COHERENT INC
Form 10-K
November 27, 2018
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UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

FORM 10-K
(Mark One)
x ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the Fiscal Year Ended September 29, 2018

or

o TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
Commission File Number: 001-33962

COHERENT, INC.

Delaware	94-1622541
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)
5100 Patrick Henry Drive, Santa Clara, California	95054
(Address of principal executive offices)	(Zip Code)

Registrant's telephone number, including area code: (408) 764-4000
Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Name of each exchange on which registered
Common Stock, $0.01 par value	The NASDAQ Stock Market LLC Nasdaq Global Select Market

Securities registered pursuant to Section 12(g) of the Act: None
Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes x No o
Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Securities Exchange Act of 1934 (the "Exchange Act"). Yes o No x
Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports) and (2) has been subject to such filing requirements for the past 90 days. Yes x No o
Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§229.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files. Yes x No o
Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. x

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

Large accelerated filer x	Accelerated filer ¨	Non-accelerated filer o	Smaller reporting company o	Emerging growth company o

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

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PART IV

As of November 23, 2018, 24,379,270 shares of common stock were outstanding. The aggregate market value of the voting shares (based on the closing price reported on the NASDAQ Global Select Market on March 31, 2018) of Coherent, Inc., held by nonaffiliates was approximately $3,089,114,531. For purposes of this disclosure, shares of common stock held by persons who own 5% or more of the outstanding common stock and shares of common stock held by each officer and director have been excluded in that such persons may be deemed to be "affiliates" as that term is defined under the Rules and Regulations of the Exchange Act. This determination of affiliate status is not necessarily a conclusive determination for other purposes.

DOCUMENT INCORPORATED BY REFERENCE

Portions of the registrant's Proxy Statement for the registrant's 2019 Annual Meeting of Stockholders are incorporated by reference into Part III of the Form 10-K to the extent stated herein. The Proxy Statement or an amended report on Form 10-K will be filed within 120 days of the registrant's fiscal year ended September 29, 2018.

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SPECIAL NOTE REGARDING FORWARD LOOKING STATEMENTS

This annual report contains certain forward-looking statements. These forward-looking statements include, without limitation, statements relating to:

- expansion into, and financial returns from, new markets;
- maintenance and development of current and new customer relationships;
- enhancement of market position through existing or new technologies;
- timing of new product introductions and shipments;
- optimization of product mix;
- future trends in microelectronics, scientific research and government programs, OEM components and instrumentation and materials processing;
- utilization of vertical integration;
- adoption of our products or lasers generally;
- applications and processes that will use lasers, including the suitability of our products;
- capitalization on market trends;
- alignment with current and new customer demands;
- positioning in the marketplace and gains of market share;
- design and development of products, services and solutions;
- control of supply chain and partners;
- protection of intellectual property rights;
- compliance with environmental and safety regulations;
- net sales and operating results, including expected decreases in fiscal 2019 and subsequent expected recovery in fiscal 2020;
- effect of global economic conditions, including in particular resulting from U.S. and Chinese trade policies;
- capital spending;
- order volumes;
- fluctuations in backlog, including potential for cancellation or rescheduling of orders;
- variations in stock price;
- growth in our operations;
- trends in our revenues, particularly as a result of seasonality;
- controlling our costs;
- sufficiency and management of cash, cash equivalents and investments;
- acquisition efforts, payment methods for acquisitions and utilization of technology from our acquisitions, and potential synergies and benefits, including completion of post-acquisition integration and restructuring processes, in particular with respect to our acquisition of Rofin Sinar Technologies, Inc.;
- sales by geography;
- effect of legal claims;
- expectations regarding the payment of future dividends;

•effect of competition on our financial results;
•plans to renew leases when they expire;
•compliance with standards;
•effect of our internal controls;
•optimization of financial results;
•repatriation of funds;
•accounting for goodwill and intangible assets, inventory valuation, warranty reserves and taxes; and
•impact from our use of financial instruments.

In addition, we include forward-looking statements under the "Our Strategy" and "Future Trends" headings set forth below in "Business".

You can identify these and other forward-looking statements by the use of the words such as "may," "will," "could," "would," "should," "expects," "plans," "anticipates," "estimates," "intends," "potential," "projected," "continue," "our observation," or the negative of such terms, or other comparable terminology. Forward-looking statements also include the assumptions underlying or relating to any of the foregoing statements.

Our actual results could differ materially from those anticipated in these forward-looking statements as a result of various factors, including those set forth below in "Business," "Management's Discussion and Analysis of Financial Condition and Results of Operations" and under the heading "Risk Factors." All forward-looking statements included in this document are based on information available to us on the date hereof. We undertake no obligation to update these forward-looking statements as a result of events or circumstances or to reflect the occurrence of unanticipated events or non-occurrence of anticipated events, except to the extent required by law.

PART I

ITEM 1. BUSINESS

GENERAL

Business Overview

Our fiscal year ends on the Saturday closest to September 30. Fiscal years 2018, 2017 and 2016 ended on September 29, September 30, and October 1, respectively, and are referred to in this annual report as fiscal 2018, fiscal 2017 and fiscal 2016 for convenience. Each of fiscal 2018, 2017 and 2016 included 52 weeks.

We are one of the world's leading providers of lasers, laser-based technologies and laser-based system solutions in a broad range of commercial, industrial and scientific applications. We design, manufacture, service and market lasers and related accessories for a diverse group of customers. Since inception in 1966, we have grown through internal expansion and through strategic acquisitions of complementary businesses, technologies, intellectual property, manufacturing processes and product offerings.

We are organized into two reporting segments: OEM Laser Sources ("OLS") and Industrial Lasers & Systems ("ILS"), based on the organizational structure of the company and how the chief operating decision maker ("CODM") receives and utilizes information provided to allocate resources and make decisions. This segmentation reflects the go-to-market strategies and synergies for our broad portfolio of laser technologies and products. While both segments deliver cost-effective, highly reliable photonics solutions, the OLS business segment is focused on high performance laser sources and complex optical sub-systems typically used in microelectronics manufacturing, medical diagnostics and therapeutic medical applications, as well as in scientific research. Our ILS business segment delivers high performance laser sources, sub-systems and tools primarily used for industrial laser materials processing, serving important end markets like automotive, machine tool, consumer goods and medical device manufacturing.

Income from continuing operations is the measure of profit and loss that our CODM uses to assess performance and make decisions. Income from continuing operations represents the sales less the cost of sales and direct operating expenses incurred within the operating segments as well as allocated expenses such as shared sales and manufacturing costs. We do not allocate to our operating segments certain operating expenses, which we manage separately at the corporate level. These unallocated costs include stock-based compensation and corporate functions (certain advanced research and development, management, finance, legal and human resources) and are included in Corporate and other. Management does not consider unallocated Corporate and other costs in its measurement of segment performance.

We were originally incorporated in California on May 26, 1966 and reincorporated in Delaware on October 1, 1990. Our common stock is listed on the NASDAQ Global Select Market and we are a member of the Standard & Poor's MidCap 400 Index and the Russell 1000 Index.

Additional information about Coherent, Inc. (referred to herein as the Company, we, our, or Coherent) is available on our web site at www.coherent.com. We make available, free of charge on our web site, access to our annual report on Form 10-K, our quarterly reports on Form 10-Q, our current reports on Form 8-K and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), as soon as reasonably practicable after we file or furnish them electronically with the Securities and Exchange Commission ("SEC"). Information contained on our web site is not part of this annual report or our other filings with the SEC. Any product, product name, process, or technology described in these materials is the property of Coherent.

RECENT EVENTS

On October 28, 2018, our board of directors authorized a stock repurchase program authorizing the Company to repurchase up to $250.0 million of our common stock through December 31, 2019, with a limit of no more than $75.0 million per quarter.

On March 8, 2018, we acquired privately held O.R. Lasertechnologie GmbH and certain assets of its U.S.-based affiliate (collectively "OR Laser") for approximately $47.4 million, excluding transaction costs. OR Laser produces laser-based material processing equipment for a variety of uses, including additive manufacturing, welding, cladding, marking, engraving and drilling. See Note 3, "Business Combinations" in the Notes to Consolidated Financial Statements under Item 15 of this annual report.

On February 6, 2018, our board of directors authorized a stock repurchase program authorizing the Company to repurchase up to $100.0 million of our common stock from time to time through January 31, 2019. During the three and nine

months ended June 30, 2018, we repurchased and retired 574,946 shares of outstanding common stock under this program at an average price of $173.91 per share for a total of $100.0 million.

During fiscal 2018, we made payments on our senior secured term loan facility ("Euro Term Loan") of a total of 141.7 million Euros, including voluntary payments of a total of 135.0 million Euros.

On November 7, 2016, we completed our acquisition of Rofin Sinar Technologies, Inc. ("Rofin") pursuant to the Merger Agreement dated March 16, 2016. Rofin was one of the world's leading developers and manufacturers of high-performance industrial laser sources and laser-based solutions and components. As a condition of the acquisition, we were required to divest and hold separate Rofin's low power CO_2 laser business based in Hull, United Kingdom (the "Hull Business"), and reported this business separately as a discontinued operation until its divestiture. We completed the divestiture of the Hull Business on October 11, 2017, after receiving approval for the terms of the sale from the European Commission. On April 27, 2018, we completed the sale of several entities that we acquired in our acquisition of Rofin. See Note 18, "Discontinued Operations and Sale of Assets Held for Sale" in the Notes to Consolidated Financial Statements

INDUSTRY BACKGROUND

The word "laser" is an acronym for "light amplification by stimulated emission of radiation." A laser emits an intense coherent beam of light with some unique and highly useful properties. Most importantly, a laser is orders of magnitude brighter than any lamp. As a result of its coherence, the beam can be focused to a very small and intense spot, useful for applications requiring very high power densities including cutting and other materials processing procedures. The laser's high spatial resolution is also useful for microscopic imaging and inspection applications. Laser light can be monochromatic—all of the beam energy is confined to a narrow wavelength band. Some lasers can be used to create ultrafast output—a series of pulses with pulse durations as short as attoseconds (10^{-18} seconds).

There are many types of lasers and one way of classifying them is by the material or medium used to create the lasing action. This can be in the form of a gas, liquid, semiconductor, solid state crystal or fiber. Lasers can also be classified by their output wavelength: ultraviolet, visible, infrared or wavelength tunable. We manufacture all of these laser types. There are also many options in terms of pulsed output versus continuous wave, pulse duration, output power, beam dimensions, etc. In fact, each application has its own specific requirements in terms of laser performance. The broad technical depth at Coherent enables us to offer a diverse set of product lines characterized by lasers targeted at growth opportunities and key applications. In all cases, we aim to be the supplier of choice by offering a high-value combination of superior technical performance and high reliability.

Photonics has taken its place alongside electronics as a critical enabling technology for the twenty-first century. Photonics based solutions are entrenched in a broad array of industries that include microelectronics, flat panel displays, machine tool, automotive, and medical diagnostics, with adoption continuing in ever more diverse applications. Growth in these applications stems from two sources. First, there are many applications where the laser is displacing conventional technology because it can do the job faster, better or more economically (e.g. sheet metal cutting). Second, there are new applications where the laser is the enabling tool that makes the work possible, as in the conversion of amorphous silicon into poly crystalline silicon at low temperatures, where lasers are used in the manufacturing of high resolution flexible OLED displays found in the latest smart phones, tablets and laptop computers.

Key laser applications include: semiconductor inspection; manufacturing of advanced printed circuit boards ("PCBs"); flat panel display manufacturing; solar cell production; medical and bio-instrumentation; materials processing; metal cutting and welding; industrial process and quality control; marking; imaging and printing; graphic arts and display; and research and development. For example, ultraviolet ("UV") lasers are enabling the continuous move towards miniaturization, which drives innovation and growth in many markets. In addition, the advent of industrial grade ultrafast lasers continues to open up new applications for laser processing.

Coherent occupies a unique position in the industry thanks to the breadth and depth of our product and technology portfolio, which includes lasers, optics, laser beam delivery components and laser systems. Working closely with our customers we have developed specialized solutions that include lasers, delivery and process optics in complete assemblies (sub-systems or "rails"), and for certain applications and markets we have also developed parts handling and automation to build complete laser production systems or tools.

OUR STRATEGY

We strive to develop innovative and proprietary products and solutions that meet the needs of our customers and that are based on our core expertise in lasers and optical technologies. In pursuit of our strategy, we intend to:

- Leverage our technology portfolio and application engineering to lead the proliferation of photonics into broader markets—We will continue to identify opportunities in which our technology portfolio and application engineering can be used to offer innovative solutions and gain access to new markets. We plan to utilize our expertise to increase our market share in the mid to high power material processing applications.
- Streamline our manufacturing structure and improve our cost structure—We will focus on optimizing the mix of products that we manufacture internally and externally. We will utilize vertical integration where our internal manufacturing process is considered proprietary and seek to leverage external sources when the capabilities and cost structure are well developed and on a path towards commoditization.
- Focus on long-term improvement of adjusted EBITDA, in dollars and as a percentage of net sales—We define adjusted EBITDA as operating income adjusted for depreciation, amortization, stock-based compensation expense, major restructuring costs and certain other non-operating income and expense items, such as costs related to our acquisition of Rofin. Key initiatives for EBITDA improvements include utilization of our Asian manufacturing locations, optimizing our supply chain and continued leveraging of our infrastructure.
- Optimize our leadership position in existing markets—There are a number of markets where we have historically been at the forefront of technological development and product deployment and from which we have derived a substantial portion of our revenues. We plan to optimize our financial returns from these markets.
- Maintain and develop additional strong collaborative customer and industry relationships—We believe that the Coherent brand name and reputation for product quality, technical performance and customer satisfaction will help us to further develop our loyal customer base. We plan to maintain our current customer relationships and develop new ones with customers who are industry leaders and work together with these customers to design and develop innovative product systems and solutions as they develop new technologies.
- Develop and acquire new technologies and market share—We will continue to enhance our market position through our existing technologies and develop new technologies through our internal research and development efforts, as well as through the acquisition of additional complementary technologies, intellectual property, manufacturing processes and product offerings.

APPLICATIONS

Our products address a broad range of applications that we group into the following markets: Microelectronics, Materials Processing, OEM Components and Instrumentation and Scientific and Government Programs.

The following table sets forth, for the periods indicated, the percentages of total net sales by market application:

	Fiscal 2018 Percentage of total net sales	Fiscal 2017 Percentage of total net sales	Fiscal 2016 Percentage of total net sales
Consolidated:			
Microelectronics	54.5 %	51.9 %	53.1 %
Materials processing	27.4 %	29.7 %	14.5 %
OEM components and instrumentation	11.6 %	11.8 %	18.8 %
Scientific and government programs	6.5 %	6.6 %	13.6 %
Total	100.0 %	100.0 %	100.0 %

Microelectronics

Nowhere is the trend towards miniaturization and higher performance more prevalent than in the Microelectronics market where smart phones, tablets, personal computers ("PC's"), televisions ("TV's") and "wearables" are driving advances in displays, integrated circuits and PCBs. In response to market demands and consumer expectations, semiconductor and device manufacturers are continually seeking to improve their process and design technologies in order to manufacture smaller, more powerful and more reliable devices at lower cost. New laser applications and new laser technologies are a key element in delivering higher resolution and higher precision at lower manufacturing cost. We support three major markets in the microelectronics industry: (1) flat panel display ("FPD") manufacturing, (2) advanced packaging and interconnects ("API") and (3) semiconductor front-end ("SEMI").

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Microelectronics—flat panel display manufacturing

The high-volume consumer market is driving the production of FPDs in applications such as mobile phones, tablets, laptop computers, TVs and wearables. There are several types of established and emerging displays based on quite different technologies, including liquid crystal ("LCD") and organic light emitting diodes ("OLED"). Each of these technologies utilize laser applications in their manufacturing process to enable improved yields, higher process speed, improved battery life, lower cost and/or superior display brightness, resolution and refresh rates.

Several display types require a high-density pattern of silicon thin film transistors ("TFTs"). If this silicon is polycrystalline as opposed to amorphous, the display performance is greatly enhanced. In the past, these polysilicon layers could only be produced on expensive special glass at high temperatures. However, excimer-based processes, such as excimer laser annealing ("ELA") have allowed high-volume production of low-temperature polysilicon ("LTPS") on conventional glass substrates as well as flexible displays based on plastic substrates. Our excimer lasers provide a unique solution for LTPS because they are the only industrial-grade excimer lasers optimized for this application. The current state-of-the-art product for this application is our excimer Vyper laser and Linebeam systems. These systems deliver power ranges of 1200W to 3600W, depending on the system, enabling a critical manufacturing process step with Generation 4, 5, 5.5 and 6 substrates. These systems are integral to the manufacturing process on all leading LTPS-based smart phone displays, with the highest commercially available pixel densities of greater than 300 pixels per inch (ppi), with the current trends going to even higher ppi (~500 ppi) for high end smart phones, and hold the potential for deployment in tablet, laptop and OLED TV displays. Excimer based LTPS is also enabling flexible OLED displays which have recently undergone rapid growth as they have been adopted into smart phones.

A modern flat panel display incorporates a number of different layers, some of which are thin films that need to be cut or structured. As film thicknesses decrease over time, lasers are becoming the tool of choice to process these materials. Our DIAMOND CO_2 and Rapid series ultrafast lasers are used for cutting FPD films.

We have developed a proprietary technology for cutting of brittle materials such as glass and sapphire without debris and with zero kerf called SMART Cleave™, which is used for cutting brittle materials used in displays. This technology uses ultrafast lasers coupled with proprietary optics.

Our AVIA, Rapid, Monaco and DIAMOND CO_2 and CO lasers are also used in other production processes for FPDs. These processes include drilling, cutting, patterning, marking and yield improvement.

Microelectronics—advanced packaging and interconnects

After a wafer is patterned, there are then a host of other processes, referred to as back-end processing, which finally result in a packaged encapsulated silicon chip. Ultimately, these chips are then assembled into finished products. The advent of high-speed logic and high-memory content devices has caused chip manufacturers to look for alternative technologies to improve performance and lower process costs. This search includes new types of materials, such as low-k and thinner silicon. Our AVIA, Rapid, Monaco and Matrix lasers provide economical methods of cutting and scribing these wafers while delivering higher yields than traditional mechanical methods.

There are similar trends in chip packaging and PCB manufacturing requiring more compact packaging and denser interconnects. In many cases, lasers present enabling technologies. For instance, lasers are now the only economically practical method for drilling microvias in chip substrates and in both rigid and flexible PCBs. These microvias are tiny interconnects that are essential for enabling high-density circuitry commonly used in smart phones, tablets and advanced computing systems. Our DIAMOND CO_2 and AVIA diode pumped solid state ("DPSS") lasers are the lasers of choice in this application. The ability of these lasers to operate at very high repetition rates translates into faster drilling speeds and increased throughput in microvia processing applications. In addition, multi-layer circuit boards require more flexible production methods than conventional printing technologies can offer, which has led to widespread adoption of laser direct imaging ("LDI"). Our Paladin laser is used for this application.

Microelectronics—semiconductor front-end

The term "front-end" refers to the production of semiconductor devices which occurs prior to packaging.

As semiconductor device geometries decrease in size, devices become increasingly susceptible to smaller defects during each phase of the manufacturing process and these defects can negatively impact yield. One of the semiconductor industry's responses to the increasing vulnerability of semiconductor devices to smaller defects has been to use defect detection and inspection techniques that are closely linked to the manufacturing process.

Detecting the presence of defects is only the first step in preventing their recurrence. After detection, defects must be examined in order to identify their size, shape and the process step in which the defect occurred. This examination is called

defect classification. Identification of the sources of defects in the lengthy and complex semiconductor manufacturing process has become essential for maintaining high yield production. Semiconductor manufacturing has become an around-the-clock operation and it is important for products used for inspection, measurement and testing to be reliable and to have long lifetimes. Our Azure, Paladin, Excimer and ion lasers are used to detect and characterize defects in semiconductor chips.

Materials processing

The materials processing segment is comprised of four major markets: (1) automotive, (2) machine tool, (3) medical device and (4) consumer goods, as well a number of smaller markets. It is the most diverse of all the segments we serve and a large cross section of our products are used in this segment. Our sales in this segment include laser sources, laser sources with beam delivery optics (laser rails), beam delivery components, laser diagnostic equipment and complete laser systems (tools). At a high level, the drivers for laser deployment within the materials processing segment are faster processing with higher yields, processing of new and novel materials, more environmentally friendly processes and higher precision. With the broadest product portfolio in the laser industry, we offer solutions for almost any application on any material to our customers. The most common applications include cutting, welding, joining, drilling, perforating, scribing, engraving and marking.

Lasers are used in a number of applications in the automotive industry, from fine processing of high precision parts to marking, as well as cutting of metals and welding large components such as gear boxes and car bodies. We serve this industry with a number of our products including ultrafast, DPSS, CO_2, diode and fiber lasers as well as rails and tools in the areas of marking, scribing, cutting and welding.

In the machine tool industry lasers have been the solution of choice for cutting metal for some time. Traditionally this was a market for high power CO_2 lasers, but with the advent of high power fiber lasers, a transition away from CO_2 took place in many applications. That transition is substantially done since fiber lasers are used in the majority of metal cutting applications. We serve this market with our high power fiber and CO_2 lasers. As a fully vertically integrated fiber and laser diode supplier, we are able to produce all key components in-house. We have a complete line of high power fiber lasers in power levels up to 10 kW. We offer lasers with different performance points in terms of power levels and beam profiles to address specific applications, including single mode lasers and advanced beam shaping options, e.g. the ARM advanced high power fiber laser where the beam parameters can be optimized to reach higher quality welds and translate into higher customer yields. Additive manufacturing or 3D printing is another growing market where lasers have seen rapid growth. We serve this market with laser selective laser melting (SLM) systems for 3D printing of metal parts called Laser Creator as well as CO_2 and DPSS lasers.

The medical device market is characterized by its need for high precision manufacturing with high levels of quality control which lends itself very well to laser manufacturing. Applications include fine cutting and welding in addition to corrosive resistant marking. We serve this market with a number of lasers as well as a portfolio of tools.

In the consumer goods market, we serve a large variety of applications in packaging, digital printing, jewelry, textiles, security and consumer electronics. We serve these industries with almost all of our products from lasers to laser tools. As a consequence, this broad segment represents a stable and growing market for us.

In summary, we serve the materials processing segment with a very broad product portfolio. Laser sources include the Diamond series mid-power CO and CO_2 lasers; the DC series of high power CO_2 lasers; Highlight FL high power fiber lasers; the DF series of high power diode laser systems; the Diamond mid-power and Q-Switched fiber; the COMPACT, MINI and EVOLUTION series of low and mid power diode lasers; the AViA, Matrix, Flare, Helios and LDP DPSS lasers; the Monaco and Rapid series of ultrafast lasers; and the SLS, KLS, FLS and NA series of lamp pumped lasers. Laser tools include the Performance, Select and Integral series of manual welding systems; the UW and MPS series of modular and highly configurable laser processing systems; the EasyMark, EasyJewel, LabelMarker Advanced and Combiline laser marking systems; the META laser cutting tools; and the PWS mini welding system. Laser rails, i.e. laser sources combined with software, beam delivery, processing heads, process monitoring, pattern recognition and vision, include the PowerLine series for marking; the StarFiber for welding and cutting; the PWS welding system; the QFS laser scribing system; and the PerfoLas and StarShape CO_2 laser based systems.

OEM components and instrumentation

Instrumentation is one of our more mature commercial applications. Representative applications within this market include bio-instrumentation, medical OEMs, graphic arts and display, machine vision and defense applications. We

also support the laser-based instrumentation market with a range of laser-related components, including diode lasers and optical fibers. Our OEM component business includes sales to other, less integrated laser manufacturers participating in OEM markets such as materials processing, scientific, and medical.

Bio-instrumentation

Laser applications for bio-instrumentation include bio-agent detection for point source and standoff detection of pathogens or other bio-toxins; confocal microscopy for biological imaging that allows researchers and clinicians to visualize cellular and subcellular structures and processes with an incredible amount of detail; DNA sequencing where lasers provide automation and data acquisition rates that would be impossible by any other method; drug discovery—genomic and proteomic analyses that enable drug discovery to proceed at very high throughput rates; and flow cytometry for analyzing single cells or populations of cells in a heterogeneous mixture, including blood samples. Our OBIS, Flare, Galaxy, Sapphire, BioRay and Genesis lasers are used in several bio-instrumentation applications.

Medical Therapy

We sell a variety of components and lasers to medical laser companies for use in end-user applications such as ophthalmology, aesthetic, surgical, therapeutic and dentistry. Our DIAMOND series CO_2 lasers are widely used in ophthalmic, aesthetic and surgical markets. We have a leading position in Lasik and photorefractive keratectomy surgery methods with our ExciStar XS excimer laser platform. We also provide ultrafast lasers for use in cataract surgery and optical fibers for surgical applications.

The unique ability of our optically pumped semiconductor lasers ("OPSL") technology to match a wavelength to an application has led to the development of a high-power yellow (577nm) laser for the treatment of eye related diseases, such as Age Related Macular Degeneration and retinal diseases associated with diabetes. The 577nm wavelength was designed to match the peak in absorption of oxygenated hemoglobin thereby allowing treatment to occur at a lower power level, and thus reducing stress and heat-load placed on the eye with traditional green-based (530nm) solid state lasers. Other applications where our OBIS, Genesis and Sapphire series of lasers are used include the retinal scanning market in diagnostic imaging systems as well as new ground breaking in-vivo imaging.

Scientific research and government programs

We are widely recognized as a technology innovator and the scientific market has historically provided an ideal "test market" for our leading-edge innovations. These have included ultrafast lasers, DPSS lasers, continuous-wave ("CW") systems, excimer gas lasers and water-cooled ion gas lasers. Our portfolio of lasers that address the scientific research market is broad and includes our Chameleon, Chameleon Discovery, COMPexPro, Astrella, Revolution, Fidelity, Legend, Libra, Monaco, Vitara, Mephisto, Mira, Genesis and Verdi lasers. Many of the innovations and products pioneered in the scientific marketplace have become commercial successes for both our OEM customers and us.

We have a large installed base of scientific lasers which are used in a wide range of applications spanning virtually every branch of science and engineering. These applications include biology and life science, engineering, physical chemistry and physics. Most of these applications require the use of ultrafast lasers that enable the generation of pulses short enough to be measured in femto- or attoseconds (10^{-15} to 10^{-18} seconds). Because of these very short pulse durations, ultrafast lasers enable the study of fundamental physical and chemical processes with temporal resolution unachievable with any other tool. These lasers also deliver very high peak power and large bandwidths, which can be used to generate many exotic effects. Some of these are now finding their way into mainstream applications, such as microscopy or materials processing. The use of ultrafast lasers such as the Chameleon, Fidelity and Monaco in microscopy is now a common occurrence in bio-imaging labs, and they have become a crucial tool in modern neuroscience research.

FUTURE TRENDS

Microelectronics

Lasers are widely used in mass production microelectronics applications largely because they enable entirely new application capabilities that cannot be realized by any other known means. These laser-based fabrication and testing methods provide a level of precision, typically on a micrometer and nanometer level, that are unique, faster, are touch free, deliver superior end products, increase yields, and/or reduce production costs. We anticipate this trend to continue, driven primarily by the increasing sophistication and miniaturization of consumer electronic goods and their convergence via the internet, resulting in increasing demand for better displays, more bandwidth and memory, and all packaged into devices which are lighter, thinner and consume less power. Although this market follows the macro-economic trends and carries inherent risks, we believe that we are well positioned to continue to capitalize on the current market trends.

Excimer laser based LTPS is a key technology for producing high resolution OLED displays in general and flexible OLED displays in particular.

Demand for CO_2, Avia, Matrix, Rapid, Monaco, Helios and direct diode lasers correlate with the need for related FPD touch panel, film cutting, light guide technology, repair and frit welding applications.

The trend for thinner and lighter devices is impacting the glass substrates used in today's mobile devices requiring thinner glass with higher degrees of mechanical strength and scratch resistance. Mechanical means of cutting these glass and sapphire pieces are no longer adequate to meet future requirements and we expect lasers to play an increased role. Our CO, CO_2, Monaco and Rapid lasers together with our proprietary SmartCleave technology are well positioned to take advantage of this trend.

Semiconductor devices look set to continue Moore's Law, shrinking device geometries for at least another decade, as well as expanding vertically into new 3D structures. As a result we believe our many UV laser sources (such as Azure, Paladin, Avia, Rapid, ExiStar and Matrix) will continue to find increasing adoption, since their unique optical properties align well with the process demands of a nanometer scale world.

These same lasers, plus Monaco, Rapid, CO and CO_2 are also widely adopted for back end Advanced Packaging and Interconnect (API) applications. With dimension roadmaps showing a decade of dimension shrink on PCBs, interconnects, Silicon & LED scribe widths and wafer thickness, we believe that our portfolio of lasers aligns well with these demands as well as new processes that could be enabled by our lasers, to meet the increasing demands and decreasing tolerances of these markets.

While we anticipate investment in OLED technology to continue, we expect a softening of the demand in fiscal 2019 and a recovery from anticipated 2019 demand levels in fiscal 2020, with additional vendors supplying OLED displays for consumer products.

Materials processing

The materials processing segment is the most diverse of all the segments we serve and a large cross section of our products are used in this segment. We sell laser sources, laser rails, beam delivery components, laser diagnostic equipment and complete laser tools. There are many drivers at play, but at a high level they involve faster processing with higher yields, processing of new materials, more environmentally friendly processes and higher precision.

The automotive industry is undergoing rapid changes that present opportunities for further use of lasers. Trends such as reduction in emissions from lighter cars and electric vehicles require new materials and new processes for welding, cutting and drilling. We believe this will lead to further adoption of lasers and tools based on high power fiber and diode lasers, as well as ultrafast and CO_2 lasers. For example, the trend toward lighter weight cars requires more aluminum welding, an application in which our ARM laser technology offers competitive advantages versus alternative solutions. We see similar opportunities for electric vehicle and battery applications.

We expect to see continued growth for high power fiber lasers in the machine tool industry used in metal cutting applications. In addition, we see additional opportunities in newer applications such as laser cladding and heat treatment.

In the consumer goods market, we serve a large variety of applications in packaging, digital printing, jewelry, textiles, security and consumer electronics. We serve these industries with almost all of our products from lasers to laser tools. As a consequence, this broad segment represents a stable and growing market for us.

We supply the medical device market with a variety of lasers and laser tools in applications such as fine cutting and welding as well as marking. This market is set to continue to grow in the foreseeable future as the population becomes older and advanced medical procedures spread outside the traditional markets in US, Europe and Japan.

In 3D printing we expect continued growth, particularly in the area of metal additive manufacturing where we supply SLM tools.

OEM components and instrumentation

The bio instrumentation market's most important areas: microscopy, flow cytometry and DNA sequencing, are all enjoying solid research funding on a worldwide basis with some local variations. In this field, our OPSL technology gives us differentiated products at a number of important wavelengths. This advantage coupled with strong focus on meeting our customers' demands for more compact and cost effective sources has resulted in growth for us in this market and we expect that to continue. Our OPSL technology resulted in the first truly continuous wave solid-state UV laser which enables the use of UV in a clinical as well as a research environment.

In the medical therapeutic area, we see stable business with several opportunities for growth. We supply excimer lasers used in refractive eye surgery and are actively involved in further developments in laser vision correction including the use of ultrafast lasers in applications such as laser cataract surgery where higher precision and use of advanced implants enable better and more reliable patient outcomes. We also have opportunities in dental procedures

for both hard and soft tissue ablation, with greatly improved patient comfort and outcome. In the area of photocoagulation, our Genesis OPSL yellow lasers are being used

since the wavelength is particularly suitable for the treatment of blood vessels. We are an OEM supplier of CO_2 and semiconductor lasers to the major manufacturers of equipment used in the latest aesthetic procedures.

Scientific research and government programs

Worldwide scientific funding is expected to be relatively stable, with some regions growing and others just holding their current level. Bright spots include the strong push in neuroscience to better understand how the brain functions. Lasers play a very important role in imaging brain structure as well as tracking activity in animal brains using techniques such as optogenetics. We believe that our current and upcoming products are well positioned to take advantage of this exciting opportunity. In physics and chemistry applications, our recent product introductions of high performance and industrially hardened ultrafast products have been very well received. While this is a very competitive market, we expect that our new products will position us for growth.

MARKET APPLICATIONS

We design, manufacture and market lasers, laser tools, precision optics and related accessories for a diverse group of customers. The following table lists our major markets and the Coherent technologies serving these markets.*

Market	Application	Technology
Microelectronics	Flat panel display	CO, CO_2 DPSS Excimer Ultrafast Semiconductor Laser Rails
	Advanced packaging and interconnects	CO, CO_2 DPSS Excimer Ultrafast Laser Rails
	Semiconductor front-end	CO_2 DPSS OPSL Excimer Ion Laser Marking Tools
Materials processing	Metal cutting, drilling, joining, cladding, surface treatment and additive manufacturing	CO_2 Fiber Semiconductor Laser Machine Tools Ultrafast Laser Rails Components
	Laser marking and coding	CO_2 DPSS Ultrafast Laser Rails Laser Marking Tools
	Non-metal cutting, drilling	CO, CO_2 DPSS Ultrafast Excimer Semiconductor Laser Machine Tools Laser Rails Components
OEM components and instrumentation	Bio-Instrumentation	DPSS OPSL Semiconductor
	Graphic arts and display	OPSL CO_2
	Medical therapy (OEM)	CO, CO_2 DPSS

		Ultrafast Excimer OPSL Semiconductor DPSS
Scientific research and government programs	All scientific applications	Excimer OPSL Ultrafast

*Coherent sells its laser measurement and control products into a number of these applications.

In addition to products we provide, we invest routinely in the core technologies needed to create substantial differentiation for our products in the marketplace. Our semiconductor, crystal, fiber and large form factor optics facilities all maintain an external customer base providing value-added solutions. We direct significant engineering efforts to produce unique solutions targeted for internal consumption. These investments, once integrated into our broader product portfolio,

provide our customers with uniquely differentiated solutions and the opportunity to substantially enhance the performance, reliability and capability of the products we offer.

TECHNOLOGIES

Diode-pumped solid-state lasers (DPSS)

DPSS lasers use semiconductor lasers to pump a crystal to produce a laser beam. By changing the energy, optical components and the types of crystals used in the laser, different wavelengths and types of laser light can be produced. The efficiency, reliability, longevity and relatively low cost of DPSS lasers make them ideally suited for a wide range of OEM and end-user applications, particularly those requiring 24-hour operations. Our DPSS systems are compact and self-contained sealed units. Unlike conventional tools and other lasers, our DPSS lasers require minimal maintenance since they do not have internal controls or components that require adjusting and cleaning to maintain consistency. They are also less affected by environmental changes in temperature and humidity, which can alter alignment and inhibit performance in many systems.

We manufacture a variety of types of DPSS lasers for different applications including semiconductor inspection; advanced packaging and interconnects; laser pumping; spectroscopy; bio-agent detection; DNA sequencing; drug discovery; flow cytometry; forensics; computer-to-plate printing; entertainment lighting (display); medical; rapid prototyping and marking, welding, engraving, cutting and drilling.

Fiber Lasers, Fiber Components and Fiber Assemblies

Fiber lasers use semiconductor lasers to pump a doped optical fiber to produce a laser beam. The unique features of a fiber laser make them suitable for producing high power, continuous wave laser beams. Our fiber laser design has several unique features including a modular design for improved serviceability and diode bar based pumping. Due to packaging efficiency, diode bars reduce the overall cost of a fiber laser. Some of the most critical components inside a fiber laser include the gain fiber itself and the diodes providing the pump power. We plan to continue to drive cost reduction in our diode laser pumps and demonstrate the scalability of the platform and as a result, expect to be well positioned as a fiber laser supplier. This platform addresses the large growing high power metal cutting and joining market.

We are the world's leading OEM supplier of Active Fiber for fiber lasers - selected for our combination of high performance and consistent quality. In addition, we are a volume supplier of Specialty Passive Fiber, High Power Fiber Cables, Fiber Switches, Fiber-to-Fiber Couplers and OEM Medical Fiber Assemblies. We produce our Medical assemblies in high volume in one of our ISO 13485 certified plants. In addition, many of the fiber components offered in the broader market, such as Fiber Bragg Gratings and Fiber Combiners, have Coherent fiber in them.

Gas lasers (CO, CO_2, Excimer, Ion)

The breadth of our gas laser portfolio is industry leading, encompassing CO, CO_2, excimer and ion laser technologies. Gas lasers derive their name from the use of one or more gases as a lasing medium. They collectively span an extremely diverse and useful emission range, from the very deep ultraviolet to the far infrared. This diverse range of available wavelengths, coupled with high optical output power, and an abundance of other attractive characteristics, makes gas lasers extremely useful and popular for a variety of microelectronics, scientific, medical therapeutic and materials processing applications.

Optically Pumped Semiconductor Lasers ("OPSL")

Our OPSL platform is a surface emitting semiconductor laser that is energized or pumped by a semiconductor laser. The use of optical pumping circumvents inherent power scaling limitations of electrically pumped lasers, enabling very high powered devices. A wide range of wavelengths can be achieved by varying the semiconductor materials used in the device and changing the frequency of the laser beam using techniques common in solid state lasers. The platform leverages high reliability technologies developed for telecommunications and produces a compact, rugged, high power, single-mode laser.

Our OPSL products are well suited to a wide range of applications, including the bio-instrumentation, medical therapeutics and graphic arts and display markets.

Semiconductor lasers

High power edge emitting semiconductor diode lasers use the same principles as widely-used CD and DVD lasers, but produce significantly higher power levels. The advantages of this type of laser include smaller size, longer life, enhanced reliability and greater efficiency. We manufacture a wide range of discrete semiconductor laser products

with wavelengths ranging from 650nm to over 1000nm and output powers ranging from 1W to over 100W, with highly integrated products in the kW range. These products are available in a variety of industry standard form factors including the following: bare die,

packaged and fiber coupled single emitters and bars, monolithic stacks and fully integrated modules with microprocessor controlled units that contain power supplies and active coolers.

Our semiconductor lasers are used internally as the pump lasers in DPSS, fiber and OPSL products that are manufactured by us, as well as a wide variety of external medical, OEM, military and industrial applications, including aesthetic (hair removal, cosmetic dentistry), graphic arts, counter measures, rangefinders, target designators, cladding, hardening, brazing and welding.

Ultrafast ("UF") Lasers

Ultrafast lasers are lasers generating light pulses with durations of a few femtoseconds (10^{-15} seconds) to a few tens of picoseconds (10^{-12} seconds). These types of lasers are used for medical, advanced microelectronics and materials processing applications as well as scientific research. UF laser oscillators generate a train of pulses at 50-100 MHz, with peak powers of tens of kilowatts, and UF laser amplifiers generate pulses at 1-2000 kHz, with peak powers up to several Terawatts.

The extremely short duration of UF laser pulses enables temporally resolving fast events like the dynamics of atoms or electrons. In addition, the high peak power enables so-called non-linear effects where several photons can be absorbed by a molecule at the same time. This type of process enables applications like multi-photon excitation microscopy or ablation of materials with high precision and minimal thermal damage. The use of our ultrafast lasers in applications outside science has been growing rapidly over the last several years, particularly in microelectronics and materials processing applications.

Integrated Laser Solutions: Rails and Tools

In most cases, our lasers are integrated into machine tools or systems to perform a specific task, e.g. manufacturing of electronic components or performing a procedure on a patient. Inside the tool the laser is typically combined with delivery optics and beam steering devices, such as galvos, to deliver the laser beam to the workpiece. In addition to offering laser sources, we also offer solutions comprising beam delivery optics, mechanics and control electronics including software. We believe that these 'sub-systems' or 'rails' allow us to leverage our expertise in laser processing and optical design into superior solutions for our customers, with applications that can offer higher value and/or faster time to market. We have developed proprietary hardware, firmware and software in this area. Rail products often include vision systems, process monitoring and monitoring of the system itself. Our rail products include: PowerLine series for marking; the StarFiber for welding and cutting; the PWS welding system; the QFS laser scribing system; and the PerfoLas and StarShape CO_2 laser based systems.

In select cases we also offer complete laser systems or 'tools' which include the laser rail as well as a material handling system inside a class 1 laser safety housing, ready to be used in production or development environments. Our laser tools products include: the Laser Creator 3D metal printing system; the Performance, Select and Integral series of manual welding systems; the Exact and MPS series of modular and highly configurable laser processing systems; the EasyMark, EasyJewel, LabelMarker Advanced and Combiline laser marking systems; the META laser cutting tools; and the PWS mini welding system.

SALES AND MARKETING

We primarily market our products in the United States through a direct sales force. We sell internationally through direct sales personnel located in Canada, France, Israel, Germany, Italy, Japan, the Netherlands, China, South Korea, Taiwan, Singapore, Spain and the United Kingdom, as well as through independent representatives in certain jurisdictions around the world. Our foreign sales are made principally to customers in South Korea, China, Germany, Japan and other European and Asia-Pacific countries. Foreign sales accounted for 84% of our net sales in fiscal 2018, 83% of our net sales in fiscal 2017 and 76% of our net sales in fiscal 2016. Sales made to independent representatives and distributors are generally priced in U.S. dollars. A large portion of foreign sales that we make directly to customers are priced in local currencies and are therefore subject to currency exchange fluctuations. Foreign sales are also subject to other normal risks of foreign operations such as protective tariffs, export and import controls and political instability.

We had one customer, Advanced Process Systems Corporation, who contributed more than 10% of revenue during fiscal 2018, 2017 and 2016. We had another major customer, Japanese Steel Works, Ltd., who contributed more than 10% of revenue during fiscal 2016.

To support our sales efforts we maintain and continue to invest in a number of applications centers around the world, where our applications experts work closely with customers on developing laser processes to meet their manufacturing needs. The applications span a wide range, but are mostly centered around the materials processing and microelectronics markets. Locations include several facilities in the US, Europe and Asia.

We maintain customer support and field service staff in major markets within the United States, Europe, Japan, China, South Korea, Taiwan and other Asia-Pacific countries. This organization works closely with customers, customer groups and

independent representatives in servicing equipment, training customers to use our products and exploring additional applications of our technologies.

We typically provide parts and service warranties on our lasers, laser-based systems, optical and laser components and related accessories and services. The length of warranties offered on our products and services varies, but primarily ranges from 12 to 24 months. Warranty reserves, as reflected on our consolidated balance sheets, have generally been sufficient to cover product warranty repair and replacement costs. The weighted average warranty period covered in our reserve is approximately 15 months.

MANUFACTURING

Since the acquisition of Rofin in November 2016, we have integrated Rofin into our organizational structure and both organizations are operating as one company with common objectives, goals and processes. Strategies are being implemented to improve operating leverage, to execute synergies and to enhance our customers' experience. Common policies and guidelines have been communicated, key management and operating processes have been implemented and ERP systems at all of Rofin's sites in Asia and North America, and certain sites in Europe, have been integrated onto our Oracle ERP and Agile planning platforms, consistent with the rest of Coherent. This integration process will continue into fiscal 2019.

Strategies

One of our core manufacturing strategies is to tightly control our supply of key parts, components, sub-assemblies and outsourcing partners. We primarily utilize vertical integration when we have proprietary internal capabilities that are not cost-effectively available from external sources. We believe this is essential to maintaining high quality products and enable rapid development and deployment of new products and technologies. We provide customers with products manufactured at the highest level of quality, leveraging Coherent's quality processes that are International Organization for Standardization ("ISO") certified at our principal manufacturing sites.

Committed to quality and customer satisfaction, we design and produce many of our own components and sub-assemblies in order to retain quality and performance control. We have also outsourced certain components, sub-assemblies and finished goods where we can maintain our high quality standards while improving our cost structure.

As part of our strategy to increase our market share and customer support in Asia as well as our continuing efforts to manage costs, we have transferred the production of additional products into both of our Singapore and Malaysia factories. With the acquisition of Rofin, we now have a manufacturing footprint in Nanjing, China. We are transferring additional products and volume to Nanjing as well as consolidating our China repair activities in that facility. We have significantly increased our tube refurbishment capacity and footprint in our South Korea operations, which has allowed us to reduce service response time and inventories, providing benefits to us and to our customers. We have also increased our sourcing of materials from Asia through our International Procurement Office in Singapore, which has enabled us to reduce material costs on a global basis.

We have designed and implemented proprietary manufacturing tools, equipment and techniques in an effort to provide products that differentiate us from our competitors. These proprietary manufacturing techniques are utilized in a number of our product lines including our gas laser production, crystal growth, beam alignment as well as the wafer growth for our semiconductor, optically pumped semiconductor laser product family and fiber component and fiber laser product family.

Raw materials or sub-components required in the manufacturing process are generally available from several sources. However, we currently purchase several key components and materials, including exotic materials, crystals and optics, used in the manufacture of our products from sole source or limited source suppliers. We also purchase assemblies and turnkey solutions from contract manufacturers based on our proprietary designs. We rely on our own production and design capability to manufacture and specify certain strategic components, crystals, fibers, semiconductor lasers, lasers and laser based systems.

For a discussion of the importance to our business of, and the risks attendant to sourcing, see "Risk Factors" in item 1A — "We depend on sole source or limited source suppliers, both internal and external, for some of our key components and materials, including exotic materials, certain cutting-edge optics and crystals, used in our products, which make us susceptible to supply shortages or price fluctuations that could adversely affect our business, particularly our ability to meet our customers' delivery requirements."

Operations

Our products are manufactured at our sites in California, Oregon, Arizona, Michigan, Massachusetts, New Jersey, Connecticut and New Hampshire in the U.S.; Germany, Scotland, Finland, Sweden and Switzerland in Europe; and South Korea, China, Singapore and Malaysia in Asia. In addition, we also use contract manufacturers for the production of certain assemblies and turnkey solutions.

Our ion gas lasers, a portion of our DPSS lasers that are used in microelectronics, scientific research and materials processing applications, semiconductor lasers, OPS lasers, fiber lasers and ultrafast scientific lasers are manufactured at our Santa Clara, California site. Our laser diode module products, laser instrumentation products, test and measurement equipment products are manufactured in Wilsonville, Oregon. We manufacture exotic crystals in East Hanover, New Jersey and both active and passive fibers are manufactured in our Salem, New Hampshire facility. Our low power CO_2 and CO gas lasers are manufactured in Bloomfield, Connecticut. We manufacture a portion of our DPSS lasers used in microelectronics and OEM components and instrumentation applications in Lübeck, Germany. We manufacture a portion of our DPSS lasers used in microelectronics, OEM components and instrumentation and materials processing applications in Kaiserslautern, Germany. Our excimer gas laser products are manufactured in Göttingen, Germany. We refurbish excimer tubes at our manufacturing sites in Yong-In and An-Seong, South Korea. We manufacture the fiber-based lasers and a portion of our DPSS lasers used in microelectronics and scientific research applications in Glasgow, Scotland. Our facility in Sunnyvale, California grows the aluminum-free materials that are incorporated into our semiconductor lasers. Our facility in Richmond, California manufactures large form factor optics for our Linebeam excimer laser annealing systems. We manufacture and test high-power CO_2, solid-state and fiber laser macro products in Hamburg, Germany; Plymouth, Michigan; East Granby, Connecticut; Tampere, Finland; and Nanjing, China. Our laser marking products are manufactured and tested in Gunding-Munich and Gilching-Munich, Germany; and Singapore. Our micro application products are manufactured and tested in Gilching-Munich, Germany; Tampere, Finland; Plymouth, Michigan; and Belp, Switzerland. Our diode laser products are manufactured and tested in Mainz and Freiburg, Germany; Tucson, Arizona; and Nanjing, China. Coating of our Slab laser electrodes is performed in Overath, Germany. Our fiber optics and beam delivery systems are manufactured and tested in Molndal, Sweden, and power supplies are manufactured and tested in Starnberg-Munich, Germany. The Company's active and passive fibers and amplifiers are manufactured and tested in East Granby, Connecticut. Optical engines for fiber lasers, fiber lasers modules and wafer material are designed and manufactured in Tampere, Finland. In the second quarter of fiscal 2018, we acquired OR Laser and we manufacture and test the laser tools for the Metal Additive Manufacturing (3D Printing) market in Dieburg, Germany.

We have transferred several products and subassemblies for manufacture and repairs to our Singapore, Malaysia and Nanjing, China facilities and are continuing to transfer additional product manufacturing to these facilities as part of our worldwide manufacturing cost reduction strategy.

Coherent is committed to meeting internationally recognized manufacturing standards. All of our legacy Coherent facilities are ISO 9001 certified and several facilities are ISO 13485, ISO 14001, ISO 17025 and/or ISO 50001 certified depending on the products designed and manufactured at that facility. Substantially all of our legacy Rofin facilities are either ISO 9001 certified or are in the process of being certified.

INTELLECTUAL PROPERTY

We rely on a combination of patent, copyright, trademark and trade secret laws and restrictions on disclosure to protect our intellectual property rights. As of September 29, 2018, we held approximately 725 U.S. and foreign patents, which expire in calendar years 2018 through 2037 (depending on the payment of maintenance fees) and we have approximately 245 additional pending patent applications that have been filed. The issued patents cover various products in all of the major markets that we serve.

Some of our products are designed to include intellectual property licensed from third parties. It may be necessary in the future to seek or renew licenses relating to aspects of our products, processes and services. While we have generally been able to obtain such licenses on commercially reasonable terms in the past, there is no guarantee that such licenses could be obtained on reasonable terms in the future or at all.

For a discussion of the importance to our business of, and the risks attendant to intellectual property rights, see "Risk Factors" in Item 1A — "If we are unable to protect our proprietary technology, our competitive advantage could be harmed" and "We may, in the future, be subject to claims or litigation from third parties, for claims of infringement of their proprietary rights or to determine the scope and validity of our proprietary rights or the proprietary rights of competitors or other rights holders. These claims could result in costly litigation and the diversion of our technical and management personnel. Adverse resolution of litigation may harm our operating results or financial condition."

COMPETITION

Competition in the various photonics markets in which we provide products is very intense. We compete against a number of large public and private companies including IPG Photonics Corporation, Lumentum Holdings Inc., MKS Instruments, Inc., Novanta Inc., nLIGHT, Inc. and TRUMPF GmbH, as well as other smaller companies. In addition, from time to time our customers may also decide to vertically integrate and build their own photonics products. We compete globally based on our broad product offering, reliability, cost, and performance advantages for the widest range of commercial and

scientific research applications. Other considerations by our customers include warranty, global service and support and distribution.

BACKLOG

At fiscal 2018 year-end, our backlog of orders scheduled for shipment (within one year) was $759.9 million compared to $1,040.0 million at fiscal 2017 year-end. By segment, backlog for OLS was $488.8 million and $801.4 million, respectively, at fiscal 2018 and 2017 year-ends. Backlog for ILS was $271.1 million and $238.6 million, respectively, at fiscal 2018 and 2017 year-ends. The decrease in OLS backlog from fiscal 2017 to fiscal 2018 year-end was primarily due to the timing of large excimer laser annealing system shipments, net of orders, for the flat panel display market. The increase in ILS backlog from fiscal 2017 to fiscal 2018 year-end was primarily from orders in the materials processing and high power fiber laser markets. Orders used to compute backlog are generally cancellable and, depending on the notice period, are subject to rescheduling by our customers. We have not historically experienced a significant rate of cancellation or rescheduling, however the rate of cancellations or rescheduling may increase in the future. Subsequent to year-end, one customer indicated its intent to cancel three purchase orders which included orders shippable within 12 months of $38.2 million and were included in backlog as of fiscal 2018 year-end. We reached agreement with this customer for compensation for such cancellation.

SEASONALITY

We have historically generally experienced decreased revenue in the first fiscal quarter compared to other quarters in our fiscal year due to the impact of time off and business closures at our facilities and those of many of our customers due to year-end holidays. For example over the past 10 years, excluding certain recovery years, our first fiscal quarter revenues have ranged 2%-12% below the fourth quarter of the prior fiscal years. This historical pattern should not be considered a reliable indicator of the Company's future net sales or financial performance.

EMPLOYEES

As of fiscal 2018 year-end, we had 5,418 employees. Approximately 694 of our employees are involved in research and development; 3,496 of our employees are involved in operations, manufacturing, service and quality assurance; and 1,228 of our employees are involved in sales, order administration, marketing, finance, information technology, general management and other administrative functions. Our success will depend in large part upon our ability to attract and retain employees. We face competition in this regard from other companies, research and academic institutions, government entities and other organizations. We consider our relations with our employees to be good.

ACQUISITIONS

On March 8, 2018, we acquired privately held OR Laser for approximately $47.4 million, excluding transaction costs. OR Laser produces laser-based material processing equipment for a variety of uses, including additive manufacturing, welding, cladding, marking, engraving and drilling.

On November 7, 2016, we acquired Rofin, one of the world's leading developers and manufacturers of high-performance industrial laser sources and laser-based solutions and components, for approximately $936.3 million. Rofin's operating results have been included primarily in our Industrial Lasers & Systems segment.

Please refer to Note 3, "Business Combinations" and Note 19, "Subsequent Events" of Notes to Consolidated Financial Statements under Item 15 of this annual report for further discussion of recent acquisitions completed.

RESTRUCTURINGS AND CONSOLIDATION

In the first quarter of fiscal 2017, we began the implementation of planned restructuring activities in connection with the acquisition of Rofin. These activities to date primarily have related to exiting our legacy high power fiber laser product line, change of control payments to Rofin officers, the exiting of two product lines acquired in the acquisition of Rofin, realignment of our supply chain due to segment reorganization and consolidation of sales and distribution offices as well as certain manufacturing sites. These activities resulted in charges primarily for employee termination, other exit related costs associated with the write-off of property and equipment and inventory and early lease termination costs.

The fiscal 2018 severance related costs are primarily comprised of severance pay for employees being terminated due to the consolidation of certain manufacturing sites. The fiscal 2018 asset write-offs are primarily comprised of inventory and equipment write-offs due to the consolidation of certain manufacturing sites.

We plan to continue additional restructuring activities in fiscal 2019 related to our acquisition of Rofin.

GOVERNMENT REGULATION

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Environmental regulation

Our operations are subject to various federal, state, local and foreign environmental regulations relating to the use, storage, handling and disposal of regulated materials, chemicals, various radioactive materials and certain waste products. In the United States, we are subject to the federal regulation and control of the Environmental Protection Agency. Comparable authorities are involved in other countries. Such rules are subject to change by the governing agency and we monitor those changes closely. We expect all operations to meet the legal and regulatory environmental requirements and believe that compliance with those regulations will not have a material adverse effect on our capital expenditures, earnings and competitive and financial position.

Although we believe that our safety procedures for using, handling, storing and disposing of such materials comply with the standards required by federal and state laws and regulations, we cannot completely eliminate the risk of accidental contamination or injury from these materials. In the event of such an accident involving such materials, we could be liable for damages and such liability could exceed the amount of our liability insurance coverage and the resources of our business.

We face increasing complexity in our product design and procurement operations due to the evolving nature of environmental compliance regulations and standards, as well as specific customer compliance requirements. These regulations and standards have an impact on the material composition of our products entering specific markets. Such legislation has gone into effect at various time across the worldwide markets. For example, in the European Union ("EU"), the Restriction of the use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) went into effect in 2006, and was subsequently revised in 2011 (as RoHS 2) and again in 2015 (as RoHS 2 amended) and will be in effect in 2019. The Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) went into effect in 2007, and is updated with additional substances every 6 months. China enacted the Management Methods for Controlling Pollution Caused by Electronic Information Products Regulation (China-RoHS) in 2007, which was revised and renamed in 2016 as the Administrative Measures for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products (known as China RoHS 2). Another example is the US Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 (Conflict Minerals Act) which requires manufacturers to provide disclosures about the use of specified conflict minerals emanating from the DRC and nine adjoining countries (Covered Countries). In addition to these regulations and directives, we may face costs and liabilities in connection with product take-back legislation. For example, beginning in 2006 (with several subsequent revisions), the EU Waste Electrical and Electronic Equipment Directive 2012/19/EU made producers of electrical goods financially responsible for specified collection, recycling, recovery, treatment and disposal of past and future covered products. Similar laws are now pending in various jurisdictions around the world, including the United States.

Environmental liabilities

Our operations are subject to various laws and regulations governing the environment, including the discharge of pollutants and the management and disposal of hazardous substances. As a result of our historic as well as on-going operations, we could incur substantial costs, including remediation costs. The costs under environmental laws and the timing of these costs are difficult to predict. Our accruals for such costs and liabilities may not be adequate because the estimates on which the accruals are based depend on a number of factors including the nature of the matter, the complexity of the site, site geology, the nature and extent of contamination, the type of remedy, the outcome of discussions with regulatory agencies and other Potentially Responsible Parties (PRPs) at multi-party sites and the number and financial viability of other PRPs.

We further discuss the impact of environmental regulation under "Risk Factors" in Item 1A — "Compliance or the failure to comply with current and future environmental regulations could cause us significant expense."

Regulatory Compliance

Lasers that are manufactured or sold in the United States are classified under the applicable rules and regulations of the Center for Devices and Radiological Health ("CDRH") of the U.S. Food and Drug Administration ("FDA"). A similar classification system is applied in the European markets.

CDRH regulations require a self-certification procedure pursuant to which a manufacturer must submit a filing to the CDRH with respect to each product incorporating a laser, make periodic reports of sales and purchases, and comply with product labeling standards, product safety and design features and informational requirements. The CDRH is empowered to seek fines and other remedies for violations of their requirements. We believe that our products are in

material compliance with the applicable rules and regulations of CDRH relating to lasers manufactured or sold in the United States.

ITEM 1A. RISK FACTORS

You should carefully consider the followings risks when considering an investment in our common stock. These risks could materially affect our business, results of operations or financial condition, cause the trading price of our common stock to decline materially or cause our actual results to differ materially from those expected or those expressed in any forward-looking statements made by us. These risks are not exclusive, and additional risks to which we are subject include, but are not limited to, the factors mentioned under "Forward-Looking Statements" and the risk of our businesses described elsewhere in this annual report. Additionally, these risks and uncertainties described herein are not the only ones facing us. Other events that we do not currently anticipate or that we currently deem immaterial also may affect our business, results of operations or financial condition.

Our operating results, including net sales, net income (loss) and adjusted EBITDA in dollars and as a percentage of net sales, as well as our stock price have varied in the past, and our future operating results will continue to be subject to quarterly and annual fluctuations based upon numerous factors, including those discussed in this Item 1A and throughout this report. Our stock price will continue to be subject to daily variations as well. Our future operating results and stock price may not follow any past trends or meet our guidance and expectations.

Our net sales and operating results, such as adjusted EBITDA percentage, net income (loss) and operating expenses, and our stock price have varied in the past and may vary significantly from quarter to quarter and from year to year in the future. We believe a number of factors, many of which are outside of our control, could cause these variations and make them difficult to predict, including:

- general economic uncertainties in the macroeconomic and local economies facing us, our customers and the markets we serve;
- impact of government economic policies on macroeconomic conditions, including recently instituted or proposed changes in trade policies by the U.S. and any corresponding retaliatory actions by affected countries, in particular with respect to China;
- fluctuations in demand for our products or downturns in the industries that we serve;
- the ability of our suppliers, both internal and external, to produce and deliver components and parts, including sole or limited source components, in a timely manner, in the quantity, quality and prices desired;
- the timing of receipt of bookings and the timing of and our ability to ultimately convert bookings to net sales;
- the concentration of a significant amount of our backlog, and resultant net sales, with a few customers in the Microelectronics market;
- rescheduling of shipments or cancellation of orders by our customers;
- fluctuations in our product mix;
- the ability of our customers' other suppliers to provide sufficient material to support our customers' products;
- currency fluctuations and stability, in particular the Euro, the Japanese Yen, the South Korean Won, the Chinese RMB and the US dollar as compared to other currencies;
- commodity pricing;
- interpretation and impact of the recently enacted and aforementioned U.S. tax law, the Tax Cuts and Jobs Act;
- introductions of new products and product enhancements by our competitors, entry of new competitors into our markets, pricing pressures and other competitive factors;
- our ability to develop, introduce, manufacture and ship new and enhanced products in a timely manner without defects;
- our ability to manage our manufacturing capacity across our diverse product lines and that of our suppliers, including our ability to successfully expand our manufacturing capacity in various locations around the world;
- our ability to successfully and fully integrate acquisitions, such as the historical Rofin businesses, into our operations and management;
- our ability to successfully internally transfer products as part of our integration efforts;

- our reliance on contract manufacturing;
- our reliance in part upon the ability of our OEM customers to develop and sell systems that incorporate our laser products;
- our customers' ability to manage their susceptibility to adverse economic conditions;
- the rate of market acceptance of our new products;
- the ability of our customers to pay for our products;
- expenses associated with acquisition-related activities;
- seasonal sales trends, including with respect to Rofin's historical business, which has traditionally experienced a reduction in sales during the first half of its fiscal year as compared to the second half of its fiscal year;
- jurisdictional capital and currency controls negatively impacting our ability to move funds from or to an applicable jurisdiction;
- access to applicable credit markets by us, our customers and their end customers;
- delays or reductions in customer purchases of our products in anticipation of the introduction of new and enhanced products by us or our competitors;
- our ability to control expenses;
- the level of capital spending of our customers;
- potential excess and/or obsolescence of our inventory;
- costs and timing of adhering to current and developing governmental regulations and reviews relating to our products and business, including import and export regulations in multiple jurisdictions;
- costs related to acquisitions of technology or businesses;
- impairment of goodwill, intangible assets and other long-lived assets;
- our ability to meet our expectations and forecasts and those of public market analysts and investors;
- the availability of research funding by governments with regard to our customers in the scientific business, such as universities;
- continued government spending on defense-related and scientific research projects where we are a subcontractor;
- maintenance of supply relating to products sold to the government on terms which we would prefer not to accept;
- changes in policy, interpretations, or challenges to the allowability of costs incurred under government cost accounting standards;
- our ability and the ability of our contractual counterparts to comply with the terms of our contracts;
- damage to our reputation as a result of coverage in social media, Internet blogs or other media outlets;
- managing our and other parties' compliance with contracts in multiple languages and jurisdictions;
- managing our internal and third party sales representatives and distributors, including compliance with all applicable laws;
- costs, expenses and damages arising from litigation;
- costs associated with designing around or payment of licensing fees associated with issued patents in our fields of business;
- individual employees intentionally or negligently failing to comply with our internal controls;
- government support of alternative energy industries, such as solar;

- negative impacts related to the "Brexit" vote by the United Kingdom, particularly with regard to sales from our Glasgow, Scotland facility to other jurisdictions and purchases of supplies from outside the United Kingdom by such facility;
- negative impacts related to the recent independence movement in Catalonia, Spain, particularly with regard to holding and operating some of our foreign entities in an efficient manner from a tax, business and legal perspective;
- negative impacts related to government instability in any jurisdiction in which we operate, such as the recent difficulties in forming a governing coalition in Germany;
- the future impact of legislation, rulemaking, and changes in accounting, tax, defense procurement, export policies; and
- distraction of management related to acquisition, integration or divestment activities.

In addition, we often recognize a substantial portion of our sales in the last month of our fiscal quarters. Our expenses for any given quarter are typically based on expected sales and if sales are below expectations in any given quarter, the adverse impact of the shortfall on our operating results may be magnified by our inability to adjust spending quickly enough to compensate for the shortfall. We also base our manufacturing on our forecasted product mix for the quarter. If the actual product mix varies significantly from our forecast, we may not be able to fill some orders during that quarter, which would result in delays in the shipment of our products. Accordingly, variations in timing of sales, particularly for our higher priced, higher margin products, can cause significant fluctuations in quarterly operating results.

Due to these and other factors, such as varying product mix, we believe that quarter-to-quarter and year-to-year comparisons of our historical operating results may not be meaningful. You should not rely on our results for any quarter or year as an indication of our future performance. Our operating results in future quarters and years may be below public market analysts' or investors' expectations, which would likely cause the price of our stock to fall. In addition, over the past several years, U.S. and global equity markets have experienced significant price and volume fluctuations that have affected the stock prices of many technology companies both in and outside our industry. There has not always been a direct correlation between this volatility and the performance of particular companies subject to these stock price fluctuations. These factors, as well as general economic and political conditions or investors' concerns regarding the credibility of corporate financial statements, may have a material adverse effect on the market price of our stock in the future.

We depend on sole source or limited source suppliers, as well as on our own production capabilities, for so