gains and losses associated with derivatives are recorded in other expense (income), net, in the consolidated statements of operations. Losses associated with derivative instruments not designated as hedging instruments for the years ended December 31, 2016 and 2015 were as follows:

(In thousands)	2016	2015
Losses on foreign currency forward contracts	$(1,647)	$(10,787)

In the years ended December 31, 2015 and 2014, the Company recorded an other-than-temporary impairment of $0.5 million and $1.9 million, respectively, related to an available-for-sale common stock investment classified in short-term investments in the consolidated balance sheet. The fair value of the investment after impairment was $2.2 million and $4.6 million at December 31, 2015 and 2014, respectively, and is classified as a Level 1 investment in the fair value hierarchy. The fair value measurement of the common stock investment was based on a quoted market price in an active market. The Company determined that it was an other-than-temporary impairment due to the significant decline in fair value compared to the acquisition cost for an extended period of time and the financial condition of the issuer.

(14) EARNINGS PER SHARE (EPS)

Basic EPS is computed by dividing net income by the weighted average number of shares of common stock outstanding during each period. The following table presents a reconciliation of the share amounts used in the computation of basic and diluted earnings per share:

(In thousands)	2016	2015	2014
Basic earnings per share—Weighted common shares outstanding	141,093	140,353	139,311
Weighted common shares assumed upon exercise of options and vesting of restricted stock units	957	768	751
Diluted earnings per share—Weighted common shares outstanding	142,050	141,121	140,062

The Company excluded the following shares underlying stock-based awards from the calculations of diluted EPS because their inclusion would have been anti-dilutive for the years ended December 31, 2016, 2015 and 2014:

(In thousands)	2016	2015	2014

Shares excluded from calculations of diluted EPS	434	998	1,183

Table of Contents

(15) SEGMENT INFORMATION

In 2016, the Company has changed its financial segment reporting, reflecting an organizational realignment intended to better leverage its unique portfolio of capabilities to create value for its customers by developing mission-critical solutions to maximize manufacturing yields and enable higher performance of devices. While these segments have separate products and technical know-how, they share a single, global sales force, unified core systems and processes, global technology centers, strategic and technology roadmaps, and a focus on a common set of customers. The Company leverages its expertise from these three segments to create new and increasingly integrated solutions for its customers. The Company's business is reported in the following segments:

- Specialty Chemicals and Engineered Materials (SCEM): SCEM provides high-performance and high-purity process chemistries, gases, and materials and safe and efficient delivery systems to support semiconductor and other advanced manufacturing processes.
- Advanced Materials Handling (AMH): AMH develops solutions to monitor, protect, transport, and deliver critical liquid chemistries and substrates for a broad set of applications in the semiconductor industry and other high-technology industries.
- Microcontamination Control (MC): MC solutions purify critical liquid chemistries and gases used in semiconductor manufacturing processes and other high-technology industries.

Inter-segment sales are not significant. Segment profit is defined as net sales less direct segment operating expenses, excluding certain unallocated expenses, consisting mainly of general and administrative costs for the Company’s human resources, finance and information technology functions as well as interest expense, amortization of intangible assets, charges for the fair value write-up of acquired inventory sold, contingent consideration fair value adjustments, income taxes and equity in net loss of affiliate.

Corporate assets consist primarily of cash and cash equivalents, short-term investments, investments, deferred tax assets and deferred tax charges.

Table of Contents

Summarized financial information for the Company's reportable segments is shown in the following tables.

(In thousands)	2016	2015	2014
Net sales:			
SCEM	$428,328	$418,878	$292,339
AMH	384,284	346,426	346,571
MC	362,658	315,817	323,159
Total net sales	$1,175,270	$1,081,121	$962,069

(In thousands)	2016	2015	2014
Segment profit:			
SCEM	$96,060	$100,370	$59,017
AMH	73,452	66,419	70,464
MC	110,042	83,076	99,019
Total segment profit	$279,554	$249,865	$228,500

(In thousands)	2016	2015	2014
Total assets:			
SCEM	$766,126	$801,250	$807,544
AMH	267,085	259,377	288,680
MC	200,399	183,518	195,457
Corporate	465,922	402,552	456,626
Total assets	$1,699,532	$1,646,697	$1,748,307

(In thousands)	2016	2015	2014
Depreciation and amortization:			
SCEM	$64,062	$65,352	$51,046
AMH	22,874	23,604	23,099
MC	9,222	8,733	4,982
Corporate	3,728	3,965	4,577
Total depreciation and amortization	$99,886	$101,654	$83,704

(In thousands)	2016	2015	2014
Capital expenditures:			
SCEM	$27,348	$29,333	$18,960
AMH	19,029	23,617	13,539
MC	6,281	11,408	11,243
Corporate	12,602	7,619	13,991
Total capital expenditures	$65,260	$71,977	$57,733

Table of Contents

The following table reconciles total segment profit to income before income taxes and equity in net loss of affiliate:

(In thousands)	2016	2015	2014
Total segment profit	$279,554	$249,865	$228,500
Less:			
Charge for fair value write-up of acquired inventory sold	—	—	48,586
Amortization of intangibles	44,263	47,349	37,067
Contingent consideration fair value adjustment	—	—	(1,282)
Unallocated general and administrative expenses	79,755	84,448	122,775
Operating income	155,536	118,068	21,354
Interest expense	36,846	38,667	33,355
Interest income	(318)	(429)	(1,336)
Other (income) expense, net	(991)	(12,355)	2,727
Income (loss) before income tax expense (benefit) and equity in net loss of affiliate	$119,999	$92,185	$(13,392)

The following table presents amortization of intangibles for each of the Company's segments for the years ended December 31, 2016, 2015 and 2014:

(In thousands)	2016	2015	2014
Amortization of intangibles:			
SCEM	$40,034	$42,909	$32,099
AMH	4,229	4,440	4,968
Total amortization of intangibles	$44,263	$47,349	$37,067

The following table summarizes total net sales, based upon the country or region to which sales to external customers were made for the years ended December 31, 2016, 2015 and 2014:

(In thousands)	2016	2015	2014
Net sales:			
United States	$253,868	$253,141	$240,767
Japan	156,021	131,336	121,878
Europe	105,779	106,036	108,889
Taiwan	291,309	248,842	230,416
Singapore	65,133	55,409	46,048
South Korea	145,661	148,016	122,322
China	118,435	97,148	73,281
Other	39,064	41,193	18,468
	$1,175,270	$1,081,121	$962,069

The following table summarizes property, plant and equipment, net, attributed to significant countries for the years ended December 31, 2016, 2015 and 2014:

(In thousands)	2016	2015	2014
Property, plant and equipment:			
United States	$226,394	$229,558	$222,125
Korea	33,441	32,400	32,163
Japan	25,248	23,619	22,261
Malaysia	19,180	19,878	20,607
Other	17,299	15,846	16,413
	$321,562	$321,301	$313,569

Table of Contents

In the years ended December 31, 2016, 2015 and 2014, one individual customer, Taiwan Semiconductor Manufacturing Company Limited, accounted for $161.9 million, $134.1 million and $130.9 million of net sales, respectively, all of which include sales from all of the Company's segments.

(16) COMMITMENTS AND CONTINGENT LIABILITIES

The Company is subject to various claims, legal actions, and complaints arising in the ordinary course of business. The Company believes the final outcome of these matters will not have a material adverse effect on its consolidated financial statements. The Company expenses legal costs as incurred.

(17) QUARTERLY INFORMATION-UNAUDITED

	Fiscal quarter ended			
(In thousands, except per share data)	April 2, 2016	July 2, 2016	October 1, 2016	December 31, 2016
Net sales	$267,024	$303,052	$296,692	$ 308,502
Gross profit	114,706	139,205	122,980	131,800
Net income	16,212	32,890	21,947	26,098
Basic net income per common share	0.12	0.23	0.16	0.18
Diluted net income per common share	0.11	0.23	0.15	0.18

	Fiscal quarter ended			
(In thousands, except per share data)	March 28, 2015	June 27, 2015	September 26, 2015	December 31, 2015
Net sales	$263,373	$280,709	$ 270,253	$ 266,786
Gross profit	116,536	128,087	116,310	109,298
Net income	14,872	24,448	23,403	17,573
Basic net income per common share	0.11	0.17	0.17	0.13
Diluted net income per common share	0.11	0.17	0.17	0.12

(18) SUBSEQUENT EVENT

On February 15, 2017, the Company’s Board of Directors authorized a repurchase program covering up to an aggregate of $100 million of the Company’s common stock in open market transactions and in accordance with one or more pre-arranged stock trading plans to be established in accordance with Rule 10b5-1 under the Securities Exchange Act of 1934, as amended. The authorization expires February 15, 2018. This repurchase program represents a renewal and replacement of the repurchase program originally authorized by the Board of Directors on February 5, 2016, which expired February 15, 2017.