ANNUAL REPORT 2017

IPG PHOTONICS®

TRANSFORMING THE PRODUCTS THAT TOUCH YOUR LIFE

Notice of 2018 Annual Meeting & Proxy Statement

WORLD LEADER IN FIBER LASERS

MANUFACTURING

MEDICAL

AEROSPACE

CINEMA DISPLAY

APPLIANCES

MOBILE

TRANSPORTATION

COMMUNICATIONS

ELECTRIC VEHICLES

IPG's mission is making our fiber laser technology the tool of choice in mass production.

IPG Photonics (Nasdaq: IPGP) is the world leader in high-performance fiber lasers and amplifiers used primarily in materials processing and other diverse applications. Fiber lasers deliver superior performance, reliability and usability compared to other types of lasers and non-laser tools.

2017 IN REVIEW

$1.4B NET SALES

UP **40%**

VERSUS THE PRIOR YEAR

$867M

SALES OF HIGH-POWER FIBER LASERS

UP **50%**

VERSUS THE PRIOR YEAR

$551M

OPERATING INCOME

UP **51%**

VERSUS THE PRIOR YEAR

39%

OPERATING MARGIN

$405M

OPERATING CASH FLOW

19% RETURN ON EQUITY

40% RETURN ON INVESTED CAPITAL*

*EXCLUDING CASH

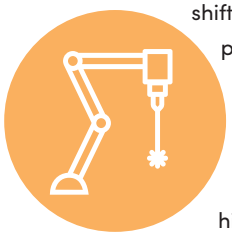
Valentin Gapontsev

MESSAGE TO OUR SHAREHOLDERS:

2017 was an outstanding year for IPG.

Having achieved $1 billion in annual revenue for the first time in 2016, we grew revenue by more than $400 million in 2017 to $1.4 billion. The list of billion-dollar high tech companies that grow annual sales by 40% is very short. And we are pleased to have delivered even stronger growth in backlog, operating earnings and free cash flow. We sold nearly 80% more optical power in 2017 increasing production faster than revenue growth and fulfilling orders with no meaningful change in lead time. This achievement reflects excellent planning and manufacturing execution, for which I thank all of IPG's employees.

Our success in 2017 was largely driven by the secular shift to high-power products as high-power laser sales increased by 50% in 2017. That growth was driven by three major trends. The first was a shift to ultra-high power laser sources of 6 kilowatts and above. Sales of ultra-high power lasers more than doubled in 2017, representing more than 30% of our high-power revenue. The world-leading power, compactness, electrical efficiency, and reliability of IPG fiber lasers is driving substantial productivity gains within the cutting, welding and sintering markets. For example, a 10 kilowatt fiber laser cutting system offers five times the productivity of a 6 kilowatt CO_2 laser system. This enhanced productivity allows machine shops to shift workloads from inflexible, non-laser punching, stamping, and shearing tools to their fiber laser cutting systems, which are CNC controlled and flexible. In addition, improvements in beam delivery components, system speeds and materials-handling capabilities have enabled end users to take advantage of the greater productivity of our ultra-high power lasers throughout their manufacturing organization.



Secondly, we experienced rapid growth in laser sources of 1 to 2 kilowatts for lower-end cutting systems. We believe these laser cutting systems are beginning to displace non-laser machine tools such as punches and presses, which use inflexible dies that take weeks to build and wear out over time. The upfront cost of these laser-based cutting systems has come down significantly over the last several years, enabled by cost reductions from our OEM partners and IPG's introduction of new products for this market, including rack-mounted fiber lasers. We believe unit volumes of these lower-end cutting systems have doubled over the last 2-3 years as they provide machine shops with greater flexibility, productivity, and return on investment.

The third major growth driver in our high-power business was in welding applications. Within the transportation industry we are benefiting from the shift to electrically-powered cars, trucks, buses, and other transportation vehicles. We believe electric vehicle battery production drove a rapid expansion of the laser-based welding market in 2017. Our high-power CW and pulsed lasers are used within a variety of battery production applications including cell welding, module integration welding, thin foil cutting and welding of contact points, terminal cleaning, battery case welding, busbar welding and battery integration welding. In addition to the battery, the transition to high-strength, lightweight materials in automotive production to improve fuel economy provide additional opportunities for laser-based welding to take share from non-laser technologies like resistance spot welding, arc, MIG, TIG and ebeam welding, adhesives, and riveting.

We experienced rapid growth in other product categories as well. Sales of QCW lasers grew 82% in 2017 driven by consumer electronics investments and other fine welding applications. Laser sales into additive manufacturing or 3D printing applications reached a record $50 million in 2017, growing by more than 40% from the year-ago period. Additive manufacturing processes such as laser sintering are now our fourth largest application area. We are seeing strong demand for medium power laser sales into the metal-based 3D printing industry as these systems continue to gain acceptance within the aerospace, automotive, medical device, and general manufacturing industries.

Within newer product categories, sales of high-power, 100 watt and above, nanosecond pulsed fiber lasers increased more than 80% in 2017 driven by a diverse set of applications that include foil cutting and terminal cleaning for batteries, solar cell scribing and drilling, laser trimming for displays, and oxide removal from metals prior to welding. Green pulsed lasers used to improve solar cell efficiency also grew strongly during the year.

We also delivered rapid growth in sales of beam delivery products and fully integrated systems to drive new applications for laser technology. Our systems business reached $40 million in annual sales driven by macrosystems, which include the ILT business we acquired last year, our seam stepper and our integrated marker and many other applications. We continue to develop new laser technologies and macrosystems for automobile, oil, gas, aerospace and other applications. We sold our first commercial cinema projection systems in 2017. In addition, we delivered double digit growth in beam delivery products, a business that today totals more than $60 million in annual sales. This growth is being fueled by our expanding portfolio of cutting, welding and scanning heads that are uniquely suited for high-power laser applications. Our December acquisition of LDD further compliments our beam delivery product lineup. LDD is an innovative provider of in-process quality monitoring and control solutions for laser-based welding applications. There has been a very favorable response to this acquisition as it enhances our real-time weld monitoring capability and competitive position.

We continue to see encouraging customer interest in our newest products. Our new ultrafast pulsed lasers expand our addressable market opportunity in the micro materials processing, marking and engraving, medical, and scientific markets. This family of picosecond and femtosecond pulsed fiber lasers overcome the limitations of traditional ultrafast products that are high-priced, bulky, and inconsistent in performance. IPG's ultrafast products offer a fiber-coupled design with easy systems integration, much higher wall-plug efficiency, a compact footprint, more consistent energy per pulse, a faster cold-start time, and a significantly lower investment and cost of ownership. Combining ultrafast opportunities with continued progress in UV and visible lasers, medical and dental lasers, unique super high lumen RGB systems, the defense industry, instrumentation, and scientific applications IPG is unlocking multiple potential growth drivers for the next three to five years that will significantly increase our addressable market.

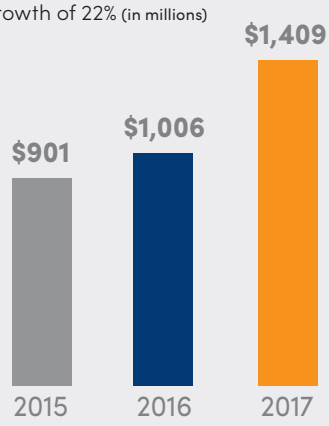
The rapid growth across our entire product portfolio drove record operating earnings of more than $550 million and operating cash flow of more than $400 million in 2017. Our total cash balance exceeds $1 billion providing us ample firepower to invest in new organic and inorganic growth opportunities. Along these lines, we expect to spend $170 million to $190 million on capital investments in 2018 to further expand our business. We remain committed to allocating capital in a manner that maximizes returns and increases shareholder value.

Once again, I would like to thank you, our shareholders, for your loyalty and support. We are very pleased to have delivered our strongest annual growth in six years, a direct result of our scale advantages and our unique business model combining a vertically-integrated manufacturing operation with broad-based technology and process abilities. This business model enables us to rapidly increase production, reduce costs and deliver innovation. Looking ahead, we see excellent opportunities to leverage these advantages within both our core markets and new applications, making our fiber laser technology the tool of choice in mass production.

Valentin P. Gapontsev, Ph. D.
Chairman and Chief Executive Officer
April 6, 2018

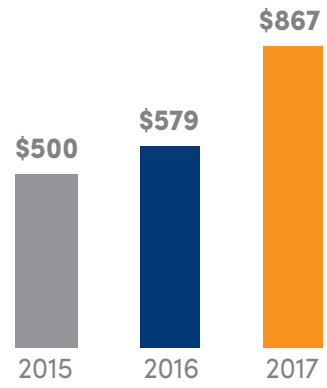
Net Sales

Three-Year Compound Annual Growth of 22% (in millions)

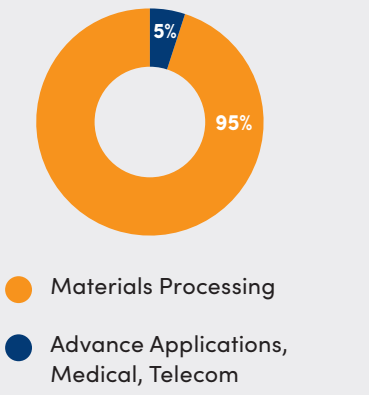


High Power Laser Sales

(in millions)

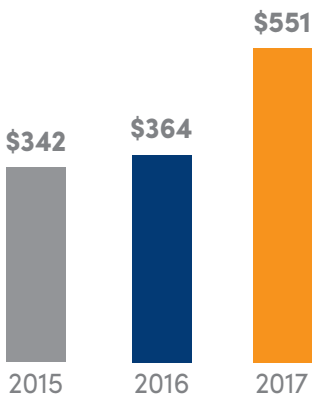


2017 Sales by Application



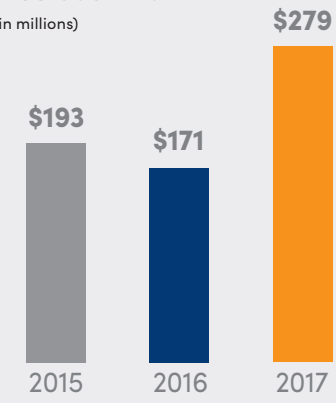
Operating Income

(in millions)



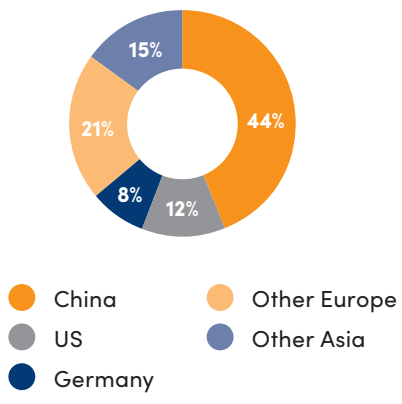
Free Cash Flow

(in millions)

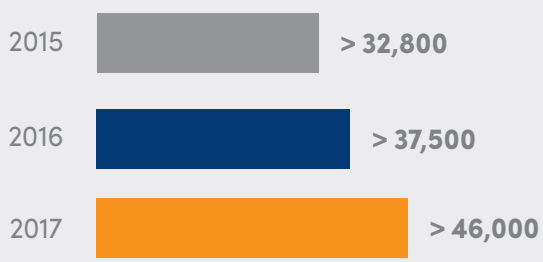


*Net cash provided by operating activities less capital expenditures

2017 Sales by Region

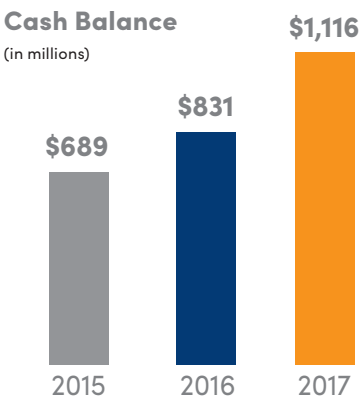


Devices Shipped



Cash Balance

(in millions)



5 YEAR STOCK PERFORMANCE

221%

THROUGH DECEMBER 31, 2017

UNITED STATES SECURITIES AND EXCHANGE COMMISSION
Washington, DC 20549

Form 10-K

(Mark One)

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

For the fiscal year ended December 31, 2017
OR

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

Commission File Number: 001-33155

IPG PHOTONICS CORPORATION

(Exact name of registrant as specified in its charter)

Delaware	**04-3444218**
(State or other jurisdiction of incorporation or organization)	*(IRS Employer Identification No.)*
50 Old Webster Road, Oxford, Massachusetts	**01540**
(Address of principal executive offices)	*(Zip Code)*

Registrant's telephone number, including area code:
(508) 373-1100
Securities registered pursuant to Section 12(b) of the Act:

Title of Class	**Name of Exchange on Which Registered**
Common Stock, Par Value $0.0001 per share	**The NASDAQ Stock Market LLC**

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

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

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

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

Indicate by check mark whether the registrant has submitted electronically 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 ☑ No ☐

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. ☑

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

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

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

The aggregate market value of the registrant's common stock held by non-affiliates of the registrant was approximately$4.1 billion, calculated based upon the closing price as reported by the Nasdaq Global Market on June 30, 2017. 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 conclusive.

As of February 22, 2018, 54,056,120 shares of the registrant's common stock were outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's Proxy Statement for its 2018 Annual Meeting of Stockholders to be filed pursuant to Regulation 14A within 120 days of the end of the registrant's fiscal year ended December 31, 2017 are incorporated by reference into Part III of this Annual Report on Form 10-K to the extent stated herein.

TABLE OF CONTENTS

This Annual Report on Form 10-K contains certain forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended, and we intend that such forward-looking statements be subject to the safe harbors created thereby. For this purpose, any statements contained in this Annual Report on Form 10-K except for historical information are forward-looking statements. Without limiting the generality of the foregoing, words such as "may," "will," "expect," "believe," "anticipate," "intend," "could," "estimate," or "continue" or the negative or other variations thereof or comparable terminology are intended to identify forward-looking statements. In addition, any statements that refer to projections of our future financial performance, trends in our businesses, or other characterizations of future events or circumstances are forward-looking statements.

The forward-looking statements included herein are based on current expectations of our management based on available information and involve a number of risks and uncertainties, all of which are difficult or impossible to accurately predict and many of which are beyond our control. As such, our actual results may differ significantly from those expressed in any forward-looking statements. Factors that may cause or contribute to such differences include, but are not limited to, those discussed in more detail in Item 1 (Business) and Item 1A (Risk Factors) of Part I and Item 7 (Management's Discussion and Analysis of Financial Condition and Results of Operations) of Part II of this Annual Report on Form 10-K. Readers should carefully review these risks, as well as the additional risks described in other documents we file from time to time with the Securities and Exchange Commission (the "SEC"). In light of the significant risks and uncertainties inherent in the forward-looking information included herein, the inclusion of such information should not be regarded as a representation by us or any other person that such results will be achieved, and readers are cautioned not to rely on such forward-looking information. We undertake no obligation to revise the forward-looking statements contained herein to reflect events or circumstances after the date hereof or to reflect the occurrence of unanticipated events.

PART I

ITEM 1. *BUSINESS*

Our Company

IPG Photonics Corporation ("IPG", the "Company", the "Registrant", "we", "us" or "our") is the leading developer and manufacturer of a broad line of high-performance fiber lasers, fiber amplifiers and diode lasers that are used for diverse applications, primarily in materials processing. Fiber lasers are a type of laser that combine the advantages of semiconductor diodes, such as long life and high efficiency, with the high amplification and precise beam qualities of specialty optical fibers to deliver superior performance, reliability and usability.

Our diverse lines of low, mid and high power lasers and amplifiers are used in materials processing, advanced communications and medical applications. We sell our products globally to original equipment manufacturers ("OEMs"), system integrators and end users. We market our products internationally primarily through our direct sales force. Our major manufacturing facilities are located in the United States, Germany and Russia. We have sales service offices and applications laboratories worldwide.

We are vertically integrated such that we design and manufacture most of the key components used in our finished products, from semiconductor diodes to optical fiber preforms, finished fiber lasers and amplifiers. We also manufacture complementary products used with our lasers including optical delivery cables, fiber couplers, beam switches, optical processing heads and chillers. In addition, we offer laser-based systems for certain markets and applications. Our vertically integrated operations allow us to reduce manufacturing costs, control quality, rapidly develop and integrate advanced products and protect our proprietary technology.

We are listed on the Nasdaq Global Market (ticker: IPGP). We began operations in 1990, and we were incorporated in Delaware in 1998. Our principal executive offices are located at 50 Old Webster Road, Oxford, Massachusetts 01540, and our telephone number is (508) 373-1100.

Industry Background

Since the laser was invented over 50 years ago, laser technology has revolutionized a broad range of applications and products in various industries, including general manufacturing, automotive, medical, research, consumer products, electronics, semiconductors and communications. A laser works by converting electrical energy to optical energy. In a laser, an energy source excites or pumps a lasing medium, which converts the energy from the source into an emission consisting of particles of light, called photons, at particular wavelengths. Lasers provide flexible, non-contact and high-speed ways to process and treat various materials and are a key enabler of advanced manufacturing techniques including automation and miniaturization. They are incorporated into manufacturing, medical and other systems by OEMs, system integrators and end users. Also, they are widely used for various medical applications and test and measurement systems and to transmit large volumes of data in optical communications systems. For a wide variety of applications, lasers provide superior performance and a more cost-effective solution than non-laser technologies.

Lasers emit an intense light beam that can be focused on a small area, causing metals and other materials to melt, vaporize or change their character. These properties are utilized in materials processing applications requiring very high power densities, such as cutting, welding, marking and engraving, additive manufacturing, ablation, printing, drilling and cladding. Many different types of machine tools have been used within the materials processing industry to cut, form or otherwise process metal in the production of finished goods such as automobiles, consumer appliances, electronics, and heavy machinery. These machine tools include (but are not limited to) grinding machines, mechanical saws, milling machines, lathes, presses, stamping machines, electrical-discharge machines, plasma, water-jet and lasers. The 2017 World Machine Tool Survey conducted by Gardner Business Intelligence estimates global machine tool consumption of $82 billion in 2017. Laser-based systems are increasingly gaining share within the materials processing market given the greater precision, processing speeds, and flexibility enabled by this technology. Because laser energy can be delivered remotely, with greater precision and power, the trends toward automated production, miniaturization and increasing product complexity are helping drive adoption of laser technology. Beyond materials processing, lasers are well-suited for imaging and inspection applications, and the ability to confine laser light to narrow wavelengths makes them particularly effective in medical and sensing applications.

Other Laser Technologies

Historically, carbon dioxide ("CO_2") gas lasers and crystal lasers have been the two principal laser types used in materials processing and many other applications. They are named for the materials used to create the lasing action. A CO_2 laser produces light by electrically stimulating a gas-filled tube and delivers the beam through free space using mirrors to provide

direction. A crystal laser uses an arc lamp, pulsed flash lamp or diode stack or array to optically pump a special crystal. The most common crystal lasers use yttrium aluminum garnet ("YAG") crystals infused with neodymium or ytterbium. Crystal lasers also use mirrors in free space to deliver the beam or direct the beam through fiber optics.

Fiber Lasers

Fiber lasers use semiconductor diodes as the light source to pump specialty optical fibers, which are infused with rare earth ions. These fibers are called active fibers and are comparable in diameter to a human hair. The laser emission is created within optical fibers and delivered through a flexible optical fiber cable. As a result of their different design and components, fiber lasers are more reliable, efficient, robust, compact and easier to operate than other laser technologies. In addition, fiber lasers free the end users from fine mechanical adjustments and the high maintenance costs that are typical for other laser technologies.

Although low power fiber lasers were introduced four decades ago, their increased adoption in the last decade has been driven primarily by our improvements in their output power levels and cost, as well as their superior performance, lower cost of ownership and greater reliability compared with other laser technologies. We have successfully increased output power levels by developing improved optical components such as diodes and active fibers that have increased their power capacities and improved their performance. Fiber lasers now offer output powers that exceed those of other laser technologies in many categories. Also, semiconductor diodes historically have represented the majority of the cost of fiber lasers. In the past, the high cost of diodes meant that fiber lasers could not compete with other laser technologies on price and limited their use to high value-added applications. Over the last twenty years, however, our semiconductor diodes have become more affordable and reliable due, in part, to substantial advancements in semiconductor diode technology, packaging design and increased production volumes. As a result, the average cost per watt of output power has decreased dramatically over the last fifteen years. Because of these improvements, our fiber lasers can now effectively compete with other laser technologies over a wide range of output powers and applications, and begin to compete with non-laser technologies in many applications that that did not use lasers historically. As a pioneer in the development and commercialization of fiber lasers, we have contributed to many advancements in fiber laser technology and products.

Advantages of Fiber Lasers

We believe that fiber lasers provide a combination of benefits that include:

- *Superior Performance.* Fiber lasers provide uniform beam quality over the entire power range. In most other laser solutions, the beam quality is sensitive to output power, while in fiber lasers, the output beam is virtually non-divergent over a wide power range. A non-divergent beam enables higher levels of precision, increased power densities and the ability to deliver the beam over greater distances to where processing can be completed. The superior beam quality and greater intensity of a fiber laser's beam allow tasks to be accomplished more rapidly, with lower power units and with greater flexibility than comparable lasers.

- *Enhanced End User Productivity.* The near-infrared ("IR") wavelengths produced by ytterbium fiber lasers are absorbed well by metals, enabling faster processing speeds than other lasers and non-laser technologies across many metal-based materials processing applications. Because IPG fiber lasers utilize rigorously-tested long-lived semiconductor diodes, unique active fibers to prevent photo darkening and other leading-edge, proprietary technologies, our fiber lasers have demonstrated greater uptime and reliability in the field, with less required maintenance and fewer service interventions than many competing technologies.

- *Cost of Ownership.* Fiber lasers are less expensive to operate due to their faster processing speeds, higher energy efficiency and lower required maintenance costs. Fiber lasers convert electrical energy to optical energy approximately 2 to 3 times more efficiently than diode-pumped YAG lasers or disc lasers, approximately 3 to 4 times more efficiently than conventional CO_2 lasers and approximately 15 to 30 times more efficiently than lamp-pumped YAG lasers. Because fiber lasers are much more energy-efficient and place lower levels of thermal stress on their internal components, they have substantially lower cooling requirements compared to those of other lasers, which also improves overall energy efficiency. Fiber lasers have lower maintenance costs due to the high performance and long life of our single-emitter diodes, fiber optics and other optical components.

- *Ease of Use.* Numerous features of fiber lasers make them easier to operate, maintain and integrate into laser-based systems as compared to other lasers, many of which require mirrors to direct the beam. There are no moving parts in fiber lasers and the beam is contained in a flexible fiber optic cable so they do not require adjustments of internal components or mirrors to direct the beam.

- *Compact Size.* Fiber lasers are typically smaller and lighter in weight than other lasers, saving valuable floor space. While other laser technologies are delicate due to the precise alignment of mirrors, fiber lasers are more durable and able to perform in variable environments.

- *Choice of Wavelengths and Precise Control of Beam.* The design of fiber lasers generally provides a broad range of wavelength choices, allowing users to select the precise wavelength that best matches their application and materials. As the beam is delivered through a flexible fiber optic cable, it can be directed to the work area over longer distances without loss of beam quality.

Fiber amplifiers are similar in design to fiber lasers, use many of the same components, such as semiconductor diodes and specialty optical fibers, and provide many of the same advantages in the applications that require amplification.

Notwithstanding the benefits offered by fiber lasers, there remain applications and processes where other laser technologies may provide superior performance with respect to particular features. For example, crystal lasers can provide higher peak power pulses necessary in certain applications and fiber lasers cannot now generate the deep ("UV") light that is used for photolithography in many semiconductor applications. In addition, CO_2 lasers operate at wavelengths that are optimal for use on many non-metallic materials, including organic materials like wood.

Our Competitive Strengths

Our key strengths and competitive advantages include:

World's Leading Producer of Fiber Laser Technology. We are the world's largest manufacturer of fiber lasers. As a pioneer and technology leader in fiber lasers, we have built leading positions in our various end markets with a large and diverse customer base. Based on our leadership positions, we are able to leverage our scale to reduce costs for our customers and drive the proliferation of fiber lasers in existing and new applications. We rely on several key proprietary technologies, including pumping and combining technologies, manufacturing fibers to withstand the high output powers of our lasers, fiber gain blocks and optics that contribute to the superior performance and reliability of our products. As a result of our technology leadership, we can commercially manufacture reliable high power fiber lasers in high volumes at a lower cost per watt than our competitors.

Vertically Integrated Development and Manufacturing. We develop and manufacture all of our key high-volume specialty components, including semiconductor diodes, active fibers, passive fibers and specialty optical components. We also produce beam switches, fiber optic delivery cables, certain optical processing heads, power suppliers, printed circuit boards and mechanical parts developed especially for use with our lasers. Recently, we have been able to expand our product portfolio by offering systems capabilities in certain applications. We believe that our vertical integration enhances our ability to meet customer requirements, reduce costs, accelerate and focus development, shorten lead times, limit the spread of trade secrets and provide competitive pricing advantages while maintaining high performance and quality standards.

Manufacturing Scale. We have invested extensively in our production capabilities allowing us to deliver large volumes of fiber lasers in short delivery cycles which provide us with a competitive advantage. In 2017, we shipped more than 46,000 devices across a wide variety of applications and end markets.

Breadth and Depth of Expertise. We have extensive know-how in materials sciences, which enables us to make our specialty optical fibers, semiconductor diodes and other critical components. We also have experience in optical, electrical, mechanical and semiconductor engineering, which we use to develop and manufacture our proprietary components, products, accessories and systems. We also operate numerous application development centers worldwide and offer custom engineered systems solutions which allow us to assist customers in improving their manufacturing using our deep experience with fiber lasers.

Broad Product Portfolio and Ability to Meet Customer Requirements. We offer a broad range of standard and custom fiber lasers operating at various wavelengths and pulse durations and amplifiers, enabling deployment in a wide variety of applications and end markets. Our vertically integrated manufacturing, broad technology expertise and investment in inventory enable us to design, prototype and commence high-volume production of our products rapidly, allowing us to meet customer requests for quick deliveries.

Diverse Customer Base, End Markets and Applications. Our diverse customer base, end markets and applications provide us with many growth opportunities. In 2017, we shipped products to over 3,750 customers worldwide. Our principal end markets and representative applications within those markets include:

Materials Processing		
	General manufacturing	• Flat sheet, tube and 3D cutting • Welding, brazing and hardening • Marking, engraving and printing • 3D printing, selective laser melting and sintering • Ablation and cleaning
	Automotive	• High-strength steel and aluminum cutting and welding • Welding tailored metal blanks, frames, seats and transmissions • Brazing and welding of auto frames • Seam welding • Electric vehicle battery welding
	Consumer	• Welding, cutting and marking for smart phones, electronics and appliances • Electronics and credit card marking • Stent, pacemaker and medical device manufacturing
	Heavy industry	• Hardening and welding pipes in nuclear and pipeline industries • Welding and cutting thick plates for ships and rail cars • Cladding of turbine blades for power generators and drill bits for energy extraction
	Aerospace	• Welding titanium air frames • Cladding parts • Percussion drilling of parts
	Semiconductor and electronics	• Wafer inspections • Photovoltaic manufacturing • Dicing and scribing
Advanced Applications		• Obstacle warning and light detecting and ranging • Special projects and research • Directed energy demonstrations • Laser cinema projection
Communications		• Short to ultra long reach, 1G to 100G+ DWDM for all network segments • Broadband — fiber to premises, cable video signal transport • Metro and long-haul wire-line DWDM transport • Pluggable optical transceivers
Medical		• Skin rejuvenation and wrinkle removal • General surgery and urology • Dental • Hair Removal • Treatment of pigmented and vascular lesions

Our Strategy

Our objective is to maintain and extend our leadership position in our industry by pursuing the following key elements of our strategy:

Leverage Our Technology to Increase Sales. As fiber lasers become more widely accepted, we plan to leverage our position as the leader in fiber lasers and our applications expertise to develop solutions for customers and increase our position in the market. We believe that our fiber lasers can perform many tasks that have been done with other machine tools in current non-laser applications and will continue to displace other laser technologies. Over the last few years, our high power lasers have become widely accepted in two- and three-dimension cutting, one of the largest laser materials processing applications. We plan to continue to leverage our fiber laser technology by pursuing large-scale laser applications where our fiber lasers offer improved customer value and performance. Some of the more significant applications we intend to target include: (i) joining

processes including laser welding and brazing, (ii) deposition technology (cladding) and additive manufacturing (also called 3D printing); (iii) ablation processes including cleaning and stripping of materials; and (iv) micro-processing, scribing and marking with high power green lasers, ultrafast pulsed lasers, UV and ultrafast, IR lasers now under development.

Target New Applications for Lasers and Expand into Broader Markets. We intend to expand the use of fiber lasers into additional applications in which lasers are not widely used. We believe that the advantages of fiber laser technology can overcome many of the limitations that have hindered the broader adoption of laser technology. Using our manufacturing scale and technological innovations, we have been successful in reducing the cost of manufacturing with lasers, which we believe has made fiber lasers a more attractive manufacturing alternative as compared to other laser technologies and many non-laser methods. We target applications where the cost, reliability, mobility, quality of the final process and speed can lead customers to adopt fiber lasers instead of non-laser solutions. Certain industry trends such as the use of high-strength steel and aluminum in automotive manufacturing in order to decrease the weight of vehicles and improve structural rigidity are driving the use of fiber lasers over other manufacturing methods such as stamping, non-laser welding, riveting and adhesives. Other trends, such as increasing automation and miniaturization of parts and electronics, contribute to the use of lasers because no other tools can work as precisely or quickly. Large scale fiber laser applications outside of materials processing are also targeted. We are developing a fiber laser projection technology platform as an alternative to xenon bulb projection platforms in cinemas and other entertainment venues.

Expand Our Product Portfolio. We plan to continue to invest in research and development to produce lasers at additional wavelengths, power levels and more rapid pulse durations as well as new laser-based systems. We are developing and introducing lasers with ultrashort pulse durations (picosecond and femtosecond), UV and mid infra-red lasers. We have introduced a line of optical processing cutting, welding and scanning heads optimized for use with our laser sources. We have also grown our product portfolio through acquisitions. In 2017, we acquired Innovative Laser Technologies, LLC ("ILT"), a developer of high-precision laser systems for the medical device industry, OptiGrate, a pioneer of chirped volume Bragg grating technologies used in ultrafast lasers for pulse compression, and Laser Depth Dynamics Inc., which develops and manufactures in-process quality monitoring and control solutions for laser-based welding applications. In 2016, we acquired Menara Networks which expanded our telecom product offerings to include pluggable optical transceivers.

Lower Our Costs Through Manufacturing Improvements and Innovation. We plan to seek further improvements in component manufacturing processes and device assembly as well as innovation in components and device designs to improve performance and decrease the overall cost per watt for our products. As we increase our production volumes, we improve our internal manufacturing economies of scale and we believe we will be able to better negotiate price reductions with certain suppliers. We intend to leverage our technology and operations expertise to manufacture additional components in order to reduce costs, ensure component quality, ensure supply and improve product performance. We continue to manufacture more of the mechanical parts, printed circuit boards and power supplies we use and redesign certain optical components to improve quality and power capacities. We further decreased the manufacturing cost of our packaged diodes and other key components and sub-assemblies. Additionally, we have developed the capability of growing and processing crystals used in certain of our lasers. By reducing the cost per watt of our lasers and maintaining the lower operating cost of our products, we believe that we can increase the use of fiber lasers in applications for which other laser technologies are not an economical or competitive option.

Expand Global Reach to Attract Customers Worldwide. The acceptance of fiber laser technology has expanded in both developed and emerging markets around the world. As a result, we have increased and continue to increase our international sales and service locations to respond to our customer needs. In 2017, we established a new office in Mexico and the Czech Republic and continued to expand our facilities in Russia, the United States and Germany to increase manufacturing capacity.

Products

We design and manufacture a broad range of high-performance optical fiber-based lasers and amplifiers. We also make packaged diodes, direct diode lasers, laser systems and communications components and systems. Many of our products are designed to be used as general-purpose energy or light sources, making them useful in diverse applications and markets.

Our products are based on a common proprietary technology platform using many of the same core components, such as semiconductor diodes and specialty fibers, which we configure to our customers' specifications. Our engineers and scientists work closely with OEMs, system integrators and end users to develop and customize our products for their needs. Because of our flexible and modular product architecture, we offer products in different configurations according to the desired application, including modules, rack-mounted units and tabletop units. Our engineers and other technical experts work directly with the customer in our application and development centers to develop and configure the optimal solution for each customer's manufacturing requirements. We also manufacture certain complementary products that are used with our lasers, such as optical delivery cables, fiber couplers, beam switches, optical processing heads and chillers.

Lasers

Our laser products include low (1 to 99 watts), medium (100 to 999 watts) and high (1,000 watts and above) output power lasers from 0.3 to 4.5 microns in wavelength. These lasers may be continuous wave ("CW"), quasi-continuous wave ("QCW") or pulsed. Our pulsed line includes nanosecond, picosecond and femtosecond lasers. We offer several different types of lasers, which are defined by the type of gain medium they use. These are ytterbium, erbium and thulium, as well as Raman and hybrid fiber-crystal lasers. We also sell fiber pigtailed packaged diodes and fiber coupled direct diode laser systems that use semiconductor diodes rather than optical fibers as their gain medium. In addition, we offer high-energy pulsed lasers, multi-wavelength lasers, tunable lasers, single-polarization and single-frequency lasers, as well as other versions of our products.

We believe that we produce the highest power solid-state lasers in the industry. Our ytterbium fiber lasers reach power levels of up to 120,000 watts. We also make single-mode and low-mode output ytterbium fiber lasers with power levels of up to 20,000 watts and single-mode, erbium and thulium fiber lasers with power levels of up to 500 watts. Our compact, durable design and integrated fiber optic beam delivery allow us to offer versatile laser energy sources and simple laser integration for complex production processes without compromising quality, speed or power.

We also sell laser diode chips and packaged laser diodes operating at 8XX to 9XX nanometers. We sell our own family of high power optical fiber delivery cables, fiber couplers, beam switches, chillers, scanners and other accessories for our fiber lasers. We are expanding our line of cutting and welding optical processing heads for use with our fiber lasers, including in-line coherent monitoring for welding.

We also make active and passive laser materials and tunable lasers in the mid-IR region.

Amplifiers

Our amplifier products range from milliwatts to up to 1,500 watts of output power from 1 to 2 microns in wavelength. We offer erbium-doped fiber amplifiers ("EDFAs"), Raman amplifiers and integrated communications systems that incorporate our amplifiers. These products are predominantly deployed in broadband networks such as fiber to the home ("FTTH"), fiber to the curb ("FTTC"), and passive optical networks ("PON"), and dense wavelength division multiplexing ("DWDM") networks. We also offer ytterbium and thulium specialty fiber amplifiers and broadband light sources that are used in advanced applications. In addition, we sell single-frequency, linearly polarized and polarization-maintaining versions of our amplifier products. As with our fiber lasers, our fiber amplifiers offer some of the highest output power levels and highest number of optical outputs in the industry. We believe our line of fiber amplifiers offers the best commercially available output power and performance.

Tranceivers

Our transceivers provide interconnect, coarse wavelength division multiplexing ("CWDM"), DWDM, and tunable-based pluggable interfaces to serve optical transmission needs from 100 meters over multimode fiber to over 1,200 kilometers. A transceiver combines the functions of a transmitter, which uses a laser and modulation to convert electrical signals into optical signals for transmission over optical fiber, and a receiver, which uses photo detectors to convert incoming optical signals into electrical signals, within a single device. These optical subsystems provide the interface for interconnecting electronic equipment including Ethernet switches, IP routers and SONET/SDH optical transport modules within telecommunications, cable multi-system operator ("MSO") and data center networks.

Systems

Besides selling laser sources, we also offer integrated laser systems for particular geographic markets or custom-developed for a customer's manufacturing requirements. We offer 2D flat sheet cutter systems and multi-axis systems for fine welding, cutting and drilling. In 2017, we acquired ILT, a producer of high precision laser systems for the medical device industry. Also we offer a welding seam stepper and picker, which is an automated and integrated fiber laser welding tool providing customers increased processing speeds, better quality and the elimination of certain clamping tools and laser safety enclosures.

IPG also develops and sells specialized fiber laser systems for unique material processing applications as requested by customers desiring a complete laser-based solution, including orbital welding, pipe welding and remote welding. The platforms include robotic and multi-axis workstations for welding, cutting and cladding, flatbed cutting systems, and diode markers.

The following table lists our principal product lines that generated a substantial majority of our revenues in 2017, and the principal applications markets in which they are used:

Product Line	Principal Markets	Principal Applications
High Power Ytterbium CW (1,000 — 120,000 Watts)	Automotive Heavy Industry General Manufacturing Natural Resources Aerospace	• Cutting • Welding • Annealing • Drilling • Cladding • Brazing • 3D Printing
Medium Power Ytterbium CW (100 — 999 Watts)	General Manufacturing Consumer Medical Devices Printing Electronics	• Cutting • Welding • Scribing • Engraving • 3D printing
Pulsed Ytterbium (0.1 to 200 Watts)	General Manufacturing Semiconductor Medical Devices Consumer Electronics Panel Displays	• Marking • Engraving • Scribing • Drilling • Coating removal • Cutting
Ultrafast Pulsed Ytterbium	General Manufacturing Semiconductor Medical Scientific Consumer Electronics Panel Displays	• Marking • Engraving • Coating removal • Scribing • Cutting • Drilling • Solar
Quasi-CW Ytterbium (100 — 4,500 Watts)	Medical Device Computer Components Fine-Processing	• Welding and micro-welding • Drilling • Cutting metals and crystals
Pulsed and CW Green Lasers	Microprocessing and Semiconductor Solar General Manufacturing	• Annealing silicon wafers • Thin film ablation • Marking plastics
Pulsed Ultraviolet	Consumer Pharmaceutical Semiconductor Consumer Electronics	• Marking • Engraving • Scribing • Micro punching
Erbium Amplifiers	Broadband Access Cable TV DWDM Instrumentation Scientific Research	• Telephony • Video on demand • High-speed internet • Ultra-long-haul transmission • Beam combining
Transceivers	Telecommunications Cable TV Data Center Networking	• SONET/SDH optical transport • Ethernet switching • IP routing

Our products are used in a broad range of applications. The major application is materials processing, comprising approximately 94% of our sales in 2017. Our products also address other applications, including advanced applications (approximately 3% of sales), communications (approximately 2% of sales) and medical (approximately 1% of sales).

Our Markets

Materials Processing

The most significant materials processing applications for fiber lasers are cutting, welding and brazing, marking and engraving, additive manufacturing such as 3D printing and ablation. Other applications include micro-processing, surface treatment, drilling, and annealing.

Cutting and Welding Applications. Laser-based cutting technology has several advantages compared to alternative technologies. Laser cutting is fast, flexible and highly precise and can be used to cut complex contours on flat, tubular or three-dimensional materials. The laser source can be programmed to process many different kinds of materials such as steel, aluminum, brass, copper, glass, ceramic and plastic at various thicknesses. Laser cutting technology is a non-contact process that is easy to integrate into an automated production line and is not subject to wear of the cutting medium. We sell low, mid and high power ytterbium fiber lasers for laser cutting. High electrical efficiency, low maintenance and operating cost, high

beam quality, wide operating power range, power stability and small spot size are some of the qualities offered by IPG fiber lasers for many cutting applications, which enable customers to cut a variety of materials faster.

Laser welding offers several important advantages compared to conventional welding technology as it is non-contact, easy to automate, provides high process speed and results in narrow-seamed, high-quality welds that generally require little or no post-processing machining. The high beam quality of our fiber lasers coupled with high CW power offer deep penetration welding as well as shallow conduction mode welding. In addition, fiber lasers can be focused to a small spot with extremely long focal lengths, enabling remote welding "on the fly," a flexible method of three-dimensional welding in which the laser beam is positioned by a robot-guided scanner. Such remote welding stations equipped with fiber lasers are used for welding door panels and seat backs, the multiple welding of spot and lap welds over the entire auto body frame, tailor blank welding and welding "body-in-white," which is welding pieces of metal with different thicknesses for automotive applications. Typically, mid to high power ytterbium fiber lasers and long-pulse QCW ytterbium fiber lasers are used in welding applications. Our products are used also for laser brazing of visible joints in automobiles such as tailgates, roof joints and columns. Brazing is a method of joining sheet metal by using a melted filler material similar to soldering but requiring higher temperatures.

3D Printing. Historically, metalworking has been performed with processes that remove material to produce component parts. The development of 3D printing technology enables the production of three-dimensional objects from digital design data through an additive manufacturing process, which builds up components in layers using materials that are available in fine powder form. 3D printers take advantage of improvements in computing power and motion and process control to deposit a range of materials, including metals, plastics and composite materials, accurately at high speed. Within metal-based 3D printing processes that include laser metal deposition (LMD) and selective laser melting (SLM), a laser beam is used to fuse metallic powder at points defined by computer-generated design data. In many metal-based 3D printers, multiple laser sources are used to to fuse the metallic powder more quickly and at multiple angles. 3D printing permits highly complex structures, with a high degree of customization capability and significantly less waste than subtractive manufacturing processes. The trends toward automation and miniaturization, as well as the stability and reliability of our fiber lasers have played important roles in the development of additive manufacturing technology.

Marking and Engraving. With the increasing need for source traceability, component identification and product tracking as a means of reducing product liability and preventing falsification, as well as the demand for modern robotic production systems, manufacturers increasingly demand marking systems capable of applying serialized alphanumeric, graphic or bar code identifications directly onto their manufactured components. Laser engraving is similar to marking but forms deeper grooves in the material. In contrast to conventional acid etching and ink-based technologies, lasers can mark a wide variety of metal and non-metal materials, such as ceramic, glass and plastic surfaces, at high speeds and without contact by changing the surface structure of the material or by engraving. Laser marking systems can be easily integrated into a customer's production process and do not subject the item being marked to mechanical stress. Our ytterbium pulsed fiber lasers are used for these applications.

In the semiconductor industry, lasers typically are used to mark wafers and integrated circuits. In the electronics industry, lasers typically are used to mark electrical components such as contactors, relays and printed circuit boards. Consumer electronic devices such as mobile phones, computers and handheld computers contain many parts that are laser-marked, including keyboards, logos and labels. With the increase in marking speed in the past few years, the cost of laser marking has decreased. In the photovoltaic or solar panel industry, pulsed lasers increasingly are used to remove materials and to scribe, or cut, solar cells. The high beam quality, increased peak output powers, flexible fiber delivery and competitive price of fiber lasers have accelerated the adoption of fiber lasers in these low power applications.

Micro-Processing and Fine Processing. The trend toward miniaturization in numerous industries such as consumer electronics, as well as innovations in materials and structures, is driving end users to utilize lasers in processing and fabrication. The ability of lasers to cut, weld, drill, ablate, etch and add materials on a fine scale is enabling new technologies and products across many industries. Our low power CW and QCW lasers are used to cut medical stents and weld medical batteries. In photovoltaic manufacturing, our lasers etch and perform edge isolation processes. The aerospace industry requires precise manufacturing of engine parts so that cooling is effective and aerospace manufacturers use lasers to conduct percussion drilling. Processing of plastics and semi-conductors require short pulse and high energy lasers, in the green, UV and mid-IR wavelengths.

Advanced Applications

Our fiber lasers and amplifiers are utilized by commercial firms and by academic and government institutions worldwide for manufacturing of commercial systems and for research in advanced technologies and products. These markets may use specialty products developed by us or commercial versions of our products.

Special Projects. Due to the high power, compactness, performance, ruggedness and electrical efficiency of our fiber lasers and amplifiers, we sell our commercial products for government research and projects. These include materials testing, ordnance destruction, coherent beam combining, directed energy demonstrations, advanced communications and research.

Research and Development. Our products are used in a variety of applications for research and development by scientists and industrial researchers, including atom trapping. In addition, our lasers and amplifiers are used to design, test and characterize components and systems in a variety of markets and applications.

Optical Pumping and Harmonic Generation. Several types of our lasers are used to optically pump other solid-state lasers and for harmonic generation and parametric converters to support research in sensing, medical and other scientific research in the IR and visible wavelength domains. Our lasers are used as a power source for these other lasers. Green visible lasers are used to pump titanium sapphire lasers. Visible lasers can be used in cinema projection, amusement parks, planetariums and light shows.

Remote Sensing. Our products are used in light detection and ranging ("LIDAR"), a laser technique for remote sensing. Optical fiber can be used as a sensor for measuring changes in temperature, pressure and gas concentration in oil wells, atmospheric and pollution measurements and seismic exploration.

Obstacle Warning and Mapping. Our products are used for obstacle warning and 3-dimensional mapping of earth surfaces.

Communications

We design and manufacture enhanced optical transmission modules and systems and DWDM transport systems for transmission of multiple wavelength channels over a single optical fiber.

We make optical pluggable systems, based upon mixed signal ASIC proprietary designs, intended to simplify optical networks and reduce customer capital costs. These are integrated into advanced 100G/400G software-defined, flexible and configurable coherent DWDM transceiver modules to comprise a "system-in-module". Major customers of this technology include a leading MSO, a large US data center operator and leading optical network system integrators.

IPG's fiber amplifiers are deployed in some of the world's largest broadband FTTH networks. In addition, we design and manufacture transceivers for interconnecting electronic equipment within telecommunications, cable MSO, and data center networks.

DWDM. DWDM is a technology that expands the capacity of optical networks, allowing service providers to extend the life of existing fiber networks and reduce operating and capital costs by maximizing bandwidth capacity. We provide a broad range of high power products for DWDM applications including EDFAs and Raman lasers. We provide a DWDM transport system that offers service providers and private network operators a simple, flexible, optical layer solution scalable to 80 channels that aggregates and multiplexes multiprotocol clients into optical transport network signals operating at 10, 40 and 100 gigabits per second per channel. We also provide both fixed wavelength DWDM transceivers and tunable DWDM transceivers that are capable of dynamically tuning across a range of wavelengths.

Broadband Access. The delivery to subscribers of television programming and Internet-based information and communication services is converging, driven by advances in Internet Protocol ("IP") technology and by changes in the regulatory and competitive environment. Fiber optic lines now offer connection speeds of up to 10 gigabits per second to the subscriber, or 1,000 times faster than digital subscriber lines ("DSL"), or cable links. We offer a series of specialty multi-port EDFAs and cable television ("TV") nodes and transmitters that support different types of passive optical network architectures, enabling high-speed data, voice, video on demand and high-definition TV. We provide an EDFA that supports up to 64 output ports, which allows service providers to support a high number of customers in a small space, reducing overall power consumption and network cost. End users for our products include communications network operators for video wavelength division multiplexing overlay solutions, operators of metro and long-haul networks for DWDM and amplification solutions, as well as cable and multiple system operators for optical amplification solutions.

Medical

We sell our commercial fiber and diode lasers to OEMs that incorporate our products into their medical laser systems. Our ultrafast and CW ytterbium, erbium and thulium fiber lasers from 1 to 150 watts and diode laser systems can be used in various medical and biomedical applications. Aesthetic applications addressed by lasers include skin rejuvenation, hair removal, and treatment of pigmented and vascular lesions. Purchasers use our diode lasers in dental and skin rejuvenation procedures. Through our medical business, we are developing laser systems for dental (soft tissue and bone surgery) and

surgical (benign prostatic hyperplasia and lithotripsy) aesthetic, and veterinary uses. Other medical procedures are also being investigated.

Technology

Our products are based on our proprietary technology platform that we have developed and refined since our formation. The following technologies are key elements in our products.

Specialty Optical Fibers

We have extensive expertise in the disciplines and techniques that form the basis for the multi-clad active and passive optical fibers used in our products. Active optical fibers form the laser cavity or gain medium in which lasing or amplification of light occurs in our products. Passive optical fibers deliver the optical energy created in our products. Our active fibers consist of an inner core that is infused with the appropriate rare earth ion, such as ytterbium, erbium or thulium, and outer cores of un-doped glass having different indices of refraction. We believe that our large portfolio of specialty active and passive optical fibers has a number of advantages as compared to other commercially available optical fibers. These advantages include higher concentrations of rare earth ions, fibers that will not degrade at the high power levels over the useful life of the product, high lasing efficiency, ability to achieve single-mode outputs at high powers, ability to withstand high optical energies and temperatures and scalable side-pumping capability.

Semiconductor Diode Laser Processing and Packaging Technologies

Another key element of our technology platform is that we use multiple multi-mode, or broad area, single-emitter diodes rather than diode bars or stacks as a pump source. We believe that multi-mode single-emitter diodes are the most efficient and reliable pumping source presently available, surpassing diode bars and stacks in efficiency, brightness and reliability. Single-emitter diodes have substantially reduced cooling requirements and typically have long lifetimes at high operating currents, compared to typical lifetimes of diode bars.

We developed advanced molecular beam epitaxy techniques to grow alumina indium gallium arsenide wafers for our diodes. This method yields high-quality optoelectronic material for low-defect density and high uniformity of optoelectronic parameters. In addition, we have developed numerous proprietary wafer processes and testing and qualification procedures in order to create a high energy output in a reliable and high power diode. We package our diodes in hermetically sealed pump modules in which the diodes are combined with an optical fiber output. Characteristics such as the ability of the package to dissipate heat produced by the diode and withstand vibration, shock, high temperature, humidity and other environmental conditions are critical to the reliability and efficiency of the products.

Specialty Components and Combining Techniques

We developed a wide range of advanced optical components that are capable of handling high optical power levels and contribute to the superior performance, efficiency and reliability of our products. In addition to fibers and diodes, our optical component portfolio includes fiber gratings, couplers, isolators and combiners. We also developed special methods and expertise in splicing fibers together with low optical energy loss and on-line loss testing. We believe that our internal development and manufacturing of key optical components allows us to lower our manufacturing costs and improve product performance.

Side Pumping of Fibers and Fiber Block Technologies

Our technology platform allows us to efficiently combine a large number of multi-mode single-emitter semiconductor diodes with our active optical fibers that are used in all of our products. A key element of this technology is that we pump our fiber lasers through the cladding surrounding the active core. We splice our specialty active optical fibers with other optical components and package them in a sealed box, which we call a fiber block. The fiber blocks are compact and eliminate the risk of contamination or misalignment due to mechanical vibrations and shocks as well as temperature or humidity variations. Our design is scalable and modular, permitting us to make products with high output power by coupling a large number of diodes with fiber blocks, which can be combined in parallel and serially.

High-Stress Testing

We employ high-stress techniques in testing components and final products that help increase reliability and accelerate product development. For example, we test all of our diodes with high current and temperatures to accelerate aging. We also have built a large database of diode test results that allows us to predict the estimated lifetime of our diodes. This testing allows us to eliminate defective diodes prior to further assembly and thus increase reliability.

Customers

We sell our products globally to OEMs, system integrators and end users in a wide range of diverse markets who have the in-house engineering capability to integrate our products into their own systems. We have thousands of customers worldwide. Our primary end market is materials processing, comprised of general manufacturing, automotive, heavy industry, aerospace, consumer products, medical device manufacturing, natural resources, photovoltaic, semiconductor and electronics. We estimate that in 2017, approximately 54%, 20% and 9% of our net sales were generated from sales for cutting, welding and brazing, and marking and engraving applications, respectively. In 2016, approximately 51%, 18% and 11% and 2015, approximately 50%, 18% and 15% of our net sales were generated from sales for cutting, welding and brazing, and marking and engraving applications, respectively. These estimates are based upon customer information and when customer information has not been provided, upon our best information and belief. Within each of these applications, the lasers may vary substantially in terms of output powers depending upon the types of materials processed (e.g., thick steel cutting, aluminum cutting and fine metal cutting) and the industry served within the diverse materials processing end market, some of which are listed above. We also sell our products to other end markets, including advanced applications (comprised of commercial companies, universities, research entities and government entities), communications (comprised of system integrators, utilities and municipalities) and medical (comprised of medical laser systems manufacturers and researchers). We believe that our customer, geographic and end market diversification minimizes dependence on any single industry or group of customers.

The following table shows the allocation of our net sales (in thousands) among our principal markets:

	Year Ended December 31,					
	2017		2016		2015	
		% of Total		% of Total		
Materials Processing	$ 1,332,607	94.6%	$ 942,119	93.6%	$ 849,335	94.2%
Other applications:						
Advanced Applications	36,836	2.6	28,166	2.8	28,866	3.2
Communications	32,023	2.3	28,823	2.9	14,399	1.6
Medical	7,423	0.5	7,065	0.7	8,665	1.0
Total other applications:	76,282	5.4	64,054	6.4	51,930	5.8
Total	$ 1,408,889	100.0%	$ 1,006,173	100.0%	$ 901,265	100.0%

One of our customers, Han's Laser, headquartered in China, accounted for 13%, 9% and 13% of our net sales in 2017, 2016 and 2015, respectively. No other customer accounted for 10% or more of our net sales in 2017, 2016 or 2015.

Our net sales (in thousands) were derived from customers in the following geographic regions:

	Year Ended December 31,					
	2017		2016		2015	
		% of Total		% of Total		% of Total
United States and other North America (1)	$ 165,363	11.8%	$ 141,184	14.0%	$ 131,525	14.6%
Europe:						
Germany	114,608	8.1	90,893	9.1	93,802	10.4
Other including Eastern Europe/CIS	290,067	20.6	224,836	22.3	189,123	21.0
Asia and Australia:						
China	621,283	44.1	358,476	35.7	311,946	34.7
Japan	80,612	5.7	88,592	8.8	76,033	8.4
Other	131,511	9.3	100,052	9.9	95,494	10.6
Rest of World	5,445	0.4	2,140	0.2	3,342	0.3
Total	$ 1,408,889	100.0%	$ 1,006,173	100.0%	$ 901,265	100.0%

(1) The substantial majority of sales in North America are to customers in the United States.

Backlog

At December 31, 2017, our backlog of orders (generally scheduled for shipment within one year) was approximately $743.6 million compared to $413.9 million at December 31, 2016. At December 31, 2017, our backlog included $326.1 million of orders with firm shipment dates and $417.4 million of frame agreements that we expect to ship within one year, compared to $226.7 million of orders with firm shipment dates and $187.2 million of frame agreements at December 31, 2016. Frame agreements are non-binding indications of customer pricing and volume levels but are not firm customer purchase obligations. Orders used to compute backlog are generally cancelable without substantial penalties. Historically, we have not experienced a

significant cancellation rate in ordinary economic conditions. We manage the risk of cancellation by establishing the right to charge a cancellation fee that generally covers a portion of the purchase price, any materials and development costs incurred prior to the order being canceled. Our ability to enforce this right depends on many factors including, but not limited to, the customer's requested length of delay, the number of other outstanding orders with the customer and our ability to quickly convert the canceled order to another sale.

We anticipate shipping a substantial majority of the present backlog during fiscal year 2018. However, our backlog at any given date is not necessarily indicative of actual sales for any future period.

Sales, Marketing and Support

We market our products internationally primarily through our direct sales force. Our direct sales force sells to end users, OEMs and systems integrators. Once our fiber laser products are designed into an OEMs' system, the OEM's sales force markets its systems, allowing us to take advantage of numerous OEMs' sales forces, each typically having several sales persons in locations other than where our sales offices are located. We have sales offices in the countries in which we have major manufacturing: United States, Germany and Russia.

We also have sales and service offices in the following countries: Brazil, Canada, China, Czech Republic, France, India, Italy, Japan, Mexico, Poland, Singapore, South Korea, Spain, Taiwan, Turkey and the United Kingdom. We have materials processing application centers in the United States, Germany, Russia, China, Italy, Japan and South Korea, which we use to demonstrate our products and develop new applications. Our application centers are fundamental to developing new laser applications for customers and assisting them in integrating lasers into their production processes.

To a lesser extent, we market through agreements with independent sales representatives and distributors. Sales to foreign customers may be priced in non-U.S. currencies and are therefore subject to currency exchange fluctuations.

We maintain a customer support and field service staff in our major markets. We work closely with customers and independent representatives to service equipment and to train customers to use our products. We have expanded our support and field service, particularly in locations where customer concentration or volume requires local service capabilities. We repair products at our facilities or at customer sites.

We typically provide one to three-year parts and service warranties on our lasers and amplifiers. Most of our sales offices provide support to customers in their respective geographic areas. Warranty reserves have generally been sufficient to cover product warranty repair and replacement costs.

Manufacturing

Vertical integration is one of our core business strategies through which we control our proprietary processes and technologies as well as the supply of key components and assemblies. We believe that our vertically integrated business model gives us the following advantages:

- maintaining a technological lead over competitors;
- reducing component and final product costs compared to market prices available to competitors;
- ensuring access to critical components, enabling us to better meet customer demands;
- controlling performance, quality and consistency;
- enabling rapid development and deployment of new products and technologies;
- short lead times for customer deliveries; and
- limiting the spread our trade secrets.

Our vertically integrated manufacturing operations include optical preform making, specialty fiber drawing, semiconductor wafer growth, diode processing and packaging, specialty optical component manufacturing, fiber block and fiber module assembly for different power units, circuit board, software and electronics development and production, crystal growth, cleaning and polishing, machining of metal parts and casings and final assembly of finished product. In addition we make some of the testing, tool manufacturing and automated production systems that we use in our own manufacturing processes. Over the last several years, we added additional production capabilities, including five multi-wafer growth reactors, diode test stations, fiber pre-form and fiber drawing equipment and low, mid and high power laser production and testing, in order to increase our capacity as well as reduce the risks associated with our production process.

We operate our own semiconductor foundry for the production of the multi-mode single-emitter diodes. Diodes are the pumps that are used as the light source in each device we make. We also process, package and extensively test all of our diodes.

Because pump diodes represent a significant component cost of the final laser or amplifier, we have developed internal manufacturing capabilities for diodes. As a result of our high-volume production levels of pump diodes, proprietary processes and use of a small number of chip designs, we have been able to increase yields, lower component costs and assure high quality. We also design, manufacture and optimize many of our own test instruments, diode test racks, robotic and automated assembly tools and machines.

We developed these proprietary components, manufacturing tools, equipment and techniques over many years in an effort to address the major issues that had been inhibiting the development of fiber laser technology and to provide products that differentiate us from our competitors. In addition, we have acquired additional components including volume Bragg gratings. We believe that the proprietary components, manufacturing tools, equipment, techniques and software utilized in all of our product lines provide extensive barriers to potential competitors. Generally, we do not sell our proprietary components to third parties in significant quantities. Using our technology platform, we configure standard products based upon each customer's specifications. Through our vertically integrated manufacturing operations, we believe that we can develop, test and produce new products and configurations with higher performance and reliability and in less time than by working with external vendors. We have developed proprietary testing methodologies that allow us to develop higher power components and products in short periods of time, enable us to introduce products to the market more quickly, capitalize on new opportunities and provide superior service to our customers.

Our in-house manufacturing generally includes those operations and components that are critical to the protection of our intellectual property, the reduction of our costs or the achievement of performance and quality standards. We purchase from vendors common and specialized mechanical, electrical and optical parts and raw materials.

Research and Development

We have extensive research and development experience in laser materials, fiber, optoelectronic and optomechanical components. We have assembled a team of scientists and engineers with specialized experience and extensive knowledge in fiber lasers and amplifiers, materials science, optics, critical components, testing and manufacturing process design, and laser application development.

We focus our research and development efforts on designing and introducing new and improved standard and customized products and complementary products, and the mass production of components for our products. In addition to our cladding-pumped specialty fiber platform, we have core competencies in high power multi-mode and single-mode semiconductor laser diodes, diode packaging, specialty active and passive optical fibers, high-performance optical components, crystal growth and processing, fiber gain blocks and fiber modules, thin film optical coatings, as well as splicing and combining techniques and high-stress test methods. Our research and development efforts are aided by our vertical integration and our proprietary high-stress testing techniques that result in accelerated development cycles. The strategy of developing our proprietary components has allowed us to leverage our optical experience and large volume requirements to lower the cost of our products.

Our research and development efforts are also directed at expanding our product line by increasing power levels, improving beam quality and electrical efficiency, decreasing the size of our products and lowering the cost per watt. We also are engaged in research projects to expand the spectral range of products that we offer, including the development of UV pulsed fiber lasers, ultrafast pulsed fiber lasers, and a mid-IR line of lasers from 2 to 5 microns, with a hybrid fiber and crystal laser design. We are also investing our research and development funds on laser systems, products for medical applications, and telecommunications products and components. Our team of experienced scientists and engineers works closely with many of our customers to develop and introduce custom products and laser processing that address specific applications and performance requirements.

We incurred research and development costs of approximately $100.9 million, $78.6 million and $63.3 million for the years ended December 31, 2017, 2016 and 2015, respectively. We expect to continue our commitment to research and development and to introduce new products, systems and complementary products that would allow us to maintain our competitive position. See Item 7, "Management's Discussion and Analysis of Financial Condition of Results of Operations."

Intellectual Property

We seek to protect our proprietary technology primarily through the U.S. and foreign laws affording protection for trade secrets, and to seek U.S. and foreign patent, copyright and trademark protection of our products and processes where appropriate. Historically, we relied primarily on trade secrets, technical know-how and other unpatented proprietary information relating to our product development and manufacturing activities. We seek to protect our trade secrets and proprietary information, in part, by requiring our employees to enter into agreements providing for the maintenance of confidentiality and the assignment to us of rights to inventions that they make while we employ them. We also enter into non-disclosure agreements with our consultants and suppliers to protect confidential information delivered to them. We believe that

our vertical integration, including our extensive experience in making a wide range of specialty and high power capacity components, as well as our technology platform make it difficult for others to reverse engineer our products.

We have increased our efforts to expand our patent portfolio globally. As of December 31, 2017, we have over 270 patents issued and over 420 pending patent applications worldwide relating principally to optical fiber lasers, amplifiers, bulk optics, semiconductors, laser and telecommunications systems and applications of fiber lasers. With respect to the United States, we were issued 20 patents and we filed 23 applications containing new subject matter in 2017. We own a portfolio of photonics patents in the fields of optical fiber lasers and amplifiers, semiconductor devices, integrated optics, fiber gratings, high-speed systems and optical networking. Intellectual property rights, including those that we own, those that we license and those of others, involve significant risks. See Item 1A, "Risk Factors-Our Inability to Protect Our Intellectual Property and Proprietary Technologies Could Result in the Unauthorized Use of Our Technologies by Third Parties, Hurt Our Competitive Position and Adversely Affect Our Operating Results."

Competition

Our markets are competitive and characterized by rapidly changing technology and continuously evolving customer requirements. We believe that the primary competitive factors in our markets are:

- product performance and reliability;
- quality and service support;
- price and value to the customer;
- ability to manufacture and deliver products on a timely basis;
- ability to achieve qualification for and integration into OEM systems;
- ability to meet customer specifications; and
- ability to respond quickly to market demand and technological developments.

We believe we compete favorably with respect to these criteria. In the materials processing market, the competition is fragmented and includes a large number of competitors. We compete with makers of high power CO_2, YAG and disc lasers, including Coherent, Inc., Fanuc Corporation, Inc. and Trumpf GmbH + Co. KG, makers of mid and low power CO_2, solid-state lasers such as Coherent, Inc., and direct diode lasers such as Laserline GmbH and TeraDiode, Inc., a subsidiary of Panasonic. We also compete with fiber laser makers, including Trumpf GmbH + Co. KG, Coherent Inc., Fanuc Corporation, Furukawa Electric Co., Ltd., Keopsys SA, Raycus Fiber Laser Technologies Co. Ltd., Maxphotonics Co., Ltd, nLight Corporation and Lumentum Holdings Inc. In addition, some customers recently introduced fiber lasers and most competitors are increasing the output powers of their fiber lasers to compete with our products. We believe that we compete favorably with other makers of fiber lasers on price and value to customer, reliability, service and performance.

We also compete in the materials processing, advanced and medical applications markets with end users that produce their own solid-state and gas lasers as well as with manufacturers of non-laser methods and tools, such as traditional non-laser welding and cutting dies in the materials processing market and scalpels in the medical market.

Some of our competitors are larger than we are and have substantially greater financial, managerial and technical resources, more extensive distribution and service networks, greater sales and marketing capacity, and larger installed customer bases than we do.

Employees

As of December 31, 2017, we had approximately 5,030 full-time employees, including 560 in research and development, 3,900 in manufacturing operations, 240 in sales, service and marketing, and 330 in general and administrative functions. Of our total full-time employees at our principal facilities, approximately 1,870 were in the United States, 1,300 were in Germany, 1,570 were in Russia and 190 were in China. We have never experienced a work stoppage, and none of our employees are subject to a collective bargaining agreement. We believe that our current relations with our employees are good. We also have approximately 360 independent contractors worldwide who are principally used in manufacturing operations.

Government Regulation

Regulatory Compliance

The majority of our laser and amplifier products sold in the United States are classified as Class IV Laser Products under the applicable rules and regulations of the Center for Devices and Radiological Health ("CDRH") of the U.S. Food and Drug

Administration ("FDA"). The same classification system is applied in the European markets. Safety rules are formulated with "Deutsche Industrie Norm" (i.e., German Industrial Standards) or International Organization for Standardization ("ISO") standards, which are internationally harmonized.

CDRH regulations generally 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 device, 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 applicable laws and regulations relating to the manufacture of laser devices.

Environmental Regulation

Our operations are subject to various federal, state, local and international laws governing the environment, including those relating to the storage, use, discharge, disposal, product composition and labeling of, human exposure to and hazardous and toxic materials. We believe that our operations are in material compliance with applicable environmental protection laws and regulations. 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.

Availability of Reports

Our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K and any amendments to such reports are available free of charge on our web site at www.ipgphotonics.com as soon as reasonably practicable after such reports are electronically filed with, or furnished to, the Securities and Exchange Commission ("SEC") (www.sec.gov). We will also provide electronic or paper copies of such reports free of charge, upon request made to our Corporate Secretary. The information included on our website is not a part of, nor is it incorporated by reference into, this annual report on Form 10-K.

ITEM 1A. *RISK FACTORS*

The factors described below are the principal risks that could materially adversely affect our operating results and financial condition. Other factors may exist that we do not consider significant based on information that is currently available. In addition, new risks may emerge at any time, and we cannot predict those risks or estimate the extent to which they may affect us.

Downturns in the markets we serve, particularly materials processing, could have a material adverse effect on our sales and profitability.

Our business depends substantially upon capital expenditures by our customers, particularly by manufacturers in the materials processing market, which includes general manufacturing, automotive, aerospace, other transportation, heavy industry, electronics and photovoltaic industries. Approximately 94% of our revenues in 2017 were from customers in the materials processing market. Although applications in this market are broad, sales for these applications are cyclical and have historically experienced sudden and severe downturns and periods of oversupply, resulting in significantly reduced demand for capital equipment, including the products that we manufacture and market. For example, our sales decreased by 25% in the materials processing market in 2009 as a result of the global economic recession. For the foreseeable future, our operations will continue to depend upon capital expenditures by customers in these industries or markets, which, in turn, depend upon the demand for their products or services. Decreased demand for products and services from customers for these applications during an economic downturn may lead to decreased demand for our products, which would reduce our sales and margins. We may not be able to respond by decreasing our expenses quickly enough or sufficiently, due in part, to our fixed overhead structure related to our vertically integrated operations and our commitments to continuing investment in research and development and infrastructure for long term growth.

Uncertainty and adverse changes in the general economic conditions of markets in which we participate negatively affect our business.

Current and future conditions in the economy have an inherent degree of uncertainty. As a result, it is difficult to estimate the level of growth or contraction for the economy as a whole. It is even more difficult to estimate growth or contraction in various parts, sectors and regions of the economy, including the materials processing, telecommunications, advanced and medical markets and applications in which we participate. Because all components of our budgeting and forecasting are dependent upon estimates of growth or contraction in the markets and applications we serve and demand for our products, the

prevailing economic uncertainties render estimates of future income and expenditures very difficult to make. A significant portion of our sales are to customers in China, which accounted for 44%, 36% and 35% in 2017, 2016 and 2015, respectively. A slowing of economic growth or recession, other adverse economic developments or uncertainty in any of our key markets, including in China, would slow our growth rates or may result in a decrease in our sales. Adverse changes have occurred and may occur in the future as a result of declining or flat global or regional economic conditions, fluctuations in currency and commodity prices, wavering confidence, capital expenditure reductions, unemployment, declines in stock markets, contraction of credit availability, declines in real estate values, or other factors affecting economic conditions generally. These changes may negatively affect the sales of our lasers and amplifiers, increase exposure to losses from bad debts, increase the cost and decrease the availability of financing, increase the risk of loss on investments, or increase costs associated with manufacturing and distributing products. An economic downturn could have a material adverse effect on our business, financial condition and results of operations.

The markets for our products are highly competitive and increased competition could increase our costs, reduce our sales or cause us to lose market share.

The industries in which we operate are characterized by significant price and technological competition. Our fiber laser and amplifier products compete with other laser technologies and amplifier products, some offered by well-established companies. Several of these are larger and have substantially greater financial, managerial and technical resources, more extensive distribution and service networks, greater sales and marketing capacity, and larger installed customer bases than we do. Also, we compete with widely used non-laser production methods, such as water-jet cutting and resistance welding. We believe that competition will be particularly intense from makers of CO_2, YAG, disc and direct diode lasers, as these makers of laser solutions may lower prices to maintain or gain current market share and have committed significant research and development resources to pursue opportunities related to these technologies.

In addition, we face competition from a growing number of fiber laser makers, including Coherent Inc., Fanuc Corporation, Keopsys SA, Lumentum Holdings Inc., Maxphotonics Co., Ltd., nLight Corporation, Raycus Fiber Laser Technologies Co. Ltd., Shenzen JPT Opto-Electronics Co., Ltd., The Furukawa Electric Co., Ltd. and Trumpf GmbH + Co. KG. In addition, some customers recently introduced fiber lasers and most competitors are increasing the output powers of their fiber lasers to compete with our products. We may not be able to successfully differentiate our current and proposed products from our competitors' products and current or prospective customers may not consider our products to be superior to competitors' products. To maintain our competitive position, we believe that we will be required to continue a high level of investment in research and development, application development, manufacturing facilities and customer service and support, and to react to market pricing conditions. We may not have sufficient resources to continue to make these investments and we may not be able to make the technological advances or price adjustments necessary to maintain our competitive position. In addition, there are no assurances that our investments in research and development, application development and customer service and support will be successful. We also compete against our OEM customers' internal production of competitive laser and amplifier technologies.

The laser and amplifier industries are experiencing declining average selling prices, which could cause our gross margins to decline and harm our operating results.

Products in the laser and amplifier industries generally, and our products specifically, are experiencing and may in the future continue to experience a significant decline in average selling prices ("ASPs") as a result of new product and technology introductions, increased competition and price pressures from significant customers. If the ASPs of our products decline further and we are unable to increase our unit volumes, introduce new or enhanced products with higher margins or reduce manufacturing costs to offset anticipated decreases in the prices of our existing products, our operating results may be adversely affected. In addition, because of our significant fixed costs, we are limited in our ability to reduce total costs quickly in response to any revenue shortfalls. Because of these factors, we have experienced and we may experience in the future material adverse fluctuations in our operating results on a quarterly or annual basis if the ASPs of our products continue to decline.

Our sales growth depends upon our ability to penetrate new applications and end markets for fiber lasers and increase our market share in existing applications.

Our level of sales will depend on our ability to generate sales of fiber lasers in applications where conventional lasers, such as CO_2 and YAG lasers, have been used or in new and developing markets and applications for lasers where they have not been used previously. To date, a significant portion of our revenue growth has been derived from sales of fiber lasers primarily for applications where CO_2 and YAG lasers historically have been used. We have made significant sales into the cutting, welding and marking and engraving applications, three large applications where other laser technologies are used. As fiber lasers reach higher levels of penetration in core materials processing applications, the development of new applications, end

markets and products outside our core applications becomes more important to our growth. In order to maintain or increase market demand for our fiber laser products, we will need to devote substantial resources to:

- demonstrate the effectiveness of fiber lasers in new applications for materials processing, medical, communications or other applications such as cinema and projection;
- successfully develop new product lines, such as UV, visible and ultrafast fiber lasers, that extend our product line to address different applications than our current products;
- increase our direct and indirect sales efforts;
- effectively service and support our installed product base on a global basis;
- effectively meet growing competition and pricing pressures; and
- continue to reduce our manufacturing costs and enhance our competitive position.

Potential customers may have substantial investments and know-how related to their existing laser and non-laser technologies. They may perceive risks relating to the reliability, quality, usefulness and profitability of integrating of fiber lasers in their systems when compared to other laser or non-laser technologies available in the market or that they manufacture themselves. Despite fiber lasers having better performance and prices compared to other lasers or tools, OEM customers may be reluctant to switch incumbent suppliers or we may miss the design cycles of our customers. Many of our target markets, such as the automotive, machine tool and other manufacturing, communications and medical industries, have historically adopted new technologies slowly. These markets often require long test and qualification periods or lengthy government approval processes before adopting new technologies.

If we are unable to implement our strategy to develop new applications and end markets for our products or develop new products, our revenues, operating results and financial condition could be adversely affected. We cannot assure you that we will be able to successfully implement our business strategy in part or whole. In addition, any newly developed or enhanced products may not achieve market acceptance or may be rendered obsolete or less competitive by the introduction of new products by other companies.

Our vertically integrated business results in high levels of fixed costs and inventory levels that may adversely impact our gross profits and our operating results in the event that demand for our products declines or we maintain excess inventory levels.

We have a high fixed cost base due to our vertically integrated business model, including the fact that approximately 78% of our approximately 5,030 employees as of December 31, 2017 were employed in our manufacturing operations. We may not adjust these fixed costs quickly enough or sufficiently to adapt to rapidly changing market conditions. Our gross profit, in absolute dollars and as a percentage of net sales, is impacted by our sales volume, the corresponding absorption of fixed manufacturing overhead expenses and manufacturing yields. In addition, because we are a vertically integrated manufacturer and design and manufacture our key specialty components, insufficient demand for our products may subject us to the risks of high inventory carrying costs and increased inventory obsolescence. If our capacity and production levels are not properly sized in relation to expected demand, we may need to record write-downs for excess or obsolete inventory. Because we are vertically integrated, the rate at which we turn inventory has historically been low when compared to our cost of sales. We do not expect this to change significantly in the future and believe that we will have to maintain a relatively high level of inventory compared to our cost of sales. As a result, we expect to have a significant amount of working capital invested in inventory. Changes in our level of inventory lead to an increase in cash generated from our operations when inventory is sold or a decrease in cash generated from our operations at times when the amount of inventory increases.

Our manufacturing capacity and operations may not be appropriate for future levels of demand and may adversely affect our gross margins.

We have added and are continuing to add substantial manufacturing capacity at our facilities in the United States, Germany and Russia. A significant portion of our manufacturing facilities and production equipment, such as our semiconductor production and processing equipment, diode packaging equipment and diode burn-in stations, are special-purpose in nature and cannot be adapted easily to make other products. If the demand for fiber lasers or amplifiers does not increase or if our revenue decreases from current levels, we may have significant excess manufacturing capacity and under-absorption of our fixed costs, which could in turn adversely affect our gross margins and profitability.

To maintain our competitive position as the leading developer and manufacturer of fiber lasers and to meet anticipated demand for our products, we invest significantly in the expansion of our manufacturing and operations throughout the world and may do so in the future. We incurred in the past and will incur in the future significant costs associated with the acquisition,

build-out and preparation of our facilities. We had capital expenditures of $126.5 million and $127.0 million in 2017 and 2016, respectively, and we expect to incur approximately $170 million to $190 million in capital expenditures, excluding acquisitions, in 2018. In connection with these projects, we may incur cost overruns, construction delays, labor difficulties or regulatory issues which could cause our capital expenditures to be higher than what we currently anticipate, possibly by a material amount, which would in turn adversely impact our operating results. Moreover, we may experience higher costs due to yield loss, production inefficiencies and equipment problems until any operational issues associated with the opening of new manufacturing facilities are resolved.

A few customers account for a significant portion of our sales, and if we lose any of these customers or they significantly curtail their purchases of our products, our results of operations could be adversely affected.

We rely on a few customers for a significant portion of our sales. In the aggregate, our top five customers accounted for 28%, 22% and 25% of our consolidated net sales in 2017, 2016 and 2015, respectively. Our largest customer is located in China and accounted for 13%, 9% and 13% of sales in 2017, 2016 and 2015, respectively. A few of our larger customers are making fiber lasers or announced plans to develop fiber lasers. We generally do not enter into agreements with our customers obligating them to purchase our fiber lasers or amplifiers. Our business is characterized by short-term purchase orders and shipment schedules. If any of our principal customers discontinues its relationship with us, replaces us as a vendor for certain products or suffers downturns in its business, our business and results of operations could be adversely affected.

Foreign currency risk may negatively affect our net sales, cost of sales and operating margins and could result in exchange losses.

We conduct our business and incur costs in the local currency of most countries in which we operate. In 2017, our net sales outside the United States represented a substantial majority of our total sales. We incur currency transaction risk whenever one of our operating subsidiaries enters into either a purchase or a sales transaction using a different currency from the currency in which it operates or holds assets or liabilities in currencies different than their functional currency. Changes in exchange rates can also affect our results of operations when the value of sales and expenses of foreign subsidiaries are translated to U.S. dollars. We cannot accurately predict the impact of future exchange rate fluctuations on our results of operations. Further, given the volatility of exchange rates, we may not be able to effectively manage our currency risks, and any volatility in currency exchange rates may increase the price of our products in local currency to our foreign customers or increase the manufacturing cost of our products, which may have an adverse effect on our financial condition, cash flows and profitability.

Our inability to manage risks associated with our international customers and operations could adversely affect our business.

We have significant facilities in and our products are sold in numerous countries. Our principal markets include China, the United States, Germany, Turkey, Switzerland, Italy, Japan, Korea and Russia. A substantial majority of our revenues are derived from customers outside the United States. In addition we have substantial tangible assets outside of the United States. We anticipate that foreign sales will continue to account for a significant portion of our revenues in the foreseeable future. Our operations and sales in these markets are subject to risks inherent in international business activities, including:

- fluctuations in the values of foreign currencies;
- longer accounts receivable collection periods and less developed credit assessment and collection procedures;
- changes in a specific country's or region's economic conditions, such as recession;
- compliance with a wide variety of domestic and foreign laws and regulations and unexpected changes in those laws and regulatory requirements, including uncertainties regarding taxes, tariffs, quotas, export controls, export licenses and other trade barriers;
- certification requirements;
- environmental regulations;
- less effective protection of intellectual property rights in some countries;
- potentially adverse tax consequences;
- different capital expenditure and budget cycles for our customers, which affect the timing of their spending;
- political, legal and economic instability, foreign conflicts, labor unrest and the impact of regional and global infectious illnesses in the countries in which we and our customers, suppliers, manufacturers and subcontractors are located;
- preference for locally produced products;

- difficulties and costs of staffing and managing international operations across different geographic areas and cultures;
- seasonal reductions in business activities;
- fluctuations in freight rates and transportation disruptions;
- investment restrictions or requirements;
- repatriation restrictions or requirements;
- export and import restrictions; and
- limitations on the ability of our employees to travel without restriction to certain countries in which we operate.

Political, economic and monetary instability and changes in governmental regulations or policies, including trade tariffs and protectionism, could adversely affect both our ability to effectively operate our foreign sales offices and the ability of our foreign suppliers to supply us with required materials or services. Any interruption or delay in the supply of our required components, products, materials or services, or our inability to obtain these components, materials, products or services from alternate sources at acceptable prices and within a reasonable amount of time, could impair our ability to meet scheduled product deliveries to our customers and could cause customers to cancel orders.

We are subject to risks of doing business in Russia through our subsidiary, NTO IRE-Polus, which provides components and test equipment to us and sells finished fiber devices to customers in Russia and neighboring countries as well as finished lasers to China. Further, approximately 44% of our sales are to customers in China. The results of our operations, business prospects and facilities in these two countries are subject to the economic and political environment in Russia and China. In recent years, both countries have undergone substantial political, economic and social change. As is typical of an emerging economy, neither China nor Russia possesses a well-developed business, financial, legal and regulatory infrastructure that would generally exist in a more mature free market economy. In addition, tax, currency and customs legislation is subject to varying interpretations and changes, which can occur frequently. The future economic direction of these two emerging market countries remains largely dependent upon the effectiveness of economic, financial and monetary measures undertaken by the government, together with tax, legal, regulatory and political developments. Our failure to manage the risks associated with our operations in Russia and China and our other existing and potential future international business operations could have a material adverse effect upon our results of operations.

We are subject to many laws governing our international operations, including those that prohibit improper payments to government officials, including but not limited to the U.S. Foreign Corrupt Practices Act and the anti-corruption laws of the countries in which we operate. Violations of these laws, which are complex and often difficult to interpret and apply, could result in significant criminal penalties or sanctions that could materially adversely affect our business, financial condition, operating results and cash flows.

We must comply with and could be impacted by various export controls and trade and economic sanctions laws and regulations that are fluid and may change due to diplomatic and political considerations outside of our control.

Our business activities are subject to various export controls and trade and economic sanctions laws and regulations, including, without limitation, the U.S. Commerce Department's Export Administration Regulations, the U.S. Treasury Department's Office of Foreign Assets Control's trade and economic sanctions programs, and the U.S. Department of State's Nonproliferation Sanctions, which we collectively refer to as Trade Controls.

We have a large manufacturing facility and research and development operations in Russia which supplies components to our U.S. and German manufacturing facilities and finished lasers to our subsidiary in China. In addition, we supply components from our U.S. and German manufacturing facilities to our Russian facility. Should there be any disruption of our supplies from or to our Russian operations, or should the United States, the European Union or Russia implement new or broad-based Trade Controls, our production and/or deliveries as well as results of operations would be affected. Although we have implemented compliance measures designed to prevent transactions prohibited by the Trade Controls, our failure to successfully comply with applicable Trade Controls may expose us to negative legal and business consequences, including civil or criminal penalties, government investigations, and reputational harm.

In addition, Trade Controls and their implementation are fluid and may change due to diplomatic and political considerations outside of our control. Such changes, including the potential expansion of sanctions and sanctions designations, as well as public statements by government officials, could be significant, require us to take certain actions to be in compliance, adversely affect prevailing market prices of our common stock, have a reputational impact, or otherwise have a material adverse impact on us, our business, and our ability to raise capital.

We have experienced, and expect to experience in the future, fluctuations in our quarterly operating results. These fluctuations may increase the volatility of our stock price and may be difficult to predict.

We have experienced, and expect to continue to experience, fluctuations in our quarterly operating results. We believe that fluctuations in quarterly results may cause the market price of our common stock to fluctuate, perhaps substantially. Factors which may have an influence on our operating results in a particular quarter include:

- the increase, decrease, cancellation or rescheduling of significant customer orders;
- the timing of revenue recognition based on the installation or acceptance of certain products shipped to our customers;
- seasonality attributable to different purchasing patterns and levels of activity throughout the year in the areas where we operate;
- the timing of customer qualification of our products and commencement of volume sales of systems that include our products;
- our ability to obtain export licenses for our products on a timely basis or at all;
- the rate at which our present and future customers and end users adopt our technologies;
- the gain or loss of a key customer;
- product or customer mix;
- competitive pricing pressures and new market entrants;
- our ability to design, manufacture and introduce new products on a cost-effective and timely basis;
- our ability to manage our inventory levels and any provisions for excess or obsolete inventory;
- our ability to collect outstanding accounts receivable balances;
- the incurrence of expenses to develop and improve application and support capabilities, the benefits of which may not be realized until future periods, if at all;
- the incurrence of expenses related to impairment of values for goodwill, intangibles and other long-lived assets;
- different capital expenditure and budget cycles for our customers, which affect the timing of their spending;
- foreign currency fluctuations;
- economic and market conditions in a particular geography or country; and
- our ability to control expenses.

These factors make it difficult for us to accurately predict our operating results. In addition, our ability to accurately predict our operating results is complicated by the fact that many of our products have long sales cycles, some lasting as long as twelve months or more. Once a sale is made, our delivery schedule typically ranges from four weeks to four months, and therefore our sales will often reflect orders shipped in the same quarter that they are received and will not enhance our ability to predict our results for future quarters. In addition, long sales cycles may cause us to incur significant expenses without offsetting revenues since customers typically expend significant effort in evaluating, testing and qualifying our products before making a decision to purchase them. Moreover, customers may cancel or reschedule shipments, and production difficulties could delay shipments. Accordingly, our results of operations are subject to significant fluctuations from quarter to quarter, and we may not be able to accurately predict when these fluctuations will occur.

Because we lack long-term purchase commitments from our customers, our sales can be difficult to predict, which could lead to excess or obsolete inventory and adversely affect our operating results.

We generally do not enter into long-term agreements with our customers obligating them to purchase our fiber lasers or amplifiers. Our business is characterized by short-term purchase orders and shipment schedules and, in some cases, orders may be canceled or delayed without significant penalty. As a result, it is difficult to forecast our revenues and to determine the appropriate levels of inventory required to meet future demand. In addition, due to the absence of long-term volume purchase agreements, we forecast our revenues and plan our production and inventory levels based upon the demand forecasts of our OEM customers, end users and distributors, which are highly unpredictable and can fluctuate substantially. This could lead to increased inventory levels and increased carrying costs and risk of excess or obsolete inventory due to unanticipated reductions in purchases by our customers. In addition, provisions have been recorded as a result of changes in market prices of certain components, the value of those inventories that was realizable through finished product sales due to declines in certain end market demand and uncertainties related to the recoverability of the value of inventories due to technological and product changes, and excess quantities. In this regard, we recorded provisions for slow-moving, obsolete or excess inventory totaling $16.9 million, $22.8 million and $15.4 million in 2017, 2016 and 2015, respectively. If our OEM customers, end users or distributors fail to accurately forecast the demand for our products, fail to accurately forecast the timing of such demand, or are unable to consistently negotiate acceptable purchase order terms with customers, our results of operations may be adversely affected.

We pursue acquisitions and investments in new businesses, products, patents or technologies. These involve risks which could disrupt our business and may harm our financial results and condition.

We make acquisitions of and investments in new businesses, products, patents and technologies and expand into new geographic areas, or we may acquire operations, products or technologies that expand our current capabilities. Although we have pursued acquisitions small in size in the past, we may pursue larger transactions in the future. Acquisitions present a number of potential risks and challenges that could, if not met, disrupt our business operations, increase our operating costs and reduce the value of the acquired company, asset or technology to us. For example, if we identify an acquisition candidate, we may not be able to successfully negotiate or finance the acquisition on favorable terms. Even if we are successful, we may not be able to integrate the acquired businesses, products, patents or technologies into our existing business and products, or retain key employees. As a result of the rapid pace of technological change in our industry, we may misjudge the long-term potential of an acquired business, product, patent or technology, or the acquisition may not be complementary to our existing business. Furthermore, potential acquisitions and investments, whether or not consummated, may divert our management's attention and require considerable cash outlays at the expense of our existing operations. In addition, to complete future acquisitions, we may issue equity securities, incur debt, assume contingent liabilities or have amortization expenses and write-downs of acquired assets, which could adversely affect our profitability and result in dilution to our existing and future stockholders.

We rely on the significant experience and specialized expertise of our senior management and scientific staff and if we are unable to retain these key employees and attract other highly skilled personnel necessary to grow our business successfully, our business and results of operations could suffer.

Our future success is substantially dependent on the continued service of our executive officers, particularly our founder and chief executive officer, Dr. Valentin P. Gapontsev, age 79, and the chief operating officer, Dr. Eugene Scherbakov, age 70, our highly trained team of scientists, many of whom have numerous years of experience and specialized expertise in optical fibers, semiconductors and optical component technology, and other key engineering, sales, marketing, manufacturing and support personnel, any of whom may leave, which could harm our business. The members of our scientific staff who are expected to make significant individual contributions to our business are also members of our executive management team as disclosed under Item 10, "Directors, Executive Officers and Corporate Governance" below. Furthermore, our business requires scientists and engineers with experience in several disciplines, including physics, optics, materials sciences, chemistry and electronics. We will need to continue to recruit and retain highly skilled scientists and engineers for certain functions. Our future success also depends on our ability to identify, attract, hire, train, retain and motivate highly skilled research and development, managerial, operations, sales, marketing and customer service personnel. If we fail to attract, integrate and retain the necessary personnel, our ability to extend and maintain our scientific expertise and grow our business could suffer significantly.

We are subject to litigation alleging that we are infringing third-party intellectual property rights. Intellectual property claims could result in costly litigation and harm our business.

In recent years, there has been significant litigation involving intellectual property rights in many technology-based industries, including our own. We face risks and uncertainties in connection with such litigation, including the risk that patents issued to others may harm our ability to do business; that there could be existing patents of which we are unaware that could be

pertinent to our business; and that it is not possible for us to know whether there are patent applications pending that our products might infringe upon, since patent applications often are not disclosed until a patent is issued or published. Moreover, the frequency with which new patents are granted and the diversity of jurisdictions in which they are granted make it impractical and expensive for us to monitor all patents that may be relevant to our business.

From time to time, we have been notified of allegations and claims that we may be infringing patents or intellectual property rights owned by third parties. We were named a defendant in an action filed November 2015 in the United States District Court for the Eastern District of Texas for patent infringement relating to an apparatus for coupling radiation beams into optical waveguides. The complaint seeks unspecified damages, injunctive relief and attorneys' fees. Following a federal jury trial in 2011, we won a patent infringement lawsuit asserted by IMRA America, Inc. in 2006 alleging that certain products we produce infringe one U.S. patent allegedly owned by IMRA America. IMRA America has also informed us that it has patents and applications in the United States and in foreign jurisdictions directed to fiber lasers and fiber amplifiers, but has not asserted them against us. We are engaged in opposition proceedings in Japan and Germany with respect to several patents allegedly owned by IMRA America which are part of the same patent family for which IMRA America asserted one patent against us in the United States.

There can be no assurance that we will be able to dispose without a material effect any claims or other allegations made or asserted in the future. The outcome of any litigation is uncertain. Even if we ultimately are successful on the merits of any such litigation or re-examination, legal and administrative proceedings related to intellectual property are typically expensive and time-consuming, generate negative publicity and divert financial and managerial resources. Some litigants may have greater financial resources than we have and may be able to sustain the costs of complex intellectual property litigation more easily than we can.

If we do not prevail in any intellectual property litigation brought against us, it could affect our ability to sell our products and materially harm our business, financial condition and results of operations. These developments could adversely affect our ability to compete for customers and increase our revenues. Plaintiffs in intellectual property cases often seek, and sometimes obtain, injunctive relief. Intellectual property litigation commenced against us could force us to take actions that could be harmful to our business, competitive position, results of operations and financial condition, including the following:

- stop selling our products or using the technology that contains the allegedly infringing intellectual property;
- pay actual monetary damages, royalties, lost profits or increased damages and the plaintiff's attorneys' fees, which individually or in the aggregate may be substantial; and
- attempt to obtain a license to use the relevant intellectual property, which may not be available on reasonable terms or at all.

In addition, intellectual property lawsuits can be brought by third parties against OEMs and end users that incorporate our products into their systems or processes. In some cases, we indemnify OEMs against third-party infringement claims relating to our products and we often make representations affirming, among other things, that our products do not infringe the intellectual property rights of others. As a result, we may incur liabilities in connection with lawsuits against our customers. Any such lawsuits, whether or not they have merit, could be time-consuming to defend, damage our reputation or result in substantial and unanticipated costs.

Our inability to protect our intellectual property and proprietary technologies could result in the unauthorized use of our technologies by third parties, hurt our competitive position and adversely affect our operating results.

We rely on patents, trade secret laws, contractual agreements, technical know-how and other unpatented proprietary information to protect our products, product development and manufacturing activities from unauthorized copying by third parties. Our patents do not cover all of our technologies, systems, products and product components and may not prevent third parties from unauthorized copying of our technologies, products and product components. We seek to protect our proprietary technology under laws affording protection for trade secrets. We also seek to protect our trade secrets and proprietary information, in part, by requiring employees to enter into agreements providing for the maintenance of confidentiality and the assignment of rights to inventions made by them while employed by us. We have significant international operations and we are subject to foreign laws which differ in many respects from U.S. laws. Policing unauthorized use of our trade secret technologies throughout the world and proving misappropriation of our technologies are particularly difficult, especially due to the number of our employees and operations in numerous foreign countries. The steps that we take to acquire ownership of our employees' inventions and trade secrets in foreign countries may not have been effective under all such local laws, which could expose us to potential claims or the inability to protect intellectual property developed by our employees. Furthermore, any changes in, or unexpected interpretations of, the trade secret and other intellectual property laws in any country in which we operate may adversely affect our ability to enforce our trade secret and intellectual property positions. Costly and time-

consuming litigation could be necessary to determine the scope of our confidential information and trade secret protection. We also enter into confidentiality agreements with our consultants and other suppliers to protect our confidential information that we deliver to them. However, there can be no assurance that our confidentiality agreements will not be breached, that we will be able to effectively enforce them or that we will have adequate remedies for any breach.

Given our reliance on trade secret laws, others may independently develop similar or alternative technologies or duplicate our technologies and commercialize discoveries that we have made. Therefore, our intellectual property efforts may be insufficient to maintain our competitive advantage or to stop other parties from commercializing similar products or technologies. Many countries outside of the United States afford little or no protection to trade secrets and other intellectual property rights. Intellectual property litigation can be time-consuming and expensive, and there is no guarantee that we will have the resources to fully enforce our rights. If we are unable to prevent misappropriation or infringement of our intellectual property rights, or the independent development or design of similar technologies, our competitive position and operating results could suffer.

We depend upon internal production and on outside single or limited-source suppliers for many of our key components and raw materials, including cutting-edge optics and materials. Any interruption in the supply of these key components and raw materials could adversely affect our results of operations.

We rely exclusively on our own production capabilities to manufacture certain of our key components, such as semiconductor diodes, specialty optical fibers and optical components. We do not have redundant production lines for some of our components, such as our diodes, specialty optical fibers and some other components, which are made at a single manufacturing facility. These are not readily available from other sources at our current costs. If our manufacturing activities were obstructed or hampered significantly, it could take a considerable length of time, or it could increase our costs, for us to resume manufacturing or find alternative sources of supply. Many of the tools and equipment we use are custom-designed, and it could take a significant period of time to repair or replace them. Our three major manufacturing facilities are located in Oxford, Massachusetts; Burbach, Germany; and Fryazino, Russia. Despite our efforts to mitigate the impact of any flood, fire, natural disaster, political unrest, act of terrorism, war, outbreak of disease or other similar event, our business could be adversely affected to the extent that we do not have redundant production capabilities if any of our three major manufacturing facilities or equipment should become inoperable, inaccessible, damaged or destroyed.

Also, we purchase certain raw materials used to manufacture our products and other components, such as semiconductor wafer substrates, diode packages, modulators, micro-optics, bulk optics and high power beam delivery products, from single or limited-source suppliers. We typically purchase our components and materials through purchase orders or agreed-upon terms and conditions and we do not have guaranteed supply arrangements with many of these suppliers. These suppliers are relatively small private companies that may discontinue their operations at any time and may be particularly susceptible to prevailing economic conditions. Some of our suppliers are also our competitors. Some of our suppliers may not be able to meet demand from our growing business or because of global demand for their components. As a result, we experienced and may in the future experience longer lead times or delays in fulfillment of our orders. Furthermore, other than our current suppliers, there are a limited number of entities from whom we could obtain these supplies. We do not anticipate that we would be able to purchase these components or raw materials that we require in a short period of time or at the same cost from other sources in commercial quantities or that have our required performance specifications. Any interruption or delay in the supply of any of these components or materials, or the inability to obtain these components and materials from alternate sources at acceptable prices and within a reasonable amount of time, could adversely affect our business. If our suppliers face financial or other difficulties, if our suppliers do not maintain sufficient inventory on hand or if there are significant changes in demand for the components and materials we obtain from them, they could limit the availability of these components and materials to us, which in turn could adversely affect our business.

We depend on our OEM customers and system integrators to incorporate our products into their systems.

Our sales depend in part on our ability to maintain existing and secure new OEM customers. Our revenues also depend in part upon the ability of our current and potential OEM customers and system integrators to incorporate our laser and amplifier products. The commercial success of these systems depends to a substantial degree on the efforts of these OEM customers and system integrators to develop and market products that incorporate our technologies. Relationships and experience with traditional laser makers, limited marketing resources, reluctance to invest in research and development and other factors affecting these OEM customers and third-party system integrators could have a substantial impact upon our financial results. If OEM customers or integrators are not able to adapt existing tools or develop new systems to take advantage of the features and benefits of fiber lasers or if they perceive us to be an actual or potential competitor, then the opportunities to increase our revenues and profitability may be severely limited or delayed. In addition, some of our OEM customers are developing their own fiber laser sources. If they are successful, this may reduce our sales to these customers. Furthermore, if our OEM

customers or third-party system integrators experience financial or other difficulties that adversely affect their operations, our financial condition or results of operations may also be adversely affected.

Changes in tax rates, tax liabilities or tax accounting rules could affect future results.

As a global company, we are subject to taxation in the United States and various other countries and jurisdictions. Significant judgment is required to determine worldwide tax liabilities. Our future tax rates could be affected by changes in the composition of earnings in countries or states with differing tax rates, transfer pricing rules, changes in the valuation of our deferred tax assets and liabilities, or changes in the tax laws. In addition, we are subject to regular examination of our income tax returns by the Internal Revenue Service ("IRS") and other tax authorities. From time to time the United States, foreign and state governments make substantive changes to tax rules and the application of rules to companies, including various announcements from the United States government potentially impacting our ability to defer taxes on international earnings. We regularly assess the likelihood of favorable or unfavorable outcomes resulting from these examinations to determine the adequacy of our provision for income taxes. Although we believe our tax estimates are reasonable, there can be no assurance that any final determination will not be materially different than the treatment reflected in our historical income tax provisions and accruals, which could materially and adversely affect our operating results and financial condition.

Failure to effectively maintain and expand our direct field service and support organization could have an adverse effect on our business.

It is important for us to provide rapid, responsive service directly to our customers throughout the world and to maintain and expand our own personnel resources to provide these services. Any actual or perceived lack of direct field service in the locations where we sell or try to sell our products may negatively impact our sales efforts and, consequently, our revenues. This requires us to recruit and train additional qualified field service and support personnel as well as maintain effective and highly trained organizations that can provide service to our customers in various countries. We may not be able to attract and train additional qualified personnel to expand our direct support operations successfully. We may not be able to find and engage additional qualified third-party resources to supplement and enhance our direct support operations. Further, we may incur significant costs in providing these direct field and support services. Failure to implement and manage our direct support operation effectively could adversely affect our relationships with our customers, and our operating results may suffer.

Our products could contain defects, which may reduce sales of those products, harm market acceptance of our fiber laser products or result in claims against us.

The manufacture of our fiber lasers and amplifiers involves highly complex and precise processes. Despite testing by us and our customers, errors have been found, and may be found in the future, in our products. These defects may cause us to incur significant warranty, support and repair costs, incur additional costs related to a recall, divert the attention of our engineering personnel from our product development efforts and harm our relationships with our customers. These problems could result in, among other things, loss of revenues or a delay in revenue recognition, loss of market share, harm to our reputation or a delay or loss of market acceptance of our fiber laser products. Defects, integration issues or other performance problems in our fiber laser and amplifier products could also result in personal injury or financial or other damages to our customers, which in turn could damage market acceptance of our products. Our customers could also seek damages from us for their losses. A product liability claim brought against us, even if unsuccessful, could be time-consuming and costly to defend.

We may experience lower than expected manufacturing yields, which would adversely affect our gross margins.

The manufacture of semiconductor diodes and the packaging of them is a highly complex process. Manufacturers often encounter difficulties in achieving acceptable product yields from diode and packaging operations. We have from time to time experienced lower than anticipated manufacturing yields for our diodes and packaged diodes. This occurs during the production of new designs and the installation and start-up of new process technologies and new equipment. If we do not achieve planned yields, our product costs could increase resulting in lower gross margins, and key component availability would decrease.

Failure to maintain effective internal controls may cause a loss of investor confidence in the reliability of our financial statements or to cause us to delay filing our periodic reports with the SEC and adversely affect our stock price.

The SEC, as directed by Section 404 of the Sarbanes-Oxley Act of 2002, adopted rules requiring public companies to include a report of management on internal control over financial reporting in their annual reports on Form 10-K that contain an assessment by management of the effectiveness of our internal control over financial reporting. In addition, our independent registered public accounting firm must attest to and report on the effectiveness of our internal control over financial reporting. We have experienced rapid growth and have extensive and complex international manufacturing and sales and service locations which may make us more vulnerable to weaknesses in our internal controls. Although we test our internal control over financial reporting in order to ensure compliance with the Section 404 requirements, our failure to maintain adequate internal controls

over financial reporting could result in an adverse reaction in the financial marketplace due to a loss of investor confidence in the reliability of our financial statements or a delay in our ability to timely file our periodic reports with the SEC, which ultimately could negatively impact our stock price.

Our information systems are subject to attacks, interruptions and failures. If unauthorized access is obtained to our information systems, we may incur significant legal and financial exposure and liabilities.

Like many multinational corporations, we maintain several information technology systems, including software products licensed from third parties. These systems vary from country to country. Any system, network or internet failures, misuse by system users, the hacking into or disruption caused by the unauthorized access by third parties or loss of license rights could disrupt our ability to timely and accurately manufacture and ship products or to report our financial information in compliance with the timelines mandated by the SEC. Any such failure, misuse, hacking, disruptions or loss would likely cause a diversion of management's attention from the underlying business and could harm our operations. In addition, a significant failure of our various information technology systems could adversely affect our ability to complete an evaluation of our internal controls and attestation activities pursuant to Section 404 of the Sarbanes-Oxley Act of 2002 under the updated framework issued in 2013.

As part of our day-to-day business, we store our data and certain data about our customers, employees and service providers in our information technology system. While our system is designed with access security, if a third party gains unauthorized access to our data or technology, including information regarding our customers, employees and service providers, such security breach could expose us to a risk of loss of this information, loss of business, litigation and possible liability. Our security measures may be breached as a result of third-party action, including intentional misconduct by computer hackers, employee error, malfeasance or otherwise. Additionally, third parties may attempt to fraudulently induce employees or customers into disclosing sensitive information such as user names, passwords or other information in order to gain access to our customers' data or our data, including our intellectual property and other confidential business information, employee information or our information technology systems. Because the techniques used to obtain unauthorized access, or to sabotage systems, change frequently and generally are not recognized until launched against a target, we may be unable to anticipate or detect these techniques or to implement adequate preventative measures. Any unauthorized access could result in a loss of confidence by our customers, damage our reputation, disrupt our business, result in a misappropriation of our assets (including cash), lead to legal liability and negatively impact our future sales. Additionally, such actions could result in significant costs associated with loss of our intellectual property, impairment of our ability to conduct our operations, rebuilding our network and systems, prosecuting and defending litigation, responding to regulatory inquiries or actions, paying damages or taking other remedial steps.

We may face particular privacy, data security and data protection risks due to the new European General Data Protection Regulation

We may face particular privacy, data security and data protection risks in Europe due to the new European General Data Protection Regulation ("GDPR"). Effective May 25, 2018, the GDPR imposes additional obligations and risk upon our business and increases substantially the penalties to which we could be subject in the event of any non-compliance. The GDPR requires companies to satisfy new requirements regarding the handling of personal data, including its use, protection and the rights of affected persons regarding their data. Failure to comply with GDPR requirements could result in penalties of up to 4% of worldwide revenue. The GDPR and other similar laws and regulations, as well as any associated inquiries or investigations or any other government actions, may be costly to comply with, result in negative publicity, increase our operating costs, require significant management time and attention, and subject us to remedies that may harm our business. The company is evaluating its processes and taking measures to ensure compliance with the GDPR. Due to the lack of experience with the interpretation of this new regulation and its enforcement, some measures initially might not satisfy the best practices that will be established in the coming years.

We are subject to export control regulations that could restrict our ability to increase our international sales and may adversely affect our business.

A significant part of our business involves the export of our products to other countries. The U.S. government has in place a number of laws and regulations that control the export, re-export or transfer of U.S.-origin products, software and technology. The governments of other countries in which we do business have similar regulations regarding products, software and technology originating in those countries. These laws and regulations may require that we obtain a license before we can export, re-export or transfer certain products, software or technology. The requirement to obtain a license could put us at a competitive disadvantage by restricting our ability to sell products to customers in certain countries or by giving rise to delays or expenses related to obtaining a license. In applying for a license and responding to questions from licensing authorities, we have experienced and, in the future, may experience delays in obtaining export licenses based on issues solely within the

control of the applicable government agency. Under the discretion of the issuing government agency, an export license may permit the export of one unit to a single customer or multiple units to one or more customers. Licenses may also include conditions that limit the use, resale, transfer, re-export, modification, disassembly, or transfer of a product, software or technology after it is exported without first obtaining permission from the relevant government agency. Failure to comply with these laws and regulations could result in government sanctions, including substantial monetary penalties, denial of export privileges, debarment from government contracts and a loss of revenues. Delays in obtaining or failure to obtain required export licenses may require us to defer shipments for substantial periods or cancel orders. Any of these circumstances could adversely affect our operations and, as a result, our financial results could suffer.

We are subject to various environmental laws and regulations that could impose substantial costs upon us and may adversely affect our business, operating results and financial condition.

Some of our operations use substances regulated under various federal, state, local and international laws governing the environment, including those relating to the storage, use, discharge, disposal, product composition and labeling of, and human exposure to, hazardous and toxic materials. We could incur costs, fines and civil or criminal sanctions, third-party property damage or personal injury claims, or could be required to incur substantial investigation or remediation costs, if we were to violate or become liable under environmental laws. Liability under environmental laws can be joint and several and without regard to comparative fault. Compliance with current or future environmental laws and regulations could restrict our ability to expand our facilities or require us to acquire additional expensive equipment, modify our manufacturing processes, or incur other significant expenses in order to remain in compliance with such laws and regulations. At this time, we do not believe the costs to maintain compliance with current environmental laws to be material. Although we do not currently anticipate that such costs will become material, if such costs were to become material in the future, whether due to unanticipated changes in environmental laws, unanticipated changes in our operations or other unanticipated changes, we may be required to dedicate additional staff or financial resources in order to maintain compliance. There can be no assurance that violations of environmental laws or regulations will not occur in the future as a result of the lack of, or failure to obtain, permits, human error, accident, equipment failure or other causes.

We are exposed to credit risk and fluctuations in the market values of our cash, cash equivalents and marketable securities.

Given the global nature of our business, we have both domestic and international investments. At December 31, 2017, 36% of our cash, cash equivalents and marketable securities were in the United States and 64% were outside the United States. Credit ratings and pricing of our investments can be negatively affected by liquidity, credit deterioration, prevailing interest rates, financial results, economic risk, political risk, sovereign risk or other factors. Also, our investments may be negatively affected by events that impact the banks or depositories that hold our investments. As a result, the value and liquidity of our cash, cash equivalents and marketable securities may fluctuate substantially. Therefore, although we have not realized any significant losses on our cash, cash equivalents and marketable securities, future fluctuations in their value could result in a significant realized loss.

Our ability to access financial markets to raise capital or finance a portion of our working capital requirements and support our liquidity needs may be adversely affected by factors beyond our control and could negatively impact our ability to finance our operations, meet certain obligations, implement our operating strategy or complete acquisitions.

We occasionally borrow under our existing credit facilities to fund operations, including working capital investments. Our major credit lines in the United States and Germany expire in April 2020 and July 2020, respectively. In the past, market disruptions experienced in the United States and abroad have materially impacted liquidity in the credit and debt markets, making financing terms for borrowers less attractive, and, in certain cases, have resulted in the unavailability of certain types of financing. Uncertainty in the financial markets may negatively impact our ability to access additional financing or to refinance our existing credit facilities or existing debt arrangements on favorable terms or at all, which could negatively affect our ability to fund current and future expansion as well as future acquisitions and development. These disruptions may include turmoil in the financial services industry, unprecedented volatility in the markets where our outstanding securities trade, and general economic downturns in the areas where we do business. If we are unable to access funds at competitive rates, or if our short-term or long-term borrowing costs increase, our ability to finance our operations, meet our short-term obligations and implement our operating strategy could be adversely affected.

We also may in the future be required to raise capital through public or private financing or other arrangements. Such financing may not be available on acceptable terms, or at all, and our failure to raise capital when needed could harm our business. Additional equity financing may be dilutive to the holders of our common stock, and debt financing, if available, may involve restrictive covenants and could reduce our profitability. If we cannot raise funds on acceptable terms, we may not be able to grow our business or respond to competitive pressures.

Substantial sales of our common stock, including shares issued upon the exercise of currently outstanding options, restricted stock units and performance stock units could cause our stock price to decline.

Sales of a substantial number of shares of common stock, or the perception that sales could occur, could adversely affect the market price of our common stock. As of December 31, 2017, we had 53,629,439 shares of common stock outstanding and 2,251,703 shares subject to outstanding options, restricted stock units and performance stock units. We have registered all shares of common stock that we may issue under our stock option plans and our employee stock ownership plan. In addition, all of the unregistered shares of our common stock are now eligible for sale under Rule 144 or Rule 701 under the Securities Act. As these shares are issued, they may be freely sold in the public market subject, in the case of any awards under our stock-based compensation plans, to applicable vesting requirements.

We currently have the ability to file a registration statement and immediately offer and sell common stock, preferred stock, warrants, debt and convertible securities because of our current status a well-known seasoned issuer. In the future, we may issue additional options, warrants or other securities convertible into our common stock. Sales of substantial amounts of shares of our common stock or other securities under any future registration statement that we may file covering newly issued shares or shares held by affiliates or others could lower the market price of our common stock and impair our ability to raise capital through the sale of equity securities.

Dr. Valentin P. Gapontsev, our Chairman and Chief Executive Officer, and three trusts he created collectively control approximately 31% of our voting power and have a significant influence on the outcome of director elections and other matters requiring stockholder approval, including a change in corporate control.

Dr. Valentin P. Gapontsev, our Chairman and Chief Executive Officer, and IP Fibre Devices (UK) Ltd., of which Dr. Gapontsev is the managing director, together with three trusts he created beneficially own approximately 31% of our common stock. Trustees of the trusts are officers or employees of the Company.

Dr. Gapontsev and the trusts have a significant influence on the outcome of matters requiring stockholder approval, including:

- election of our directors;
- amendment of our certificate of incorporation or by-laws; and
- approval of mergers, consolidations or the sale of all or substantially all of our assets.

Dr. Gapontsev and the trusts may vote their shares of our common stock in ways that are adverse to the interests of other holders of our common stock. These significant ownership interests could delay, prevent or cause a change in control of the Company, any of which could adversely affect the market price of our common stock.

Anti-takeover provisions in our charter documents and Delaware law could prevent or delay a change in control of our company, even if a change in control would be beneficial to our stockholders.

Provisions of our certificate of incorporation and by-laws, including certain provisions that will take effect when Dr. Valentin P. Gapontsev (together with his affiliates and associates) ceases to beneficially own an aggregate of 25% or more of our outstanding voting securities, may discourage, delay or prevent a merger, acquisition or change of control, even if it would be beneficial to our stockholders. The existence of these provisions could also limit the price that investors might be willing to pay in the future for shares of our common stock. These provisions include:

- authorizing the issuance of "blank check" preferred stock;
- establishing a classified board;
- providing that directors may only be removed for cause;
- prohibiting stockholder action by written consent;
- limiting the persons who may call a special meeting of stockholders;
- establishing advance notice requirements for nominations for election to the board of directors and for proposing matters to be submitted to a stockholder vote; and
- supermajority stockholder approval to change these provisions.

Provisions of Delaware law may also discourage, delay or prevent someone from acquiring or merging with the Company or obtaining control of our company. Specifically, Section 203 of the Delaware General Corporation Law, which will apply to the Company following such time as Dr. Gapontsev (together with his affiliates and associates) ceases to beneficially

own 25% or more of the total voting power of our outstanding shares, may prohibit business combinations with stockholders owning 15% or more of our outstanding voting stock.

If securities analysts stop publishing research or reports about our business, or if they downgrade our stock, the price of our stock could decline.

The trading market for our common stock relies in part on the research and reports that industry or financial analysts publish about us. If one or more of these analysts who cover us downgrade our stock, our stock price would likely decline. Further, if one or more of these analysts cease coverage of the Company, we could lose visibility in the market, which in turn could cause our stock price to decline.

ITEM 1B. *UNRESOLVED STAFF COMMENTS*

None.

ITEM 2. *PROPERTIES*

Our facilities consisting of 20,000 or more square feet at December 31, 2017 include the following:

Location	Owned or Leased	Lease Expiration	Approximate Size (sq. ft.)	Primary Activity
Fryazino, Russia	Owned	—	509,500	Manufacturing, administration
	Leased	September 2019	73,500	Components, complete device manufacturing
Oxford, Massachusetts	Owned	—	427,300	Diodes, components, complete device manufacturing, administration
Burbach, Germany	Owned	—	415,500	Optical fiber, components, final assembly, complete device manufacturing, administration
Malborough, Massachusetts	Owned	—	115,000	Components, administration
	Owned	—	112,000	Manufacturing, administration
Moscow Russia	Owned	—	51,500	Components, complete device manufacturing
Beijing, China	Owned	—	34,500	Administration, service
	Leased	April 2019	20,100	Service
Birmingham, Alabama	Owned	—	39,000	Administration, service
Cerro Maggiore, Italy	Owned	—	33,000	Complete device manufacturing, administration
Daejeon, South Korea	Owned	—	24,000	Administration, service
Shanghai, China	Leased	April 2019	20,000	Administration, service
Mountain View, California	Leased	—	30,000	Components, administration
Total sq.ft. occupied:			1,904,900	

We maintain our corporate headquarters in Oxford, Massachusetts, and we operate four principal manufacturing facilities for lasers, laser systems, amplifiers and components, which are located in the United States, Germany, Russia and Italy. We are committed to meeting internationally recognized manufacturing standards. Our facilities in the United States and Germany are ISO 9001 certified, and we have ISO certification in Russia for specific products. We conduct our major research and development activities in Oxford and Marlborough, Massachusetts; Burbach, Germany; and Fryazino, Russia, and at several other facilities in the United States. We have sales personnel at each of our manufacturing facilities, and at the countries in which we operate.

We plan to continue our expansion of our operations in Russia, Germany and the United States, and to build manufacturing in Belarus to meet the demand for our products and our sales and support needs. The additional expansion for the United States, Russia, Germany, and Belarus will provide an approximately additional 120,200 square feet, 15,600 square feet, 270,900 square feet, and 136,100 square feet, respectively once these additions are completed and occupied in 2018. With the amount occupied as of December 31, 2017, once all expansions are completed in 2018, we will have over approximately 2.4 million square feet of occupied space to continue to execute on our planned strategies.

ITEM 3. *LEGAL PROCEEDINGS*

From time to time, we are party to various legal claims and legal proceedings and other disputes incidental to our business, such as employment, intellectual property or product issues. For a discussion of the risks associated with intellectual property legal proceedings and other disputes, see Item 1A. "Risk Factors — We are subject to litigation alleging that we are infringing third-party intellectual property rights. Intellectual property claims could result in costly litigation and harm our business."

ITEM 4. *MINE SAFETY DISCLOSURES*

Not applicable.

PART II

ITEM 5. *MARKET FOR THE REGISTRANT'S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES*

Price Range of Common Stock

Our common stock is quoted on the Nasdaq Global Market under the symbol "IPGP". The following table sets forth the quarterly high and low sale prices of our common stock as reported on the Nasdaq Global Market.

	Common Stock Price Range	
	High	Low
First Quarter ended March 31, 2016	$ 98.26	$ 73.55
Second Quarter ended June 30, 2016	$ 102.90	$ 76.22
Third Quarter ended September 30, 2016	$ 88.76	$ 76.64
Fourth Quarter ended December 31, 2016	$ 102.46	$ 81.00
First Quarter ended March 31, 2017	$ 124.27	$ 95.04
Second Quarter ended June 30, 2017	$ 149.29	$ 116.82
Third Quarter ended September 30, 2017	$ 187.98	$ 144.71
Fourth Quarter ended December 31, 2017	$ 248.23	$ 185.00

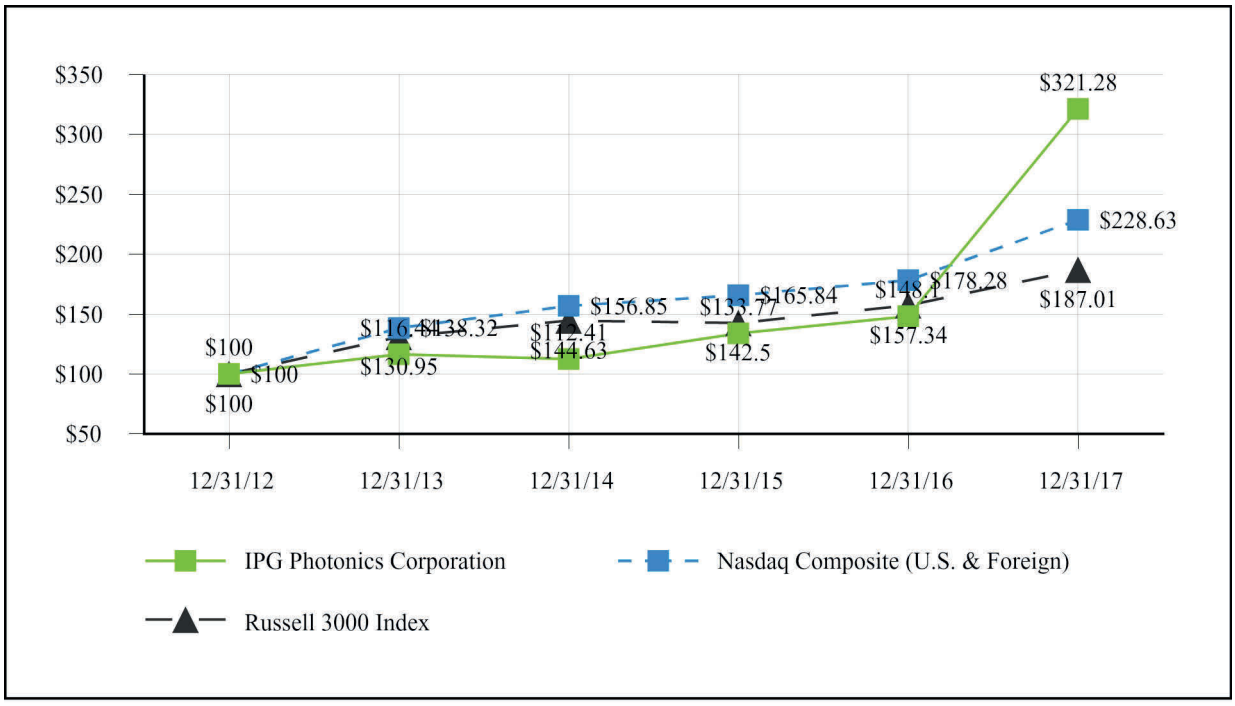
As of February 22, 2018, there were 54,056,120 shares of our common stock outstanding held by approximately 36 holders of record, which does not include beneficial owners of common stock whose shares are held in the names of various securities brokers, dealers and registered clearing agencies.

Stock Price Performance Graph

The following Stock Price Performance Graph and related information includes comparisons required by the SEC. The graph does not constitute "soliciting material" and should not be deemed "filed" or incorporated by reference into any other filings under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended, except to the extent that we specifically incorporate this information by reference into such filing.

The following graph presents the cumulative shareholder returns for our Common Stock compared with the NASDAQ Composite Index and the Russell 3000 Index. We selected these comparative groups due to industry similarities and the fact that they contain several direct competitors.

COMPARISON OF CUMULATIVE TOTAL RETURN
AMONG THE COMPANY, THE NASDAQ COMPOSITE INDEX AND RUSSELL 3000 INDEX



	5-Year Cumulative Total Return					
	12/31/2012	12/31/2013	12/31/2014	12/31/2015	12/31/2016	12/31/2017
IPG Photonics Corporation	$ 100.00	$ 116.44	$ 112.41	$ 133.77	$ 148.10	$ 321.28
Nasdaq Composite (U.S. & Foreign)	$ 100.00	$ 138.32	$ 156.85	$ 165.84	$ 178.28	$ 228.63
Russell 3000 Index	$ 100.00	$ 130.95	$ 144.63	$ 142.50	$ 157.34	$ 187.01

The above graph represents and compares the value, through December 31, 2017, of a hypothetical investment of $100 made at the closing price on December 31, 2012 in each of (i) our common stock, (ii) the NASDAQ Composite Stock Index and (iii) the Russell 3000 Index, in each case assuming the reinvestment of dividends. The stock price performance shown in this graph is not necessarily indicative of, and not is intended to suggest, future stock price performance.

Dividends

We declared and paid a special cash dividend on our capital stock in December 2012 of $33.4 million or $0.65 per share. We anticipate that we will retain future earnings to support operations, fund acquisitions and to finance the growth and development of our business. Therefore, we do not expect to pay cash dividends in the foreseeable future. Our payment of any future dividends will be at the discretion of our Board of Directors after taking into account any business conditions, any contractual and legal restrictions on our payment of dividends, and our financial condition, operating results, cash needs, growth plans and other factors. In addition, a current agreement with one lender contains a restrictive covenant that prohibits us from paying cash dividends, making any distribution on any class of stock or making stock repurchases if a breach of a financial covenant or an event of default exists or would result from the dividend, distribution or repurchase.

Recent Sales of Unregistered Securities; Use of Proceeds from Registered Securities

There have been no sales of unregistered securities during the past year.

Issuer Purchases of Equity Securities

The following table shows repurchases of our common stock in the fiscal quarter ended December 31, 2017.

Date	Total Number of Shares (or Units) Purchased		Average Price Paid per Share (or Unit)	Total Number of Shares (or Units) Purchased as Part of Publicly Announced Plans or Programs	Maximum Number (or Approximate Dollar Value) of Shares (or Units) that May Yet Be Purchased Under the Plans or Programs
October 1, 2017 — October 31, 2017	266	(1)	$ 207.62	$ —	$ 64,143
November 1, 2017 — November 30, 2017	24,191	(1),(2)	232.89	23,235	58,711
December 1, 2017 — December 31, 2017	36,400	(2)	210.00	36,400	51,067
Total	60,857		$ 219.09	$ 59,635	$ 51,067

(1) In 2012, our Board of Directors approved "withhold to cover" as a tax payment method for vesting of restricted stock awards for certain employees. Pursuant to the "withhold to cover" method, we withheld from such employees the shares noted in the table above to cover tax withholding related to the vesting of their awards. For the fourth quarter of 2017, the Company withheld 1,222 shares at an average price of $210.02.

(2) In July 2016, the Board of Directors authorized a share repurchase program (the "Program"). Under the Program, the Company's management is authorized to repurchase shares of common stock in an amount not to exceed the number of shares issued to employees and directors under its various employee and director equity compensation and employee stock purchase plans from January 1, 2016 through December 31, 2017. The Program limits aggregate share repurchases to no more than $100 million over a period ending June 30, 2018. For the fourth quarter of 2017, the Company repurchased 59,635 shares of its common stock with an average price of $219.27 per share in the open market. Since the beginning of the Program, the Company has purchased $48.9 million in shares pursuant to the Program.

Information Regarding Equity Compensation Plans

The following table sets forth information with respect to securities authorized for issuance under our equity compensation plans as of December 31, 2017:

Equity Compensation Plan Information

Plan Category	Number of Securities to be Issued upon Exercise of Outstanding Options, RSUs and PSUs (a)	Weighted-Average Exercise Price of Outstanding Options, RSUs and PSUs (b)	Number of Securities Remaining Available for Future Issuance under Equity Compensation Plans (Excluding Securities Reflected in Column (a)) (c)
Equity Compensation Plans Approved by Security Holders	2,251,703	$ 79.23	4,089,061
Equity Compensation Plans Not Approved by Security Holders	—		—
Total	2,251,703		4,089,061

ITEM 6. *SELECTED FINANCIAL DATA*

The following selected consolidated financial data should be read in conjunction with, and is qualified by reference to, our consolidated financial statements and related notes and Item 7, "Management's Discussion and Analysis of Financial Condition and Results of Operations" included elsewhere in this Annual Report on Form 10-K. The data as of December 31, 2017 and 2016, and for the years ended December 31, 2017, 2016 and 2015, is derived from our audited consolidated financial statements and related notes included elsewhere in this Annual Report on Form 10-K. The data as of December 31, 2015, 2014 and 2013, and for the years ended December 31, 2014 and 2013, is derived from our audited consolidated financial statements and related notes not included in this Annual Report on Form 10-K. Our historical results are not necessarily indicative of the results for any future period.

	Year Ended December 31,				
	2017	2016	2015	2014	2013
	(In thousands, except per share data)				
Consolidated Statement of Income Data:					
Net sales	$ 1,408,889	$ 1,006,173	$ 901,265	$ 769,832	$ 648,034
Cost of sales	611,978	453,933	409,388	353,314	308,136
Gross profit	796,911	552,240	491,877	416,518	339,898
Operating expenses:					
Sales and marketing	49,801	38,393	31,868	30,637	26,692
Research and development	100,870	78,552	63,334	53,403	41,660
General and administrative	80,668	66,486	57,192	55,338	50,863
Loss (gain) on foreign exchange	14,460	4,496	(2,560)	(6,618)	2,536
Total operating expenses	245,799	187,927	149,834	132,760	121,751
Operating income	551,112	364,313	342,043	283,758	218,147
Interest income (expense), net	737	1,304	(301)	(77)	(1)
Other income (expense), net	22	948	(125)	793	155
Income before provision for income taxes	551,871	366,565	341,617	284,474	218,301
Provision for income taxes	(204,283)	(105,849)	(99,590)	(84,029)	(62,521)
Net income	347,588	260,716	242,027	200,445	155,780
Less: Net (loss) income attributable to noncontrolling interests	(26)	(36)	(127)	—	—
Net income attributable to IPG Photonics Corporation	347,614	260,752	242,154	200,445	155,780
Net income attributable to common shareholders	$ 347,614	$ 260,752	$ 242,154	$ 200,445	$ 155,780
Net income per share:					
Basic	$ 6.50	$ 4.91	$ 4.60	$ 3.85	$ 3.02
Diluted	$ 6.36	$ 4.85	$ 4.53	$ 3.79	$ 2.97
Weighted-average shares outstanding:					
Basic	53,495	53,068	52,676	52,104	51,548
Diluted	54,699	53,797	53,427	52,824	52,375
Dividends per common share	$ —	$ —	$ —	$ —	$ —

	As of December 31,				
	2017	2016	2015	2014	2013
			(In thousands)		
Consolidated Balance Sheet Data:					
Cash and cash equivalents	$ 909,900	$ 623,855	$ 582,532	$ 522,150	$ 448,776
Short-term investments	206,257	206,779	106,584	—	—
Working capital, excluding cash and cash equivalents and short-term investments	438,950	312,053	271,683	237,546	225,365
Total assets	2,371,975	1,789,999	1,453,429	1,210,887	1,061,216
Revolving line-of-credit facilities	—	—	—	2,631	3,296
Long-term debt, including current portion	48,982	40,823	19,667	33,000	12,666
Noncontrolling interests and redeemable noncontrolling interests	—	166	1,137	—	—
IPG Photonics Corporation equity	2,022,322	1,557,558	1,259,528	1,046,561	927,969

ITEM 7. *MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS*

The following discussion and analysis of our financial condition and results of operations should be read in conjunction with Item 6, "Selected Financial Data" and our consolidated financial statements and related notes included in this Annual Report on Form 10-K. This discussion contains forward-looking statements that involve risks and uncertainties. Our actual results could differ materially from those anticipated in these forward-looking statements as a result of certain factors including, but not limited to, those discussed under Item 1A, "Risk Factors."

Overview

We develop and manufacture a broad line of high-performance fiber lasers, fiber amplifiers and diode lasers that are used in numerous applications, primarily in materials processing. We sell our products globally to OEMs, system integrators and end users. We market our products internationally primarily through our direct sales force.

We are vertically integrated such that we design and manufacture most of our key components used in our finished products, from semiconductor diodes to optical fiber preforms, finished fiber lasers and amplifiers. We also manufacture certain complementary products used with our lasers, including optical delivery cables, fiber couplers, beam switches, optical processing heads and chillers. In addition, we offer laser-based systems for certain markets and applications.

Description of Our Net Sales, Costs and Expenses

Net sales. We derive net sales primarily from the sale of fiber lasers and amplifiers. We also sell diode lasers, communications systems, laser systems and complementary products. We sell our products through our direct sales organization and our network of distributors and sales representatives, as well as system integrators. We sell our products to OEMs that supply materials processing laser systems, communications systems, medical laser systems and other laser systems for advanced applications to end users. We also sell our products to end users that build their own systems which incorporate our products or use our products as an energy or light source. Our scientists and engineers work closely with OEMs, systems integrators and end users to analyze their system requirements and match appropriate fiber laser or amplifier specifications. Our sales cycle varies substantially, ranging from a period of a few weeks to as long as one year or more, but is typically several months.

Sales of our products generally are recognized upon shipment, provided that no obligations remain and collection of the receivable is reasonably assured. Our sales typically are made on a purchase order basis rather than through long-term purchase commitments.

We develop our products to standard specifications and use a common set of components within our product architectures. Our major products are based upon a common technology platform. We continually enhance these and other products by improving their components and developing new components and new product designs.

The average selling prices of our products generally decrease as the products mature. These decreases result from factors such as decreased manufacturing costs and increases in unit volumes, increased competition, the introduction of new products and market share considerations. In the past, we have lowered our selling prices in order to penetrate new

markets and applications. Furthermore, we may negotiate discounted selling prices from time to time with certain customers that purchase multiple units.

Cost of sales. Our cost of sales consists primarily of the cost of raw materials and components, direct labor expenses and manufacturing overhead. We are vertically integrated and currently manufacture all critical components for our products as well as assemble finished products. We believe our vertical integration allows us to increase efficiencies, leverage our scale and lower our cost of sales. Cost of sales also includes personnel costs and overhead related to our manufacturing, engineering and service operations, related occupancy and equipment costs, shipping costs and reserves for inventory obsolescence and for warranty obligations. Inventories are written off and charged to cost of sales when identified as excess or obsolete.

Due to our vertical integration strategy and ongoing investment in plant and machinery, we maintain a relatively high fixed manufacturing overhead. We may not be able to or choose not to adjust these fixed costs to adapt to rapidly changing market conditions. Our gross margin is therefore significantly affected by our sales volume and the corresponding utilization of capacity and absorption of fixed manufacturing overhead expenses.

Sales and marketing. Our sales and marketing expense consists primarily of costs related to compensation, trade shows, professional and technical conferences, travel, facilities, depreciation of equipment used for demonstration purposes and other marketing costs.

Research and development. Our research and development expense consists primarily of compensation, development expenses related to the design of our products and certain components, the cost of materials and components to build prototype devices for testing and facilities costs. Costs related to product development are recorded as research and development expenses in the period in which they are incurred.

General and administrative. Our general and administrative expense consists primarily of compensation and associated costs for executive management, finance, legal, information technology and other administrative personnel, outside legal and professional fees, insurance premiums and fees, allocated facilities costs and other corporate expenses such as charges and benefits related to the change in allowance for doubtful debt.

Factors and Trends That Affect Our Operations and Financial Results

In reading our financial statements, you should be aware of the following factors and trends that our management believes are important in understanding our financial performance.

Net sales. Our net sales grew from $769.8 million in 2014 to $1,408.9 million in 2017, representing a three year compound annual growth rate of approximately 22%. Net sales growth was driven by (i) increasing demand for our products, fueled by their superior performance and decreasing average cost per watt of output power which has resulted in a substantial improvement in their competitiveness and increased market share compared to other laser technologies including CO_2 and YAG lasers, (ii) increased sales of fiber lasers for cutting and welding applications and the development of OEM customers in these applications. (iii) the introduction of new products, including our high power lasers with higher output power levels, quasi-continuous wave ("QCW") lasers, laser systems, high power pulsed lasers and optical heads and other accessories and (iv) the development of new applications for our products some of which displace non-laser technologies. Our annual revenue growth rates have varied. Net sales increased by 40%, 12% and 17% in 2017, 2016 and 2015, respectively.

Our business depends substantially upon capital expenditures by our customers, particularly by manufacturers using our products for materials processing, which includes general manufacturing, automotive, aerospace, heavy industry, consumer, semiconductor and electronics. Approximately 94% of our revenues in 2017 were from customers using our products for materials processing. Although applications within materials processing are broad, the capital equipment market in general is cyclical and historically has experienced sudden and severe downturns. For the foreseeable future, our operations will continue to depend upon capital expenditures by customers for materials processing and will be subject to the broader fluctuations of capital equipment spending.

Our net sales have historically fluctuated from quarter to quarter. The increase or decrease in sales from a prior quarter can be affected by the timing of orders received from customers, the shipment, installation and acceptance of products at our customers' facilities, the mix of OEM orders and one-time orders for products with large purchase prices, economic and political conditions in a certain country or region and seasonal factors such as the purchasing patterns and levels of activity throughout the year in the regions where we operate. Historically, our net sales have been higher in the second half of the year than in the first half of the year. Furthermore, net sales can be affected by the time taken to qualify our products for use in new applications in the end markets that we serve. The adoption of our products by a new customer or qualification in a new application can lead to an increase in net sales for a period, which may then slow until we penetrate new markets or obtain new customers.

Gross margin. Our total gross margin in any period can be significantly affected by total net sales in any period, by product mix, that is, the percentage of our revenue in the period that is attributable to higher or lower power products and the mix of sales between laser and amplifier sources and complete systems, by sales mix between OEM customers who purchase devices from us in high unit volumes and other customers, by mix of sales in different geographies and by other factors, some of which are not under our control.

Our product mix affects our margins because the selling price per watt is generally higher for medium power devices and certain specialty products than for high power devices and certain pulsed lasers sold in large volumes. The overall cost of high power lasers may be partially offset by improved absorption of fixed overhead costs associated with sales of larger volumes of higher power products because they use a greater number of optical components and drive economies of scale in manufacturing. Also, the profit margins on systems can be lower than margins for our laser and amplifier sources, depending on the configuration, volume and competitive forces, among other factors.

We believe our strategy to maintain and extend our leadership position will result in industry-leading revenue growth and profitability. Although our fiber laser technology has a leading market position within select materials processing applications, our share within many other laser applications is significantly smaller and non-existent in many other applications. We estimate fiber lasers comprise less than 35% of total laser source sales and that laser-based machine tools comprise less than 25% of all machine tools used for cutting and welding of metals. Given the potential for our fiber laser technology to gain deeper penetration within the broader markets we serve and plan to target, we continue to introduce new technologies and products to expand our market presence. We expect that some new technologies and products will have returns above our cost of capital but may have gross margins below our corporate average. If we are able to develop opportunities that are significant in size, competitively advantageous or leverage our existing technology base and leadership, our current gross margin levels may not be maintained. Instead, we aim to deliver industry-leading levels of gross and operating margins by growing our market position across the broader markets we serve.

The mix of sales between OEM customers and other customers can affect gross margin because we provide sales price discounts on products based on the number of units ordered. As the number of OEM customers increase and the number of units ordered increases, the average sales price per unit will be reduced. We expect that the impact of reduced sales price per unit will be offset by the manufacturing efficiency provided by high unit volume orders, but the timing and extent of achieving these efficiencies may not always match the mix of sales in any given time period or be realized at all.

We invested $126.5 million, $127.0 million and $70.1 million in capital expenditures in 2017, 2016 and 2015, respectively. Most of this investment relates to expansion of our manufacturing capacity and, to a lesser extent, research and development and sales-related facilities.

A high proportion of our costs is fixed so costs are generally difficult or may take time to adjust in response to changes in demand. In addition, our fixed costs increase as we expand our capacity. If we expand capacity faster than is required by sales growth, gross margins could be negatively affected. Gross margins generally decline if production volumes are lower as a result of a decrease in sales or a reduction in inventory because the absorption of fixed manufacturing costs will be reduced. Gross margins generally improve when the opposite occurs. If both sales and inventory decrease in the same period, the decline in gross margin may be greater if we cannot reduce fixed costs or choose not to reduce fixed costs to match the decrease in the level of production. If we experience a decline in sales that reduces absorption of our fixed costs, or if we have production issues, our gross margins will be negatively affected.

We also regularly review our inventory for items that are slow-moving, have been rendered obsolete or are determined to be excess. Any provision for such slow-moving, obsolete or excess inventory affects our gross margins. For example, we recorded provisions for slow-moving, obsolete or excess inventory totaling $16.9 million, $22.8 million and $15.4 million in 2017, 2016 and 2015, respectively.

Sales and marketing expense. We expect to continue to expand our worldwide direct sales organization, build and expand applications centers, hire additional sales and marketing personnel at our existing and new geographic locations as well as to support sales of new product lines, increase the number of units for demonstration purposes and otherwise increase expenditures on sales and marketing activities in order to support the growth in our net sales. As such, we expect that our sales and marketing expenses will increase in the aggregate.

Research and development expense. We plan to continue to invest in research and development to improve our existing components and products and develop new components, products, systems and applications technology. The amount of research and development expense we incur may vary from period to period. In general, if net sales continue to increase we expect research and development expense to increase in the aggregate.

General and administrative expense. We expect our general and administrative expenses to increase as we continue to invest in systems and resources in management, finance, legal, information technology, human resources and administration to support our worldwide operations. Legal expenses vary from quarter to quarter based primarily upon the level of litigation and transaction activities.

Major customers. While we have historically depended on a few customers for a large percentage of our annual net sales, the composition of this group can change from year to year. Net sales derived from our five largest customers as a percentage of our annual net sales were 28%, 22% and 25% in 2017, 2016 and 2015. Our largest customer accounted for 13%, 9% and 13% of our net sales in 2017, 2016 and 2015, respectively. We seek to add new customers and to expand our relationships with existing customers. We anticipate that the composition of our significant customers will continue to change. We generally do not enter into agreements with our customers obligating them to purchase our fiber lasers or amplifiers. If any of our significant customers were to substantially reduce their purchases from us, our results would be adversely affected.

Critical Accounting Policies and Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States ("GAAP") requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of net sales and expenses. By their nature, these estimates and judgments are subject to an inherent degree of uncertainty. On an ongoing basis we re-evaluate our judgments and estimates including those related to inventories, warranty obligations, contingent liabilities, income taxes and the fair value of certain debt and equity instruments including stock-based compensation. We base our estimates and judgments on our historical experience and on other assumptions that we believe are reasonable under the circumstances, the results of which form the basis for making the judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. Actual results could differ from those estimates, which may materially affect our operating results and financial position. The accounting policies described below are those which, in our opinion, involve the most significant application of judgment, or involve complex estimation, and which could, if different judgments or estimates were made, materially affect our reported results of operations and financial position.

Revenue Recognition. We recognize revenue in accordance with Financial Accounting Standards Board ("FASB") Accounting Standards Codification ("ASC") 605. Revenue from orders with multiple deliverables is divided into separate units of accounting when certain criteria are met. These separate units generally consist of equipment and installation. The consideration for the arrangement is then allocated to the separate units of accounting based on their relative selling prices. The selling price of equipment is based on vendor-specific objective evidence and the selling price of installation is based on third-party evidence. Applicable revenue recognition criteria are then applied separately for each separate unit of accounting. Revenue for laser and amplifier sources generally is recognized upon the transfer of ownership which is typically at the time of shipment. Installation revenue is recognized upon completion of the installation service which typically occurs within 30 to 90 days of delivery. For laser systems that have customer specific processing requirements, revenue is recognized at the latter of customer acceptance date or shipment date if the customer acceptance is made prior to shipment. Returns and customer credits are infrequent and are recorded as a reduction to revenue. Rights of return generally are not included in sales arrangements.

Accounts Receivable and Allowance for Doubtful Accounts. Accounts receivable include $46.1 million and $24.0 million of bank acceptance drafts issued in China at December 31, 2017 and 2016, respectively. Bank acceptance drafts are bank guarantees of payment on specified dates. The maturity of these bank acceptance drafts is less than 90 days. We maintain an allowance for doubtful accounts to provide for the estimated amount of accounts receivable that will not be collected. The allowance is based upon an assessment of customer creditworthiness, historical payment experience and the age of outstanding receivables.

Inventory. Inventory is stated at the lower of cost (first-in, first-out method) or market value. Inventory includes parts and components that may be specialized in nature and subject to rapid obsolescence. We maintain a reserve for excess or obsolete inventory items. The reserve is based upon a review of inventory materials on hand, which we compare with historic usage, estimated future usage and age. In addition, we review the inventory and compare recorded costs with estimates of current market value. Write-downs are recorded to reduce the carrying value to the net realizable value with respect to any part with costs in excess of current market value. Estimating demand and current market values is inherently difficult, particularly given that we make highly specialized components and products. We determine the valuation of excess and obsolete inventory by making our best estimate considering the current quantities of inventory on hand and our forecast of the need for this inventory to support future sales of our products. We often have limited information on which to base our forecasts. If future sales differ from these forecasts, the valuation of excess and obsolete inventory may change and additional inventory provisions may be required. Because of our vertical integration, a significant or sudden decrease in sales could result in a significant change in the estimates of excess or obsolete inventory valuation.

Warranty. We maintain an accrual for warranty claims for units sold that are subject to warranty. We estimate this accrual considering past claims experience, the number of units still carrying warranty coverage and the average life of the remaining warranty period.

Stock-based compensation. Stock-based compensation is included in the following financial statement captions as follows:

	Year Ended December 31,		
	2017	2016	2015
Cost of sales	$ 5,863	$ 6,018	$ 5,316
Sales and marketing	2,041	1,820	1,998
Research and development	5,001	4,905	4,049
General and administrative	10,116	8,991	7,626
Total stock-based compensation	23,021	21,734	18,989
Tax benefit recognized	(7,367)	(6,971)	(6,141)
Net stock-based compensation	$ 15,654	$ 14,763	$ 12,848

We account for stock-based compensation using the fair value of the awards granted. We estimate the fair value of stock options granted using the Black-Scholes model, we value restricted stock units using the intrinsic value method and we use a Monte Carlo simulation model to estimate the fair value of market-based performance stock units. We amortize the fair value of stock options and awards on a straight-line basis over the requisite service periods of the awards, which are generally the vesting periods. After adoption of Accounting Standards Update ("ASU") 2016-09 effective January 1, 2017, we account for forfeitures as they occur whereas previous to that date, we estimated the effect of forfeitures at the date of issuance. The assumptions used to calculate the fair value of stock-based payment awards represent management's best estimates, but the estimates involve inherent uncertainties and the application of management judgment. As a result, if factors change and we use different assumptions, our stock-based compensation expense could be materially different in the future.

The weighted-average assumptions used in the Black-Scholes model were as follows:

	Year Ended December 31,		
	2017	2016	2015
Expected term	3.8-5.0 years	4.4-6.1 years	4.4-6.3 years
Volatility	31%-35%	37%-45%	45%-48%
Risk-free rate of return	1.57%-1.97%	1.06%-1.41%	1.38%-1.74%
Dividend yield	0.25%	0.25%	0.25%
Forfeiture rate	—%	2.65%-5.26%	3.47%-5.88%

The weighted-average assumptions used in the Monte Carlo simulation model was as follows:

	Year Ended December 31,		
	2017	2016	2015
Expected term	3.0 years	3.0 years	3.2 years
Volatility	13%-31%	13%-32%	12%-36%
Risk-free rate of return	1.49%	0.88%	0.98%
Dividend yield	—%	—%	—%
Weighted-average fair value per share	147.25	88.51	128.42

We offer an employee stock purchase plan covering our U.S. and German employees. The plan allows employees who participate to purchase shares of common stock through payroll deductions at a 15% discount to the lower of the stock price on the first day or last day of the six-month purchase period. Payroll deductions may not exceed 10% of the employee's compensation. Compensation expense related to the employee stock purchase plan for the years ended 2017, 2016 and 2015, was approximately $1.0 million, $0.8 million and $0.7 million, respectively.

Income Taxes and Deferred Taxes. Our annual tax rate is based on our income, statutory tax rates and tax planning opportunities available to us in the various jurisdictions in which we operate.

We file federal and state income tax returns in the United States and tax returns in numerous international jurisdictions. We must estimate our income tax expense after considering, among other factors, if inter-company transactions have been made

on an arm's length basis, differing tax rates between jurisdictions, allocation factors, tax credits, nondeductible items and changes in enacted tax rates. Significant judgment is required in determining our annual tax expense and in evaluating our tax positions. As we continue to expand globally, there is a risk that, due to complexity within and diversity among the various jurisdictions in which we do business, a governmental agency may disagree with the manner in which we have computed our taxes. Additionally, due to the lack of uniformity among all of the foreign and domestic taxing authorities, there may be situations where the tax treatment of an item in one jurisdiction is different from the tax treatment in another jurisdiction or that the transaction causes a tax liability to arise in another jurisdiction.

On December 22, 2017, the U.S. government enacted comprehensive tax legislation commonly referred to as the Tax Cuts and Jobs Act (the "Tax Act"). The Tax Act makes broad and complex changes to the U.S. tax code including, but not limited to: (1) reducing the U.S. federal corporate tax rate from 35 percent to 21 percent; (2) requiring companies to pay a one-time transition tax on certain un-repatriated earnings of foreign subsidiaries; (3) generally eliminating U.S. federal income taxes on dividends from foreign subsidiaries; and (4) bonus depreciation that will allow for full expensing of qualified property. Our accounting for the Deemed Repatriation Transition Tax ("Transition Tax") element of the Tax Act is incomplete. However, we were able to make estimates of certain effects and, therefore, recorded provisional adjustments. As a result of the enactment of the Tax Act, we recorded a $47.0 million accrual for the federal Transition Tax and an associated $1.1 million state tax liability with a corresponding adjustment to current income tax expense. The federal Transition Tax is payable over eight years. We also recorded a $1.3 million reduction of net deferred tax assets as a result of the lower enacted tax rate in the Tax Act with a corresponding adjustment to deferred income tax expense.

While our annual tax rate is dependent on the factors detailed above, we expect that the reduction in the U.S. federal corporate rate will reduce our consolidated effective tax rate by approximately four percentage points in 2018 as compared to what the effective tax rate would have been without the enacted tax rate reduction.

We have provided a $2.2 million deferred tax liability for certain withholding and dividend taxes related to possible distributions from non-U.S. subsidiaries to their non-U.S. parents. With regard to repatriation of undistributed earnings of non-U.S. subsidiaries back to the U.S., we previously considered these earnings to be indefinitely reinvested and, accordingly, recorded no deferred income taxes. We are currently analyzing our global working capital and cash requirements and the potential tax liabilities attributable to a repatriation. We have yet to determine whether we will change our prior assertion and repatriate earnings. Accordingly, we have not recorded any deferred taxes attributable to repatriation to the U.S. of our investments in its foreign subsidiaries. We will record the tax effects of any change in our prior assertion in the period that we complete our analysis and are able to make a reasonable estimate.

Deferred taxes arise because of the different treatment between financial statement accounting and tax accounting, known as "temporary differences." The tax effects of these temporary differences are recorded as deferred tax assets and deferred tax liabilities on the consolidated balance sheet. At December 31, 2017, we had a net deferred tax asset of $5.6 million. If insufficient evidence of our ability to generate future taxable income arises, we may be required to record a valuation allowance against these assets, which will result in additional income tax expense. On a quarterly basis, we evaluate whether the deferred tax assets may be realized in the future and assess the need for a valuation allowance.

We provide reserves for potential payments of tax to various tax authorities related to uncertain tax positions and other issues. Reserves recorded are based on a determination of whether and how much of a tax benefit taken by us in our tax filings or positions is "more likely than not" to be realized following resolution of any potential contingencies present related to the tax benefit, assuming that the matter in question will be raised by the tax authorities. Potential interest and penalties associated with such uncertain tax positions is recorded as a component of income tax expense. At December 31, 2017, we had unrecognized tax benefits of approximately $10.4 million that, if recognized, would be recorded as a reduction in income tax expense.

At December 31, 2017, we had $191.7 million of cash and cash equivalents and $206.3 million in short-term investments in the United States and $718.2 million of cash and cash equivalents at foreign locations. Cash and cash equivalents outside of the United States are intended to fund working capital, capital expenditures and business expansion outside the United States.

EXECUTIVE COMPENSATION TABLES

Summary Compensation Table

The following table provides information regarding compensation earned by our Chief Executive Officer, our Chief Financial Officer and our three other most highly compensated executives for the fiscal years indicated below:

Name and Principal Position	Year	Salary ($)(1)	Bonus ($)	Stock Awards ($)(2)	Option Awards ($)(2)	Non-Equity Incentive Plan Compensation ($)(3)	All Other Compensation ($)(4)	Total ($)
Valentin P. Gapontsev, Ph.D. Chief Executive Officer and Chairman of the Board (5)	2017	832,000	—	—	—	1,399,100	53,583	2,284,683
	2016	735,400	—	—	—	709,044	36,953	1,481,397
	2015	687,981	—	—	—	713,582	11,853	1,413,416
Eugene A. Scherbakov, Ph.D. Chief Operating Officer, Managing Director of IPG Laser GmbH, Senior Vice President, Europe and Director (5)	2017	510,000	—	899,514	340,038	769,300	23,028	2,541,880
	2016	510,677	—	643,031	228,899	361,928	30,138	1,774,672
	2015	450,449	—	636,664	305,714	363,675	30,231	1,973,841
Timothy P.V. Mammen, Chief Financial Officer and Senior Vice President	2017	458,300	—	763,578	288,607	577,000	8,910	2,096,395
	2016	436,025	—	643,031	228,899	315,694	8,760	1,632,409
	2015	440,067	—	823,772	305,714	342,223	8,764	1,920,540
Trevor Ness, Senior Vice President, World Wide Sales and Marketing	2017	410,000	—	682,866	258,169	516,200	8,910	1,876,145
	2016	379,724	—	527,502	187,744	275,121	8,490	1,378,581
	2015	383,543	—	673,995	250,130	298,267	8,511	1,614,446
Angelo P. Lopresti, Senior Vice President, General Counsel and Secretary	2017	421,000	—	623,394	235,635	530,000	9,342	1,819,372
	2016	408,256	—	496,333	176,709	263,042	9,192	1,353,532
	2015	412,015	—	636,664	236,234	284,911	9,240	1,579,063

(1) Salaries for 2015 reflect 27 pay periods occurring in the year.

(2) Valuation based on the fair value of such award as of the grant date determined pursuant to ASC Topic 718. The assumptions that we used with respect to the valuation of service-based restricted stock unit, performance-based stock units and stock option awards are set forth in Note 2 to our Consolidated Financial Statements in our Annual Report on Form 10-K filed with the SEC on February 28, 2018. The amounts in the Stock Awards column reflect service-based restricted stock units and performance-based stock units granted in 2017. The value of the performance-based stock units is based on the probable outcome of the performance conditions (at the grant date) in accordance with ASC Topic 718 assuming no forfeiture. The values of performance-based stock units at the grant date assuming the highest level of performance conditions will be achieved are $1,619,464, $1,374,728, $1,229,416 and $1,122,344 for Dr. Scherbakov and Messrs Mammen, Ness and Lopresti, respectively. There is no assurance that any of the performance targets will be achieved, that the service-based awards will vest or that the any of the recipients will realize the values listed above.

(3) Represents amounts earned under our AIP for services rendered in 2017, 2016 and 2015, respectively.

(4) The amount in 2017 for Dr. Gapontsev consists of premiums paid for group life insurance, the incremental cost for non-employee guests accompanying him on the Company's aircraft and the cost of a car and driver ($36,776) at the Company's headquarters. The amount in 2017 for Dr. Scherbakov is the expense of an automobile provided by us.

(5) Portions of the amounts paid to Dr. Gapontsev and Dr. Scherbakov were denominated in Euros and Rubles. Dr. Scherbakov's salary is approved in US dollars and payments are converted to Euro at then prevailing Euro exchange rate. Amounts paid in foreign currencies were translated into U.S. Dollars at the average daily exchange rates for the full years. The average daily rates in 2017, 2016 and 2015, for the Euro were 0.89, 0.90 and 0.90, respectively, and for the Ruble were 58.3, 67.0 and 61.2, respectively. As a result of compensation being paid in one or more currencies that fluctuate against the U.S. Dollar, the amount of salary paid may vary slightly from the salary stated in an employment agreement or approved by the Compensation Committee.

Employment Agreements

The Company has entered into employment agreements with each of the above-named executives, effective through December 31, 2018. Upon expiration, the employment agreements will automatically renew for successive one year periods, unless the Company or a Named Executive Officer provides written notice of non-renewal at least six months prior to the end of the then current term. In the event of a change in control, the agreements would extend through the second anniversary of the change in control.

The employment agreements set the annual base salaries and stipulate that the Compensation Committee may adjust the salaries annually, as noted in the above "*Compensation Discussion and Analysis - 2017 Base*

The table below sets forth sales by type of product and other revenue (in thousands, except for percentages):

	Year Ended December 31,					
	2017		2016		Change	
		% of Total		% of Total		
High Power CW Lasers	$ 867,464	61.6%	$ 578,668	57.5%	$ 288,796	49.9%
Medium Power CW Lasers	105,547	7.5%	98,855	9.8%	6,692	6.8%
Low Power CW Lasers	13,158	0.9%	12,788	1.3%	370	2.9%
Pulsed Lasers	148,701	10.5%	128,971	12.8%	19,730	15.3%
QCW Lasers	88,329	6.3%	48,612	4.8%	39,717	81.7%
Other Revenue including Amplifiers, Laser Systems, Service, Parts, Accessories and Change in Deferred Revenue	185,690	13.2%	138,279	13.8%	47,411	34.3%
Total	$1,408,889	100.0%	$1,006,173	100.0%	$ 402,716	40.0%

Sales for materials processing applications increased due to higher sales of high power lasers, medium power lasers, pulsed lasers, QCW lasers and laser systems.

- The increase in high power laser sales related to growth in cutting and welding. High power lasers continue to displace CO2 lasers. We believe our revenue growth has benefited from an accelerated replacement cycle for older CO2 based cutting systems and also from displacement of non-laser technologies, which has resulted in higher demand for the fiber based cutting and welding systems sold by our OEM customers. Within cutting applications, we continue to see a migration to lasers with higher output powers which improve processing speeds and enable processing of thicker materials. The shift towards lasers with higher output powers has also benefited sales due to their higher average selling prices.

- Medium power sales increased due to growth in laser sintering and fine welding applications, which was partially offset by decreases in sales for fine cutting applications because fine cutting systems using medium power lasers migrated to using high power 1 to 2 kilowatt lasers. Average selling prices for medium power lasers also declined.

- Pulsed laser sales increased due to growth in marking and engraving, cleaning and stripping, solar cell manufacturing and cutting applications. Within the pulsed laser category, the rate of sales increases was larger for high power pulsed lasers than for pulsed lasers with lower average power.

- QCW laser sales increased due to the demand for welding and drilling applications. Welding applications for QCW lasers are primarily related to consumer electronics.

- Materials processing sales also increased as a result of improved laser systems and parts and service sales, which are included in Other Revenue in the Sales by Product chart above. The increase in laser systems sales was mainly driven by the July 2017 acquisition of Innovative Laser Technologies, LLC ("ILT").

Sales for other applications increased due to higher sales for telecom and advanced applications. Telecom sales benefited from an increase in sales of pluggable transceivers used in data transmission and an increase in amplifier sales used for last mile fiber access to the home applications. For 2017, the rate of growth of telecom sales benefited from the contribution of sales by Menara, which we acquired in May 2016. Sales of telecom products are included in Other Revenue in the Sales by Product chart above. Advanced application sales are typically uneven from quarter to quarter. The increase in advanced applications sales was driven by increase in demand from defense, semiconductor and scientific applications across various product lines.

Cost of sales and gross margin. Cost of sales increased by $158.0 million, or 34.8%, to $612.0 million in 2017 from $453.9 million in 2016. Our gross margin increased to 56.6% in 2017 from 54.9% in 2016. Gross margin increased due to a decrease in the cost of internally manufactured components, increased manufacturing efficiency and product mix which included increased sales of high power, QCW and pulsed lasers with higher average powers. These increases in gross margin were partially offset by lower average selling prices. Expenses related to provisions for excess or obsolete inventory and other valuation adjustments decreased by $5.9 million to $16.9 million, or 1.2% of sales, for the year ended December 31, 2017, as compared to $22.8 million, or 2.3% of sales, for the year ended December 31, 2016.

Sales and marketing expense. Sales and marketing expense increased by $11.4 million, or 29.7%, to $49.8 million in 2017 from $38.4 million in 2016, primarily as a result of an increase in personnel, trade show and exhibitions, travel and

depreciation expense. As a percentage of sales, sales and marketing expense decreased to 3.5% in 2017 from 3.8% in 2016. As we continue to expand our worldwide sales organization, we expect sales and marketing expenses to increase in the aggregate.

Research and development expense. Research and development expense increased by $22.3 million, or 28.4%, to $100.9 million in 2017 from $78.6 million in 2016, primarily as a result of an increase in personnel, contractors, consultants, materials, depreciation and other research and development expense. Research and development continues to focus on developing new products, enhancing performance of existing components, improving production processes and developing manufacturing of new components such as crystals and refining production processes to improve manufacturing yields and productivity. New products include lasers that operate at different wavelengths such as UV, visible and mid-IR, lasers with ultrafast pulses, laser based systems for material processing, projection, display and medical as well as accessories such as welding and cutting heads. In addition to new products research and development is focused on enhancing the performance of our existing products by improving their electrical efficiency and increasing their average power. As a percentage of sales, research and development expense decreased to 7.2% in 2017 from 7.8% in 2016. We expect to continue to invest in research and development and that research and development expense will increase in the aggregate.

General and administrative expense. General and administrative expense increased by $14.2 million, or 21.3%, to $80.7 million in 2017 from $66.5 million in 2016, primarily as a result of increased expenses for personnel, stock-based compensation, accounting, subscription fees, recruitment, information technology, travel and depreciation expense. In 2016, general and administrative expense also includes a non-cash impairment charge of $2.9 million related to our corporate aircraft. As a percentage of sales, general and administrative expense decreased to 5.7% in 2017 from 6.6% in 2016. We expect general and administrative expenses to increase as we invest to support the expected growth in net sales.

Effect of exchange rates on sales, gross margin and operating expenses. We estimate that if exchange rates had been the same as one year ago, sales in 2017 would have been $2.0 million higher, gross margin would have been $4.3 million higher and operating expenses in total would have been $3.7 million lower. These estimates assume constant exchange rates between fiscal year 2017 and fiscal year 2016 and are calculated using the average exchange rates for the twelve-month period ended December 31, 2016 for the respective currencies, which were US$1=Euro 0.90, US$1=Japanese Yen 109, US$1=Chinese Yuan 6.65 and US$1=Russian Ruble 67.

Loss (gain) on foreign exchange. We incurred a foreign exchange loss of $14.5 million in 2017 as compared to a loss of $4.5 million in 2016. The change was primarily attributable to the appreciation of the Euro and Russian Ruble as compared to the U.S. Dollar, which was partially offset by appreciation of the Chinese Yuan as compared to the U.S. Dollar.

Interest income (expense), net. Interest income (expense), net decreased to $0.7 million of income in 2017 compared to $1.3 million of income in 2016.

Other income (expense), net. Other income (expense), net decreased to approximately $0 in 2017 compared to $0.9 million of income in 2016 as a result of the loss incurred upon sale of available-for-sale-securities being partially offset by increases in net rental income from a building in the United States purchased in the second quarter of 2016 that is partially leased to third parties.

Provision for income taxes. Provision for income taxes was $204.3 million in 2017 compared to $105.8 million in 2016, representing an effective tax rate of 37.0% in 2017 and 28.9% in 2016. The increase in the effective tax rate was primarily driven by the amounts recorded upon adoption of the Tax Act including $47.0 million of accrued federal Transition Taxes for undistributed earnings of foreign subsidiaries with an associated $1.1 million state tax liability and a $1.3 million write down of deferred tax assets as a result of the rate reductions in the Tax Act. In addition, the provision for income taxes includes a $4.4 million provision for uncertain tax positions. These increases in the provision for income taxes were partially offset by $14.6 million of excess tax benefits related to exercise of stock options and release of restricted stock units which vested during the period. Effective as of the beginning of 2017, the accounting standard related to excess tax benefits and deficits changed, and these items are now recognized in the provision for income taxes whereas previously they were accounted for within additional paid-in capital. The tax effects of the accounting for share-based compensation will increase or decrease our effective rate based upon the difference between our share-based compensation expense and the benefits taken on our tax return which will depend upon the quantity and intrinsic value of RSUs that vest and options that are exercised in the period. Additionally, we recognize excess tax benefits on a discrete basis and we anticipate that our effective rate will vary from quarter to quarter depending upon the factors described above.

Net income. Net income attributable to IPG Photonics Corporation increased by $86.8 million to $347.6 million in 2017 from $260.8 million in 2016. Net income attributable to IPG Photonics Corporation as a percentage of our net sales decreased by 1.2% to 24.7% in 2017 from 25.9% in 2016 due to the factors described above.

Comparison of Year Ended December 31, 2016 to Year Ended December 31, 2015

Net sales. Net sales increased by $104.9 million, or 11.6%, to $1,006.2 million in 2016 from $901.3 million in 2015. The table below sets forth sales by application (in thousands, except for percentages):

	Year Ended December 31,					
	2016		2015		Change	
		% of Total		% of Total		
Materials Processing	$ 942,119	93.6%	$ 849,335	94.2%	$ 92,784	10.9%
Other Applications	64,054	6.4%	51,930	5.8%	12,124	23.3%
Total	$ 1,006,173	100.0%	$ 901,265	100.0%	$ 104,908	11.6%

The table below sets forth sales by type of product and other revenue (in thousands, except for percentages):

	Year Ended December 31,					
	2016		2015		Change	
		% of Total		% of Total		
High Power CW Lasers	$ 578,668	57.5%	$ 499,643	55.4%	$ 79,025	15.8 %
Medium Power CW Lasers	98,855	9.8%	99,452	11.0%	(597)	(0.6)%
Low Power CW Lasers	12,788	1.3%	13,761	1.5%	(973)	(7.1)%
Pulsed Lasers	128,971	12.8%	124,824	13.8%	4,147	3.3 %
QCW Lasers	48,612	4.8%	56,506	6.3%	(7,894)	(14.0)%
Other Revenue including Amplifiers, Laser Systems, Service, Parts, Accessories and Change in Deferred Revenue	138,279	13.7%	107,079	11.9%	31,200	29.1 %
Total	$ 1,006,173	100.0%	$ 901,265	100.0%	$ 104,908	11.6 %

Sales for materials processing applications increased due to higher sales of high power lasers, pulsed lasers and laser systems.

- The increase in high power laser sales related to growth in cutting, cladding, laser sintering, heat treatment and annealing applications partially offset by a decline in surface patterning and automotive related welding applications and decreases in average selling prices. High power lasers are continuing to displace CO2 lasers in cutting systems sold by our OEM customers. We are also seeing increased use of high power lasers for deposition applications like cladding and laser sintering which is used in additive manufacturing. Our cutting and additive manufacturing OEM customers are producing systems using lasers with higher output powers in order to improve the speed with which parts are cut and grown.

- The decrease in medium power sales related to fine cutting applications partially offset by a higher demand for medium power lasers used for fine welding, sintering and ablation applications. In part the increase in sintering applications transitioned to high power lasers because our additive manufacturing OEM customers are increasingly using high power lasers instead of medium power lasers in their systems. While the number of units shipped of medium power lasers increased, this increase was offset by declines in average selling prices.

- Low power laser sales decreased due to lower sales for medical applications.

- Pulsed laser sales increased due to higher demand for ablation and cleaning and stripping applications. Marking and engraving applications, which is the largest application for pulsed lasers, was relatively flat. Within the pulsed laser category, increased sales of high power pulsed lasers and green pulsed lasers were partially offset by decreased sales of pulsed lasers with lower average power.

- QCW laser sales decreased due to lower demand for fine cutting from consumer electronics applications partially offset by increased sales for welding and drilling applications.

- Materials processing sales also increased as a result of higher sales and service related sales which are included in above.

Sales for other applications increased due to higher sales for telecom applications. The increase in telecom sales was driven by sales from Menara, which we acquired in May 2016, and an increase in amplifier sales used for last mile fiber access

to the home applications. Sales of telecom products are included in Other Revenue. These sales increases were partially offset by a decrease in medical application sales.

Cost of sales and gross margin. Cost of sales increased by $44.5 million, or 10.9%, to $453.9 million in 2016 from $409.4 million in 2015. Our gross margin increased to 54.9% in 2016 from 54.6% in 2015. Gross margin increased due to decreases in the cost of internally manufactured components and increased manufacturing efficiency which have offset decreases in average selling prices. Gross margin also benefited from product mix including increased sales of CW high power lasers with output power of more than 6 kilowatts, high power pulsed lasers and higher power QCW lasers. These benefits were partially offset by a decrease in absorption of manufacturing costs, increased provision for inventory reserves, an increase in expenses related to the amortization of intangibles and the step-up to fair value of inventory acquired in the Menara transaction. Expenses related to provisions for excess or obsolete inventory and other valuation adjustments increased by $7.4 million to $22.8 million, or 2.3% of sales, for the year ended December 31, 2016, as compared to $15.4 million, or 1.7% of sales, for the year ended December 31, 2015.

Sales and marketing expense. Sales and marketing expense increased by $6.6 million, or 20.5%, to $38.4 million in 2016 from $31.9 million in 2015, primarily as a result of an increase in personnel, premises and trade show and exhibitions expense. As a percentage of sales, sales and marketing expense increased to 3.8% in 2016 from 3.5% in 2015.

Research and development expense. Research and development expense increased by $15.2 million, or 24.0%, to $78.6 million in 2016 from $63.3 million in 2015, primarily as a result of an increase in personnel, stock-based compensation, materials, depreciation and other research and development expense. Research and development continues to focus on developing new products, enhancing performance of existing components, improving production processes and developing manufacturing of new components such as crystals and refining production processes to improve manufacturing yields and productivity. New products include lasers that operate at different wavelengths such as UV, visible and mid-IR, lasers with ultrafast pulses, laser based systems for material processing, projection, display and medical as well as accessories such as welding and cutting heads. In addition to new products research and development is focused on enhancing the performance of our existing products by improving their electrical efficiency and increasing their average power. As a percentage of sales, research and development expense increased to 7.8% in 2016 from 7.0% in 2015.

General and administrative expense. General and administrative expense increased by $9.3 million, or 16.3%, to $66.5 million in 2016 from $57.2 million in 2015, primarily as a result of increased expenses for personnel, stock-based compensation, legal, consulting, information technology and travel. It also includes a non-cash impairment charge of $2.9 million related to our corporate aircraft. As a percentage of sales, general and administrative expense increased to 6.6% in 2016 from 6.3% in 2015.

Effect of exchange rates on sales, gross margin and operating expenses. We estimate that if exchange rates had been the same as one year ago, sales in 2016 would have been $16.1 million higher, gross margin would have been $8.6 million higher and operating expenses in total would have been $2.2 million higher. These estimates assume constant exchange rates between fiscal year 2016 and fiscal year 2015 and are calculated using the average exchange rates for the twelve-month period ended December 31, 2015 for the respective currencies, which were US$1=Euro 0.90, US$1=Japanese Yen 121, US$1=Chinese Yuan 6.24 and US$1=Russian Ruble 61.

Loss (gain) on foreign exchange. We incurred a foreign exchange loss of $4.5 million in 2016 as compared to a gain of -$2.6 million in 2015. The change was primarily attributable to the appreciation of the Russian Ruble and depreciation of the Chinese Yuan as compared to the U.S. Dollar partially offset by the depreciation of the Euro as compared to the U.S. Dollar.

Interest income (expense), net. Interest income (expense), net increased to $1.3 million of income in 2016 compared to $0.3 million of expense in 2015 as a result of higher yielding interest and increases in short-term investments.

Other income (expense), net. Other income (expense), net increased to $0.9 million of income in 2016 compared to $0.1 million of expense in 2015 as a result of increased rental income from current occupied spaces in a recently acquired building.

Provision for income taxes. Provision for income taxes was $105.8 million in 2016 compared to $99.6 million in 2015, representing an effective tax rate of 28.9% in 2016 and 29.2% in 2015. The increase in the provision for income taxes was primarily the result of increased income before provision for income taxes. The decrease in effective rate was due to the release of income tax reserves upon the completion of a tax audit, the mix of income earned in various tax jurisdictions, and an increase in the benefit related to research and development tax credits. The legislation enabling research and development credits in the United States was permanently enacted at the end of 2015. The effective rate decrease was partially offset by a $1.6 million deferred tax liability for certain withholding and dividend taxes related to possible distributions from non-U.S. subsidiaries to their non-U.S. parents in 2016.

Net income. Net income attributable to IPG Photonics Corporation increased by $18.6 million to $260.8 million in 2016 from $242.2 million in 2015. Net income attributable to IPG Photonics Corporation as a percentage of our net sales decreased by 1.0% to 25.9% in 2016 from 26.9% in 2015 due to the factors described above.

Liquidity and Capital Resources

Our principal sources of liquidity as of December 31, 2017 consisted of cash and cash equivalents of $909.9 million, short-term investments of $206.3 million, unused credit lines and overdraft facilities of $111.0 million and working capital (excluding cash and cash equivalents and short-term investments) of $439.0 million. This compares to cash and cash equivalents of $623.9 million, short-term investments of $206.8 million, unused credit lines and overdraft facilities of $71.5 million and working capital (excluding cash and cash equivalents and short-term investments) of $312.1 million as of December 31, 2016. The increase in cash and cash equivalents and short-term investments of $285.5 million from $830.7 million to $1,116.2 million relates primarily to cash provided by operating activities in 2017 of $405.4 million, which was partially offset by cash used in investing activities of $170.8 million and cash used in financing activities of $3.4 million.

Short-term investments consist of liquid investments including U.S. government and government agency notes, corporate notes, commercial paper and certificates of deposit with original maturities of greater than three months but less than one year.

Our long-term debt consists of two long-term notes with a combined total outstanding balance at December 31, 2017 of $49.0 million of which $3.6 million is the current portion. We have an unsecured note with an outstanding balance at December 31, 2017 of $22.0 million of which $1.2 million is the current portion. The interest on this unsecured note is variable at 1.20% above LIBOR and is fixed using an interest rate swap at 2.85% per annum. The unsecured note matures in May 2023, at which time the outstanding debt balance will be $15.4 million. We have another note that is secured by our corporate aircraft. The outstanding balance on this secured note at December 31, 2017 was $27.0 million of which $2.4 million is the current portion. The interest rate on this secured note is fixed at 2.74% per annum and it matures in July 2022, at which time the outstanding debt balance will be $15.4 million.

We believe that our existing cash and cash equivalents, short-term investments, our cash flows from operations and our existing lines of credit provide us with the financial flexibility to meet our liquidity and capital needs, as well as to complete certain acquisitions of businesses and technologies. We intend to continue to pursue acquisition opportunities based upon market conditions and the strategic importance and valuation of the target company. We may consider issuing debt to finance acquisitions depending on the timing and size of the acquisition among other reasons. Our future long-term capital requirements will depend on many factors including our level of sales, the impact of economic environment on our sales levels, the timing and extent of spending to support development efforts, the expansion of the global sales and marketing activities, government regulation including trade sanctions, the timing and introduction of new products, the need to ensure access to adequate manufacturing capacity and the continuing market acceptance of our products.

The following table details our line-of-credit facilities as of December 31, 2017:

Description	Available Principal	Interest Rate	Maturity	Security
U.S. Revolving Line of Credit (1)	Up to $50.0 million	LIBOR plus 0.80% to 1.20%, depending on our performance	April 2020	Unsecured
Euro Credit Facilities (Germany) (2)	Euro 50.0 million ($59.9 million)	Euribor plus 0.75% or EONIA 1.00%	July 2020	Unsecured, guaranteed by parent company and Germany subsidiary
Euro Overdraft Facilities (3)	Euro 2.0 million ($2.4 million)	1.0%-6.5%	October 2018	Common pool of assets of Italian subsidiary

(1) This facility is available to certain foreign subsidiaries in their respective local currencies. At December 31, 2017, there were no amounts drawn on this line, however, there were $0.5 million of guarantees issued against the line which reduces total availability.
(2) This facility is available to certain foreign subsidiaries in their respective local currencies. At December 31, 2017, there were no drawings, however, there were $0.8 million of guarantees issued against the line which reduces total availability.
(3) At December 31, 2017, there were no drawings.

Our largest committed credit lines are with Bank of America N.A. and Deutsche Bank AG in the amounts of $50.0 million and $59.9 million (or 50 million Euro as described above), respectively, and neither of them is syndicated.

We are required to meet certain financial covenants associated with our U.S. revolving line of credit and long-term debt facilities. These covenants, tested quarterly, include a debt service coverage ratio and a funded debt to earnings before interest, taxes, depreciation and amortization ("EBITDA") ratio. The debt service coverage covenant requires that we maintain a trailing twelve month ratio of cash flow to debt service that is greater than 1.5:1. Debt service is defined as required principal and interest payments during the period. Debt service in the calculation is decreased by our cash held in the U.S.A. in excess of $50 million up to a maximum of $250 million. Cash flow is defined as EBITDA less unfunded capital expenditures. The funded debt to EBITDA covenant requires that the sum of all indebtedness for borrowed money on a consolidated basis be less than two times our trailing twelve months EBITDA. We were in compliance with all such financial covenants as of and for the three months ended December 31, 2017.

The financial covenants in our loan documents may cause us to not take or to delay investments and actions that we might otherwise undertake because of limits on capital expenditures and amounts that we can borrow or lease. In the event that we do not comply with any one of these covenants, we would be in default under the loan agreement or loan agreements, which may result in acceleration of the debt, cross-defaults on other debt or a reduction in available liquidity, any of which could harm our results of operations and financial condition.

Operating activities. Net cash provided by operating activities increased by $107.7 million to $405.4 million in 2017 from $297.7 million in 2016. Our business has experienced a compounded annual growth rate over the past three years of 22% in net sales and of 20% in net income. In 2017, net sales and net income grew by 40% and 33%, respectively. As the business and net income has grown, cash provided by net income after adding back non-cash charges has increased. This increase has been partially offset by continued increases in working capital to support the growth of the business. Our largest working capital items are inventory and accounts receivable. Items such as accounts payable to third parties, prepaid expenses and other current assets and accrued expenses and other liabilities are not as significant as our working capital investment in accounts receivable and inventory because of the amount of value added within IPG due to our vertically integrated structure. Accruals and payables for personnel costs including bonuses and income and other taxes payable are largely dependent on the timing of payments for those items. The increase in cash flow from operating activities in 2017 primarily resulted from:

- An increase in cash provided by net income after adding back non-cash charges of $512.0 million in 2017 as compared to $372.5 million in 2016; and
- An increase in cash due to an increase in income and other taxes payable of $16.7 million in 2017 compared with a decrease of $10.7 million in 2016; partially offset by
- An increase in cash used by accounts receivable of $63.2 million in 2017 as compared to $11.4 million in 2016 due to higher sales volume and an increase in days sales outstanding; and
- An increase in cash used by inventory of $71.1 million in 2017 as compared to $53.6 million in 2016 due to an increase in inventory to support the sales growth and an increase in days inventory on hand.

Given our vertical integration, rigorous and time-consuming testing procedures for both internally manufactured and externally purchased components and the lead time required to manufacture components used in our finished products, the rate at which we turn inventory has historically been comparatively low when compared to our cost of sales. Also, our historic growth rates required investment in inventories to support future sales and enable us to quote short delivery times to our customers, providing what we believe is a competitive advantage. Furthermore, if there was a disruption to the manufacturing capacity of any of our key technologies, our inventories of components should enable us to continue to build finished products for a reasonable period of time. We believe that we will continue to maintain a relatively high level of inventory compared to our cost of sales. As a result, we expect to have a significant amount of working capital invested in inventory. A reduction in our level of net sales or the rate of growth of our net sales from their current levels would mean that the rate at which we are able to convert our inventory into cash would decrease.

We assess our intention and ability to reinvest the earnings of non-U.S. subsidiaries in those operations. The Tax Act estimated charges include $47.0 million related to the one-time Transition tax on undistributed foreign earnings which is payable over eight years. The provisions of the Tax Act allow for tax free repatriation of undistributed foreign earnings. We have recorded a deferred tax liability of $1.1 million for the state tax effect of future repatriation. In addition, we have a $2.2 million deferred tax liability for certain withholding and dividend taxes related to possible distributions from non-U.S. subsidiaries to their non-U.S. parents. With regard to repatriation of undistributed earnings of non-U.S. subsidiaries back to the U.S., we are currently analyzing our global working capital and cash requirements and the potential additional tax liabilities attributable to a repatriation. We have yet to determine whether we will repatriate earnings. Accordingly, we have not recorded any deferred taxes attributable to repatriation to the U.S. of our investments in its foreign subsidiaries.

Investing activities. Net cash used in investing activities was $170.8 million and $274.4 million in 2017 and 2016, respectively. The cash used in investing activities in 2017 related to $126.5 million for property, plant and equipment including the purchase of a new corporate aircraft and $60.5 million for the acquisition of three businesses during 2017, net of cash acquired. These cash uses were partially offset by $15.9 million of cash generated by the sale of fixed assets, primarily the previous corporate aircraft. The cash used in investing activities in 2016 related to $127.0 million for property, plant and equipment, $100.7 million of net purchases of short-term investments and $47.8 million for the acquisition of two businesses, net of cash acquired.

In 2018, we expect to incur approximately $170 million to $190 million in capital expenditures, excluding acquisitions. Capital expenditures include investments in property, facilities and equipment to add capacity worldwide to support anticipated revenue growth. The timing and extent of any capital expenditures in and between periods can have a significant effect on our cash flow. If we obtain financing for certain projects, our cash expenditures would be reduced in the year of expenditure. Many of the capital expenditure projects that we undertake have long lead times and are difficult to cancel or defer to a later period.

Financing activities. Net cash (used in) provided by financing activities was $(3.4) million and $27.4 million in 2017 and 2016, respectively. The cash used in financing activities in 2017 was primarily related to the purchase of treasury stock of $40.0 million and payments on our long-term borrowings of $19.8 million, the majority of which related to repayment of the long-term note secured by our previous corporate aircraft. These cash uses were partially offset by net proceeds from the exercise of stock options and shares issued under our employee stock purchase plan and proceeds of debt issued to fund the new corporate aircraft purchase. The cash provided by financing activities in 2016 was primarily related to the cash provided by the proceeds on long-term borrowings, the exercise of stock options, issuances under our employee stock purchase plan, the related tax benefits of the exercises, partially offset by the purchase of treasury stock and noncontrolling interest as well as payments on our long-term debt.

Contractual Obligations

The following table describes our contractual obligations as of December 31, 2017 (in thousands):

	Payments Due in				
	Total	Less Than 1 Year	1-3 Years	3-5 Years	More Than 5 Years
Operating lease obligations	$ 17,315	$ 4,734	$ 5,277	$ 1,951	$ 5,353
Purchase obligations	119,960	119,152	404	404	—
Long-term debt obligations (including interest)(1)	50,298	3,654	11,532	35,112	—
Contingent consideration	902	21	881	—	—
Total(2)	$ 188,475	$ 127,561	$ 18,094	$ 37,467	$ 5,353

(1) Interest for long-term debt obligations was calculated including the effect of our fixed rate amounts. The weighted average fixed rate amount was 2.79%

(2) Excludes obligations related to ASC 740, reserves for uncertain tax positions, because we are unable to provide a reasonable estimate of the timing of future payments relating to the remainder of these obligations. See Note 14 to the Consolidated Financial Statements.

Recent Accounting Pronouncements

See Note 1 in the Notes to Consolidated Financial Statements for a full description of recent accounting pronouncements, including the respective dates of adoption or expected adoption and effects on our consolidated financial statements contained in Part IV of this Annual Report.

ITEM 7A. *QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK*

We are exposed to market risk in the ordinary course of business, which consists primarily of interest rate risk associated with our cash and cash equivalents and our debt and foreign exchange rate risk.

Interest rate risk. Our investments have limited exposure to market risk. We maintain a portfolio of cash, cash equivalents and short-term investments, consisting primarily of bank deposits, money market funds, certificates of deposit, corporate notes and government and agency securities. None of these investments have a maturity date in excess of one year. The interest rates are variable and fluctuate with current market conditions. Because of the short-term nature of these instruments, a sudden change in market interest rates would not be expected to have a material impact on our financial condition or results of operations.

We are also exposed to market risk as a result of increases or decreases in the amount of interest expense we must pay on our bank debt and borrowings on our bank credit facilities. Our interest obligations on our long-term debt are fixed. Although our U.S. revolving line of credit and our Euro credit facility have variable rates, we do not believe that a 10% change in market interest rates would have a material impact on our financial position or results of operations.

Exchange rates. Due to our international operations, a significant portion of our net sales, cost of sales and operating expenses are denominated in currencies other than the U.S. Dollar, principally the Euro, the Russian Ruble, the Chinese Yuan and the Japanese Yen. As a result, our international operations give rise to transactional market risk associated with exchange rate movements of the U.S. Dollar, the Euro, the Chinese Yuan, the Japanese Yen, and the Russian Ruble. In 2017 we incurred a loss on foreign exchange transactions of $14.5 million as compared to a loss of $4.5 million in 2016. Management attempts to minimize these exposures by partially or fully off-setting foreign currency denominated assets and liabilities at our subsidiaries that operate in different functional currencies. The effectiveness of this strategy can be limited by the volume of underlying transactions at various subsidiaries and by our ability to accelerate or delay inter-company cash settlements. As a result, we are unable to create a perfect offset of the foreign currency denominated assets and liabilities. Furthermore, if we expect a currency movement to be beneficial to us in the short or medium term, we have, on occasions, chosen not to hedge or otherwise off-set the underlying assets or liabilities. However, it is difficult to predict foreign currency movements accurately. At December 31, 2017, our material foreign currency exposure is net U.S. Dollar denominated assets at subsidiaries where the Euro or the Russian Ruble is the functional currency and U.S. Dollar denominated liabilities where the Chinese Yuan is the functional currency. The net U.S. Dollar denominated assets are comprised of cash, third party receivables, inter-company receivables and inter-company notes offset by third party and inter-company U.S. Dollar denominated payables. The U.S. Dollar denominated liabilities are comprised of inter-company payables. A 5% change in the relative exchange rate of the U.S. Dollar to the Euro applied to the net U.S. Dollar asset balances as of December 31, 2017, would result in a foreign exchange gain of $0.5 million if the U.S. Dollar appreciated and a $0.5 million foreign exchange loss if the U.S. Dollar depreciated.

In addition we are exposed to foreign currency translation risk for those subsidiaries whose functional currency is not the U.S. Dollar as changes in the value of their functional currency relative to the U.S. Dollar can adversely affect the translated amounts of our revenue, expenses, net income, assets and liabilities. As discussed in our Results of Operations, this can, in turn, affect the reported value and relative growth of sales and net income from one period to the next. In addition changes in the translated value of assets and liabilities due to changes in functional currency exchange rates relative to the U.S. Dollar result in foreign currency translation adjustments that are a component of other comprehensive income or loss.

Foreign currency derivative instruments can also be used to hedge exposures and reduce the risks of certain foreign currency transactions; however, these instruments provide only limited protection and can carry significant cost. We have no foreign currency derivative instrument hedges as of December 31, 2017. We will continue to analyze our exposure to currency exchange rate fluctuations and may engage in financial hedging techniques in the future to attempt to minimize the effect of these potential fluctuations. Exchange rate fluctuations may adversely affect our financial results in the future.

ITEM 8. *FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA*

This information is incorporated by reference from pages F-1 through F-27 of this report.

ITEM 9. *CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE*

None.

ITEM 9A. *CONTROLS AND PROCEDURES*

Evaluation of Disclosure Controls and Procedures

Under the supervision of our Chief Executive Officer and our Chief Financial Officer, our management has evaluated the effectiveness of the design and operation of our "disclosure controls and procedures" (as defined in Rules 13a-15(e) and 15d-15(e) promulgated under the Securities Exchange Act of 1934, as amended (the "Exchange Act")), as of the end of the period covered by this Annual Report on Form 10-K (the "Evaluation Date") utilizing the Committee of Sponsoring Organizations of the Treadway Commission's Internal Control - Integrated Framework ("COSO") Updated Framework issued in 2013. Based upon that evaluation, our Chief Executive Officer and our Chief Financial Officer have concluded that, as of the Evaluation Date, our disclosure controls and procedures are effective to ensure that information we are required to disclose in reports that we file or submit under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by an issuer in the reports that it files or submits under the Exchange Act is accumulated and communicated to the issuer's management, including its principal executive and principal

financial officers, or persons performing similar functions, as appropriate to allow timely decisions regarding required disclosure.

Management's Annual Report on Internal Control Over Financial Reporting

Our management, including our Chief Executive Officer and Chief Financial Officer, is responsible for establishing and maintaining adequate internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the Company and its subsidiaries. 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. Our management conducted an assessment of the effectiveness of our internal control over financial reporting as of the Evaluation Date based on criteria established in COSO utilizing the Updated Framework issued in 2013. Based on this assessment, our management concluded that, as of the Evaluation Date, our internal control over financial reporting was effective.

Our independent registered public accounting firm, Deloitte & Touche LLP, has audited our internal control over financial reporting, as stated in their report below.

Changes in Internal Controls

There was no change in our internal control over financial reporting (as defined in Rule 13a-15(f) under the Exchange Act) that occurred during the last fiscal quarter that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

Limitations on Effectiveness of Controls

Our management, including our Chief Executive Officer and Chief Financial Officer, does not expect that the disclosure controls and procedures or internal control over financial reporting will prevent or detect all error and all fraud. A control system, no matter how well designed and operated, can provide only reasonable, not absolute, assurance that the objectives of the control system are met. Further, the design of a control system must reflect the fact that there are resource constraints, and the benefits of controls must be considered relative to their costs. Due to the inherent limitations in all control systems, no evaluation of controls can provide absolute assurance that all control issues, errors and instances of fraud, if any, within the company have been or will be detected.

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Shareholders and the Board of Directors of
IPG Photonics Corporation
Oxford, Massachusetts

Opinion on Internal Control over Financial Reporting

We have audited the internal control over financial reporting of IPG Photonics Corporation and subsidiaries (the "Company") as of December 31, 2017, based on criteria established in *Internal Control - Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2017, based on criteria established in *Internal Control - Integrated Framework (2013)* issued by COSO.

We have also audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated financial statements as of and for the year ended December 31, 2017, of the Company and our report dated February 27, 2018, expressed an unqualified opinion on those financial statements.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying "Management's Annual Report on Internal Control over Financial Reporting." Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. 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, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (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.

/s/ DELOITTE & TOUCHE LLP

Boston, Massachusetts
February 27, 2018

ITEM 9B. ***CONTROLS AND PROCEDURES***

None.

PART III

ITEM 10. ***DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE***

The information required hereunder is incorporated herein by reference to our definitive Proxy Statement to be filed pursuant to Regulation 14A, which Proxy Statement is anticipated to be filed with the SEC within 120 days after December 31, 2017.

ITEM 11. ***EXECUTIVE COMPENSATION***

The information required hereunder is incorporated herein by reference to our definitive Proxy Statement to be filed pursuant to Regulation 14A, which Proxy Statement is anticipated to be filed with the SEC within 120 days after December 31, 2017.

ITEM 12. ***SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS***

The information required hereunder is incorporated herein by reference to our definitive Proxy Statement to be filed pursuant to Regulation 14A, which Proxy Statement is anticipated to be filed with the SEC within 120 days after December 31, 2017, with the exception of the information regarding securities authorized for issuance under our equity compensation plans, which is set forth in Item 5, "Market for the Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities Information Regarding Equity Compensation Plans" and is incorporated herein by reference.

ITEM 13. ***CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE***

The information required hereunder is incorporated herein by reference to our definitive Proxy Statement to be filed pursuant to Regulation 14A, which Proxy Statement is anticipated to be filed with the SEC within 120 days after December 31, 2017.

ITEM 14. ***PRINCIPAL ACCOUNTING FEES AND SERVICES***

The information required hereunder is incorporated herein by reference to our definitive Proxy Statement to be filed pursuant to Regulation 14A, which Proxy Statement is anticipated to be filed with the SEC within 120 days after December 31, 2017.

PART IV

ITEM 15. ***EXHIBITS AND FINANCIAL STATEMENT SCHEDULES***

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

(1) Financial Statements.

See Index to Financial Statements on page F-1.

(2) Financial Statement Schedules.

All schedules are omitted because they are not applicable or the required information is shown on the financial statements or notes thereto.

(3) The exhibits listed in the "Index to Exhibits" preceding the Exhibits attached hereto are filed with this Form 10-K or incorporated by reference as set forth therein.

(b) Exhibits.

See (a)(3) above.

(c) Additional Financial Statement Schedules.

All schedules are omitted because they are not applicable or the required information is shown on the financial statements or notes thereto.

ITEM 16. ***FORM 10-K SUMMARY***

None.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the Registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized, on February 27, 2018.

IPG PHOTONICS CORPORATION

By: /s/ Valentin P. Gapontsev
Valentin P. Gapontsev
Chief Executive Officer and Chairman of the Board

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	
/s/ Valentin P. Gapontsev Valentin P. Gapontsev	Chief Executive Officer, Chairman of the Board and Director (Principal Executive Officer)	February 27, 2018
/s/ Timothy P.V. Mammen Timothy P.V. Mammen	Senior Vice President, Chief Financial Officer (Principal Financial Officer)	February 27, 2018
/s/ Thomas J. Burgomaster Thomas J. Burgomaster	Vice President, Corporate Controller (Principal Accounting Officer)	February 27, 2018
/s/ Michael C. Child Michael C. Child	Director	February 27, 2018
/s/ Henry E. Gauthier Henry E. Gauthier	Director	February 27, 2018
/s/ William S. Hurley William S. Hurley	Director	February 27, 2018
/s/ Catherine P. Lego Catherine P. Lego	Director	February 27, 2018
/s/ Eric Meurice Eric Meurice	Director	February 27, 2018
/s/ John R. Peeler John Peeler	Director	February 27, 2018
/s/ Igor Samartsev Igor Samartsev	Director	February 27, 2018
/s/ Eugene A. Scherbakov Eugene Scherbakov	Director	February 27, 2018
/s/ Thomas J. Seifert Thomas J. Seifert	Director	February 27, 2018

INDEX TO FINANCIAL STATEMENTS

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Shareholders and the Board of Directors of
IPG Photonics Corporation
Oxford, Massachusetts

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of IPG Photonics Corporation and subsidiaries (the "Company") as of December 31, 2017 and 2016, and the related consolidated statements of income, comprehensive income, equity and cash flows for each of the three years in the period ended December 31, 2017, and the related notes (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2017 and 2016, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2017, in conformity with accounting principles generally accepted in the United States of America.

We have also audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2017, based on criteria established in *Internal Control - Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission and our report dated February 27, 2018, expressed an unqualified opinion on the Company's internal control over financial reporting.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ DELOITTE & TOUCHE LLP

Boston, Massachusetts
February 27, 2018

We have served as the Company's auditor since 1999.

IPG PHOTONICS CORPORATION
CONSOLIDATED BALANCE SHEETS

	December 31,	
	2017	2016
	(In thousands, except share and per share data)	
ASSETS		
CURRENT ASSETS:		
Cash and cash equivalents	$ 909,900	$ 623,855
Short-term investments	206,257	206,779
Accounts receivable, net	237,278	155,901
Inventories	307,712	239,010
Prepaid income taxes	44,944	34,128
Prepaid expenses and other current assets	47,919	41,289
Total current assets	1,754,010	1,300,962
DEFERRED INCOME TAXES, NET	26,976	42,442
GOODWILL	55,831	19,828
INTANGIBLE ASSETS, NET	51,223	28,789
PROPERTY, PLANT AND EQUIPMENT, NET	460,206	379,375
OTHER ASSETS	19,009	18,603
TOTAL	$ 2,367,255	$ 1,789,999
LIABILITIES AND EQUITY		
CURRENT LIABILITIES:		
Current portion of long-term debt	$ 3,604	$ 3,188
Accounts payable	35,109	28,048
Accrued expenses and other liabilities	144,417	102,485
Income taxes payable	15,773	24,554
Total current liabilities	198,903	158,275
DEFERRED INCOME TAXES AND OTHER LONG-TERM LIABILITIES	100,652	36,365
LONG-TERM DEBT, NET OF CURRENT PORTION	45,378	37,635
Total liabilities	344,933	232,275
COMMITMENTS AND CONTINGENCIES (NOTE 10)		
IPG PHOTONICS CORPORATION EQUITY:		
Common stock, $0.0001 par value, 175,000,000 shares authorized; 54,007,708 and 53,629,439 shares issued and outstanding, respectively, at December 31, 2017; 53,354,579 and 53,251,805 shares issued and outstanding, respectively, at December 31, 2016	5	5
Treasury stock, at cost (378,269 and 102,774 shares held)	(48,933)	(8,946)
Additional paid-in capital	704,727	650,974
Retained earnings	1,443,867	1,094,108
Accumulated other comprehensive loss	(77,344)	(178,583)
Total IPG Photonics Corporation equity	2,022,322	1,557,558
NONCONTROLLING INTERESTS	—	166
Total equity	2,022,322	1,557,724
TOTAL	$ 2,367,255	$ 1,789,999

See notes to consolidated financial statements.

IPG PHOTONICS CORPORATION

CONSOLIDATED STATEMENTS OF INCOME

	Year Ended December 31,		
	2017	2016	2015
	(in thousands, except per share data)		
NET SALES	$1,408,889	$1,006,173	$ 901,265
COST OF SALES	611,978	453,933	409,388
GROSS PROFIT	796,911	552,240	491,877
OPERATING EXPENSES:			
Sales and marketing	49,801	38,393	31,868
Research and development	100,870	78,552	63,334
General and administrative	80,668	66,486	57,192
Loss (gain) on foreign exchange	14,460	4,496	(2,560)
Total operating expenses	245,799	187,927	149,834
OPERATING INCOME	551,112	364,313	342,043
OTHER INCOME (EXPENSE), Net:			
Interest income (expense), net	737	1,304	(301)
Other income (expense), net	22	948	(125)
Total other income (expense)	759	2,252	(426)
INCOME BEFORE PROVISION FOR INCOME TAXES	551,871	366,565	341,617
PROVISION FOR INCOME TAXES	(204,283)	(105,849)	(99,590)
NET INCOME	347,588	260,716	242,027
LESS: NET LOSS ATTRIBUTABLE TO NONCONTROLLING INTERESTS	(26)	(36)	(127)
NET INCOME ATTRIBUTABLE TO IPG PHOTONICS CORPORATION	$ 347,614	$ 260,752	$ 242,154
NET INCOME ATTRIBUTABLE TO IPG PHOTONICS CORPORATION PER SHARE:			
Basic	$ 6.50	$ 4.91	$ 4.60
Diluted	$ 6.36	$ 4.85	$ 4.53
WEIGHTED AVERAGE SHARES OUTSTANDING:			
Basic	53,495	53,068	52,676
Diluted	54,699	53,797	53,427

See notes to consolidated financial statements.

IPG PHOTONICS CORPORATION

CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME

	Year Ended December 31,		
	2017	2016	2015
	(In thousands)		
Net income	$ 347,588	$ 260,716	$ 242,027
Other comprehensive income (loss), net of tax:			
Translation adjustments	100,999	3,163	(69,314)
Unrealized (loss) gain on derivatives	(58)	49	95
Unrealized loss on available-for-sale investments	(240)	(298)	—
Loss on available-for-sale investments, net of tax reclassified to net income	538	—	—
Total other comprehensive income (loss)	101,239	2,914	(69,219)
Comprehensive income	448,827	263,630	172,808
Comprehensive gain (loss) attributable to noncontrolling interest	31	(21)	(442)
Comprehensive income attributable to IPG Photonics Corporation	$ 448,796	$ 263,651	$ 173,250

See notes to consolidated financial statements.

IPG PHOTONICS CORPORATION
CONSOLIDATED STATEMENTS OF EQUITY

	Year Ended December 31,					
	2017		2016		2015	
	(In thousands, except share data)					
	Shares	Amount	Shares	Amount	Shares	Amount
COMMON STOCK						
Balance, beginning of year	53,251,805	$ 5	52,883,902	$ 5	52,369,688	$ 5
Exercise of stock options and conversion of restricted stock units	617,662	—	430,930	—	477,785	—
Common stock issued under employee stock purchase plan	35,467	—	39,747	—	36,429	—
Purchased common stock	(275,495)	—	(102,774)	—	—	—
Balance, end of period	53,629,439	5	53,251,805	5	52,883,902	5
TREASURY STOCK						
Balance, beginning of year	(102,774)	(8,946)	—	—	—	—
Purchased treasury stock	(275,495)	(39,987)	(102,774)	(8,946)	—	—
Balance, end of period	(378,269)	(48,933)	(102,774)	(8,946)	—	—
ADDITIONAL PAID-IN CAPITAL						
Balance, beginning of year		650,974		607,649		567,617
Stock-based compensation		23,021		21,734		18,989
Common stock issued under employee stock option plan, net of shares withheld for employee taxes and related tax benefit for 2016 and 2015		25,062		18,889		18,582
Proceeds from issuance of common stock issued under employee stock purchase plan		3,592		2,702		2,461
Effect of adopted accounting standards		2,078		—		—
Balance, end of period		704,727		650,974		607,649
RETAINED EARNINGS						
Balance, beginning of year		1,094,108		833,356		591,202
Net income attributable to IPG Photonics Corporation		347,614		260,752		242,154
Effect of adopted accounting standards		2,145		—		—
Balance, end of period		1,443,867		1,094,108		833,356
ACCUMULATED OTHER COMPREHENSIVE LOSS						
Balance, beginning of year		(178,583)		(181,482)		(112,263)
Translation adjustments		100,999		3,148		(69,314)
Unrealized (loss) gain on derivatives, net of tax		(58)		49		95
Unrealized loss on available-for-sale investments, net of tax		(240)		(298)		—
Realized loss on available-for-sale investments, net of tax, reclassified to net income		538		—		—
Balance, end of period		(77,344)		(178,583)		(181,482)
TOTAL IPG PHOTONICS CORPORATION EQUITY		2,022,322		1,557,558		1,259,528
NONCONTROLLING INTERESTS						
Balance, beginning of year		166		1,137		—
Purchase of NCI		(197)		(950)		—
Attribution to NCI		—		—		1,579
Net loss attributable to NCI		(26)		(36)		(127)
Other comprehensive income (loss) attributable to NCI		57		15		(315)
Balance, end of period		—		166		1,137
TOTAL EQUITY		$2,022,322		$1,557,724		$1,260,665

See notes to consolidated financial statements.

IPG PHOTONICS CORPORATION
CONSOLIDATED STATEMENTS OF CASH FLOWS

	Year Ended December 31,		
	2017	2016	2015
	(In thousands)		
CASH FLOWS FROM OPERATING ACTIVITIES:			
Net income	$ 347,588	$ 260,716	$ 242,027
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation and amortization	64,568	51,475	42,415
Deferred income taxes	22,881	(12,908)	(7,153)
Stock-based compensation	23,021	21,734	18,989
Unrealized losses (gains) on foreign currency transactions	7,949	2,298	(5,491)
Other	986	2,724	510
Provisions for inventory, warranty and bad debt	44,978	46,469	39,985
Changes in assets and liabilities that (used) provided cash, net of acquisitions:			
Accounts receivable	(63,225)	(11,444)	(19,036)
Inventories	(71,080)	(53,626)	(70,565)
Prepaid expenses and other current assets	(911)	(4,069)	1,853
Accounts payable	2,309	(407)	9,806
Accrued expenses and other liabilities	9,612	5,480	613
Income and other taxes payable	16,719	(10,746)	9,529
Net cash provided by operating activities	405,395	297,696	263,482
CASH FLOWS FROM INVESTING ACTIVITIES:			
Purchases of property, plant and equipment	(126,535)	(127,042)	(70,119)
Proceeds from sales of property, plant and equipment	15,882	658	164
Proceeds from short-term investments	212,515	198,808	—
Purchases of short-term investments	(211,832)	(299,508)	(106,747)
Acquisitions of businesses, net of cash acquired	(60,483)	(47,792)	(4,958)
Other	(352)	468	93
Net cash used in investing activities	(170,805)	(274,408)	(181,567)
CASH FLOWS FROM FINANCING ACTIVITIES:			
Proceeds from line-of-credit facilities	6,761	7,992	12,887
Payments on line-of-credit facilities	(6,761)	(7,992)	(15,227)
Purchase of noncontrolling interests	(197)	(950)	—
Proceeds on long-term borrowings	28,000	23,750	—
Principal payments on long-term borrowings	(19,842)	(2,594)	(13,333)
Proceeds from issuance of common stock under employee stock option and purchase plans less payments for taxes related to net share settlement of equity awards	28,654	16,183	14,132
Purchase of treasury stock, at cost	(39,987)	(8,946)	—
Net cash (used in) provided by financing activities	(3,372)	27,443	(1,541)
EFFECT OF CHANGES IN EXCHANGE RATES ON CASH AND CASH EQUIVALENTS	54,827	(9,408)	(19,992)
NET INCREASE IN CASH AND CASH EQUIVALENTS	286,045	41,323	60,382
CASH AND CASH EQUIVALENTS — Beginning of period	623,855	582,532	522,150
CASH AND CASH EQUIVALENTS — End of period	$ 909,900	$ 623,855	$ 582,532
SUPPLEMENTAL DISCLOSURES OF CASH FLOW INFORMATION:			
Cash paid for interest	$ 2,583	$ 942	$ 873
Cash paid for income taxes	$ 155,559	$ 126,964	$ 91,329
Non-cash transactions:			
Demonstration units transferred from inventory to other assets	$ 4,114	$ 6,293	$ 3,181
Property, plant and equipment transferred from inventory	$ 8,425	$ 4,529	$ 2,951
Changes in accounts payable related to property, plant and equipment	$ 1,594	$ 973	$ 350

See notes to consolidated financial statements.

(In thousands, except share and per share data)

1. NATURE OF BUSINESS AND SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Nature of Business — IPG Photonics Corporation (the "Company") is the leading developer and manufacturer of a broad line of high-performance fiber lasers, fiber amplifiers, diode lasers, laser systems and optical accessories that are used for diverse applications, primarily in materials processing. Its world headquarters are located in Oxford, Massachusetts. It also has facilities and sales offices elsewhere in the United States, Europe and Asia.

Principles of Consolidation — The Company was incorporated as a Delaware corporation in December 1998. The accompanying financial statements include the accounts of the Company and its majority-owned subsidiaries. All intercompany accounts and transactions have been eliminated.

Use of Estimates — The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenue and expenses during the reporting period. The Company bases its estimates on historical experience and on various other assumptions that are believed to be reasonable under the circumstances. Actual results could differ from those estimates.

Foreign Currency — The financial information for entities outside the United States is measured using local currencies as the functional currency. Assets and liabilities are translated into U.S. dollars at the exchange rate in effect on the respective balance sheet dates. Income and expenses are translated into U.S. dollars based on the average rate of exchange for the corresponding period. Exchange rate differences resulting from translation adjustments are accounted for directly as a component of accumulated other comprehensive loss.

Cash and Cash Equivalents and Short-Term Investments — Cash and cash equivalents consist primarily of highly liquid investments, such as bank deposits, mutual funds and marketable securities with maturities of three months or less at the date of purchase with insignificant interest rate risk. Short-term investments consist primarily of similar highly liquid investments and marketable securities with insignificant interest rate risks.

Inventories — Inventories are stated at the lower of cost or market on a first-in, first-out basis. Inventories include parts and components that may be specialized in nature and subject to rapid obsolescence. The Company periodically reviews the quantities and carrying values of inventories to assess whether the inventories are recoverable. The costs associated with provisions for excess quantities, technological obsolescence, or component rejections are charged to cost of sales as incurred.

Property, Plant and Equipment — Property, plant and equipment are stated at cost, less accumulated depreciation. Depreciation is determined using the straight-line method based on the estimated useful lives of the related assets. In the case of leasehold improvements, the estimated useful lives of the related assets do not exceed the remaining terms of the corresponding leases. The following table presents the assigned economic useful lives of property, plant and equipment:

Category	Economic Useful Life
Buildings	30 years
Machinery and equipment	5-12 years
Office furniture and fixtures	3-5 years

Expenditures for maintenance and repairs are charged to operating expense.

Long-Lived Assets — Long-lived assets, which consist primarily of property, plant and equipment, are reviewed by management for impairment whenever events or changes in circumstances indicate that the carrying amount may not be recoverable. When undiscounted expected future cash flows are less than the carrying value, an impairment loss is recorded equal to the amount by which the carrying value exceeds the fair value of assets. In the fourth quarter of 2016, the Company began assessing the possible sale of its corporate aircraft included within Property, Plant and Equipment, net in its Consolidated Balance Sheets. As a result of this assessment and certain market indications of the aircraft's value if sold, the Company prepared an impairment analysis of the carrying value of the aircraft as of December 31, 2016. The impairment analysis was probability weighted considering market data available, future cash flows and whether or not the Company would sell the aircraft. The Company prepared an updated impairment analysis in the first quarter of 2017 based on a letter of intent signed for the sale of the aircraft. Based on these analyses the Company recorded impairment losses of $162 and $2,857, which are included in general and administrative expense in its Consolidated Statements of Income for the years ended December 31, 2017 and 2016,

(In thousands, except share and per share data)

respectively. There were no impairment losses for the year ended December 31, 2015. The corporate aircraft was sold during the second quarter of 2017.

Included in other long-term assets is certain demonstration equipment. The demonstration equipment is amortized over the respective estimated economic lives, generally 3 years. The carrying value of the demonstration equipment totaled $6,277 and $6,017 at December 31, 2017 and 2016, respectively. Amortization expense of demonstration equipment for the years ended December 31, 2017, 2016 and 2015, was $3,769, $2,959 and $2,345, respectively.

Goodwill — Goodwill is the amount by which the cost of the acquired net assets in a business acquisition exceeded the fair values of the net identifiable assets on the date of purchase. Goodwill is assessed for impairment at least annually, on a reporting unit basis, or more frequently when events and circumstances occur indicating that the recorded goodwill may be impaired. If the book value of a reporting unit exceeds its fair value, the implied fair value of goodwill is compared with the carrying amount of goodwill. If the carrying amount of goodwill exceeds the implied fair value, an impairment loss is recorded in an amount equal to that excess.

Intangible Assets — Intangible assets result from the Company's various business acquisitions. Intangible assets are reported at cost, net of accumulated amortization, and are amortized on a straight-line basis either over their estimated useful lives of five to thirteen years or over the period the economic benefits of the intangible asset are consumed.

Revenue Recognition — The Company recognizes revenue in accordance with Accounting Standards Codification ("ASC") 605. Revenue from orders with multiple deliverables is divided into separate units of accounting when certain criteria are met. These separate units generally consist of equipment and installation. The consideration for the arrangement is allocated to the separate units of accounting based on their relative selling prices. The selling price of equipment is based on vendor-specific objective evidence, which is the sales price of equipment sold without installation. The selling price of installation is based on third-party evidence, which is the fair value of installation services offered by third parties. Revenue for laser and amplifier sources generally is recognized upon the transfer of ownership, which is typically at the time of shipment. Installation revenue is recognized upon completion of the installation service, which typically occurs within 30 to 90 days of delivery. For laser systems that carry customer specific processing requirements, revenue is recognized at the latter of customer acceptance date or shipment date if the customer acceptance is made prior to shipment. Rights of return generally are not included in sales arrangements. Returns are infrequent and are recorded as a reduction to revenue.

Accounts Receivable and Allowance for Doubtful Accounts — Accounts receivable include $46,123 and $23,975 of bank acceptance drafts at December 31, 2017 and 2016, respectively. Bank acceptance drafts are bank guarantees of payment on specified dates. The weighted average maturity of these bank acceptance drafts is less than 90 days. The Company maintains an allowance for doubtful accounts to provide for the estimated amount of accounts receivable that will not be collected. The allowance is based upon an assessment of customer creditworthiness, historical payment experience and the age of outstanding receivables.

Activity related to the allowance for doubtful accounts was as follows:

	2017	2016	2015
Balance at January 1	$ 2,016	$ 1,811	$ 1,890
Provision for bad debts, net of recoveries	51	111	427
Uncollectable accounts written off	(38)	(76)	(114)
Foreign currency translation	169	170	(392)
Balance at December 31	$ 2,198	$ 2,016	$ 1,811

Warranties — The Company typically provides one to three-year parts and service warranties on lasers and amplifiers. Most of the Company's sales offices provide support to customers in their respective geographic areas. The Company estimates the warranty accrual considering past claims experience, the number of units still covered by warranty and the average life of the remaining warranty period. The warranty accrual has generally been sufficient to cover product warranty repair and replacement costs.

(In thousands, except share and per share data)

Activity related to the warranty accrual was as follows:

	2017	2016	2015
Balance at January 1	$ 33,978	$ 28,210	$ 19,272
Provision for warranty accrual	26,995	22,483	22,808
Warranty claims	(16,250)	(16,220)	(12,208)
Foreign currency translation and other	2,794	(495)	(1,662)
Balance at December 31	$ 47,517	$ 33,978	$ 28,210

Accrued warranty reported in the accompanying consolidated financial statements as of December 31, 2017 and December 31, 2016 consists of $25,059 and $15,711 in accrued expenses and other liabilities and $22,458 and $18,267 in other long-term liabilities, respectively.

Stock-Based Compensation — The Company accounts for stock-based compensation in accordance with ASC 718. Under the fair value recognition provision of ASC 718, the Company accounts for stock-based compensation using the fair value of the awards granted. The Company estimates the fair value of stock options granted using the Black-Scholes model, it values restricted stock units using the intrinsic value method, and it uses a Monte Carlo simulation model to estimate the fair value of market-based performance stock units. The Company amortizes the fair value of stock options and awards on a straight-line basis over the requisite service periods of the awards, which are generally the vesting periods. The Company accounts for forfeitures as they occur. The description of the Company's stock-based employee compensation plans and the assumptions it uses to calculate the fair value of stock-based employee compensation is more fully described in Note 2.

Advertising Expense — The cost of advertising is expensed as incurred. The Company conducts substantially all of its sales and marketing efforts through trade shows, professional and technical conferences, direct sales and our website. The Company's advertising costs were not material for the periods presented.

Research and Development — Research and development costs are expensed as incurred.

Income Taxes — Deferred tax assets and liabilities are recognized for the future tax consequences of temporary differences between the financial statement carrying amounts and tax basis of assets and liabilities and net operating loss and credit carryforwards using enacted rates in effect when those differences are expected to reverse. Valuation allowances are provided against deferred tax assets that are not deemed to be recoverable. The Company recognizes tax positions that are more likely than not to be sustained upon examination by relevant tax authorities. The tax positions are measured at the greatest amount of tax benefit that is more than 50 percent likely to be realized upon ultimate settlement.

The Company provides reserves for potential payments of tax to various tax authorities related to uncertain tax positions and other issues. The reserves are based on a determination of whether and how much of a tax benefit taken in its tax filings or positions is more likely than not to be realized following resolution of uncertainties related to the tax benefit, assuming that the matter in question will be raised by the tax authorities.

Concentration of Credit Risk — Financial instruments that potentially subject the Company to credit risk consist primarily of cash and cash equivalents, short-term investments, auction rate securities and accounts receivable. The Company maintains substantially all of its cash, short-term investments and marketable securities in various financial institutions, which it believes to be high-credit quality financial institutions. The Company grants credit to customers in the ordinary course of business and provides a reserve for potential credit losses. Such losses historically have been within management's expectations (see discussion related to significant customers in Note 15).

Fair Value of Financial Instruments — The Company's financial instruments consist of cash equivalents, short-term investments, accounts receivable, auction rate securities, accounts payable, drawings on revolving lines of credit, long-term debt, interest rate swaps and contingent purchase consideration.

The valuation techniques used to measure fair value are based upon observable and unobservable inputs. Observable inputs reflect market data obtained from independent sources, while unobservable inputs reflect internal market assumptions. These two types of inputs create the following fair value hierarchy: Level 1, defined as observable inputs such as quoted prices for identical instruments in active markets; Level 2, defined as inputs other than quoted prices in active markets that are either directly or indirectly observable; and Level 3, defined as unobservable inputs for which little or no market data exists, therefore requiring an entity to develop its own assumptions.

(In thousands, except share and per share data)

The carrying amounts of cash equivalents, short-term investments, accounts receivable, accounts payable and drawings on revolving lines of credit are considered reasonable estimates of their fair market value due to the short maturity of most of these instruments or as a result of the competitive market interest rates, which have been negotiated. At December 31, 2017, the Company's long-term notes consisted of a variable rate note and a new fixed rate note, accordingly, the book value of the long-term notes are considered a reasonable estimate of their fair market value.

The following table presents information about the Company's assets and liabilities measured at fair value:

		Fair Value Measurements at December 31, 2017		
	Total	Level 1	Level 2	Level 3
Assets				
Cash equivalents	$ 425,917	$ 425,917	$ —	$ —
Short-term investments	206,161	206,161	—	—
Interest rate swap	16	—	16	—
Auction rate securities	1,016	—	—	1,016
Total assets	$ 633,110	$ 632,078	$ 16	$ 1,016
Liabilities				
Long-term notes	$ 48,982	$ —	$ 48,982	$ —
Contingent purchase consideration	902	—	—	902
Total liabilities	$ 49,884	$ —	$ 48,982	$ 902

		Fair Value Measurements at December 31, 2016		
	Total	Level 1	Level 2	Level 3
Assets				
Cash equivalents	$ 179,699	$ 179,699	$ —	$ —
Short-term investments	206,616	206,616	—	—
Interest rate swap	77	—	77	—
Auction rate securities	1,144	—	—	1,144
Total assets	$ 387,536	$ 386,315	$ 77	$ 1,144
Liabilities				
Long-term notes	$ 41,351	$ —	$ 41,351	$ —
Total liabilities	$ 41,351	$ —	$ 41,351	$ —

Short-term investments consist of liquid investments including U.S. government and government agency notes, corporate notes, commercial paper and certificates of deposit with original maturities of greater than three months but less than one year and are recorded at amortized cost. The fair value of the short-term investments considered available-for-sale as of December 31, 2016 was $41,591. This amount included an unrealized loss of $432. There were no short-term investments considered available-for-sale as of December 31, 2017. The fair value of the short-term investments considered held-to-maturity as of December 31, 2017 and December 31, 2016 was $206,161 and $165,025, respectively, which represents an unrealized loss of $96 and $163, respectively, as compared to the book value recorded on the Consolidated Balance Sheets for the same periods.

The Company entered into an interest rate swap that is designated as a cash flow hedge associated with a new long-term note issued during the second quarter of 2016 that will terminate with the long-term note in May 2023. The fair value at December 31, 2017 for the interest rate swap considered pricing models whose inputs are observable for the securities held by the Company.

Auction rate securities and contingent consideration are measured at fair value on a recurring basis using significant unobservable inputs (Level 3). The fair value of the auction rate securities was determined using prices observed in inactive markets with limited observable data for the securities held by the Company. The auction rate securities are considered available-for-sale securities. They had a cost basis of $1,012 and $1,450 at December 31, 2017 and December 31, 2016, respectively.

(In thousands, except share and per share data)

The fair value of the Company's two outstanding long-term notes was determined using pricing models whose inputs are observable for the securities held by the Company. The fair value of these two debt instruments as of December 31, 2017 and December 31, 2016 was $48,982 and $41,351, respectively, as compared to the book values of $48,982 and $40,823 recorded on the Consolidated Balance Sheets for the same periods.

The fair value of contingent consideration was determined using an income approach at the respective business combination date and at the reporting date. That approach is based on significant inputs that are not observable in the market and include key assumptions such as assessing the probability of meeting certain milestones required to earn the contingent consideration. The business combinations that give rise to contingent consideration are more fully described in Note 12.

The following table presents information about the Company's movement in Level 3 assets and liabilities measured at fair value:

	2017	2016	2015
Auction Rate Securities			
Balance, January 1	$ 1,144	$ 1,136	$ 1,128
Period transactions	(128)	8	8
Balance, December 31	$ 1,016	$ 1,144	$ 1,136
Contingent Purchase Consideration			
Balance, January 1	$ —	$ 20	$ 98
Period transactions	902	(21)	(50)
Change in fair value and currency fluctuations	—	1	(28)
Balance, December 31	$ 902	$ —	$ 20

Comprehensive Income — Comprehensive income includes charges and credits to equity that are not the result of transactions with stockholders. Included within comprehensive income is the cumulative foreign currency translation adjustment, change in carrying value of auction rate securities, unrealized gains or losses on derivatives and unrealized gains or losses on available-for-sale investments. These adjustments are accumulated within the consolidated statements of comprehensive income.

Total components of accumulated other comprehensive loss were as follows:

	December 31,	
	2017	2016
Foreign currency translation adjustments	$ (77,578)	$ (178,577)
Unrealized gain on auction rate securities	232	232
Unrealized gain on derivatives, net of tax of $14 and $28	2	60
Unrealized loss on available-for-sale investments, net of tax of $134 in 2016	—	(298)
Accumulated other comprehensive loss	$ (77,344)	$ (178,583)

Derivative Instruments — The Company's primary market exposures are to interest rates and foreign exchange rates. The Company from time to time may use certain derivative financial instruments to help manage these exposures. The Company executes these instruments with financial institutions it judges to be credit-worthy. The Company does not hold or issue derivative financial instruments for trading or speculative purposes.

The Company recognizes all derivative financial instruments as either assets or liabilities at fair value in the consolidated balance sheets. The Company's only derivative financial instrument is an interest rate swap that is classified as a cash flow hedge of its variable rate debt.

(In thousands, except share and per share data)

The fair value amounts in the consolidated balance sheets were:

Notional Amounts[1]		Other Assets	
December 31,		December 31,	
2017	2016	2017	2016
$ 21,969	$ 23,156	$ 16	$ 77

(1) Notional amounts represent the gross contract/notional amount of the derivative outstanding.

The derivative gains and losses in the consolidated statements of income for the years ended December 31, 2017, 2016 and 2015, related to the Company's current and previous interest rate swap contracts were as follows:

	Year Ended December 31,		
	2017	2016	2015
Effective portion recognized in other comprehensive income (loss), pretax:			
Interest rate swap	$ (61)	$ 85	$ 304
Effective portion reclassified from other comprehensive income (loss) to interest expense, pretax:			
Interest rate swap	$ —	$ (8)	$ (153)
Ineffective portion recognized in income:			
Interest rate swap	$ —	$ —	$ —

Business Segment Information — The Company operates in one segment which involves the design, development, production and distribution of fiber lasers, laser systems, fiber amplifiers, and related optical components. The Company has a single, company-wide management team that administers all properties as a whole rather than as discrete operating segments. The chief decision maker, who is the Company's chief executive officer, measures financial performance as a single enterprise and not on legal entity or end market basis. Throughout the year, the chief decision maker allocates capital resources on a project-by-project basis across the Company's entire asset base to maximize profitability without regard to legal entity or end market basis. The Company operates in a number of countries throughout the world in a variety of product lines. Information regarding geographic financial information and product lines is provided in Note 15.

Earnings Per Share — The Company computes net income per share in accordance with ASC 260, *Earnings Per Share*.

Recent Accounting Pronouncements —

Adopted Pronouncements —

In March 2016, the FASB issued ASU No. 2016-09, "Compensation - Stock Compensation (Topic 718): Improvements to Employee Share-Based Payment Accounting" ("ASU 2016-09"). ASU 2016-09 was intended to simplify several areas of accounting for share-based compensation arrangements, including income tax impact and classification on the consolidated statement of cash flows. ASU 2016-09 was effective for fiscal years, and interim periods within those years, beginning after December 15, 2016, and the Company adopted this statement effective January 1, 2017. Under ASU 2016-09, excess tax benefits and deficiencies as a result of stock option exercises and restricted stock unit vesting are being recognized as discrete items within income tax expense or benefit in the consolidated statements of comprehensive income in the reporting period in which they occur.

The adoption of ASU 2016-09 also required the cumulative effect of initially applying the standard to be recorded as an adjustment to the opening balance of retained earnings of the annual reporting period that included the date of initial application. This resulted in a cumulative effect increase of $3,464 to retained earnings and deferred tax assets. Also, as a result of the adoption of ASU 2016-09, the Company made an accounting policy election to record forfeitures as they occur rather than by estimating expected forfeitures. The calculated cumulative effect was a decrease in retained earnings of $1,319 and an increase in deferred tax assets and additional paid-in capital of $759 and $2,078, respectively, as of January 1, 2017.

Revenue Recognition Pronouncement Currently Under Evaluation —

In May 2014, the FASB issued Accounting Standards Update ("ASU") No. 2014-09, Revenue from Contracts with Customers (Topic 606) ("ASU 2014-09" or "ASC 606"), which supersedes the revenue recognition requirements in Accounting Standard Codification 605, Revenue Recognition ("ASC 605"). ASU 2014-09 is based on the principle that revenue should be recognized as goods or services are transferred to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. ASU 2014-09 also requires additional disclosure about the nature, amount, timing and uncertainty of revenue and cash flows arising from customer contracts, including significant judgments and changes in judgments. ASU 2014-09 is effective for annual reporting periods beginning after December 15, 2017, including interim periods within such reporting period, with early application permitted. The two permitted transition methods under the new standard are the full retrospective method, in which case the standard would be applied to each prior reporting period presented and the cumulative effect of applying the standard would be recognized at the earliest period presented, or the modified retrospective method, in which case the cumulative effect of applying the standard would be recognized as of the date of initial application.

The Company has elected to adopt ASC 606 using the modified retrospective method as of January 1, 2018. This approach will be applied to all contracts not completed as of January 1, 2018. The adoption of ASC 606 is not expected to have a material effect on the Company's consolidated financial statements, though it will require enhanced footnote disclosures related to customer contracts. Upon the adoption of ASC 606, the Company will change from deferring revenue for installation services in an amount equal to the greater of the cash received or the fair value for installation to deferring the standalone selling price for these services. The Company anticipates this change in the allocation of revenue to the individual performance obligations as of January 1, 2018 will result in a decrease to deferred revenue of between $600 and $900 with an offsetting increase to retained earnings, less the impact of income taxes.

The quantitative ranges provided above are estimates of the expected effects of the Company's adoption of ASC 606. These ranges represent management's best estimates of the effects of adopting ASC 606 at the time of the preparation of this Annual Report on Form 10-K. The actual impact of ASC 606 is subject to change from these estimates.

Other Pronouncements Currently Under Evaluation —

In January 2017, the FASB issued ASU No. 2017-04, "Intangibles—Goodwill and Other (Topic 350)" ("ASU 2017-04"). ASU 2017-04 simplifies the accounting for goodwill impairments by eliminating step 2 from the goodwill impairment test. ASU 2017-04 is effective for public companies for annual reporting periods beginning after December 15, 2020, and interim reporting periods within such period. The amendments should be applied prospectively on or after the effective date and require a disclosure as to the nature of and reason for the change in accounting principle upon transition. Early adoption is allowed for all entities as of January 1, 2017, for annual and any interim impairment tests occurring after January 1, 2017. The Company is currently evaluating the potential impact that the standard will have on its consolidated financial statements upon adoption.

In February 2016, the FASB issued ASU No. 2016-02, "Leases (Topic 842)" ("ASU 2016-02"). ASU 2016-02 requires a lessee to recognize assets and liabilities on the balance sheet for leases with lease terms greater than twelve months. ASU 2016-02 is effective for fiscal years, and interim periods within those years, beginning after December 15, 2018, and early adoption is permitted. The Company is continuing to evaluate the standard but does not expect that it will have a material effect on its consolidated financial statements upon adoption.

In October 2016, the FASB issued ASU No. 2016-16, "Income Taxes (Topic 740) - Intra-Entity Transfers of Assets other than Inventory" ("ASU 2016-16"). ASU 2016-16 eliminates the current exception that prohibits the recognition of current and deferred income tax consequences for intra-entity asset transfers (other than inventory) until the asset has been sold to an outside party. The amendments will be applied on a modified retrospective basis through a cumulative effect adjustment to retained earnings. Deferred tax assets should be assessed to determine if realizable. Disclosures will be required for the (i) reason for and notice of change, (ii) effect of change on income from continuing operations and (iii) cumulative effect of change on retained earnings. Public entities will apply these changes in annual reporting periods beginning after December 15, 2017, and interim reporting periods within such period. Early adoption is permitted. The Company is continuing to evaluate the standard but does not expect that it will have a material effect on its consolidated financial statements upon adoption.

Subsequent Events — The Company has considered the impact of subsequent events through the filing date of these financial statements. There were no events through the filing date of these financial statements required to be disclosed.

(In thousands, except share and per share data)

2. STOCK-BASED COMPENSATION

Stock-based compensation is included in the following financial statement captions:

	Year Ended December 31,		
	2017	2016	2015
Cost of sales	$ 5,863	$ 6,018	$ 5,316
Sales and marketing	2,041	1,820	1,998
Research and development	5,001	4,905	4,049
General and administrative	10,116	8,991	7,626
Total stock-based compensation	23,021	21,734	18,989
Tax benefit recognized	(7,367)	(6,971)	(6,141)
Net stock-based compensation	$ 15,654	$ 14,763	$ 12,848

Incentive Plans — In February 2006, the Company's board of directors adopted the 2006 Incentive Compensation Plan (the "2006 Plan"), which provides for the issuance of stock options, restricted stock units, performance stock units, other equity-based awards and cash awards to the Company's directors, employees, consultants and advisors. In June 2006, the Company's board of directors adopted the Non-Employee Directors Stock Plan (the "Directors Plan") for non-employee directors. A total of 10,279,192 shares are reserved under the 2006 Plan. The stockholders approved the 2006 Plan, the Directors Plan and subsequent amendments increasing the authorized shares. At December 31, 2017, 4,089,061 shares of the Company's stock were available for future grant under the 2006 Plan. The Company may grant stock options only at an exercise price equal to or greater than the fair market value of its common stock on the date of grant. Equity awards generally become exercisable over periods of one to four years and generally expire ten years after the date of the grant. The vesting of awards under the the 2006 Plan accelerate following the occurrence of certain change of control events, if the participant's employment is terminated within two years without cause or if the successor entity does not agree to assume existing awards or replace with equivalent value awards. Awards granted to non-employee directors automatically become exercisable upon a change of control. All shares issued under the 2006 Plan and Directors Plan are registered shares, newly issued by the Company.

Compensation cost for all stock-based payment awards is based on the estimated grant-date fair value. The Company allocates and records stock-based compensation expense on a straight-line basis over the requisite service period. Determining the appropriate fair value model and calculating the fair value of stock-based payment awards requires the use of highly subjective assumptions, including the expected life of the stock-based payment awards, stock price volatility and, prior to the adoption of ASU 206-09 effective January 1, 2017, forfeiture rates. The assumptions used in calculating the fair value of stock-based payment awards represent management’s best estimates, but the estimates involve inherent uncertainties and the application of management judgment. As a result, if factors change and the Company uses different assumptions, its stock-based compensation expense could be materially different in the future.

The Company calculates the fair value of stock option grants using the Black-Scholes option pricing model. The assumptions used in the Black-Scholes model or the calculation of compensation were as follows for the years ended December 31.

	2017	2016	2015
Expected term	3.8-5.0 years	4.4-6.1 years	4.4-6.3 years
Volatility	31%-35%	37%-45%	45%-48%
Risk-free rate of return	1.57%-1.97%	1.06%-1.41%	1.38%-1.74%
Dividend yield	0.25%	0.25%	0.25%
Forfeiture rate	—%	2.65%-5.26%	3.47%-5.88%

A summary of option activity is presented below (see Note 11 for further information):

	Number of Options	Weighted-Average Exercise Price	Weighted-Average Remaining Contractual Life	Aggregate Intrinsic Value
			(In years)	(In thousands)
Outstanding — January 1, 2017	2,064,253	$ 60.65		
Granted	293,284	124.57		
Exercised	(546,931)	50.50		
Forfeited	(13,113)	90.81		
Outstanding — December 31, 2017	1,797,493	$ 73.95	6.02	$ 251,970
Unvested — December 31, 2017	962,056	$ 94.96	7.75	$ 114,648
Exercisable — December 31, 2017	835,437	$ 49.76	4.03	$ 137,323

The intrinsic value of the options exercised during the years ended December 31, 2017, 2016 and 2015, was $50,131, $23,315 and $27,207, respectively. The weighted-average grant fair value per share for options granted during the years ended December 31, 2017, 2016 and 2015, was $38.01, $33.08 and $42.78, respectively. The total compensation cost related to non-vested awards not yet recorded at December 31, 2017 was $16,069 which is expected to be recognized over a weighted-average of 2.5 years. The aggregate fair value of awards vested during the year ended December 31, 2017 was $9,182.

The following table summarizes the restricted stock units ("RSU's") activity for the year ended December 31, 2017:

	Number of Shares	Weighted-Average Grant-Date Fair Value	Weighted-Average Remaining Contractual Life	Aggregate Intrinsic Value
			(In years)	(In thousands)
Outstanding — January 1, 2017	366,770	$ 79.72		
Granted	106,764	127.29		
Converted	(90,385)	66.18		
Canceled	(4,888)	90.54		
Outstanding — December 31, 2017	378,261	$ 96.23	7.85	$ 80,997
Unvested — December 31, 2017	378,261	$ 96.23	7.85	$ 80,997

The intrinsic value of the RSU's converted during the years ended December 31, 2017, 2016 and 2015, was $11,684, $3,931 and $3,705, respectively. The weighted-average grant fair value per share for RSU's granted during the years ended December 31, 2017, 2016 and 2015, was $127.29, $81.86 and $95.25, respectively. The total compensation cost related to non-vested awards not yet recorded at December 31, 2017 was $19,408 which is expected to be recognized over a weighted-average of 2.6 years. The aggregate fair value of awards vested during the year ended December 31, 2017 was $5,957.

The Company grants performance stock units to officers. The performance stock unit agreements provide for the award of performance stock units with each unit representing the right to receive one share of the Company's common stock to be issued after the applicable award vesting period. The final number of units awarded, if any, for these performance grants will be determined as of the vesting dates, based upon the Company's total shareholder return over the performance period compared to the Russell 3000 Index and could range from no units to a maximum of twice the amount of awarded units. The weighted-average fair value of these performance units was determined using the Monte Carlo simulation model incorporating the following weighted-average assumptions:

	2017	2016	2015
Expected term	3.0 years	3.0 years	3.2 years
Volatility	13%-31%	13%-32%	12%-36%
Risk-free rate of return	1.49%	0.88%	0.98%
Dividend yield	—%	—%	—%
Weighted-average fair value per share	147.25	88.51	128.42

The following table summarizes the performance stock units ("PSU's") activity for the year ended December 31, 2017:

	Number of Shares	Weighted-Average Grant-Date Fair Value	Weighted-Average Remaining Contractual Life	Aggregate Intrinsic Value
			(In years)	(In thousands)
Outstanding — January 1, 2017	54,505	$ 108.51		
Granted	21,444	147.25		
Converted	—			
Canceled	—			
Outstanding — December 31, 2017	75,949	$ 119.45	8.06	$ 16,263
Unvested — December 31, 2017	75,949	$ 119.45	8.06	$ 16,263

PSU's are included at 100% of target goal; under the terms of the awards, the recipient may earn between 0% and 200% of the awarded units. The total compensation cost related to nonvested awards not yet recorded at December 31, 2017 was $4,543 which is expected to be recognized over a weighted average of 1.9 years.

3. INVENTORIES

Inventories consist of the following:

	December 31,	
	2017	2016
Components and raw materials	$ 145,261	$ 93,284
Work-in-process	43,646	44,723
Finished goods	118,805	101,003
Total	$ 307,712	$ 239,010

The Company recorded inventory provisions totaling $16,946, $22,796 and $15,364 for the years ended December 31, 2017, 2016 and 2015, respectively. These provisions relate to the recoverability of the value of inventories due to technological changes and excess quantities. These provisions are reported as a reduction to components and raw materials and finished goods.

4. PROPERTY, PLANT AND EQUIPMENT

Property, plant, and equipment consist of the following:

	December 31,	
	2017	2016
Land	$ 26,623	$ 21,811
Buildings	267,256	214,830
Machinery and equipment	344,905	279,372
Office furniture and fixtures	55,885	31,210
Construction-in-progress	49,256	59,391
Total property, plant and equipment	743,925	606,614
Accumulated depreciation	(283,719)	(227,239)
Total property, plant and equipment — net	$ 460,206	$ 379,375

The Company recorded depreciation expense of $54,900, $44,757 and $37,796 for the years ended December 31, 2017, 2016 and 2015, respectively.

(In thousands, except share and per share data)

5. ACCRUED EXPENSES AND OTHER LIABILITIES

Accrued expenses and other liabilities consist of the following:

	December 31,	
	2017	2016
Accrued compensation	$ 63,203	$ 43,761
Customer deposits and deferred revenue	47,324	34,571
Current portion of accrued warranty	25,059	15,711
Other	8,831	8,442
Total	$ 144,417	$ 102,485

6. FINANCING ARRANGEMENTS

The Company's borrowings under existing financing arrangements consist of the following:

	December 31,	
	2017	2016
Term debt:		
Long-term notes	$ 48,982	$ 40,823
Less: current portion	(3,604)	(3,188)
Total long-term debt	$ 45,378	$ 37,635

Term Debt:

Long-Term Notes — At December 31, 2017, the outstanding principal balance on the long-term notes was $48,982 of which $3,604 is the current portion. The Company has an unsecured long-term note of $21,969 of which $1,188 is the current portion. The interest on this unsecured long-term note is variable at 1.20% above LIBOR and is fixed using an interest rate swap at 2.85% per annum. The unsecured long-term note matures in May 2023, at which time the outstanding principal balance will be $15,438. The Company had another note that was secured by the Company's former corporate aircraft. The long-term note secured by the Company's corporate aircraft was repaid in the second quarter of 2017 when the Company sold the aircraft. During the third quarter of 2017, the Company financed its new corporate aircraft with another note that is secured by this corporate aircraft with a outstanding principal balance of $27,013 of which $2,416 is the current portion. The interest on this collateralized long-term note is fixed at 2.74% per annum. The collateralized long-term note matures in July 2022, at which time the outstanding principal balance will be $15,375.

Revolving Line of Credit Facilities:

U.S. Line of Credit — The Company maintains an unsecured revolving line of credit with available principal of up to $50,000, expiring in April 2020. The line of credit bears interest at a variable rate of LIBOR plus 0.80% to 1.20% depending on the Company's financial performance. Part of this credit facility is available to the Company's foreign subsidiaries including those in India, China, Japan and South Korea based on management discretion. At December 31, 2017, there were no outstanding drawings, however there were $520 of guarantees issued against the line which reduced the total availability. At December 31, 2017, the remaining availability under this line was $49,480.

The Company is required to meet certain financial covenants associated with its U.S. line of credit and collateralized long-term note. These covenants, tested quarterly, include a debt service coverage ratio and a funded debt to earnings before interest, taxes, depreciation and amortization ("EBITDA") ratio. The debt service coverage covenant requires the Company to maintain a trailing twelve month ratio of cash flow to debt service that is greater than 1.5:1. Debt service in the calculation is decreased by our cash held in the U.S.A. in excess of $50,000 up to a maximum of $250,000. Cash flow is defined as EBITDA less unfunded capital expenditures. The funded debt to EBITDA covenant requires that the sum of all indebtedness for borrowed money on a consolidated basis be less than three times the Company's trailing twelve months EBITDA.

Euro Line of Credit — The Company maintains an unsecured revolving line of credit with a principal amount of Euro 50,000 ($59,893 at December 31, 2017), expiring in July 2020. The line of credit bears interest at various rates based upon the type of loan. This credit facility is available to the Company's foreign subsidiaries including those in Germany, Russia, China and Italy based on management discretion. At December 31, 2017, there were no drawings, however there were $798 of guarantees issued against the line which reduced the total availability. At December 31, 2017, the remaining availability under this line was $59,095.

Euro Overdraft Facilities — The Company maintains a syndicated overdraft facility with available principal of Euro 500 ($599 at December 31, 2017) with no expiration date. This facility bears interest at market rates that vary depending upon the bank within the syndicate that advances the principal outstanding. At December 31, 2017, there were no outstanding drawings and the aggregate remaining availability under this line was $599.

Other European Facilities — The Company maintains two Euro credit lines in Italy with aggregate available principal of Euro 1,500 ($1,797 as of December 31, 2017) which bear interest at market rates and expire in June and September 2018. At December 31, 2017, there were no outstanding drawings and the aggregate remaining availability under these lines was $1,797. These facilities are collateralized by a common pool of the assets of the Company's Italian subsidiary.

7. NONCONTROLLING INTEREST AND EQUITY

Noncontrolling Interest — Noncontrolling interest reported in the accompanying consolidated financial statements related to an approximate 98% ownership interest in RukhTekh LLC ("RuchTech") at December 31, 2016 and during the first half of 2017. The associated net loss attributable to noncontrolling interest in 2017 and 2016 was $26 and $36, respectively.

The Company purchased a 76% ownership interest in RuchTech in 2015 for $5,000. During 2016, the Company paid an additional $950 to increase its ownership interest in RuchTech to approximately 98%. During 2017, the Company paid an additional $197 to increase its ownership interest in RuchTech to 100%.

Authorized Capital — The Company has authorized capital stock consisting of 175,000,000 shares of common stock, par value $0.0001 per share, and 5,000,000 shares of preferred stock, par value $0.0001 per share. There are no shares of preferred stock outstanding as of December 31, 2017.

8. RELATED-PARTY TRANSACTIONS

The CEO leases the annual right to use 25% of the Company's aircraft under a October 2014 lease, which was superseded by a new lease signed in July 2017 in connection with the purchase of a different aircraft. The new lease expires July 2022. The annual lease rate under the 2017 lease was $924 and future rent payments are adjusted annually. The annual lease rate under the 2014 lease was $651. The CEO paid the Company $753 in 2017 and $651 in both 2016 and 2015 under the aircraft leases. In addition, the CEO directly pays an unrelated flight management firm for the operating costs of his private use including pilot fees, fuel and other costs.

In 2017, 2016 and 2015, the Company purchased various equipment, parts and services from a company for which one of the Company's independent directors is an executive officer. The payments made for such equipment, parts and services for 2017, 2016 and 2015, totaled $2,296, $5,392 and $683, respectively. There were no amounts due to this company at December 31, 2017 or at December 31, 2016. In 2017, the Company sold products of $503 to the same company. No sales were made in either 2016 or 2015.

In 2016, the Company purchased an office building located in Marlborough, Massachusetts from a subsidiary of IP Fibre Devices (UK) Ltd. ("IPFD") for $23,750. The purchase price was based on the fair market value of the building determined using an independent appraisal. The appraisal was commissioned by the Nominating and Corporate Governance Committee of the Board of Directors. The Company's Chief Executive Officer ("CEO") is the managing director of IPFD. The CEO and certain founding members of the Company, which include the Senior Vice President, Chief Technology Officer and the Senior Vice President, Chief Operating Officer and Managing Director of IPG Laser GmbH, own shares in IPFD which is a stockholder of the Company. The Company leased space in the building prior to purchasing it and reimbursed the landlord for its portion of certain operational costs. The Company paid IPFD $443 and $531 for 2016 and 2015, respectively, under the office lease.

In 2015, the Company sold products and services of $497 to OAO "RCE" Laser Processing Center ("Laser Center"), an application development and parts processing company. There were no transactions in 2017 or 2016. The Company's CEO owns approximately 39% of Laser Center, which he acquired from an unrelated third party in 2014.

(In thousands, except share and per share data)

In 2016, the Company sold products of $146 to a separate company with whom another of the Company's independent directors was affiliated. No sales were made in either 2017 or 2015.

9. NET INCOME ATTRIBUTABLE TO IPG PHOTONICS CORPORATION PER SHARE

The following table sets forth the computation of diluted net income attributable to IPG Photonics Corporation per share:

	Year Ended December 31,		
	2017	2016	2015
Net income attributable to IPG Photonics Corporation	$ 347,614	$ 260,752	$ 242,154
Net income attributable to common stockholders	347,614	260,752	242,154
Weighted average shares	53,495	53,068	52,676
Dilutive effect of common stock equivalents	1,204	729	751
Diluted weighted average common shares	54,699	53,797	53,427
Basic net income attributable to IPG Photonics Corporation per share	$ 6.50	$ 4.91	$ 4.60
Basic net income attributable to common stockholders	$ 6.50	$ 4.91	$ 4.60
Diluted net income attributable to IPG Photonics Corporation per share	$ 6.36	$ 4.85	$ 4.53
Diluted net income attributable to common stockholders	$ 6.36	$ 4.85	$ 4.53

For the years ended December 31, 2017, 2016 and 2015, respectively, the computation of diluted weighted average common shares excludes common stock equivalents of 16,104 shares, 60,797 shares and 29,127 shares which includes RSU's of 10,724, 12,711 and 18,171 and PSU's of 0, 809 and 3,369, because the effect would be anti-dilutive.

In July 2016, the Company announced that its Board of Directors authorized a share repurchase program (the "Program") to mitigate the dilutive impact of shares issued upon exercise or release under the Company's various employee and director equity compensation and employee stock purchase plans. Under the Program, the Company's management is authorized to repurchase shares of common stock in an amount not to exceed the number of shares issued to employees and directors under its various employee and director equity compensation and employee stock purchase plans from January 1, 2016 through December 31, 2017. The Program limits aggregate share repurchases to no more than $100,000 over a period ending June 30, 2018.

For the years ended December 31, 2017 and 2016, respectively, the Company repurchased 275,495 shares and 102,774 shares of its common stock with an average price of $145.15 and $87.01 per share in the open market. The impact on the reduction of weighted average shares for years ended December 31, 2017 and 2016 was 160,439 shares and 20,935 shares, respectively.

10. COMMITMENTS AND CONTINGENCIES

Operating Leases — The Company leases certain facilities under cancelable and noncancelable operating lease agreements which expire through April 2041. In addition, it leases capital equipment and automobiles under operating leases. Rent expense for the years ended December 31, 2017, 2016 and 2015, totaled $8,095, $7,091 and $7,365, respectively.

Commitments under the noncancelable lease agreements as of December 31, 2017 are as follows:

Years Ending December 31	Facilities	Equipment and Automobiles	Total
2018	$ 3,395	$ 1,339	$ 4,734
2019	2,369	813	3,182
2020	1,563	532	2,095
2021	907	345	1,252
2022	621	78	699
Thereafter	5,312	41	5,353
Total	$ 14,167	$ 3,148	$ 17,315

(In thousands, except share and per share data)

Employment Agreements — The Company has entered into employment agreements with certain members of senior management. The terms of these agreements are up to three years and include noncompetition, nonsolicitation and nondisclosure provisions, as well as provisions for defined severance for terminations of employment under certain conditions and a change of control of the Company. The Company also maintains a severance plan for certain of its senior management providing for defined severance for terminations of employment under certain conditions and a change of control of the Company.

Contractual Obligations — The Company has entered into various purchase obligations that include agreements for construction of buildings, raw materials and equipment. Obligations under these agreements were $119,960 and $33,072 as of December 31, 2017 and 2016, respectively.

Legal proceedings — From time to time, the Company may be involved in disputes and legal proceedings in the ordinary course of its business. These proceedings may include allegations of infringement of intellectual property, commercial disputes and employment matters. As of December 31, 2017 and through the date of the Company's subsequent review period of February 27, 2018, the Company has no legal proceedings ongoing that management estimates could have a material effect on the Company's Consolidated Financial Statements.

11. EMPLOYEE BENEFIT PLANS

The Company maintains a 401(k) retirement savings plan offered to all of its U.S. employees. The Company makes matching contributions equal to 50% of the employee's contributions, subject to a maximum of 6% of eligible compensation. Compensation expense related to its contribution to the plan for the years ended December 31, 2017, 2016 and 2015, approximated $3,363, $2,509 and $2,021, respectively.

The Company has an employee stock purchase plan offered to its U.S. and German employees. The plan allows employees who participate to purchase shares of common stock through payroll deductions at a 15% discount to the lower of the stock price on the first day or the last day of the six-month purchase period. Payroll deductions may not exceed 10% of the employee's compensation and are subject to other limitations. Compensation expense related to the employee stock purchase plan was $967, $846 and $680 for the years ended December 31, 2017, 2016 and 2015, respectively. As of December 31, 2017, there were 30,328 shares available for issuance under the employee stock purchase plan.

12. BUSINESS COMBINATIONS

The fair values of net tangible assets and intangible assets acquired were based upon the Company's estimates and assumptions at the acquisition dates. The following table summarizes the allocation of the assets acquired and liabilities assumed at the acquisition dates for the year ended December 31, 2017:

	LDD	ILT	OptiGrate	Total
Cash and cash equivalents	$ 1,002	$ 969	$ 3,714	$ 5,685
Assets acquired excluding cash and cash equivalents and deferred tax assets	1,346	14,353	1,351	17,050
Liabilities assumed excluding deferred tax liabilities	(708)	(11,669)	(687)	(13,064)
Deferred tax liabilities, net	—	(4,952)	(2,068)	(7,020)
Intangible assets	3,614	19,140	5,660	28,414
Total identifiable net assets	5,254	17,841	7,970	31,065
Goodwill	4,690	22,415	8,900	36,005
Total purchase price	$ 9,944	$ 40,256	$ 16,870	$ 67,070

During the fourth quarter of 2017, the Company acquired 100% of the shares of Laser Depth Dynamics Inc. (“LDD”). LDD, located in Kingston, Ontario, Canada, provides in-process quality monitoring and control solutions for laser-based welding applications. The purchase price of $9,944, includes contingent consideration of $902 to acquire LDD, representing the fair value on that date. In addition, $948 was held back in escrow for potential post-closing adjustments related to working capital and indemnities provided by the sellers. As a result of the acquisition, the Company recorded intangible assets of $1,006 related to customer relationships with a weighted-average estimated useful life of 6 years and $2,608 related to technology, trademark and tradename with a weighted-average estimated useful life of 6 years. Any excess of the acquisition consideration over the fair value of assets acquired and liabilities assumed is allocated to goodwill, which amounted to $4,690. The goodwill arising from this acquisition will be deductible for tax purposes.

(In thousands, except share and per share data)

The purchase price allocations included in the Company's financial statements are not complete. They represent the preliminary fair value estimates as of December 31, 2017 and are subject to subsequent adjustment as the Company obtains additional information during the measurement period and finalizes its fair value estimates. Any subsequent adjustments to these fair value estimates occurring during the measurement period will result in an adjustment to intangibles or income, as applicable.

During the third quarter of 2017, the Company acquired 100% of the membership units of Innovative Laser Technologies, LLC ("ILT") located in Minneapolis, Minnesota. ILT produces high precision laser-based systems for the medical device industry and other end user markets. The Company paid $40,256 to acquire ILT, which represents the fair value on that date. As a result of the acquisition, the Company recorded intangible assets of $11,660 related to customer relationships with an estimated useful life of 13 years and $7,480 related to technology, trademark and tradename with a weighted-average estimated useful life of 8 years. Any excess of the acquisition consideration over the fair value of assets acquired and liabilities assumed is allocated to goodwill, which amounted to $22,415. The majority of goodwill arising from this acquisition will not be deductible for tax purposes.

During the second quarter of 2017, the Company acquired 100% of the shares of OptiGrate Corporation ("OptiGrate") located in Oviedo, Florida. OptiGrate is a developer and manufacturer of volume Bragg gratings used in the production of lasers and laser diodes. The Company paid $16,870 to acquire OptiGrate, which represents the fair value on that date. Of the purchase price, $1,849 was held back in escrow for potential post-closing adjustments related to working capital and indemnities provided by the sellers. As a result of the acquisition, the Company recorded intangible assets of $1,010 related to customer relationships with an estimated useful life of 4 years and $4,650 related to technology, trademark and tradename with a weighted-average estimated useful life of 9 years. Any excess of the acquisition consideration over the fair value of assets acquired and liabilities assumed is allocated to goodwill, which amounted to $8,900. The goodwill arising from this acquisition will not be deductible for tax purposes.

The following table summarizes the allocation of the assets acquired and liabilities assumed at the acquisition dates for the year ended December 31, 2016:

	BSI	Menara	Total
Cash and cash equivalents	$ —	$ 520	$ 520
Assets acquired excluding cash and cash equivalents and deferred tax assets	219	9,585	9,804
Liabilities assumed excluding deferred tax liabilities	(133)	(1,876)	(2,009)
Deferred tax liabilities, net	—	(123)	(123)
Intangible assets	1,395	19,400	20,795
Total identifiable net assets	1,481	27,506	28,987
Goodwill	—	19,325	19,325
Total purchase price	$ 1,481	$ 46,831	$ 48,312

During the fourth quarter of 2016, the Company acquired BioPhotonic Solutions, Inc. ("BSI") located in East Lansing, Michigan. BSI develops and sells pulse shaping software technology for use in ultrafast lasers. The total purchase price was $1,481, which represents the fair value of BSI on that date. As a result of the acquisition, the Company recorded intangible assets of $1,395 related to patents with an estimated useful life of 7 years.

During the second quarter of 2016, the Company acquired Menara Networks, Inc. ("Menara") located in Dallas, Texas. Menara develops and sells pluggable transceivers used in telecom and data-com networks.The Company paid $46,831 which represents the fair value of Menara on that date. As a result of the acquisition, the Company recorded intangible assets of $9,900 related to technology and tradename with a weighted-average estimated useful life of 7 years and $9,500 related to customer relationships with an estimated useful life of 10 years. Additionally, the Company recorded $19,325 of goodwill related to anticipated expansion of the Company's product offerings within the telecom market. The goodwill arising from this acquisition will not be deductible for tax purposes.

Results of operations for the businesses acquired above have been included in the Company's consolidated financial statements after the date of such acquisitions. Also, proforma results of operations in accordance with authoritative guidance for prior periods have not been presented because the effect of the acquisitions were not material to the Company's prior period consolidated financial results.

(In thousands, except share and per share data)

13. GOODWILL AND INTANGIBLES

The following table sets forth the changes in the carrying amount of goodwill for the years ended December 31, 2017 and 2016:

	December 31, 2017	December 31, 2016
Balance at January 1	$ 19,828	$ 505
Foreign exchange adjustment	(2)	(2)
Total goodwill arising from business combinations	36,005	19,325
Balance at December 31	$ 55,831	$ 19,828

Intangible assets, subject to amortization, consisted of the following:

	December 31, 2017				December 31, 2016			
	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount	Weighted-Average Lives	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount	Weighted-Average Lives
Patents	$ 8,036	$ (5,486)	$ 2,550	8 Years	$ 8,114	$ (4,926)	$ 3,188	7 Years
Customer relationships	26,768	(5,584)	21,184	11 Years	12,727	(3,621)	9,106	9 Years
Production know-how	6,820	(5,035)	1,785	8 Years	6,618	(4,093)	2,525	8 Years
Technology, trademark and tradename	32,564	(6,860)	25,704	8 Years	17,910	(3,940)	13,970	8 Years
	$74,188	$ (22,965)	$51,223		$ 45,369	$ (16,580)	$28,789	

Amortization expense for the years ended December 31, 2017, 2016 and 2015 was $5,899, $3,759 and $2,274, respectively.

The estimated future amortization expense for intangibles as of December 31, 2017 is as follows:

2018	2019	2020	2021	2022	Thereafter	Total
$7,366	$7,318	$6,687	$6,513	$5,657	$17,682	$51,223

Impairment — In accordance with ASC 350-*Intangibles-Goodwill and Other*, the Company assesses the impairment of its long-lived assets including its definite-lived intangible assets and goodwill whenever changes in events or circumstances indicate that the carrying value of such assets may not be recoverable and at least annually for goodwill. During each annual reporting period, the Company assesses for factors that may be present which would cause an impairment review.

As a result of the procedures performed of assessing both qualitative and quantitative factors provide that the goodwill amounts stated as of December 31, 2017, are not impaired.

14. INCOME TAXES

Income before the impact of income taxes for the years ended December 31 consisted of the following:

	2017	2016	2015
U.S.	$ 190,480	$ 103,798	$ 94,242
Foreign	361,391	262,767	247,375
Total	$ 551,871	$ 366,565	$ 341,617

(In thousands, except share and per share data)

The Company's provision for income taxes for the years ended December 31 consisted of the following:

	2017	2016	2015
Current:			
Federal	$ (85,761)	$ (41,407)	$ (30,334)
State	(2,387)	(4,750)	(6,616)
Foreign	(93,254)	(72,600)	(69,793)
Total current	$ (181,402)	$ (118,757)	$ (106,743)
Deferred:			
Federal	$ (12,459)	$ 8,709	$ 6,303
State	(649)	383	312
Foreign	(9,773)	3,816	538
Total deferred	$ (22,881)	$ 12,908	$ 7,153
Provision for income taxes	$ (204,283)	$ (105,849)	$ (99,590)

A reconciliation of income tax expense at the U.S. federal statutory income tax rate to the recorded tax provision for the years ended December 31, is as follows:

	2017	2016	2015
Tax at statutory rate	$ (193,155)	$ (128,298)	$ (119,566)
Non-U.S. rate differential — net	25,795	16,718	15,931
State income taxes — net	(3,413)	(2,640)	(2,094)
Equity Based Stock - Tax Benefit	14,015	—	—
Effect of 2017 U.S. Tax Cuts and Jobs Act	(48,126)	—	—
Effect of changes in enacted tax rates on deferred tax assets and liabilities	(1,281)	(111)	(153)
Nondeductible stock compensation expense	(319)	(296)	(338)
Other nondeductible expenses	(2,350)	(2,307)	(1,039)
Federal and state tax credits	9,210	9,840	8,837
Change in reserves, including interest and penalties	(4,350)	1,105	(1,522)
Change in valuation allowance	51	26	(620)
Other — net	(360)	114	974
	$ (204,283)	$ (105,849)	$ (99,590)

The tax effects of temporary differences that give rise to significant portions of the deferred tax assets and deferred tax liabilities at December 31, are as follows:

	2017	2016	2015
Property, plant and equipment	$ (20,191)	$ (14,122)	$ (8,031)
Inventory provisions	13,437	19,710	14,566
Allowances and accrued liabilities	3,588	5,434	2,590
Other tax credits	10,294	5,027	3,763
Deferred compensation	(5,223)	9,215	5,891
Net operating loss carryforwards	3,993	7,885	923
Valuation allowance	(284)	(662)	(678)
Net deferred tax assets	$ 5,614	$ 32,487	$ 19,024

On December 22, 2017, the U.S. government enacted comprehensive tax legislation commonly referred to as the Tax Cuts and Jobs Act (the "Tax Act"). The Tax Act makes broad and complex changes to the U.S. tax code including, but not limited to, (1) reducing the U.S. federal corporate tax rate from 35% to 21%, (2) requiring a one-time transition tax on certain undistributed earnings of foreign subsidiaries that is payable over eight years, (3) generally eliminating U.S. federal

(In thousands, except share and per share data)

income taxes on dividends from foreign subsidiaries, and (4) bonus depreciation that will allow for full expensing of qualified property.

The Securities and Exchange Commission ("SEC") staff issued Staff Accounting Bulleting ("SAB") 118, which provides guidance on accounting for the tax effects of the Tax Act. SAB 118 provides a measurement period that should not extend beyond one year from the Tax Act enactment date for companies to complete the accounting under ASC 740. In accordance with SAB 118, a company must reflect the income tax effects of those aspects of the Tax Act for which the accounting under ASC 740 is complete. To the extent that a company's accounting for certain income tax effects of the Tax Act is incomplete but it is able to determine a reasonable estimate, it must record a provisional estimate in the financial statements. If a company cannot determine a provisional estimate to be included in the financial statements, it should continue to apply ASC 740 on the basis of the provisions of the tax laws that were in effect immediately before the enactment of the Tax Act.

The Company's accounting for the Deemed Repatriation Transition Tax ("Transition Tax") element of the Tax Act is incomplete. However, the Company was able to make reasonable estimates of certain effects and, therefore, recorded provisional adjustments. The Transition Tax is a tax on previously untaxed accumulated and current earnings and profits ("E&P") of certain of the Company's foreign subsidiaries. To calculate the amount of the Transition Tax, the Company must determine, in addition to other factors, the amount of post-1986 E&P of the relevant subsidiaries, as well as the amount of non-U.S. income taxes paid on such earnings. In connection with the Company's initial analysis of the impact of the Tax Act, it has recorded a discrete net tax expense of $49,407. This net expense consists of $47,000 in federal Transition Tax, $1,126 of associated state tax expense both of which are provisional amounts, and a $1,281 reduction in the valuation of net deferred tax assets related to the decrease in the U.S. federal tax rate. The $47,000 in federal Transition Tax is payable over 8 years, accordingly, $44,366 of this amount is included within other long-term liabilities and the remainder is included in income taxes payable on the Consolidated Balance Sheets in the period ending December 31, 2017.

The Company previously considered the earnings in its non-U.S. subsidiaries to be indefinitely reinvested and, accordingly, recorded no deferred income taxes. The Company is currently analyzing its global working capital and cash requirements and the potential tax liabilities attributable to a repatriation. The Company has yet to determine whether it plans to change its prior assertion and repatriate earnings. Accordingly, the Company has not recorded any deferred taxes attributable to its investments in its foreign subsidiaries except for a $2,225 deferred tax liability for certain withholding and dividend taxes related to possible distributions from non-U.S. subsidiaries to their non-U.S. parents. The Company will record the tax effects of any change in its prior assertion in the period that it completes its analysis and is able to make a reasonable estimate, and disclose any unrecognized deferred tax liability for temporary differences related to its foreign investments, if practicable. While the Transition Tax resulted in the reduction of the excess of the amount for financial reporting over the tax basis in the Company's foreign subsidiaries to approximately $0 and subjected approximately $1,266,000 of undistributed foreign earnings to tax, an actual repatriation from its non-U.S. subsidiaries could still be subject to additional foreign withholding taxes and U.S. state taxes. At December 31, 2016, the cumulative undistributed earnings in non-U.S. subsidiaries were approximately $936,000.

As of December 31, 2017, 2016 and 2015, the Company has state tax credit carry-forwards of $10,294, $5,027 and $3,740, respectively. The state tax credit carry-forwards begin expiring in 2020. In addition, at December 31, 2017, the Company has net operating loss carry-forwards available for future periods of $2,896 related to its UK subsidiary. The UK net operating loss can be carried-forward indefinitely.

The Company's acquisition of Menara in 2016 included net operating loss carry-forwards of $22,242. As of December 31, 2017, the Company has $16,202 of these net operating loss carry-forwards remaining. No valuation allowance has been provided for these carry-forwards as the Company expects to be able to fully utilize them to offset future income.

The following is a tabular reconciliation of the total amounts of unrecognized tax benefits:

	2017	2016	2015
Balance at January 1	$ 6,403	$ 7,579	$ 6,494
Change in prior period positions	(2,240)	(1,876)	33
Additions for tax positions in current period	6,207	700	1,052
Balance at December 31	$ 10,370	$ 6,403	$ 7,579

(In thousands, except share and per share data)

Substantially all of the liability for uncertain tax benefits related to various federal, state and foreign income tax matters, would benefit the Company's effective tax rate, if recognized.

Estimated penalties and interest related to the underpayment of income taxes are ($155), $(163) and $437 for the years ended December 31, 2017, 2016 and 2015, respectively, and are included within the provision for income taxes. Total accrued penalties and interest related to the underpayment of income taxes are $789 and $944 at December 31, 2017 and 2016, respectively.

The Company's uncertain tax positions are related to tax years that remain subject to examination by the relevant taxing authorities. If realized, all of the Company's uncertain tax positions would affect its effective tax rate. Certain of the Company's uncertain tax positions are expected to settle within one year. Open tax years by major jurisdictions are:

• United States	2016 — 2017
• Germany	2013 — 2017
• Russia	2015 — 2017

15. GEOGRAPHIC AND PRODUCT INFORMATION

The Company markets and sells its products throughout the world through both direct sales and distribution channels. The geographic sources of the Company's net sales based on billing addresses of its customers are as follows:

	Year Ended December 31,		
	2017	2016	2015
United States and other North America	$ 165,363	$ 141,184	$ 131,525
Europe:			
Germany	114,608	90,893	93,802
Other including Eastern Europe/CIS	290,067	224,836	189,123
Asia and Australia:			
China	621,283	358,476	311,946
Japan	80,612	88,592	76,033
Other	131,511	100,052	95,494
Rest of World	5,445	2,140	3,342
Total	$ 1,408,889	$ 1,006,173	$ 901,265

Sales are derived from products for different applications: fiber lasers, diode lasers and diodes for materials processing, fiber lasers and amplifiers for advanced applications, fiber amplifiers for communications applications, and fiber lasers for medical applications. Net sales for these product lines are as follows:

	Year Ended December 31,		
	2017	2016	2015
Materials Processing	$ 1,332,607	$ 942,119	$ 849,335
Other Applications	76,282	64,054	51,930
Total	$ 1,408,889	$ 1,006,173	$ 901,265

One customer comprised 13%, 9% and 13% of net sales during the years ended December 31, 2017, 2016 and 2015, respectively. The Company has historically depended on a few customers for a significant percentage of its annual net sales. The composition of this group can change from year to year. Net sales derived from the Company's five largest customers as a percentage of its annual net sales were 28%, 22% and 25% in 2017, 2016 and 2015, respectively.

The geographic locations of the Company's long-lived assets, net, based on physical location of the assets, as of December 31, 2017, 2016 and 2015, are as follows:

	December 31,		
	2017	2016	2015
United States	$ 273,947	$ 230,116	$ 170,981
Russia	87,612	76,966	55,150
Germany	83,826	61,792	53,678
China	8,191	8,096	6,237
Other	20,278	14,116	12,045
	$ 473,854	$ 391,086	$ 298,091

Long lived assets include property, plant and equipment, related deposits on such assets and demonstration equipment.

16. SELECTED QUARTERLY FINANCIAL DATA (UNAUDITED)

2017	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
	(In thousands, except per share data)			
Net sales	$ 285,846	$ 369,373	$ 392,615	$ 361,055
Gross profit	157,267	206,296	224,555	208,793
Net income attributable to IPG Photonics Corporation	74,945	104,116	115,597	52,956
Basic earnings per share	1.40	1.95	2.16	0.99
Diluted earnings per share	1.38	1.91	2.11	0.96

2016	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
	(In thousands, except per share data)			
Net sales	$ 207,248	$ 252,787	$ 266,017	$ 280,121
Gross profit	114,410	137,703	144,791	155,336
Net income attributable to IPG Photonics Corporation	49,326	67,058	69,235	75,133
Basic earnings per share	0.93	1.26	1.30	1.42
Diluted earnings per share	0.92	1.25	1.29	1.39

Net income attributable to IPG Photonics Corporation as well as Basic and Diluted earnings per share in the fourth quarter of the year ended December 31, 2017 were impacted by the legislation that enacted the Tax Act. Refer to Footnote 14 for further explanation.

EXHIBIT

Exhibit Number	Description
3.1	Form of Second Amended and Restated Certificate of Incorporation of the Registrant (incorporated by reference to Exhibit 3.2 to Registration Statement No. 333-136521 filed with the Securities and Exchange Commission (the "Commission") on August 11, 2006)
3.3	Form of Amended and Restated By-laws of the Registrant (incorporated by reference to Exhibit 3.2 to the Registrant's current Report on Form 8-K filed with the Commission on August 22, 2014)
4.1	Specimen Stock Certificate (incorporated by reference to Exhibit 4.1 to Registration Statement No. 333-136521 filed with the Commission on November 14, 2006)
10.1	2006 Incentive Compensation Plan, as amended (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K/A filed with the Commission on February 22, 2017)
10.2	IPG Photonics Corporation Non-Employee Director Compensation Plan, as amended (incorporated by reference to Exhibit 10.5 to the Registrant's Current Report on Form 8-K/A filed with the Commission on February 22, 2017)
10.3	Senior Executive Annual Incentive Plan, as amended (incorporated by reference to Exhibit 10.2 to the Registrant's Current Report on Form 8-K/A filed with the Commission on February 22, 2017)
10.4	2008 Employee Stock Purchase Plan (incorporated by reference to Exhibit 10.8 to the Registrant's Current Report on Form 8-K filed with the Commission on May 13, 2008)
10.5	Amendment to 2008 Employee Stock Purchase Plan (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K filed with the Commission on June 15, 2009)
10.6	Employment Agreement dated October 7, 2013 between the Registrant and Dr. Valentin P. Gapontsev, (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K filed with the Commission on October 15, 2013)
10.7	Service Agreement dated October 7, 2013 between IPG Laser GmbH and Dr. Eugene Scherbakov, (incorporated by reference to Exhibit 10.2 to the Registrant's Current Report on Form 8-K filed with the Commission on October 15, 2013)
10.8	Form of Employment Agreement dated October 7, 2013 between the Registrant and each of Timothy P.V. Mammen, Angelo P. Lopresti and Alexander Ovtchinnikov, (incorporated by reference to Exhibit 10.3 to the Registrant's Current Report on Form 8-K filed with the Commission on October 15, 2013)
10.9	Form of Letter amending Employment Agreements and Confidentiality, Non-Competition and Confirmatory Assignment Agreements between the Registrant and each of the named executive officers and certain other executive officers (incorporated by reference to Exhibit 10.4 to the Registrant's Current Report on Form 8-K/A filed with the Commission on February 22, 2017)
10.10	Form of Indemnification Agreement between the Registrant and each of its Directors and Executive Officers (incorporated by reference to Exhibit 10.3 to Registrant's Current Report on Form 8-K/A filed with the Commission on February 22, 2017)
10.11	Amended and Restated Loan Agreement between the Registrant and Bank of America, N.A., dated as of April 30, 2015 (incorporated by reference to Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q filed with the Commission on May 6, 2015)
10.12	Revolving Credit Note by the Registrant dated as of April 30, 2015 (incorporated by reference to Exhibit 10.2 to the Registrant's Quarterly Report on Form 10-Q filed with the Commission on May 6, 2015)
10.13	First Amendment to the Amended and Restated Loan Agreement, between the Registrant and Bank of America, N.A. dated as of May 19, 2016 (incorporated by reference to Exhibit 10.3 to the Registrant's Current Report on Form 8-K filed with the Commission on May 20, 2016)
10.14	Term Note, between the Registrant and Bank of America, N.A., dated May 19, 2016 (incorporated by reference to Exhibit 10.4 to the Registrant's Current Report on Form 8-K filed with the Commission on May 20, 2016)

Exhibit Number	Description
10.15	Third Amendment to Credit Facility Agreement between IPG Laser GmbH and Deutsche Bank AG, dated November 1, 2016 (incorporated by reference to Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q filed with the Commission on November 2, 2016)
10.16	Annex I (Third Amendment) to Guarantee of IPG Laser GmbH to Deutsche Bank AG dated November 1, 2016 (incorporated by reference to Exhibit 10.2 to the Registrant's Quarterly Report on Form 10-Q filed with the Commission on November 2, 2016)
10.17	Fourth Amendment to Credit Facility Agreement between IPG Laser GmbH and Deutsche Bank AG, dated December 16, 2016 (incorporated by reference to Exhibit 10.43 on the Registrant's Annual Report on Form 10-K filed with the Commission on February 27, 2017)
10.18	Annex I (Fourth Amendment) to Guarantee of IPG Laser GmbH to Deutsche Bank AG dated December 16, 2016 (incorporated by reference to Exhibit 10.44 on the Registrant's Annual Report on Form 10-K filed with the Commission on February 27, 2017)
10.19	Credit Facility Agreement between IPG Laser GmbH and Deutsche Bank AG, dated July 27, 2017 (incorporated by reference to Exhibit 10.1 on Current Report on Form 8-K filed with the Commission on August 1, 2017)
10.20	Annex I to Credit Facility Agreement between IPG Laser GmbH and Deutsche Bank AG, dated July 27, 2017 (incorporated by reference to Exhibit 10.2 on Current Report on Form 8-K filed with the Commission on August 1, 2017)
10.21	Guarantee of the Registrant to Deutsche Bank dated July 27, 2017 (incorporated by reference to Exhibit 10.3 on Current Report on Form 8-K filed with the Commission on August 1, 2017)
10.22	Loan and Aircraft Security Agreement between TVPX Aircraft Solutions, as Trustee under the Trust Pledge Agreement between Registrant and Trustee dated July 27, 2017, and Banc of America Leasing & Capital, LLC dated July 27, 2017
10.23	Promissory Note between TVPX Aircraft Solutions dated July 27, 2017, as Trustee under the Trust Pledge Agreement between Registrant and Trustee dated July 27, 2017, and Banc of America Leasing & Capital, LLC dated July 27, 2017
10.24	Guaranty of the Registrant to Banc of America Lease & Capital, LLC, dated July 27, 2017
21.1	List of Subsidiaries
23.1	Consent of Deloitte & Touche LLP
31.1	Certification of Chief Executive Officer pursuant to Rule 13a-14(a) of the Securities Exchange Act of 1934, as amended
31.2	Certification of Chief Financial Officer pursuant to Rule 13a-14(a) of the Securities Exchange Act of 1934, as amended
32.1	Certification of Chief Executive Officer and Chief Financial Officer pursuant to Section 1350
101.INS	XBRL Instance Document
101.SCH	XBRL Taxonomy Extension Schema
101.CAL	XBRL Taxonomy Extension Calculation Linkbase
101.DEF	XBRL Taxonomy Definition Linkbase
101.LAB	XBRL Taxonomy Extension Label Linkbase
101.PRE	XBRL Taxonomy Extension Presentation Linkbase

NOTICE OF 2018 ANNUAL MEETING AND PROXY STATEMENT

NOTICE OF ANNUAL MEETING OF STOCKHOLDERS

To the Stockholders:

We invite you to attend our annual meeting of stockholders which is being held as follows:

Date:	**June 5, 2018**
Time:	**10:00 a.m. Eastern Time**
Location:	**IPG Photonics Corporation** **50 Old Webster Road** **Oxford, Massachusetts 01540**

At the meeting, we will ask our stockholders to:

1. elect nine directors named in the accompanying proxy statement; and
2. ratify the appointment of Deloitte & Touche LLP as our independent registered public accounting firm for 2018.

Stockholders will also transact any other business that may properly come before the meeting.

You may vote on these matters in person or by proxy. **Whether or not you plan to attend the meeting, we ask that you promptly vote your shares.** Only stockholders of record at the close of business on April 6, 2018 may vote at the meeting.

By order of the Board of Directors
IPG PHOTONICS CORPORATION

Angelo P. Lopresti
Secretary

April 9, 2018
Oxford, Massachusetts

The Notice of Meeting, Proxy Statement and Annual Report on Form 10-K are available free of charge at: *investor.ipgphotonics.com.* On or about April 18, 2018, we will mail to most of our stockholders a notice containing instructions on how to access this proxy statement and our annual report and to vote via the Internet or by telephone.

Table of Contents

PROXY SUMMARY

This summary highlights information available within our proxy statement. You should consider all of the information available in the proxy statement prior to voting your shares. Additional information on the Company's performance in 2017 can be found in our 2017 annual report to stockholders.

2018 Annual Meeting Information

Time and Date: 10:00 a.m. Eastern Time on Tuesday, June 5, 2018
Location: IPG Photonics Corporation, 50 Old Webster Road, Oxford, Massachusetts, 01540
Record Date: April 6, 2018
Voting: Stockholders as of the record date are entitled to vote. Each share of common stock is entitled to one vote for each director nominee and one vote for the other proposal to be voted on.

Voting Your Shares

We encourage you to vote by proxy, even if you plan to attend the annual meeting. Your vote is important. You can vote your shares using one of the following methods:

- Completing and mailing the enclosed proxy card
- Calling (800) 652-8683
- Visiting *www.investorvote.com/ipgp*
- In person at the annual meeting

If you own shares through a bank, broker, trustee, nominee or other institution, they will provide you with our proxy statement and any other solicitation materials, as well as voting instructions.

Items of Business

Proposal	Description	Board Vote Recommendation	Page Reference
1	Elect nine directors named in the proxy statement to serve for a one-year term	FOR	25
2	Ratify Deloitte & Touche LLP as our independent registered public accounting firm for 2018	FOR	48

Director Nominees

Every member of our Board of Directors (the "Board") is elected annually. You are being asked to vote on the election of these nine nominees, all of whom currently serve as directors.

Name	Age	Director Since	Principal Occupation	Independent	Committee Memberships	Experience and Skills
Valentin P. Gapontsev, Ph.D.	79	1990	CEO and Chm. of Bd. *IPG Photonics Corporation*	No	None	• Executive management • Technology • Markets and Applications
Eugene A. Scherbakov, Ph.D.	70	2000	COO *IPG Photonics* Managing Director *IPG Laser GmbH*	No	None	• Operations • Technology • Markets and Applications
Igor Samartsev	55	2006	Chief Technology Officer *IPG Photonics Corporation*	No	None	• Technology • Executive Management
Michael C. Child	63	2000	Senior Advisor *T.A. Associates, Inc.*	Yes	NCGC*	• Management and Operations • Mergers & Acquisitions • Technology Growth Companies
Henry E. Gauthier	77	2006	Former Pres. and Chm. *Coherent, Inc.*	Yes	Audit	• Laser Industry • Financial Expert • Management and Operations
Catherine P. Lego	61	2016	Principal *Lego Ventures, LLC*	Yes	Audit Compensation (Chair)	• Accounting and Finance • Mergers & Acquisitions • Technology Growth Companies
Eric Meurice	61	2014	Former President, CEO and Chairman *ASML Holding NV*	Yes	NCGC* (Chair) Compensation	• Strategy and Strategic Marketing • International Operations • Technology Growth Companies
John R. Peeler	63	2012	CEO and Chm. of Bd. *Veeco Instruments, Inc.*	Yes	Presiding Ind. Director Compensation NCGC*	• Management and Operations • International Operations • Leadership Development
Thomas J. Seifert	54	2014	Chief Financial Officer *Cloudflare, Inc.*	Yes	Audit (Chair) NCGC*	• Accounting and Finance • Financial Expert • Technology Growth Companies

* NCGC is the Nominating and Corporate Governance Committee.

Corporate Governance Summary

The Board:

- is comprised of 70% independent directors
- has a presiding independent director
- is comprised of directors with a broad range of leadership, professional skills, and experiences which, when taken as a whole, is invaluable in evaluating our opportunities and executing them
- meets in executive session at each regularly scheduled Board meeting
- is elected annually
- complies with stock ownership guidelines it adopted to align the interests of directors with stockholders
- adopted a policy that prohibits hedging and limits pledging of Company stock by directors and officers
- engages in an annual self-evaluation process
- oversees risk management with a focus on the most significant risks facing IPG
- regularly considers succession planning to ensure boardroom skills are aligned with IPG's long-term strategic plan

The Audit, Compensation, and Nominating and Corporate Governance Committees:

- are comprised entirely of independent directors; The Audit Committee is comprised of four "financial experts"
- annual review of charters to ensure alignment with evolving Committee responsibilities
- engage in an bi-annual self-evaluation process
- have active Committee member engagement with each director participating in more than 75% of the applicable Committee meetings

Executive Compensation Summary

The Compensation Committee:

- is comprised entirely of independent directors who oversee the executive compensation program
- retains an independent compensation consultant to advise the Committee on the executive compensation program and other compensation matters
- annually reviews the executive compensation program to align it with the stockholder interests
- aligns executive pay with performance consistent with our pay-for-performance philosophy
- balances short-term and long-term incentives including multiple measures of performance
- links executive pay to IPG performance with long-term equity incentives
- designs the compensation program to maximize stockholder value while mitigating short-term risk taking
- caps the maximum amount that can be earned for annual incentives

The Named Executive Officers:

- have a majority of total direct compensation tied to performance, thereby aligning a significant portion of executive compensation payouts with the interest of stockholders
- have no retirement benefits and limited perquisites
- do not receive excise tax gross-up protections
- may not hedge Company stock and are permitted limited pledging
- do not receive single-trigger change of control provisions
- comply with stock ownership guidelines to align the interests of officers with stockholders
- are subject to clawback provisions

PROXY STATEMENT
ANNUAL MEETING OF STOCKHOLDERS

GENERAL INFORMATION ABOUT THE MEETING

The Board of Directors of IPG Photonics Corporation is soliciting proxies from our stockholders in connection with our annual meeting of stockholders to be held on Tuesday, June 5, 2018 and any and all adjournments thereof. No business can be conducted at the annual meeting unless a majority of all outstanding shares entitled to vote are either present in person or represented by proxy at the meeting. As far as we know, the only matters to be brought before the annual meeting are those referred to in this proxy statement. If any additional matters are presented at the annual meeting, the persons named as proxies may vote your shares in their discretion.

This proxy statement and our 2017 annual report are first being made available to stockholders of record on or about April 18, 2018 at *investor.ipgphotonics.com*. Information on the website does not constitute part of this proxy statement.

Unless otherwise noted, the information in this proxy statement covers our 2017 fiscal year (or "fiscal 2017"), which ran from January 1, 2017 through December 31, 2017, and in some cases our 2016 fiscal year (or "fiscal 2016"), which ran from January 1, 2016 through December 31, 2016.

Questions and Answers about the Meeting and Voting

When and Where Is the Annual Meeting?

When:	Tuesday, June 5, 2018, at 10:00 a.m. Eastern Time
Where:	IPG Photonics Corporation 50 Old Webster Road Oxford, Massachusetts 01540

What Matters Am I Being Asked to Vote On at the Meeting and What Vote is Required to Approve Each Matter?

You are being asked to vote on two proposals.

Proposal 1 requests the election of directors. Each director will be elected by the vote of the plurality of the votes cast when a quorum is present. A "plurality of the votes cast" means that the nine persons receiving the greatest number of votes cast "for" will be elected. "Votes cast" excludes "withhold votes" and any broker non-votes (as defined below). Accordingly, withhold votes and broker non-votes will have no effect on Proposal 1. If you hold your shares in "street name," it is critically important that you submit your voting instructions to your bank or broker if you want your shares to count for Proposal 1.

Proposal 2 requests the ratification of the appointment of our independent registered public accounting firm for 2018. The affirmative vote of a majority of the shares which are present at the meeting in person or by proxy, and entitled to vote thereon, is required for approval of Proposal 2. Abstentions have the same effect as voting against Proposal 2.

Who Is Entitled to Vote at the Meeting?

You are entitled to vote at the meeting if you owned IPG Photonics shares (directly or in "street name," as defined below) as of the close of business on April 6, 2018, the record date for the meeting. On that date, 53,732,790 shares of our common stock were outstanding and entitled to vote and no shares of our preferred stock were outstanding. Each share of our common stock is entitled to one vote with respect to each matter on which it is entitled to vote. There is no cumulative voting with respect to any proposal.

What Do I Need to Do If I Plan to Attend the Meeting in Person?

If you plan to attend the annual meeting in person, you must provide proof of your ownership of our common stock and a form of personal identification, such as a driver's license, for admission to the meeting. If you are a stockholder of record, the top half of your proxy card is your admission ticket and will serve as proof of ownership. If you hold your shares in street name, a recent brokerage statement or a letter from your bank or broker are examples of proof of ownership. If you hold your shares in street name and you also wish to be able to vote at the meeting, you must obtain a proxy, executed in your favor, from your bank or broker.

What Is the Difference Between Holding Shares Directly as a Stockholder of Record and Holding Shares in "Street Name" at a Bank or Broker?

Most of our stockholders hold their shares directly through a broker, bank or other nominee rather than directly in their own name. As summarized below, there are differences between shares held of record and those held in "street name."

Stockholder of Record: If your shares are registered directly in your name with our transfer agent, Computershare, N.A., you are considered the stockholder of record with respect to those shares, and the proxy statement and annual report were sent directly to you. As the stockholder of record, you have the right to vote your shares as described herein.

"Street Name" Stockholder: If your shares are held by a bank, broker or other nominee on your behalf, you are considered the beneficial owner of shares held in "street name," and the proxy statement and annual report were forwarded to you by your bank,broker or other nominee who is considered the stockholder of record with respect to those shares. Your bank, broker or other nominee sent to you, as the beneficial owner, a document describing the procedure for voting your shares. You should follow the instructions provided by your bank, broker or other nominee to vote your shares. You are also invited to attend the annual meeting. However, if you wish to be able to vote at the meeting, you must obtain a proxy card, executed in your favor, from your bank, broker or other nominee.

What Does it Mean to Give a Proxy?

Your properly completed proxy/voting instruction card will appoint Valentin P. Gapontsev and Angelo P. Lopresti as proxy holders or your representatives to vote your shares in the manner directed therein by you. Dr. Gapontsev is our Chairman of the Board and Chief Executive Officer. Mr. Lopresti is our Senior Vice President, General Counsel and Secretary. Your proxy permits you to direct the proxy holders to vote "For" or "Withhold" for the nominees for director (Proposal 1), and "For," "Against," or "Abstain" the vote to ratify the appointment of our independent registered accounting firm (Proposal 2).

All of your shares entitled to vote and represented by a properly completed proxy or voting instruction received prior to the meeting and not revoked will be voted at the meeting in accordance with your instruction.

What Happens If I Sign, Date and Return My Proxy But Do Not Specify How I Want My Shares Voted on One of the Proposals?

Stockholder of Record: Your proxy will be counted as a vote "For" all of the nominees for director (Proposal 1), and "For" the vote to ratify the appointment of our independent registered accounting firm (Proposal 2).

"Street Name" Stockholder: Your bank, broker or nominee may vote your shares only on those proposals on which it has discretion to vote. Under New York Stock Exchange rules, your bank, broker or nominee does not have discretion to vote your shares on non-routine matters such as the election of directors (Proposal 1). This is called a "broker non-vote." However, your bank, broker or nominee does have discretion to vote your shares on routine matters such as the vote to ratify the appointment of our independent registered public accounting firm (Proposal 2). Accordingly, if you do not give your bank, broker or nominee specific instructions with respect to Proposal 2, your shares will be voted in such entity's discretion (but only with respect to Proposal 2). We urge you to promptly

provide your bank, broker or nominee with appropriate voting instructions so that all of your shares may be voted at the meeting.

Can I Change My Vote Before the Meeting?

You can change your vote at any time before your proxy is exercised by delivering a properly executed, later-dated proxy (including an internet or telephone vote), by revoking your proxy by written notice to the Secretary of IPG Photonics, or by voting in person at the meeting. If you choose to revoke your proxy by attending the annual meeting, you must vote your shares for revocation to be effective. The method by which you vote by a proxy will in no way limit your right to vote at the meeting if you decide to attend in person.

If your shares are held in street name, please refer to the information forwarded by your bank, broker or nominee for procedures on changing your voting instructions.

Is the Proxy Statement Available on the Internet?

Yes. We are delivering our proxy statement and 2017 annual report pursuant to the Securities and Exchange Commission rules that allow companies to furnish proxy materials to their stockholders over the internet. On or about April 18, 2018, we will mail to our stockholders a notice (the "Notice") containing instruction on how to access this proxy statement and our annual report and to vote via the internet or by telephone. Stockholders can view these documents on the internet by accessing the website at *investor.ipgphotonics.com.*

What does it mean if I receive more than one Notice of Internet Availability of Proxy Materials?

You may receive more than one Notice, more than one e-mail or multiple proxy cards or voting instruction cards. For example, if you hold your shares in more than one brokerage account, you may receive a separate Notice, a separate e-mail or a separate voting instruction card for each brokerage account in which you hold shares. If you are a stockholder of record and your shares are registered in more than one name, you may receive more than one Notice, more than one e-mail or more than one proxy card. To vote all of your shares by proxy, you must complete, sign, date and return each proxy card and voting instruction card that you receive and vote over the internet the shares represented by each Notice that you receive (unless you have requested and received a proxy card or voting instruction card for the shares represented by one or more of those Notices).

Who Is Soliciting my Proxy and Who is Paying for the Cost of this Proxy Solicitation?

The Board of Directors of IPG Photonics is soliciting your proxy to vote at the 2018 annual meeting of stockholders. IPG Photonics will bear the expense of preparing, posting to the internet, printing and mailing this proxy material, as well as the cost of any required solicitation. Our directors, officers or employees may solicit proxies on our behalf. We have not engaged a proxy solicitation firm to assist us in the solicitation of proxies, but we may if we deem it appropriate. In addition, we will reimburse banks, brokers and other custodians, nominees and fiduciaries for reasonable expenses incurred in forwarding proxy materials to beneficial owners of our stock and obtaining their proxies.

Who Counts the Votes?

We have engaged Computershare, N.A. as our independent agent to receive and tabulate stockholder votes. Computershare, N.A. will separately tabulate "For," "Against" and "Withhold" votes, abstentions and broker non-votes. Computershare, N.A. will also act as independent election inspector to certify the results, determine the existence of a quorum and the validity of proxies and ballots, and perform any other acts required under the General Corporation Law of Delaware.

How Can I Vote?

Most stockholders have a choice of voting in one of four ways:

- via the internet,
- using a toll-free telephone number,
- completing a proxy/voting instruction card and mailing it in the postage-paid envelope provided or
- in person at the meeting.

The telephone and internet voting facilities for stockholders of record will close at 1:00 a.m. Central Time on June 5, 2018. The internet and telephone voting procedures are designed to authenticate stockholders by use of a control number and to allow you to confirm that your instructions have been properly recorded.

If you hold your shares in "street name," your bank, broker or other nominee will send you a separate package describing the procedures and options for voting your shares. Please read this information carefully. If you hold your shares in "street name," and wish to vote in person at the annual meeting, you must obtain a "legal proxy" from the organization that holds your shares. A legal proxy is a written document that will authorize you to vote your shares held in "street name" at the annual meeting. Please contact the organization that holds your shares for instructions regarding obtaining a legal proxy. You must bring a copy of the legal proxy to the annual meeting and ask for a ballot when you arrive.

What Is the Quorum Required to Transact Business?

At the close of business on April 6, 2018, the record date, there were 53,732,790 shares of our common stock outstanding. Our by-laws require that a majority of our common stock be represented, in person or by proxy, at the meeting in order to constitute the quorum we need to transact business at the meeting. We will count withhold votes, abstentions and broker non-votes in determining whether a quorum exists.

CORPORATE GOVERNANCE

Significant Corporate Governance Practices and Policies

At IPG Photonics, we believe that strong and effective corporate governance procedures and practices are an extremely important part of our corporate culture. We have summarized several of our corporate governance practices below.

- ***Independent Director Majority and Presiding Independent Director.*** Seven of the ten directors currently on our Board of Directors (the "Board") are non-employees of the Company who meet the independence criteria under the applicable rules of the Securities and Exchange Commission ("SEC") and NASDAQ guidelines. Only independent directors sit on our three standing Board Committees. Several years ago, the Board established the role of a presiding independent director who is elected annually by the independent directors.

- ***Executive Sessions.*** Our Board meets regularly in executive sessions without the presence of management, including our Chairman and Chief Executive Officer. These sessions are led by our Presiding Independent Director.

- ***Annual Election of Entire Board.*** Stockholders elect each director annually. We do not have a classified board.

- ***Related Person Transactions.*** Our Nominating and Corporate Governance Committee is responsible for approving or ratifying transactions involving our Company and related persons and determining if the transaction is in, or not inconsistent with, the best interests of our Company and our stockholders.

- ***Stock Ownership Guidelines.*** Our directors and executive officers are required to own a minimum amount of IPG Photonics shares. We believe that stock ownership requirements align the interests of the directors and officers with our stockholders. Our directors and executive officers fully complied with our guidelines in 2017.

- ***Prohibition on Hedging; Limits on Pledging.*** Our insider trading policy expressly prohibits directors and employees from engaging in short sales of our common stock or buying or selling puts, calls or derivative securities in connection with IPG Photonics shares. The policy also limits the pledging of IPG Photonics shares.

- ***Annual Self-Assessments.*** Our Board engages in annual self-evaluations and our committees perform bi-annual self-assessments to determine if they are functioning effectively.

- ***Oversight of Risk Management.*** As part of its oversight, the entire Board reviews Company strategy and performance and the principal risks involved. The Board allocates risk oversight responsibility among the full Board, the independent directors acting as a group and the three standing committees.

Additional information is provided below regarding these and certain other key corporate governance policies, which we believe enable us to manage our business in accordance with high standards of business practices and in the best interest of our stockholders. Several of our policies may be found at *investor.ipgphotonics.com/corporate-governance/governance-documents*. Note that information on our website does not constitute part of this proxy statement.

Corporate Governance Guidelines

Our Board has adopted Corporate Governance Guidelines that outline, among other matters, the roles and functions of the Board, the responsibilities of various Board committees and the mission of the Board. Each of the Board committees has a written charter that sets forth the purposes, goals and responsibilities of the committees as well as qualification for committee membership, procedures for committee membership, appointment and removal, committee structure and operations and committee reporting to the entire Board.

The Corporate Governance Guidelines provide, among other things, that:

- a majority of our Board must be independent,
- the Presiding Independent Director presides over executive sessions of independent directors,
- the Board appoints all members and chairpersons of the Board committees,
- the Audit, Compensation, and Nominating and Corporate Governance Committees consist solely of independent directors,
- the independent directors meet periodically in executive sessions without the presence of the non-independent directors or members of our management,
- directors may not serve on the boards of more than three other public companies or on more than two other audit committees of public companies,
- evaluation of the Board is conducted annually and
- the Board and key officers should have a meaningful financial stake in the Company.

The Board reviews changing legal and regulatory requirements, evolving best practices and other developments. The Board modifies the Corporate Governance Guidelines and its other corporate governance policies and practices from time to time, as appropriate.

Executive Sessions. Our independent directors meet privately, without employee directors or management present, at least four times during the year. These private sessions are generally held in conjunction with the regular quarterly Board meetings. Other private meetings of the independent directors are held as often as deemed necessary by them. The Audit Committee, the Compensation Committee and the Nominating and Corporate Governance Committee meet without employee directors or management present from time to time as they deem necessary.

Director Meetings and Policy Regarding Board Attendance. It has been the practice of our Board and its committees to hold at least four in-person regular meetings each year. The Board and its committees also have telephone meetings throughout the year. In accordance with our Corporate Governance Guidelines, our directors are expected to prepare for, attend and actively participate in meetings of the Board and its committees. Our directors are expected to spend the time needed at each meeting and to meet as frequently as necessary to properly discharge their responsibilities. We encourage members of our Board to attend annual meetings of stockholders, but we do not have a formal policy requiring them to do so.

Stock Ownership Guidelines. The Board adopted stock ownership guidelines to more closely align the interests of our directors and executive officers with those of our long-term stockholders. Under the guidelines, the following persons are expected to maintain a minimum investment in our common stock as follows: for non-employee directors, the lesser of 3,000 shares or three times their annual cash Board retainer (excluding committee retainers); for the Chief Executive Officer, five times his annual salary; and for senior executive officers, the lesser of 5,000 shares or one times their respective annual salaries. Vested stock options and unvested restricted stock units count toward the stock ownership levels. Indirect ownership of shares through a separate legal entity counts toward fulfillment of the ownership guidelines. These ownership levels are to be achieved no later than four years after the election as a director or as an executive officer, except that prior to such time the director or officer is expected to retain a certain portion of stock issued upon exercise of stock options or vesting of restricted stock units until the minimum ownership levels are attained. All directors and executive officers were in compliance with our stock ownership guidelines as of December 31, 2017.

Board Self-Assessments. The Board conducts annual self-evaluations and the committees conduct bi-annual self-assessments to determine whether they are functioning effectively. The Nominating and Corporate Governance Committee oversees the Board and committee self-assessments. Each committee also reviews its own performance bi-annually and reports the results to the Board. Each committee reviews and reassesses the adequacy of its charter annually and recommends proposed changes to the Board.

Prohibition on Hedging; Limits on Pledging. Under our insider trading policy, no director or employee may engage in shorting shares of our common stock, or buying or selling puts, calls or derivatives related to our common stock. A director or officer of the Company may not pledge shares constituting more than 20% of his or her total stock ownership. Pledges of shares constituting 20% or less of total stock ownership are subject to certain conditions.

Governance Trends and Director Education*.* The Board and its committees proactively monitor legislative and regulatory initiatives, as well as other corporate governance trends and their potential impact on the Company. Each director has access to publications and other resources that cover these matters. In addition, we reimburse relevant director education expenses.

The Board receives presentations from professionals with expertise in corporate law, governance and other related topics.These experts have specialized knowledge of regulatory actions, governance trends and various other corporate governance topics. Additionally, our directors participate in continuing education sessions to remain informed on recent trends applicable to their committee duties. Likewise, newly elected directors attend a comprehensive director orientation program that covers, among other things, our strategy, business structure, financial performance, and competitive landscape. New committee members are also provided training on committee policies, practices and trends. As part of this program, directors are invited to participate in a tour of selected facilities of the Company. To further familiarize directors with our expanding operations, we conduct Board meetings at our major facilities from time to time.

The committees actively engage with senior management and other parties when necessary to further assess the current environment or respond to governance related matters. The Audit Committee, Compensation Committee and Nominating and Corporate Governance Committee each routinely receive updates on matters applicable to their responsibilities from legal counsel, auditors and independent consultants.

Code of Business Conduct. We have a code of business conduct that applies to all of our directors and employees, including our Chief Executive Officer, Chief Financial Officer and other executive officers. Our code of business conduct includes provisions covering conflicts of interest, business gifts and entertainment, outside activities, compliance with laws and regulations, insider trading practices, antitrust laws, payments to government personnel, bribes or kickbacks, corporate record keeping and accounting records. The code of business conduct is posted on our website at *investor.ipgphotonics.com/corporate-governance/governance-documents.*

Procedures for Submitting Complaints. We have procedures to treat complaints regarding accounting, internal accounting controls, auditing matters, fight against bribery, banking, and financial crime, including submission of confidential and anonymous concerns regarding questionable accounting, internal accounting controls or auditing matters raised by our directors, officers and employees. These procedures are posted on our website at *investor.ipgphotonics.com/corporate-governance/governance-documents.*

Board Leadership Structure

As of the date of this proxy statement, the positions of Chairman of the Board and Presiding Independent Director are held by two different individuals. Dr. Gapontsev, our Chief Executive Officer, also serves as the Chairman of the Board. Our independent directors determined several years ago that, for effective board governance, it is important to have a presiding independent director. Mr. Peeler has been selected as the Presiding Independent Director for the term ending June 2018.

Dr. Gapontsev became our Chief Executive Officer and Chairman in 1998. His dual role was created when the Board was first established in 2000. Our directors believe that each of the possible leadership structures for a board has its particular benefits and drawbacks which must be considered in the context of the specific circumstances, culture and challenges facing a company, and that such consideration is the responsibility of a company's board that has a diversity of views and experiences. Our directors come from a variety of organizational backgrounds and have direct experience with a wide range of leadership and management structures. The makeup of our Board puts it in a strong position to evaluate the pros and cons of the various types of board leadership structures and to ultimately decide which form is in the best interests of our stockholders. The independent directors believe that having Dr. Gapontsev serve in both capacities is in the best interest of the Company and its stockholders because it allows Dr. Gapontsev to more effectively execute the Company's strategic initiatives and business plans. He is the founder of the Company and beneficially owns approximately 14% of the Company's common stock. The duality of Dr. Gapontsev's roles as Chairman and Chief Executive Officer creates clear and unambiguous authority, which is essential to effective management. The Board and management can respond more effectively to a distinct line of authority. Further, given that he is closer to the Company's business than any other Board member and he has the benefit of over twenty years of operations and executive management experience within the Company, Dr. Gapontsev is best-positioned to set the Board's agenda and provide leadership. Dr. Gapontsev's extensive scientific and business experience also gives him vast industry knowledge, which the Board believes is critical for the chairman of the board of a company that operates in a highly technical industry. The combined Chairman/Chief Executive structure is a leadership model that has served our stockholders well for many years.

The Board also recognizes the importance of having in place, and building upon, a counterbalancing structure to ensure that it functions in an appropriately independent manner. As a result, the Board enhanced its governance structure several years ago by creating the position of Presiding Independent Director with leadership authority and responsibilities. The duties and responsibilities of the Presiding Independent Director include: setting the agenda for, and leading, executive sessions of the independent directors; providing consolidated feedback from those meetings to the Chairman and Chief Executive Officer; providing input on the agenda for Board meetings; periodically providing feedback on the quality and quantity of information flow from management; having the authority to call meetings of the independent directors; facilitating discussions outside of scheduled Board meetings among the independent directors on key issues as required; serving as a non-exclusive liaison with the Chairman and Chief Executive Officer in consultation with the other independent directors; interviewing Board candidates as appropriate; and leading the determination of the goals and objectives for the Chairman and Chief Executive Officer with the input of the independent directors and the annual performance evaluation for him with the input of the independent directors and providing that evaluation to the Compensation Committee. In the event of a crisis, the Presiding Independent Director would have an increased role in crisis management oversight. The independent directors of our Board elected Mr. Peeler as the Presiding Independent Director for the term ending June 2018, and this position is voted upon annually by our independent directors.

The Board believes that the position and responsibilities of a presiding independent director and the regular use of executive sessions of the independent directors without the Chief Executive Officer or other executive officers present, along with the Company's strong committee system and substantial majority of independent directors, allow the Board to maintain effective oversight.

Risk Oversight

The Board and management recognize that effectively monitoring and managing risk are essential to the successful execution of the Company's strategy. The Board reviews strategy regularly with management and provides input to management. As part of its oversight of operations, the entire Board reviews and discusses the performance of the Company and the principal risks involved in the operations and management of the Company. The Board allocates risk oversight responsibility among the full Board, the independent directors acting as a group and the three standing committees of the Board. The Nominating and Corporate Governance Committee periodically reviews risk oversight matters and responsibilities, then makes recommendations to the Board to allocate risk oversight responsibilities.

The Board as a whole reviews risk management practices and a number of significant risks in the course of its reviews of corporate strategy, management reports and other presentations. The independent directors as a group, the Audit Committee and the Compensation Committee all participate in senior executive succession and resource planning. The standing committees also contribute to succession and resource planning oversight for management. The Audit Committee oversees certain financial risks and recommends guidelines to monitor and control such exposures. The Compensation Committee reviews the Company's executive compensation programs, their effectiveness at both linking executive pay to performance and aligning the interests of our executives and our stockholders, and oversees an entity-wide compensation risk assessment. The Nominating and Corporate Governance Committee reviews significant related person transactions with directors, executives and managers and may conduct negotiations on behalf of the Company in connection with related person transactions and retain independent advisors to assist it. The Board's risk oversight role is independent from the Company's day-to-day management, as more than two-thirds of the current directors are independent and therefore have no conflicts that might discourage critical review of the Company's risks.

Communication with our Board of Directors

Interested parties wishing to write to the Board, a specified director or a committee of the Board should send correspondence to the Office of the Secretary, IPG Photonics Corporation, 50 Old Webster Road, Oxford, Massachusetts 01540. All written communications received in such manner from stockholders of the Company will be forwarded to the members or committee of the Board to whom the communication is directed or, if the communication is not directed to any particular member(s) or committee(s) of the Board, the communication shall be forwarded to all members of the Board.

RELATED PERSON TRANSACTIONS

The Board adopted a related person transaction policy that requires the Company's executive officers, directors, nominees for director and owners of more than 5% of the Company's shares to promptly notify the Secretary in writing of any transaction in which (i) the amount exceeds $100,000, (ii) the Company is, was or is proposed to be a participant and (iii) such person or such person's immediate family members ("Related Persons") has, had or may have a direct or indirect material interest (a "Related Person Transaction"). Subject to certain exceptions in the policy, Related Person Transactions must be brought to the attention of the Nominating and Corporate Governance Committee for an assessment of whether the transaction or proposed transaction should be permitted. In deciding whether to approve or ratify the Related Person Transaction, the Nominating and Corporate Governance Committee considers relevant facts and circumstances. If the Nominating and Corporate Governance Committee determines that a Related Person has a direct or indirect material interest in any such transaction, the Committee must review and approve, ratify or disapprove the Related Person Transaction.

Pursuant to our Corporate Governance Guidelines, we expect each of our directors to ensure that other existing and future commitments do not conflict with or materially interfere with his or her service as a director. Directors are expected to avoid any action, position or interest that conflicts with our interests or gives the appearance of a conflict. In addition, directors are required to inform the chairman of our Nominating and Corporate Governance Committee prior to joining the Board of another public company to ensure that any potential conflicts, excessive time demands or other issues are carefully considered.

The Nominating and Corporate Governance Committee reviewed and approved the following Related Person Transactions which were conducted on an "arm's length" basis with the Company. Members of the Nominating and Corporate Governance Committee having an interest in a transaction excuse themselves for the consideration and approval of the transaction in which they have an interest.

In 2017, the Company purchased from Veeco Instruments Inc. various equipment, parts and services amounting to approximately $2,296,000. Mr. Peeler, a non-employee member of our Board, is the Chief Executive Officer and Chairman of the Board of Directors of Veeco Instruments Inc. For several years before Mr. Peeler was elected to our Board, Veeco Instruments Inc. was a provider of equipment, parts and services to the Company.

Previously, Dr. Gapontsev leased the annual right to use 25% of the Company's corporate aircraft under an October 2014 lease (the "2014 Lease"), which was superseded by a new lease signed in July 2017 (the "2017 Lease") in connection with the purchase of a different aircraft. The 2017 Lease expires in July 2022. The annual lease rate under the 2017 Lease is $924,700 and future rent payments are adjusted annually based upon the costs of operating the aircraft. The annual lease rate under the 2014 Lease was $651,000. Dr. Gapontsev paid the Company $753,000 in 2017 for use of the aircraft, and in addition directly paid an unrelated flight management firm for the direct and incidental operating costs of his private use including pilot fees, fuel and other costs.

BOARD OF DIRECTORS

Mr. William Hurley decided to not stand for re-election to our Board of Directors at our 2018 annual meeting. IPG Photonics extends its sincere appreciation to Mr. Hurley for the valuable contributions he provided to our Company and stockholders during his service as a member of our Board since 2006. The Board currently has set the number of directors at ten. The number of directors will be set at nine directors from and after the 2018 annual meeting.

Nominees for Director

The following table sets forth certain information as of the date of this proxy statement regarding the director nominees. Each of our incumbent directors, other than Mr. Hurley who decided to not stand for re-election, has been nominated by the Board for election at our 2018 annual meeting.

Valentin P. Gapontsev, Ph.D.

Director since 1998
Chief Executive Officer and Chairman of the Board
Age 79

Dr. Gapontsev has been the Chief Executive Officer and Chairman of the Board of IPG since our inception. Prior to founding the company in 1990, Dr. Gapontsev served as senior scientist in laser material physics and head of the laboratory at the Soviet Academy of Science's Institute of Radio Engineering and Electronics in Moscow. In 2006, he was awarded the Ernst & Young® Entrepreneur of the Year Award for Industrial Products and Services in New England, and in 2009, he was awarded the Arthur L. Schawlow Award by the Laser Institute of America. In 2011, he received the Russian Federation National Award in Science and Technology, and he was selected as a Fellow of the Optical Society of America. Dr. Gapontsev holds a Ph.D. in Physics from the Moscow Institute of Physics and Technology.

Key Attributes, Experience and Skills
He is the founder of the Company and has successfully led the Company and the Board since the Company was formed. In the roles of Chief Executive Officer and Chairman of the Board, he has been responsible for formulation and execution of IPG's strategy and providing leadership and oversight of IPG's business during a period of rapid and profitable growth, as well as business contractions. He has over thirty years of academic research experience in the fields of solid state laser materials, laser spectroscopy and non-radiative energy transfer between rare earth ions and is the author of many scientific publications and several international patents. His strategic foresight and entrepreneurial spirit along with his deep scientific understanding has guided the Company's continued growth and technology leadership. Under Dr. Gapontsev's leadership, the Company continues to generate strong revenue and earnings growth.

Eugene A. Scherbakov, Ph.D.

Director since 2000
Chief Operating Officer, Managing Director of IPG Laser GmbH and Senior Vice President of Europe
Age 70

Dr. Scherbakov has served as Chief Operating Officer since February 2017, Managing Director of IPG Laser GmbH, our German subsidiary, since August 2000 and Senior Vice President-Europe since 2013. He served as the Technical Director of IPG Laser from 1995 to August 2000. From 1983 to 1995, Dr. Scherbakov was a senior scientist in fiber optics and head of the optical communications laboratory at the General Physics Institute, Russian Academy of Science in Moscow. Dr. Scherbakov graduated from the Moscow Physics and Technology Institute with an M.S. in Physics. In addition, Dr. Scherbakov attended the Russian Academy of Science in Moscow, where he received a Ph.D. in Quantum Electronics from its Lebedev Physics Institute and a Dr.Sci. degree in Laser Physics from its General Physics Institute.

Key Attributes, Experience and Skills
Dr. Scherbakov has extensive knowledge of the Company's business as Managing Director of IPG Laser GmbH, which produces a large volume of our products and is the source of many developments in products, technology and applications. The leadership and operational expertise of Dr. Scherbakov have contributed to IPG increasing

production, lowering manufacturing costs and maintaining high margins compared to our industry peers. He also has extensive technological knowledge of fiber lasers, their components and the manufacturing process. His service as an executive officer of the Company provides the Board with a detailed understanding of the Company's operations, sales and customers.

Igor Samartsev

Director since 2006
Chief Technology Officer
Age 55

Since 2011, Mr. Samartsev has served as our Chief Technology Officer and since 2005, he was the Deputy General Manager of our Russian subsidiary, NTO IRE-Polus. Prior to that time, he served in technical leadership roles at NTO IRE-Polus. Mr. Samartsev holds an M.S. in Physics from the Moscow Institute of Physics and Technology.

Key Attributes, Experience and Skills
Mr. Samartsev is one of the founders of the Company and has a significant management role in the Company as Chief Technology Officer. As one of the key developers of the technology platform of the Company and leader in the development of many new optical technologies and products that form part of the Company's strategic plan, the Board values Mr. Samartsev's understanding of technology developments at our company.

Michael C. Child

Director since 2000
Independent Director
Age 63
Nominating and Corporate Governance Committee
Directorship at Other Public Company: Finisar Corporation

Since July 1982, Mr. Child has been employed by TA Associates, Inc., a private equity investment firm, where he currently serves as Senior Advisor and, prior to January 2011, he was Managing Director. Mr. Child holds a B.S. in Electrical Engineering from the University of California at Davis and an M.B.A. from the Stanford University Graduate School of Business. From September 2011 until December 2015, Mr. Child was a Lecturer at the Stanford University Graduate School of Business.

Key Attributes, Experience and Skills
Mr. Child is an established and experienced investor, including in technology companies, from his three decades of experience at TA Associates, Inc., a private equity investment firm. Over the course of his career, he has overseen numerous investments and sales of portfolio companies, and served on the boards of public and private companies. He now serves on the board of Finisar Corporation, a developer and manufacturer of optical subsystems and components for networks. Through his experiences, he has gained valuable knowledge in the management, operations and finance of technology growth companies.

Henry E. Gauthier

Director since 2006
Independent Director
Age 77
Audit Committee - Audit Committee Financial Expert

He served as Chairman of the board of directors of Coherent, Inc., a manufacturer of photonics products, from February 1997 to October 2002 and was its President from 1983 to 1996. Mr. Gauthier served as Vice Chairman of the board of directors of Coherent, Inc. from October 2002 to March 2006. Mr. Gauthier was President from February 2005 to May 2005, consultant from January 2004 to February 2005 and June 2005 to December 2006, and Chairman of the board of directors from May 2005 to December 2008, of Reliant Technologies, Inc., which was acquired in December 2008 by Solta Medical, Inc., a manufacturer of medical laser systems. Since July 1996, Mr. Gauthier has served as a principal at Gauthier Consulting. Mr. Gauthier attended the United States Coast Guard

Academy, San Jose State University, and the Executive Institute of the Stanford University Graduate Business School.

Key Attributes, Experience and Skills
Mr. Gauthier has extensive management and operational experience in the laser industry from over two decades as an executive of a large publicly-held laser company, Coherent, Inc., as well as emerging growth companies such as Reliant Technologies, Inc. He has obtained an in-depth knowledge of operations, manufacturing, sales and markets, and finances through his CEO positions at these laser-related companies. Having been a past member of the audit, compensation, and nominating and corporate governance committees of public and private company boards in the technology field, Mr. Gauthier is familiar with a full range of corporate and board functions and lends this experience to the Company's Board as an independent director.

Catherine P. Lego

Director since 2016
Independent Director
Age 61
Audit Committee - Audit Committee Financial Expert
Compensation Committee (Chair)
Directorship at Other Public Companies: Lam Research Corporation and Cypress Semiconductor Corp.

Ms. Lego is principal and founder of Lego Ventures, LLC, a California-based firm that provides consulting services to early-stage technology companies. From 1999 to 2009 Ms. Lego served as the general partner of The Photonics Fund, LLP, a venture capital investment firm focused on early stage investing in component, module and systems companies in the fiber optic telecommunications market. She served as the director of finance and investment analyst at Oak Investment Partners from 1981 to 1984, and as a general partner from 1985 to 1992. Ms. Lego serves on the board of directors of technology company Lam Research Corporation and is the chair of its compensation committee. Also, she is a member of the Board of Directors of Cypress Semiconductor Corp. and its audit committee.

Ms. Lego holds a B.A. in Economics and Biology from Williams College and an M.S. in Accounting from the New York University Stern Graduate School of Business.

Key Attributes, Experience and Skills
Ms. Lego has extensive experience working with advanced technology and semiconductor companies. From her current and prior service on the boards of several technology companies as well as her memberships of other audit, compensation and nominating and corporate governance committees, she is familiar with the issues faced and the processes that boards use to manage growth, risk, accounting, acquisitions, due diligence and integration, compensation and investor relations. In addition, she is a frequent speaker on board governance, ethics and audit quality at directors' colleges and events, including the E&Y Tapestry and KPMG audit committee round tables. Ms. Lego is a member of the NACD's Audit Committee Advisory Council. She brings valuable perspectives on the latest developments in audit, compensation and other matters to the Board.

Eric Meurice

Director since 2014
Independent Director
Age 61
Nominating and Corporate Governance Committee (Chair)
Compensation Committee
Directorship at Other Public Companies: NXP Semiconductor N.V. and UMICORE S.A.

Mr. Meurice was President and Chief Executive Officer of ASML Holding NV, a provider of semiconductor manufacturing equipment and technology, from October 2004 to June 2013, and Chairman until March 2014. From 2001 to 2004, he was Executive Vice President of the Thomson Television Division of Thomson, SA, an electronics manufacturer. From 1995 to 2001, he served as head of Dell Computer's Western, Eastern Europe and EMEA emerging market businesses. Before 1995, he gained significant technology experience at ITT Semiconductors and at Intel Corporation. Mr. Meurice served on the boards of Verigy Ltd. (a manufacturer of semiconductor test equipment), until its acquisition by Advantest Corporation in 2011, and ARM Holdings plc (a semiconductor

intellectual property supplier) from July 2013 to March 2014. He has been on the board of NXP Semiconductors N.V. (a semiconductor company) since April 2014 and of UMICORE S.A. (a recycling and materials company), since April 2015. Mr. Meurice earned a Master's degree in mechanics and energy generation at the Ecole Centrale de Paris, a Master's degree in Economics from la Sorbonne University, Paris, and an M.B.A. from the Stanford University Graduate School of Business.

Key Attributes, Experience and Skills
Mr. Meurice has extensive skills and experience as a manager of several rapidly-growing, complex and global businesses in the capital equipment and electronics fields with several billions of dollars in revenues, most recently as former President and Chief Executive Officer of ASML. He has experience managing a publicly-held company as well as experience on serving on several public company boards in the equipment and technology fields, such as NXP Semiconductor N.V., UMICORE, Verigy, Ltd. and ARM Holdings plc. Mr. Meurice also has a record of proven leadership as a strategic thinker, operator and marketer at the businesses he managed.

John R. Peeler

Director since 2012
Presiding Independent Director
Age 63
Compensation Committee
Nominating and Corporate Governance Committee
Directorship at Other Public Company: Veeco Instruments Inc.

Mr. Peeler has been Chief Executive Officer and a director of Veeco Instruments Inc. since July 2007. He has been serving as its Chairman of the Board since May 2012. Veeco is a developer and manufacturer of MOCVD, molecular beam epitaxy, ion beam and other advanced thin film processes equipment. He was Executive Vice President of JDS Uniphase Corp. ("JDSU") and President of the Communications Test & Measurement Group of JDSU, which he joined upon the closing of JDSU's merger with Acterna, Inc. ("Acterna") in August 2005. Before joining JDSU, Mr. Peeler served as President and Chief Executive Officer of Acterna. He has a B.S. and M.E. in Electrical Engineering from the University of Virginia.

Key Attributes, Experience and Skills
Over the course of his career, Mr. Peeler has managed several high-growth technology companies. In addition, he has developed managerial leadership skills through his position as Chief Executive Officer of Veeco, a publicly-traded company with substantial international operations. His managerial positions have provided him with in-depth knowledge of the service needs of customers in demanding markets, including semiconductor capital equipment, various manufacturing models, marketing and sales. In these roles, he has also been responsible for attracting and incentivizing executives on his team. These experiences have provided him important insights in support of his positions as Presiding Independent Director and a member of the Compensation Committee and the Nominating and Corporate Governance Committee.

Thomas J. Seifert

Director since 2014
Independent Director
Age 54
Audit Committee (Chair) - Audit Committee Financial Expert
Nominating and Corporate Governance Committee
Directorship at Other Public Company: CompuGroup Medical, SE

Mr. Seifert is Chief Financial Officer of Cloudflare, Inc., an internet performance and security provider, from June 2017 to the present. Since February 2018, he is a member of the board of CompuGroup Medical SE, a publicly held company in Germany, which provides software to support medical and organization activities in medical offices and facilities. Mr. Seifert was the Executive Vice President and Chief Financial Officer of Symantec Corporation, a provider of security, backup and availability solutions, from March 2014 to December 2016. Mr. Seifert served as Executive Vice President and Chief Financial Officer of Brightstar Corporation, a wireless distribution and services company, from December 2012 to March 2014. He was Senior Vice President and Chief Financial Officer at Advanced Micro Devices Inc., a semiconductor company, from October 2009 to August 2012, and served as Interim

Chief Executive Officer from January 2011 to September 2012. From October 2008 to August 2009, Mr. Seifert served as Chief Operating Officer and Chief Financial Officer of Qimonda AG, a German memory chip manufacturer, and as Chief Operating Officer from June 2004 to October 2008. He also held executive positions at Infineon AG, White Oak Semiconductor, including the position as Chief Executive Officer, and Altis Semiconductor. Mr. Seifert has a Bachelor's degree and a Master's degree in Business Administration from Friedrich Alexander University and a Master's degree in Mathematics and Economics from Wayne State University.

Key Attributes, Experience and Skills
Mr. Seifert has extensive experience as both an operating executive and chief financial officer of large publicly-held international technology businesses, such as Symantec and Advanced Micro Devices. In these and other senior positions, he developed deep financial and accounting knowledge, as well as managerial leadership skills, in larger organizations. With his background in accounting, finance and management, Mr. Seifert brings broad skills and knowledge to the Board, the Audit Committee, and the Nominating and Corporate Governance Committee including internal controls, mergers and acquisitions and integrations.

Director Independence

Seven of our ten current directors are independent. A predominantly independent Board ensures that the Board is acting objectively and in the best interests of our stockholders. The independent directors also bring expertise and a diversity of perspectives to the Board. The culture of the Board enables directors to openly express their opinions in the boardroom and to raise challenges. The NASDAQ listing standards governing independence require that a majority of the members of the Board be independent as defined by NASDAQ. The Board conducted its annual review of director independence in March 2018. During this review, the Board examined all direct and indirect transactions or relationships between the Company or any of its subsidiaries and each director and any immediate family member of the director and determined that no material relationships with the Company existed during 2017. On the basis of this review, the Board determined that each of the following directors qualifies as an independent director as defined in the NASDAQ guidelines and SEC rules: Michael C. Child, Henry E. Gauthier, William S. Hurley, Catherine P. Lego, Eric Meurice, John R. Peeler and Thomas J. Seifert. The Board is comprised of directors with short and long-term tenures with the Company. Different tenures coupled with an independent and objective Board have provided stockholders with strong financial results.

Standing Committees and Board Committee Membership

The Board has a standing Audit Committee, Compensation Committee and Nominating and Corporate Governance Committee, each composed entirely of non-employee directors determined to be independent under the listing standards of the NASDAQ stock market. Under their written charters adopted by the Board, each of these committees is authorized and assured appropriate funding to retain and consult with external advisors, consultants and counsel.

The table below sets forth the directors who are currently members or chairs of each of the standing Board committees, and the number of meetings held by each committee and the full Board in 2017. All incumbent directors attended 75% or more of the aggregate meetings of the Board and committees on which they served during 2017. We encourage directors to attend the annual meeting of stockholders, but we do not have a formal policy regarding such attendance. Last year, two of the directors in office attended the annual meeting.

	Board of Directors	Audit	Compensation	Nominating and Corporate Governance
Meetings held in 2017	6	7	8	5
Written consents in 2017	2	—	—	1
Valentin P. Gapontsev, Ph.D.	Chair	—	—	—
Michael C. Child	Member	—	—	Member
Henry E. Gauthier	Member	Member	—	—
William S. Hurley	Member	Member	Member	—
Catherine P. Lego	Member	Member	Chair	—
Eric Meurice	Member	—	Member	Chair
John R. Peeler	Member, and Presiding Independent Director	—	Member	Member
Igor Samartsev	Member	—	—	—
Eugene A. Scherbakov, Ph.D.	Member	—	—	—
Thomas J. Seifert	Member	Chair	—	Member

The ***Audit Committee*** assists the Board by providing oversight of financial management, the internal auditor function and the independent auditor and providing oversight with respect to our internal controls including that management is maintaining an adequate system of internal control such that there is reasonable assurance that assets are safeguarded and that financial reports are properly prepared; that there is consistent application of generally accepted accounting principles; and that there is compliance with management's financial reporting policies and procedures. The Audit Committee also pre-approves auditing and permissible non-audit services by our independent auditor, reviews and discusses our annual and quarterly financial statements and related disclosures, and coordinates the oversight of our internal and external controls over financial reporting, disclosure controls and procedures and code of business conduct. In performing these functions, the Audit Committee meets periodically with the independent auditor, management and internal auditor function (including in private sessions) to review their work and confirm that they are properly discharging their respective responsibilities. In addition, the Audit Committee appoints the independent auditor. For more information on Audit Committee activities in 2017, see the Audit Committee Report on page 47 of this proxy statement and "*Proposal 2: Ratify Independent Registered Public Accounting Firm"* on page 48.

The Board has determined that Mr. Seifert, the Chairman of the Audit Committee, as well as each of Messrs. Gauthier and Hurley and Ms. Lego qualify as an audit committee financial expert (as defined under the rules and regulations of the SEC) after determining that each has the necessary experience and qualifications.

The primary function of the ***Compensation Committee*** is to discharge the Board's duties and responsibilities relating to compensation of our non-employee directors and executive officers, and oversee the design and management of the long-term incentive and savings plans that cover our employees. The Compensation Committee's duties and responsibilities under its charter with respect to the compensation of our executive officers and directors include:

- reviewing and approving the Chairman and Chief Executive Officer's base salary compensation;
- determining the annual performance bonus of the Chairman and Chief Executive Officer based upon the corporate goals and objectives set by the independent directors and their input on the attainment of such goals and objectives;
- reviewing and approving compensation decisions recommended by the Chairman and Chief Executive Officer for the other executive officers, including setting base salaries, annual performance bonuses, long-term incentive awards, severance benefits and perquisites;
- setting our compensation philosophy and composition of the group of peer companies used for comparison of executive compensation; and
- reviewing and recommending for approval by the Board the compensation for the non-employee directors.

The Compensation Committee has retained an independent compensation consultant firm, Radford, a unit of Aon Hewitt ("Radford"), for matters related to executive officer and director compensation. The Compensation Committee also retains outside legal counsel to provide advice on compensation-related matters, including executive officers, directors and compensation plans. For further discussion of the role of the Compensation Committee in the executive compensation decision-making process and activities in 2017, and for a description of the nature and scope of the consultant's assignment, see *"Compensation Discussion and Analysis - Role of Compensation Committee"* on page 37 of this proxy statement. Additionally, the Compensation Committee reviews the Compensation Discussion and Analysis, prepares the Compensation Committee Report in this proxy statement on page 29 and oversees management's risk assessment of the Company's compensation for all employees and compensation-related risks as delegated by the Board.

The ***Nominating and Corporate Governance Committee*** is responsible for overseeing matters of corporate governance, including the evaluation of the performance and practices of the Board. The Nominating and Corporate Governance Committee develops and recommends criteria for Board membership (see *"Board of Directors-Nomination of Directors"* for a description of such criteria), reviews possible candidates for the Board as discussed on pages 20 and 21 of this proxy statement, and recommends the nominees for directors to the Board for approval. In addition, the Nominating and Corporate Governance Committee oversees the process for the performance evaluations of the Board and its committees. An important role of this Committee is to engage in Board succession planning to ensure boardroom skills are aligned with IPG's long-term strategic plan. It is also within the responsibilities of the Nominating and Corporate Governance Committee to review and recommend director orientation, stock ownership guidelines, delegation of authority to management, insider trading guidelines, and consider questions of possible conflicts of interest, including related party transactions, as such questions arise. The Nominating and Corporate Governance Committee also reviews and recommends risk oversight responsibilities of the Board and its committees and of the independent directors as a group.

Copies of the charters of each of the three committees can be found on our website at *investor.ipgphotonics.com/corporate-governance/governance-documents*.

Nomination of Directors

Director Eligibility. Our Corporate Governance Guidelines and director membership guidelines approved by the Nominating and Corporate Governance Committee contain Board membership criteria considered by the Nominating and Corporate Governance Committee in recommending nominees for a position on IPG's Board. The Nominating and Corporate Governance Committee believes that, at a minimum, a director candidate must possess the qualities of high personal integrity and ethics, sound business judgment and support for our Code of Business Conduct. A director candidate must also have sufficient time to devote to the affairs of IPG and service on the Board and committees, and not be engaged in any activity adverse to the Company's interest. The Nominating and Corporate Governance Committee considers, among other things, the following criteria when reviewing a director candidate or an incumbent director:

- the extent that the director/potential director has demonstrated excellence, leadership and significant experience in a field of endeavor,
- whether the director/potential director assists in achieving a collective membership on the Board with a broad spectrum of experience and expertise,
- whether the director/potential director meets the independence requirements of the listing standards of the NASDAQ guidelines and SEC rules (where independence is desired),
- whether the director/potential director can read and understand financial statement fundamentals and is committed to representing the long-term interests of the Company's stockholders, while keeping in perspective the interests of the Company's customers, employees and the public and
- whether the director/potential director, by virtue of relevant technical expertise, experience or specialized skill relevant to IPG's current or future business, can add specific value as a Board member.

In addition, no potential director (excluding any incumbent director) with an age less than 21 years or greater than 72 years is eligible for election as a Board member. Each director/potential director must comply with the limits on other board memberships in our Corporate Governance Guidelines.

The Nominating and Corporate Governance Committee does not assign specific weights to particular criteria and no particular criterion is necessarily applicable to all prospective nominees. In addition to the criteria set forth above, the Nominating and Corporate Governance Committee considers how the skills and attributes of each individual candidate or incumbent director work together to create a Board that is collegial, engaged and effective in performing its duties. The Nominating and Corporate Governance Committee seeks a Board that reflects diversity, in experience, gender and ethnicity, although it does not have formal objective criteria for determining the degree of diversity desired on the Board.

In the last few years, the Board has taken an active approach to refreshing its members in order to increase the effectiveness of the Board, including by increasing its focus on Board diversity. For example, the Board has added a female director and two directors born in Europe with significant international experience. Of these newer directors, two were under 60 years old when they joined our Board. The Board seeks a diverse set of backgrounds, experiences and skills in its directors to help guide IPG as it grows and enters new businesses as part of our long-term strategy. We typically seek candidates with experience on public company boards as such candidates understand the role and duties of directors. As described in the director biographies under "Key Attributes, Experiences and Skills," our Board seeks directors who add different sets of experience and skills that are important to the Company. Based on this criterion, we have added directors with photonics, electronics and semiconductor equipment industry backgrounds, larger company and entrepreneurial experience, non-U.S. and Asia experience, as well as experience in positions associated with accounting, finance and information technology, all of which contribute to the quality of the review and oversight by the Board, Board-management discussions and IPG's long-term strategy.

Director Nomination Process. The Nominating and Corporate Governance Committee identifies potential director nominees through contacts of the Board, executives and a variety of other sources. The Committee may retain a search firm or utilize third-party database search tools to identify director nominees. Stockholders may nominate candidates for election as directors as described below.

The Nominating and Corporate Governance Committee will consider several factors prior to nominating a candidate. Generally, the Committee will consider the existing size, future requirements of the Board, composition and skills of the Board, evaluate biographical information and other background material and interview each candidate selected. The Nominating and Corporate Governance Committee will apply any director selection criteria adopted by it based on the circumstances at the time and the criteria set forth in our Corporate Governance Guidelines.

The Nominating and Corporate Governance Committee will consider all director candidates identified through the processes described above and will evaluate each of them, including incumbents, based on the same criteria. Director candidates are evaluated at regular or special meetings of the Nominating and Corporate Governance Committee and may be considered at any point during the year. If based on the Committee's initial evaluation, a director candidate continues to be of interest to the Nominating and Corporate Governance Committee, the chair of such Committee and other Committee members will interview the candidate and communicate the evaluation to the Committee and executive management. Additional interviews are conducted and all members of the Board may interview the final candidates. Ultimately, the Nominating and Corporate Governance Committee will meet to finalize its list of recommended candidates for the Board's consideration.

The Nominating and Corporate Governance Committee will also consider candidates for nomination as a director submitted by stockholders. The Nominating and Corporate Governance Committee's evaluation process and criteria does not vary based upon whether a candidate is recommended by a stockholder. However, the procedural requirements set forth in our by-laws and the procedures described under "*Other Matters - 2018 Annual Meeting and Nominations*" must be met.

Compensation Committee Interlocks and Insider Participation

No member of our Compensation Committee (Ms. Lego and Messrs. Peeler, Hurley and Meurice) is or has been an officer or employee of our Company or any of our subsidiaries. None of our executive officers served as a member of:

- the compensation committee of another entity in which one of the executive officers of such entity served on our Compensation Committee,

- the compensation committee of another entity in which one of the executive officers of such entity served as a member of our Board or
- the board of directors of another entity, one of whose executive officers served on our Compensation Committee.

DIRECTOR COMPENSATION

The objectives for our non-employee director compensation program are to attract and attain highly-qualified individuals to serve on our Board and align their interests with those of our stockholders. Our non-employee directors are paid pursuant to our non-employee director compensation plan described below. Our Compensation Committee reviews our director compensation program periodically to confirm that the program remains appropriate and competitive and recommends any changes to our full Board for consideration and approval.

Director Compensation Plan

Our non-employee director compensation plan provides for both cash and equity compensation for our non-employee directors. Directors who are also our employees receive no additional compensation for their service on the Board. In 2017, the Compensation Committee engaged independent compensation consultant firm, Radford, to provide a comprehensive review of compensation for non-employee directors in comparison to the Company's compensation peer group. The compensation our Directors received in 2017 reflects Radford's recommendations and is provided in the chart below.

Cash Compensation. Our non-employee directors receive the annual retainers from us set forth in the table below. Directors do not receive separate fees for attending meetings of the Board, committees or stockholders.

	Amount
Board Retainer	$ 40,000
Presiding Independent Director Retainer	$ 20,000
Audit Committee Retainers	
Chair	$ 25,000
Non-Chair	$ 12,500
Compensation Committee Retainers	
Chair	$ 22,500
Non-Chair	$ 10,000
Nominating and Corporate Governance Committee Retainers	
Chair	$ 17,500
Non-Chair	$ 7,500

Equity Compensation. Each non-employee director continuing in office after the annual meeting of stockholders receives a dollar value annual grant of equity totaling $250,000 (determined pursuant to Financial Accounting Standards Board Accounting Standards Codification Topic 718 ("ASC Topic 718")). Of this award, one-third is service-based stock options and two-thirds are service-based restricted stock units. The annual awards vest in a single installment on the earlier of the one-year anniversary of the date of grant or the next annual meeting of stockholders. Upon initial election to the Board, each new non-employee director receives a grant (determined pursuant to ASC Topic 718) of $125,000 in stock options and $125,000 in restricted stock units vesting on the first anniversary of the date of grant subject to the director's continued service on the Board. The exercise price of each of the stock options is the closing market price of our common stock on the date of grant. Any director who retires after at least eight years of service on the Board will be entitled to full vesting of all options and restricted stock units then held by the director.

Director Compensation Table

The following table summarizes the compensation of each of our non-employee directors for 2017:

Name	Fees Earned or Paid in Cash ($)	Stock Awards ($)(1)	Option Awards ($)(1)	Total ($)
Michael C. Child	51,458	165,091	83,319	299,868
Henry E. Gauthier	65,208	165,091	83,319	313,618
William S. Hurley	67,708	165,091	83,319	316,118
Catherin P. Lego	76,042	165,091	83,319	324,452
Eric Meurice	73,125	165,091	83,319	321,535
John R. Peeler	80,833	165,091	83,319	329,243
Thomas J. Seifert	75,417	165,091	83,319	323,827

(1) Valuation based on the fair value of the restricted stock unit and stock option awards as of the grant date determined pursuant to ASC Topic 718 with respect to 2017. The assumptions that we used with respect to the valuation of restricted stock unit and stock option awards are set forth in Note 2 to our Consolidated Financial Statements in our Annual Report on Form 10-K filed with the SEC on February 28, 2018. On June 1, 2017, each continuing director serving on the Board was granted restricted stock units for 1,185 shares of common stock and options to purchase 2,993 shares of common stock at an exercise price of $140.64 per share. Both restricted stock units and options vest in a single installment on June 1, 2018.

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Outstanding Equity Awards Table

The following table provides information regarding unexercised stock options and unvested restricted stock units held by each of our non-employee directors on December 31, 2017:

Name	Unvested Restricted Stock Units (#)	Total Option Awards Held (#)	Exercisable Option Awards (#)
Michael C. Child	1,185	52,264	49,925
Henry E. Gauthier	1,185	7,596	5,257
William S. Hurley	1,185	14,096	11,757
Catherine P. Lego	3,444	10,847	2,127
Eric Meurice	2,175	17,019	12,324
John R. Peeler	1,185	25,596	23,257
Thomas J. Seifert	2,175	4,695	—

We also reimburse directors for all reasonable out-of-pocket expenses incurred for attending Board and committee meetings and director education programs. Non-employee directors do not receive any additional payments or perquisites.

Our certificate of incorporation limits the dollar amount of personal liability of our directors for breaches by them of their fiduciary duties. Our certificate of incorporation requires us to indemnify our directors to the fullest extent permitted by the Delaware General Corporation Law. We have also entered into indemnification agreements with all of our directors and we have purchased directors' and officers' liability insurance.

PROPOSAL 1: ELECTION OF DIRECTORS

The stockholders are being asked to elect Dr. Gapontsev, Dr. Scherbakov, Mr. Samartsev, Mr. Child, Mr. Gauthier, Ms. Lego, Mr. Meurice, Mr. Peeler and Mr. Seifert to terms ending with the annual meeting to be held in 2019, until a successor is elected and qualified or until his or her earlier death, resignation or removal. The Board nominated each of these individuals for election at the 2018 annual meeting of stockholders upon the recommendation of the Nominating and Corporate Governance Committee. Each nominee is currently a director of our company. All of the director nominees set forth in the proxy card have consented to being named in this proxy statement and to serving if elected. For more information regarding the nominees for director, see *"Board of Directors."*

The Board does not contemplate that any of the nominees will be unable to stand for election, but should any nominee become unable to serve or for good cause will not serve, all proxies (except proxies marked to the contrary) will be voted for the election of a substitute nominee nominated by the Board.

OUR BOARD OF DIRECTORS RECOMMENDS A VOTE

"FOR" ALL OF THE NOMINEES FOR DIRECTOR

COMMON STOCK OWNERSHIP

The following table provides information about the beneficial ownership of our common stock as of April 6, 2018 by:

- each of the Named Executive Officers,
- each person who is a director or nominee,
- all of our executive officers and directors as a group and
- each person or entity known by us to own beneficially more than five percent of our common stock.

Percentage of beneficial ownership is based on 53,732,790 shares of common stock outstanding as of April 6, 2018.

Name	Shares Owned	Right to Acquire Shares within 60 Days	Total Beneficial Ownership (1)	Percent
Named Executive Officers and Directors (2)				
Michael C. Child	10,719	53,449	64,168	*
Valentin P. Gapontsev, Ph.D. (3)	7,249,935	—	7,249,935	13.5%
Henry E. Gauthier	13,919	8,781	22,700	*
William S. Hurley	9,820	11,781	21,601	*
Catherine P. Lego	3,753	7,914	11,667	*
Angelo P. Lopresti (4)	16,512,586	35,296	16,547,882	30.8%
Timothy P.V. Mammen	20,186	23,900	44,086	*
Trevor D. Ness	4,074	18,968	23,042	*
Eric Meurice	6,291	19,194	25,485	*
John R. Peeler	5,819	20,596	26,415	*
Igor Samartsev (5)(6)	884,283	7,300	891,583	1.7%
Eugene Scherbakov, Ph.D. (4)(5)	16,489,381	24,092	16,513,473	30.7%
Thomas J. Seifert	4,156	6,870	11,026	*
All executive officers and directors as a group (15 persons)	17,771,401	289,712	18,061,113	33.4%
Other >5% Stockholders				
The Valentin Gapontsev Trust I (2)(7)	14,612,004	—	14,612,004	27.2%
IP Fibre Devices (UK) Ltd. (2)(8)	7,014.004	—	7,014.004	13.1%
BlackRock, Inc. (9)	3,874,614	—	3,874,614	7.2%
The Vanguard Group (10)	3,121,013	—	3,121,013	5.8%

* Less than 1.0%

(1) In accordance with SEC rules, beneficial ownership includes any shares for which a person or entity has sole or shared voting power or investment power and any shares for which the person or entity has the right to acquire beneficial ownership within 60 days after April 6, 2018 through the exercise of any option or the vesting of a restricted stock unit.

(2) The contact address for each person or entity is in care of IPG Photonics Corporation, 50 Old Webster Road, Oxford, Massachusetts 01540.

(3) Includes 7,014,004 shares beneficially owned by IP Fibre Devices (UK) Ltd. (“IPFD”), of which Dr. Gapontsev is the sole managing director. See note 8 below.

(4) Includes (a) 7,598,000 shares owned of record by Valentin Gapontsev Trust I (“Gapontsev Trust I”), (b) 7,014,004 shares owned of record by IPFD which are deemed to be beneficially owned by Gapontsev Trust I (see notes 7 and 8 below), (c) 908,450 shares beneficially owned by Valentin Gapontsev Trust II ("Gapontsev Trust II"), and (d) 962,450 shares beneficially owned by Valentin Gapontsev Trust III ("Gapontsev Trust III"), because such person is a trustee of each said trust. Gapontsev Trust I, Gapontsev Trust II and Gapontsev Trust III were formed by CEO Valentin Gapontsev. Dr. Scherbakov and Mr. Lopresti are trustees of Gapontsev Trust I, Gapontsev Trust II and Gapontsev Trust III.

(5) Such person disclaims beneficial ownership of the shares held by IPFD except to the extent of his economic interest therein. See note 8 below.

(6) Includes 539,650 shares held by the spouse of Mr. Samartsev and family trusts formed by her. Mr. Samartsev disclaims beneficial ownership of such shares.

(7) Includes 7,014,004 shares beneficially owned by IPFD, in which Gapontsev Trust I has a 48% economic interest. Gapontsev Trust I disclaims beneficial ownership of the shares held by IPFD except to the extent of its economic interest therein. See note 8 below.

(8) Dr. Gapontsev has sole voting and investment power with respect to the shares held of record by IPFD. The following officers and directors of the Company or related parties have economic interests in IPFD: Gapontsev Trust I (48%), Dr. Gapontsev (3%), Mr. Samartsev (8%), Dr. Scherbakov (8%) and Gapontsev Trust III (2%). Each such person and entity (other than Dr. Gapontsev) does not possess voting or investment power with respect to such interest and each disclaims beneficial ownership of the shares held by IPFD except to the extent of his or its economic interest therein.

(9) The address of BlackRock, Inc. is 55 East 52nd Street, New York, NY 10055. Based solely on a Schedule 13G filed with the SEC on January 25, 2018.

(10) The address of The Vanguard Group is 100 Vanguard Boulevard, Malvern, PA 19355. Based solely on a Schedule 13G filed with the SEC on February 9, 2018.

EXECUTIVE OFFICERS

The following table sets forth certain information regarding our executive officers as of April 1, 2018.

Name	Age	Position
Valentin P. Gapontsev, Ph.D.	79	Chief Executive Officer and Chairman of the Board
Eugene A. Scherbakov, Ph.D.	70	Chief Operating Officer, Managing Director of IPG Laser GmbH, Senior Vice President, Europe and Director
Timothy P.V. Mammen	48	Chief Financial Officer and Senior Vice President
Angelo P. Lopresti	54	General Counsel, Secretary and Senior Vice President
Alexander Ovtchinnikov, Ph.D.	57	Senior Vice President, Components
Trevor D. Ness	45	Senior Vice President, World Wide Sales and Marketing
Igor Samartsev	55	Chief Technology Officer and Director
Felix Stukalin	56	Senior Vice President, North America Operations

The biographies of Dr. Gapontsev, Dr. Scherbakov and Mr. Samartsev are presented on pages 14 and 15 of this proxy statement. The biographies of our other executive officers are presented below.

Timothy P.V. Mammen has served as our Chief Financial Officer since July 2000 and as Vice President since November 2000. He was promoted to Senior Vice President in February 2013. Between May 1999 and July 2000, Mr. Mammen served as the Group Finance Director and General Manager of the United Kingdom operations for IPFD. Mr. Mammen was Finance Director and General Manager of United Partners Plc, a commodities trading firm, from 1995 to 1999 and, prior to that, he worked in the finance department of E.I. du Pont de Nemours and Company. Mr. Mammen holds an Upper Second B.Sc. Honours degree in International Trade and Development from the London School of Economics and Political Science. He is a Chartered Accountant and a member of the Institute of Chartered Accountants of Scotland.

Angelo P. Lopresti has served as our General Counsel and Secretary and one of our Vice Presidents since February 2001. He was promoted to Senior Vice President in February 2013. Prior to joining us, Mr. Lopresti was a partner at the law firm of Winston & Strawn LLP from 1999 to 2001. He was a partner at the law firm of Hertzog, Calamari & Gleason from 1998 to 1999 and an associate there from 1991 to 1998. He is on the board of Coastway Bancorp, Inc., the holding company of Coastway Community Bank. Mr. Lopresti holds a B.A. in Economics from Trinity College and a J.D. from the New York University School of Law.

Alexander Ovtchinnikov, Ph.D., has served as our Vice President, Components, since September 2005 and as Director of Material Sciences from October 2001 to September 2005. He was promoted to Senior Vice President in February 2013. Prior to joining us, Dr. Ovtchinnikov was Material Science Manager of Lasertel, Inc., a maker of high-power semiconductor lasers, from 1999 to 2001. For 15 years prior to joining Lasertel, Inc., he worked on the development and commercialization of high power diode pump technology at the Ioffe Institute, Tampere University of Technology, Coherent, Inc. and Spectra-Physics Corporation. He holds an M.S. in Electrical Engineering from the Electrotechnical University of St. Petersburg, Russia, and a Ph.D. from Ioffe Institute of the Russian Academy of Sciences.

Trevor D. Ness has served as our Senior Vice President, World Wide Sales and Marketing since February 2013. From January 2011 until February 2013, he served as our Vice President-Asian Operations. Prior to joining us, Mr. Ness was Director of GSI Precision Technologies China from May 2005 to December 2010 and prior to that he held technical sales management roles with GSI Group, Inc. and Cobham Plc, located in UK, Japan and Taiwan. Mr. Ness holds a B.S. in Geology from Imperial College, a H.N.C. from Bournemouth University and an M.B.A. from The Open University.

Felix Stukalin has served as our Senior Vice President, North America Operations since February 2013. From March 2009 until February 2013, he served as our Vice President, Devices. Prior to joining us, he was Vice President, Business Development of GSI Group Inc. from April 2002 to September 2008, and from March 2000 to April 2002 he was Vice President of Components and President of the Wave Precision divisions of GSI Lumonics, Mr. Stukalin holds a B.S. in Mechanical Engineering from the University of Rochester and he is a graduate of the Harvard Business School General Management Program.

COMPENSATION COMMITTEE REPORT

The Compensation Committee of the Board of Directors has reviewed and discussed with management the Compensation Discussion and Analysis included in this proxy statement. Based on this review and discussion, the Compensation Committee recommended to the Board of Directors that the Compensation Discussion and Analysis be included in the Company's proxy statement for the Company's 2018 annual meeting of stockholders and in the Company's Annual Report on Form 10-K for the year ended December 31, 2017.

The information in this Compensation Committee Report shall not be considered "soliciting material" or "filed" with the SEC, nor shall this information be incorporated by reference into any previous or future filings under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended, except to the extent that the Company incorporates it by specific reference.

COMPENSATION COMMITTEE

Catherine P. Lego, *Chair*
William S. Hurley
Eric Meurice
John R. Peeler

March 28, 2018

COMPENSATION DISCUSSION AND ANALYSIS

This Compensation Discussion and Analysis provides a review of our executive compensation philosophy and program, and Compensation Committee decisions for fiscal 2017. The discussion in this section focuses on the compensation of our "Named Executive Officers" or "NEOs" for fiscal 2017, who were:

- Valentin P. Gapontsev, Ph.D., our Chairman and Chief Executive Officer
- Eugene Scherbakov, Ph.D., our Chief Operating Officer, the Managing Director of IPG Laser GmbH, our subsidiary, and Senior Vice President, Europe
- Timothy P.V. Mammen, our Senior Vice President and Chief Financial Officer
- Trevor Ness, our Senior Vice President, World Wide Sales and Marketing
- Angelo P. Lopresti, our Senior Vice President, General Counsel and Secretary

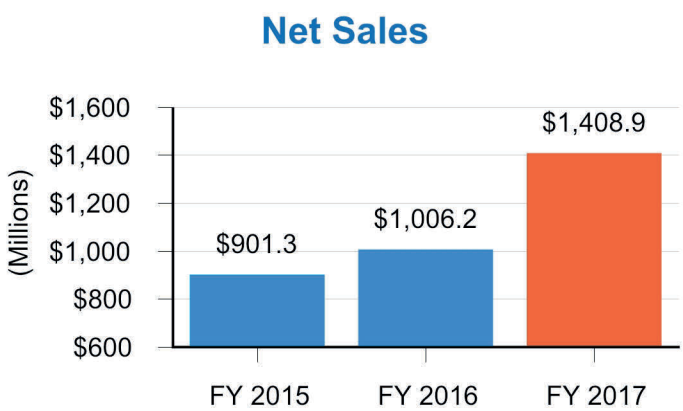
2017 Business Summary

We are committed to delivering increasing value to our shareholders by: (1) enhancing our core market leadership through the growing market penetration of our fiber laser technology over other lasers and non-laser technology and (2) expanding into multiple new markets and applications. In 2017, IPG delivered record revenue, operating margin, net income, and cash flow from operations, while we continued to make investments to drive future growth.

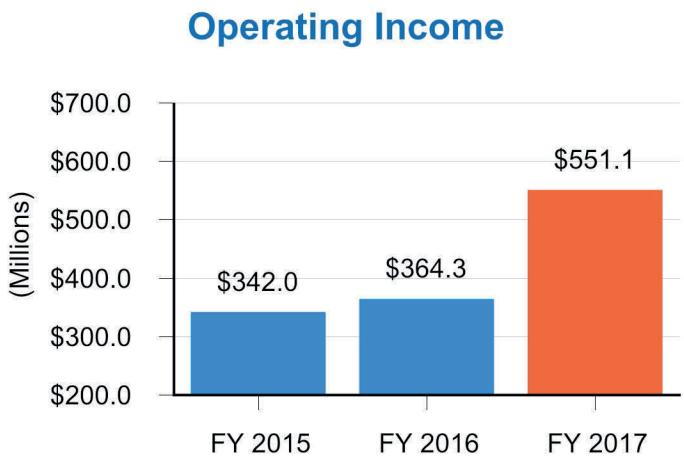
In 2017, we:

- increased revenue by 40%, our strongest annual growth in six years, and achieved a four-year compounded annual growth rate of 21%,
- used our vertical integration and direct sales model to increase our industry-leading gross margins to 56.6%,
- deepened our penetration in laser cutting and expanded laser welding sales,
- continued to gain sales from other laser and non-laser technologies and
- introduced new products, systems and accessories to expand our addressable markets.

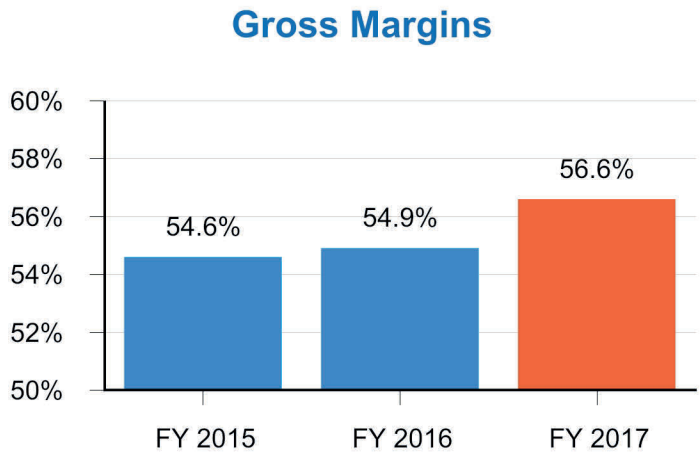
IPG recorded $1,408.9 million in net sales in 2017, which is the highest level of revenues for any fiscal year in our history. We delivered $6.36 in diluted earnings per share, up 31% year-over-year, which includes charges of $0.90 related to the U.S. Tax Cuts and Jobs Act.



Our operating income increased 51% in 2017 and achieved its highest levels to date, reaching $551 million compared to $364 million in 2016 and $342 million in 2015.



Our gross margin increased to 56.6% in 2017 up from 54.9% in 2016, as a result of increased manufacturing efficiency offset by increasing depreciation from increased investment in plant and equipment. IPG's gross margins are industry-leading as compared to our laser peers.



We also increased our cash and cash equivalents and short term investments to $1.12 billion at December 31, 2017, compared to $831 million at December 31, 2016, while investing $127 million in property, plant, equipment and technology in 2017 so that we are well-positioned for future demand growth for our industry-leading products.

For more information about our business, please read "Business" and "Management's Discussion and Analysis of Financial Condition and Results of Operations" in our Annual Report on Form 10-K filed with the SEC on February 28, 2018.

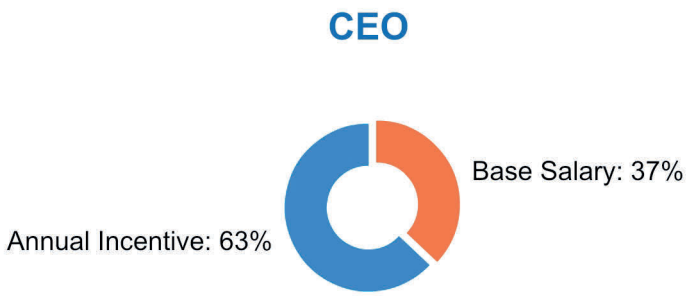
Summary of Executive Compensation Pay Practices

The guiding principles of our executive compensation philosophy and practice continue to be pay-for-performance, accountability for annual and long-term performance, alignment to stockholders' interests, and providing competitive pay to attract and retain executives. We believe our compensation program strikes the appropriate balance between utilizing responsible, measured pay practices and effectively incentivizing our executives to dedicate themselves fully to value creation for our stockholders.

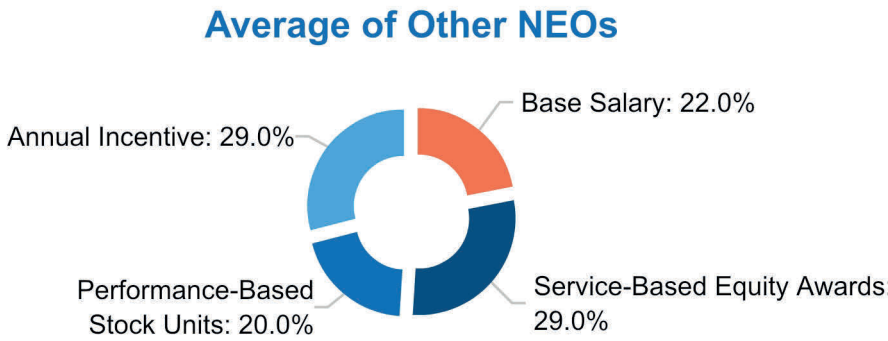
Executive Compensation Design

Our executive compensation program is designed to focus executive officers on both annual and long-term financial and operational performance, without encouraging unnecessary risk. The following graphs show approximately 63 percent of the Chief Executive Officer's total direct compensation and approximately 78 percent of the average total direct compensation of all of the other Named Executive Officers' compensation, as reflected in the 2017 column of the Summary Compensation Table, is at risk.

Our Chief Executive Officer, the Company's founder, does not receive long-term incentives because of his significant level of common stock ownership. As a result, a smaller percentage of his total compensation is performance-based as compared to the chief executives of our peer companies who typically receive additional compensation in the form of long-term incentives.



The performance-based stock units in the chart below are presented at target based upon grant date fair value.



The following provides details on the components of our executive compensation program:

Compensation Element	Objective
Base salary	• Provide a competitive fixed component of cash compensation to attract and retain talented and experienced executives with the knowledge and skills necessary to achieve the Company's strategic business objectives. • The Compensation Committee uses the services of an independent compensation consultant to assess the base salaries as compared to a competitive target range of the Company's named peer group. • The Compensation Committee considers these when setting base salaries of the executive officers: scope of the executive's responsibilities, performance, contributions, skills and experience, annual and long-term Company performance.
Annual incentive plan	• Offer a variable cash compensation opportunity earned based upon the level of achievement of challenging corporate goals, with additional compensation opportunity based upon individual performance. • Foster a shared commitment among executives through establishment of uniform Company financial goals. • Award payouts are subject to a cap of 225% of target in a performance period.
Long-term incentives	• Align interests of our executives and stockholders by motivating executive officers to increase long-term stockholder value. • Service-based equity awards offer certainty and long-term retention while providing additional compensation opportunity based upon increased stock price levels. • Performance-based stock units provide additional incentive to our NEOs (other than the CEO) and are earned based on IPG's total stockholder return relative to the Russell 3000 index. • Enhance retention with vesting over four years.
401(k) Retirement Savings Plan	• Provides participants the opportunity to defer a portion of their compensation and receive a company match of 50% of deferrals subject to a maximum of 6% of eligible compensation. • The plan is available to all eligible U.S. employees of the Company.
Pension Plan	• We provide no pension plan or deferred compensation plan.
Perquisites	• Perquisites are limited.

2017 Base Salaries

We provide base salary to our Named Executive Officers and other employees to compensate them for services rendered on a day-to-day basis during the fiscal year. Unlike annual cash incentives and long-term equity incentives, base salary is not subject to performance risk. The Compensation Committee reviews information provided by its compensation consultant and considers the experience, skills, knowledge and responsibilities of the executive and the individual's performance assessment provided by the Chief Executive Officer to assist it in evaluating base salary for each Named Executive Officer. With respect to the Chief Executive Officer, the Compensation Committee additionally considers the performance of the Company as a whole.

In 2017, the Compensation Committee evaluated the base salaries and total cash compensation for the Named Executive Officers with the assistance of Radford. The Compensation Committee reviewed Radford's assessment in connection with positioning the midpoint of the Company's target total cash compensation range near the 65th percentile of our peer group. Based upon this review, the Compensation Committee approved increases of the Named Executive Officers in the following manner: Dr. Gapontsev received an increase in base salary of 13% bringing his base salary in line with the market 65th percentile of our peer group, which also factored in the fact that the Compensation Committee does not grant any equity awards to Dr. Gapontsev. Likewise, the salary of Dr. Scherbakov increased from approximately $500,000 to $540,000 which also factored in his additional management responsibilities related to his appointment as Chief Operating Officer in February 2017. Finally, the Compensation Committee approved merit increases of 5%, 8% and 3% for the base salaries of Messrs. Mammen, Ness and Lopresti.

Update 2018. In 2018, the Compensation Committee approved increases to each of the Named Executive Officers following an updated assessment of base salaries and total cash compensation conducted by Radford. The CEO's base salary was increased by12% to $930,000. Also, the salary of Dr. Scherbakov increased from approximately $540,000 to $679,400. Finally, the Compensation Committee approved increases of 5%, 6% and 5% to the base salaries of Messrs. Mammen, Ness and Lopresti, respectively.

2017 Cash Incentive Awards

To focus each executive officer on the importance of the Company's performance, a significant portion of the individual's potential short-term compensation is in the form of annual cash incentive pay that is tied to the achievement of goals set by the Compensation Committee. Our Named Executive Officers participate in our Senior Executive Annual Incentive Plan (the "AIP") administered by the Compensation Committee. The Compensation Committee determines who is eligible to receive awards under the AIP, defines performance goals and objectives for executives, establishes target awards for each participant for the relevant performance period, and determines the percentage of the target award that should be allocated to the achievement of each of the chosen performance goals in consultation with the Chief Executive Officer with respect to other executive officers. The target award percentages established by the Compensation Committee are chosen with input from the compensation assessment conducted by Radford and the seniority level of the executive.

Consistent with prior years, in 2017 the Compensation Committee identified two financial performance measures: net sales and adjusted EBIT and assigned a 50% weighting factor to each financial performance goal. "Adjusted EBIT" is a performance measure that is equal to our earnings before interest income and expense, income taxes, equity-based compensation expenses and expenses for litigation matters approved by the Compensation Committee. Further, the Compensation Committee intentionally focused on net sales growth and pretax profits so that our executive officers would be incentivized to deliver the types of growth that benefit our stockholders, namely increasing sales and profits.

Under the 2017 AIP, the executives could receive cash incentive payments in the table below as a percentage of base salaries based upon achievement of the minimum to maximum objectives for both financial performance measures and for individual performance. If the financial performance exceeds one or more of the stretch objectives, the incentive payments to the executive would increase as determined by linear interpolation, subject to limits on maximum award payouts. Consistent with our pay-for-performance philosophy, no cash incentive payments would be made if the minimum financial objectives established by the Compensation Committee in 2017 were not met. The individual goals and objectives for the Chief Executive Officer include operational and strategic targets determined by the independent directors.

The overall target awards in the table below are a percentage of the respective base salaries. The company-wide financial objectives are the same for all executive officers in order to foster a shared commitment among executives.

Name	Target as % of Base Salary	Financial Performance Minimum	Financial Performance Maximum	Individual Performance Maximum	Maximum Award Payout (1)	Target Award ($)(2)	Actual Payout ($)
Valentin P. Gapontsev, Ph.D.	100%	18.8%	225.0%	25.00%	225%	832,000	1,399,100
Eugene A. Scherbakov, Ph.D.	75%	14.0%	225.0%	19.00%	225%	405,000	769,300
Timothy P.V. Mammen	75%	14.0%	225.0%	19.00%	225%	344,000	577,000
Trevor D. Ness	75%	14.0%	225.0%	19.00%	225%	308,000	516,200
Angelo P. Lopresti	75%	14.0%	225.0%	19.00%	225%	316,000	530,000

(1) Maximum award payout is presented as a percentage of the target award.

(2) Target award includes both financial and individual performance targets.

While objectives were intended to be achievable by the Company, a maximum bonus would require very high levels of Company performance. In 2017, the Compensation Committee adjusted the targets to reflect the acquisition of OptiGrate Corporation and Innovative Laser Technology, Inc. The adjusted target levels for net sales and Adjusted EBIT were $1,134 million and $422 million, respectively, representing 13% and 7% increases, respectively, from prior year levels. The Compensation Committee's adjusted minimum and stretch targets for net sales were $964 million and $1,304 million, and for Adjusted EBIT were $338 million and $507 million.

During 2017, the Company achieved net sales of $1,409 million and Adjusted EBIT of $593 million. These results represented a 40% increase in net sales and a 51% increase in Adjusted EBIT over 2016 levels. Despite exceeding the stretch targets in 2017, payouts were not limited by the plan maximums, which are set at 225% of the target award for financial and individual performance. The independent directors set

the individual goals and objectives for the Chief Executive Officer in 2017. In 2017, the independent directors also reviewed the Chief Executive Officer's attainment of goals and objectives and approved his payout under the 2017 AIP. As a result of this process, the independent directors awarded the Chief Executive Officer 25.0% of his base salary for his individual performance during 2017. The Compensation Committee, with input from the Chief Executive Officer, awarded the other Named Executive Officers 19.0% of their respective base salaries for their individual performances in 2017.

The Compensation Committee may award discretionary bonuses to executives for exceptional performance. For 2017, the Compensation Committee did not exercise this right.

2018 Update. In February 2018, the Committee approved annual targets and incentive payouts to the Named Executive Officers for fiscal year 2018 under the AIP, as set forth below. The awards noted below have financial and individual performance goals. The Compensation Committee approved the targets under the AIP to the Named Executive Officers in February 2018 in the following payout amounts:

Name	Target as % of Base Salary	Financial Performance Minimum	Financial Performance Maximum	Individual Performance Maximum	Maximum Award Payout (1)
Valentin P. Gapontsev, Ph.D.	110%	20.63%	220.0%	27.50%	225%
Eugene A. Scherbakov, Ph.D.	100%	18.75%	200.0%	25.00%	225%
Timothy P.V. Mammen	80%	15.00%	160.0%	20.00%	225%
Trevor D. Ness	80%	15.00%	160.0%	20.00%	225%
Angelo P. Lopresti	80%	15.00%	160.0%	20.00%	225%

(1) Maximum award payout is presented as a percentage of the target award.

Equity-Based Incentives Granted in 2017

The goal of our equity-based award program is to provide employees and executives with the perspective of an owner with a long-term financial stake in our success, further increasing alignment with stockholders. Our equity-based incentives align the interests of our executives and stockholders by motivating executive officers to increase long-term stockholder value.

In 2017, our equity-based award program for executives included service-based stock options (33%), service-based restricted stock units (33%), and performance-based stock units (at target, 33%). The type and proportion of the equity grants reflected a 2017 review by our Compensation Committee with the assistance of Radford of grant practices at peer companies. The value of stock options, restricted stock units and performance-based stock units are tied to the Company stock price which links pay to performance.

Consistent with our pay-for-performance philosophy, the service-based stock option awards have no value unless our stock price increases after the grant date. Another reason why we use service-based stock options is because it fosters an innovative environment focused on long-term growth of the Company and stockholder value.

The addition of performance-based stock units in 2015 to the equity mix increases the portion of the executives' compensation that is based upon the Company's performance. The Compensation Committee decided to measure performance of the Company's stock as compared to the Russell 3000 Index, which includes the Company. Also, it directly aligns executives' compensation with stockholders interest because the number of shares earned depends upon performance against the Russell 3000 Index and the value of the shares fluctuates based on the stock price. For each 1% that IPG's common stock exceeds the performance of the Russell 3000 Index for the trailing 60 trading days from the end of the performance measurement period (March 1, 2020) against the comparable period from the beginning of the performance measurement period (March 1, 2017), the grant recipient would receive a 2% increase in the number of shares above target (up to a maximum cap of 200% of the target award). For each 1% below the Russell 3000 Index's performance, the grant recipient would receive a 2% decrease in the number of shares (down to zero). In addition, Name Executive Officers cannot receive a number of shares that exceeds 400% of the value of the target award on the date of grant. The vesting date is March 1, 2020, should any performance-based stock units vest at all.

In 2017, the Compensation Committee targeted granting equity compensation near the 65th percentile of the target compensation of our peer group, balancing the perspective of delivering competitive compensation based upon Black-Scholes option pricing values and Monte Carlo simulations for performance-based stock units. The Compensation Committee analyzed several aspects of the equity grant program, including (i) the "in the money" value, the degree to which executives have incentives to remain employed by the Company through unvested option values, and (ii) the aggregate equity usage in terms of (a) annual usage, typically called burn rate, and (b) cumulative equity delivery, typically called overhang, to determine the dilutive effect of equity awards on investors. The majority of outstanding equity award holdings of the executives were allocated to unvested shares in the aggregate, and all such executives had a minimum of two years' worth of annual award values in unvested equity value. Based upon this information, Radford advised the Compensation Committee that our equity program provides strong retention incentives.

Since the Company's initial public offering in 2006, the Compensation Committee has not granted the Chief Executive Officer any equity compensation awards. As the Company's founder and the beneficial owner of a large number of our shares, he has the perspective of an owner with a significant financial stake in the Company's success. This practice has resulted in substantially lower total compensation earned by our Chief Executive Officer as compared to the chief executives of our named peers despite our outstanding business and earnings growth. In addition, this practice results in a lower compensation expense and lower equity burn rate for the Company.

The table below provides information on grants of service-based stock options, service-based restricted stock units and performance-based stock units to the Named Executive Officers in 2017. All awards in the table below vest on March 1, 2021, except for the performance-based stock units which vest on March 1, 2020.

Name	Service-Based Stock Options (#)	Exercise Price ($)	Service-Based Restricted Stock Units (#)	Performance-Based Stock Units (at Target) (#)	Performance-Based Stock Units Range (Based upon Achievement)
Valentin P. Gapontsev, Ph.D.	—	—	—	—	—
Eugene A. Scherbakov, Ph.D.	10,367	119.50	3,388	3,388	0 - 6,776
Timothy P.V. Mammen	8,799	119.50	2,876	2,876	0 - 5,752
Trevor D. Ness	7,871	119.50	2,572	2,572	0 - 5,144
Angelo P. Lopresti	7,184	119.50	2,348	2,348	0 - 4,696

The Compensation Committee believes that vesting of awards of service-based options and restricted stock units over four years provides a strong incentive for executives to remain employed by us and to focus on increasing our financial performance over the long-term, while discouraging excessive short-term risk taking. The Compensation Committee believes that the performance-based stock units should vest over three years, instead of four years, because having a four year performance period would reduce the utility of the performance award and not properly align pay with performance. The service-based restricted stock units granted in 2017 may be entitled to dividends, should any be paid, at the discretion of the Compensation Committee. Any dividends on shares underlying the performance-based stock units do not vest until the performance-based stock units vest.

2018 Update. The Compensation Committee approved the grant of service-based stock options and restricted stock units and performance-based stock units to the Named Executive Officers in February 2018. All equity awards in the table below vest according to the vesting schedule approved by the Compensation Committee: service-based stock options and restricted stock units vest 25% on each anniversary of March 1, 2018 and performance-based stock units vest on March 1, 2021, the last day of the performance period which is three years after the start of the performance period on March 1, 2018.

Name	Service-Based Stock Options (#)	Exercise Price ($)	Service-Based Restricted Stock Units (#)	Performance-Based Stock Units (at Target) (#)	Performance-Based Stock Units Range (Based upon Achievement) (#)
Valentin P. Gapontsev, Ph.D.	—	—	—	—	—
Eugene A. Scherbakov, Ph.D.	13,744	239.72	4,014	4,014	0 - 8,028
Timothy P.V. Mammen	6,642	239.72	1,940	1,940	0 - 3,880
Trevor D. Ness	5,689	239.72	1,661	1,661	0 - 3,322
Angelo P. Lopresti	5,786	239.72	1,690	1,690	0 - 3,380

All Other Compensation

Severance Benefits. The severance benefits we offer assist us in recruiting and retaining talented individuals and are consistent with the range of severance benefits offered by our peer group. The severance provisions of our employment agreements are summarized below in the section titled "*Potential Payments upon Termination or Change in Control.*"

Retirement Benefits. We do not offer an executive retirement plan or a non-qualified deferred compensation plan. Executive officers in the United States are eligible to participate in our 401(k) retirement savings plan on the same terms as all other U.S. employees. Our 401(k) retirement savings plan is a tax-qualified plan and therefore is subject to certain Internal Revenue Code limitations on the dollar amounts of deferrals and Company contributions that can be made to plan accounts. These limitations apply to our more highly-compensated employees (including the Named Executive Officers). We made matching contributions to our employees at a rate of 50% of deferrals subject to a maximum of 6% of eligible compensation under the 401(k) retirement savings plan, including the Named Executive Officers, who participate in the plan as set forth in the Summary Compensation Table. Our executives outside of the United States participate in government-sponsored retirement programs.

Personal Benefits. Our executives are eligible to participate in employee benefit plans, including medical, dental, life and disability insurance and vacation plans as well as an employee stock purchase plan, which is intended to be qualified under Section 423 of the Code. The employee stock purchase plan allows participants to purchase Company shares at a price equal to 85% of the lesser of the fair market value at the first day or last day of the six month offering period, subject to limitations on the amount of shares. These plans generally are available to all salaried employees and do not discriminate in favor of executive officers. Benefits are intended to be competitive with the overall market in order to facilitate attraction and retention of high-quality employees.

The Compensation Committee compared the Company's executive perquisites policies against the 2017 peer group and made no changes. The Company provides the use of a corporate aircraft to the Chief Executive Officer and other executives for business travel integral to the performance of their duties. Executives are encouraged to use the aircraft for efficiency, safety and security. However, executives are not allowed to use the aircraft for personal use that has not been paid for, except that family and other guests may accompany executives on the aircraft for business travel. The Company provides the Chief Executive Officer with a car and driver in the United States so that he may use his travel time for company purposes. The Company also provides Dr. Scherbakov use of an automobile, as it does for other high-ranking employees in Germany.

Role of Compensation Committee

The Compensation Committee determines, approves and administers the compensation programs for our executive officers, including our Named Executive Officers. The Compensation Committee recommends to the independent directors the CEO's annual base salary, annual incentive opportunity and long-term incentive opportunity. The independent directors approve the CEO's compensation and our Compensation Committee approves the compensation for other executive officers in consultation with our CEO. Our Compensation Committee is also responsible for making recommendations to the Board with respect to the adoption of equity plans and certain other benefit plans. The Compensation Committee may delegate authority whenever it deems appropriate. In 2017, the Compensation Committee delegated authority to grant

equity awards for non-executive officers to the Chief Executive Officer subject to certain conditions including amounts of awards and review of awards by the Compensation Committee.

Our Compensation Committee's policy is to set executive officer pay in accordance with the objectives of the Company's compensation programs as described above. In the Compensation Committee's view, the Company's executive compensation program provides an overall level of compensation opportunity that is competitive with peer companies. Actual compensation levels may be greater or less than target compensation levels provided by similar companies based upon annual and long-term Company performance, as well as individual performance, contributions, skills, seniority, knowledge, experience and responsibilities.

Role of Management

The Chief Executive Officer participates in the establishment of the compensation targets and payout levels for the other Named Executive Officers. He assesses the performance of all Named Executive Officers and recommends to the Compensation Committee the overall levels of achievement, and personal performance in the year. Upon request, Named Executive Officers provide supplemental material to the Compensation Committee to assist in the determination and implementation of compensation, policies and practices. The Chief Executive Officer is not involved in decisions regarding the setting of any component of his compensation. The Chief Executive Officer and other members of senior management attend Compensation Committee meetings at the invitation of the Compensation Committee.

Role of Independent Consultant

The Compensation Committee engaged Radford, an independent compensation consultant, to conduct a comprehensive review and analysis of our executive and non-employee director compensation programs and to make recommendations for compensation related to 2017. The consultation included non-executive compensation data and valuation services for equity incentives. Radford’s parent company does not perform any other work for the Company. The Compensation Committee reviews the independence of Radford in light of SEC rules and NASDAQ listing standards regarding compensation consultants. The Compensation Committee believes that there were no actual or potential conflicts of interest with Radford in 2017.

Pay Positioning Strategy

In 2017, the midpoint of the Company's target total cash compensation range was adjusted to near the 65th percentile. The Compensation Committee positioned our targeted total compensation competitively within our peer group. An individual's actual compensation may fall below or above the target positions based on the individual's experience, seniority, skills, knowledge, performance, responsibilities and contributions as well as the Company's performance. These factors are weighed by the Compensation Committee in its judgment, and no single factor takes precedence over others nor is any formula used in making these decisions.

In analyzing our executive compensation program relative to this target market positioning, the Compensation Committee utilizes a comparative analysis of the compensation of our executive officers measured against a group of peer companies selected by the Compensation Committee. The peer companies are companies in the laser source and photonics industry, as well as a broader group of technology companies of comparable size and complexity with international scope that experience growth.

For 2017, the peer companies were:

Barnes Group, Inc.	Cognex Corporation	Coherent, Inc.
Dolby Laboratories, Inc.	Entegris, Inc.	Fabrinet
FLIR Systems, Inc.	Graco, Inc.	II-VI Incorporated
IDEX Corporation	ITT, Inc.	MKS Instruments, Inc.
National Instruments, Inc.	Nordson Corporation	OSI Systems, Inc.
Teradyne, Inc.	Trimble Navigation Limited	Zebra Technologies, Inc.

The Compensation Committee reviews this peer group annually with input from Radford to ensure that the comparisons are meaningful. In this review, the Compensation Committee considers several factors in developing a peer group: it considers the current peer group to determine appropriateness, the peers used by institutional governance advisors, the companies that list our company as peer to understand crossover peers and broader research based upon established selection criteria to identify potential future peers. The Committee then develops criteria for business sector, market capitalization, revenue and headcount. Radford also supplements its peer analysis with the data from a broader list of high-technology public company participants in the AON Radford Executive Technology Survey targeting technology companies with comparable revenue levels. Companies that are no longer publicly traded have been omitted from the peer group. Based upon the process and applying the criteria above, the Compensation Committee (i) added Dolby Laboratories, Inc., Fabrinet, IDEX Corporation, ITT, Inc. and Trimble Navigation Limited to the peer group and (ii) removed Analogic Corporation, Brooks Automation, Inc., Diodes, Inc., FEI Company and Rofin-Sinar Technologies, Inc. from the peer group.

2018 Update. For 2018 compensation determinations, the Compensation Committee applied the methodology above and removed Fabrinet and OSI Systems, Inc. because such peers fell below the targeted scope of one or more of market value, revenue and headcount or were acquired. Additionally, the Compensation Committee added Arista Networks,Inc., Donaldson Company and Waters Corporation to the peer group for 2018.

Other Factors Affecting Compensation

Tax Deductibility under Section 162(m). Section 162(m) of the Internal Revenue Code ("Section 162(m)") limits the deductibility for federal income tax purposes of certain compensation paid in any year by a publicly held corporation to its "covered employees" as defined by Section 162(m) to $1 million per executive (the "$1 million cap"). Due to the recently enacted U.S. Tax Cuts and Jobs Act, the "performance-based" compensation exception to the $1 million cap does not apply for tax years after 2017, unless certain limited transition relief is met. The Compensation Committee retains the discretion to grant or pay compensation that may exceed the $1 million cap or may not qualify for the performance-based compensation exception to Section 162(m).

Accounting Considerations. We consider the accounting implications of our executive compensation program. In addition, accounting treatment is just one of many factors impacting plan design and pay determinations. Our executive compensation program is designed to achieve a favorable accounting and tax treatment as long as doing so does not conflict with the intended plan design or program objectives.

Compensation Risk

Management conducts an annual risk assessment of the Company's compensation policies and practices for all employees, including non-executive officers, and reports its findings to the Compensation Committee. In 2017, management concluded that the Company's compensation policies and practices are balanced and do not motivate imprudent risk taking. Management believes that IPG's compensation policies do not create risks that are reasonably likely to have a material adverse effect on IPG.

In reaching this conclusion, they considered the following factors:

- our compensation program is designed to provide a mix of both fixed and variable incentive compensation,
- our senior executives are subject to stock ownership guidelines, which we believe incentivize our executives to consider the long-term interests of the Company and our stockholders and discourage excessive risk-taking that could negatively impact our stock price, and
- our incentive compensation programs are designed with vesting terms that are relatively consistent, spread out over several years, and do not contain steep payout "cliffs" that might encourage short-term business decisions in order to meet a vesting or payout threshold.

Other Policies

Anti-Hedging and Limitations on Pledging of Company Stock. The Board adopted policies prohibiting hedging transactions and limiting the pledging of our common stock. Under our insider trading policy, no director or employee may engage in shorting shares of our common stock, or buying or selling puts,

calls or derivatives related to our common stock. A director or officer of the Company may not pledge shares constituting more than 20% of his or her total stock ownership. Pledges of shares constituting 20% or less of total stock ownership are subject to certain conditions.

Stock Ownership Guidelines. The Board adopted stock ownership guidelines to closely align the interests of our executive officers with those of our long-term stockholders. Under the guidelines, the Chief Executive Officer is expected to maintain a minimum investment on our common stock of five times his annual salary and other senior executive officers are expected to maintain a minimum investment on our common stock of the lesser of 5,000 shares or one times their respective annual salaries. All of our senior executive officers substantially exceed the ownership requirements under our stock ownership guidelines. These ownership levels are to be achieved no later than four years after the election as an executive officer, except that prior to such time the officer is expected to retain a certain portion of stock issued upon exercise of stock options or vesting of restricted stock awards until the minimum ownership levels are attained. For more information, see *"Corporate Governance - Stock Ownership Guidelines."*

Clawback Policies. In 2015, the Compensation Committee approved a compensation recovery policy that allows the Company to recapture performance-based compensation from executives if the amount of the award was based upon achieving certain financial results that were later restated due to the participant's misconduct. In addition, all equity awarded to employees since 2007 contain a provision under which employees may be required to forfeit equity awards or profit from equity awards if they engage in certain conduct, including competing against the Company, disclosing confidential information, or soliciting its employees or customers.

EXECUTIVE COMPENSATION TABLES

Summary Compensation Table

The following table provides information regarding compensation earned by our Chief Executive Officer, our Chief Financial Officer and our three other most highly compensated executives for the fiscal years indicated below:

Name and Principal Position	Year	Salary ($)(1)	Bonus ($)	Stock Awards ($)(2)	Option Awards ($)(2)	Non-Equity Incentive Plan Compensation ($)(3)	All Other Compensation ($)(4)	Total ($)
Valentin P. Gapontsev, Ph.D. Chief Executive Officer and Chairman of the Board (5)	2017	832,000	—	—	—	1,399,100	53,583	2,284,683
	2016	735,400	—	—	—	709,044	36,953	1,481,397
	2015	687,981	—	—	—	713,582	11,853	1,413,416
Eugene A. Scherbakov, Ph.D. Chief Operating Officer, Managing Director of IPG Laser GmbH, Senior Vice President, Europe and Director(5)	2017	510,000	—	899,514	340,038	769,300	23,028	2,541,880
	2016	510,677	—	643,031	228,899	361,928	30,138	1,774,672
	2015	450,449	—	636,664	305,714	363,675	30,231	1,973,841
Timothy P.V. Mammen, Chief Financial Officer and Senior Vice President	2017	458,300	—	763,578	288,607	577,000	8,910	2,096,395
	2016	436,025	—	643,031	228,899	315,694	8,760	1,632,409
	2015	440,067	—	823,772	305,714	342,223	8,764	1,920,540
Trevor Ness, Senior Vice President, World Wide Sales and Marketing	2017	410,000	—	682,866	258,169	516,200	8,910	1,876,145
	2016	379,724	—	527,502	187,744	275,121	8,490	1,378,581
	2015	383,543	—	673,995	250,130	298,267	8,511	1,614,446
Angelo P. Lopresti, Senior Vice President, General Counsel and Secretary	2017	421,000	—	623,394	235,635	530,000	9,342	1,819,372
	2016	408,256	—	496,333	176,709	263,042	9,192	1,353,532
	2015	412,015	—	636,664	236,234	284,911	9,240	1,579,063

(1) Salaries for 2015 reflect 27 pay periods occurring in the year.

(2) Valuation based on the fair value of such award as of the grant date determined pursuant to ASC Topic 718. The assumptions that we used with respect to the valuation of service-based restricted stock unit, performance-based stock units and stock option awards are set forth in Note 2 to our Consolidated Financial Statements in our Annual Report on Form 10-K filed with the SEC on February 28, 2018. The amounts in the Stock Awards column reflect service-based restricted stock units and performance-based stock units granted in 2017. The value of the performance-based stock units is based on the probable outcome of the performance conditions (at the grant date) in accordance with ASC Topic 718 assuming no forfeiture. The values of performance-based stock units at the grant date assuming the highest level of performance conditions will be achieved are $1,619,464, $1,374,728, $1,229,416 and $1,122,344 for Dr. Scherbakov and Messrs Mammen, Ness and Lopresti, respectively. There is no assurance that any of the performance targets will be achieved, that the service-based awards will vest or that the any of the recipients will realize the values listed above.

(3) Represents amounts earned under our AIP for services rendered in 2017, 2016 and 2015, respectively.

(4) The amount in 2017 for Dr. Gapontsev consists of premiums paid for group life insurance, the incremental cost for non-employee guests accompanying him on the Company's aircraft and the cost of a car and driver ($36,776) at the Company's headquarters. The amount in 2017 for Dr. Scherbakov is the expense of an automobile provided by us.

(5) Portions of the amounts paid to Dr. Gapontsev and Dr. Scherbakov were denominated in Euros and Rubles. Dr. Scherbakov's salary is approved in US dollars and payments are converted to Euro at then prevailing Euro exchange rate. Amounts paid in foreign currencies were translated into U.S. Dollars at the average daily exchange rates for the full years. The average daily rates in 2017, 2016 and 2015, for the Euro were 0.89, 0.90 and 0.90, respectively, and for the Ruble were 58.3, 67.0 and 61.2, respectively. As a result of compensation being paid in one or more currencies that fluctuate against the U.S. Dollar, the amount of salary paid may vary slightly from the salary stated in an employment agreement or approved by the Compensation Committee.

Employment Agreements

The Company has entered into employment agreements with each of the above-named executives, effective through December 31, 2018. Upon expiration, the employment agreements will automatically renew for successive one year periods, unless the Company or a Named Executive Officer provides written notice of non-renewal at least six months prior to the end of the then current term. In the event of a change in control, the agreements would extend through the second anniversary of the change in control.

The employment agreements set the annual base salaries and stipulate that the Compensation Committee may adjust the salaries annually, as noted in the above "*Compensation Discussion and Analysis - 2017 Base*

Salaries" section. The agreements entitle these executive officers to participate in bonus plans, standard insurance plans such as life, short-term disability and long-term disability insurance and retirement benefits, such as the 401(k) retirement savings plan and equity award plans described above, on similar terms and on a similar basis as such benefits are available to executives at similar levels within the Company. Each of these executive officers also entered into a separate restrictive covenant agreement with the Company in 2013 that prohibits each of them from competing with the Company for a period of one year after the termination of his employment with the Company for any reason and from hiring or attempting to hire the Company's employees or soliciting customers or suppliers of the Company for a period ending eighteen months following the termination of his employment for any reason. Each of the officers is entitled to receive his base salary for the period during which the Company enforces the non-competition provisions of the agreement but not for more than one year following the termination of his employment. The severance provisions of the agreements are summarized below in the section titled "*Potential Payments upon Termination or Change in Control."*

2017 Grants of Plan-Based Awards

Name	Grant Date	Estimated Possible Payouts Under Non-Equity Incentive Plan Awards ($)(1)			Estimated Future Payouts Under Equity Incentive Plan Awards (#)(2)			All Other Stock Awards: Number of Shares of Stock or Units (#)(3)	Option Awards Number of Securities Underlying Options (#)(3)	Exercise or Base Price of Option Awards ($/Sh)	Grant Date Fair Value of Stock and Option Awards ($)(4)
		Threshold	Target	Maximum	Threshold	Target	Maximum				
Valentin P. Gapontsev	2/17/2017	364,000	832,000	1,872,000	—	—	—	—	—	—	—
Eugene A. Scherbakov	2/17/2017	178,200	405,000	911,250	—	—	—	—	—	—	—
	2/17/2017	—	—	—	1,694	3,388	6,776	—	—	—	498,883
	2/17/2017	—	—	—	—	—	—	3,388	—	—	400,631
	2/17/2017	—	—	—	—	—	—	—	10,367	119.50	340,038
Timothy P.V. Mammen	2/17/2017	151,239	343,725	773,381	—	—	—	—	—	—	—
	2/17/2017	—	—	—	1,438	2,876	5,752	—	—	—	423,491
	2/17/2017	—	—	—	—	—	—	2,876	—	—	340,087
	2/17/2017	—	—	—	—	—	—	—	8,799	119.50	288,607
Trevor D. Ness	2/17/2017	135,300	307,500	691,875	—	—	—	—	—	—	—
	2/17/2017	—	—	—	1,286	2,572	5,144	—	—	—	378,727
	2/17/2017	—	—	—	—	—	—	2,572	—	—	304,139
	2/17/2017	—	—	—	—	—	—	—	7,871	119.50	258,169
Angelo P. Lopresti	2/17/2017	138,930	315,750	710,438	—	—	—	—	—	—	—
	2/17/2017	—	—	—	1.694	2.348	4.696	—	—	—	345,743
	2/17/2017	—	—	—	—	—	—	2,348	—	—	277,651
	2/17/2017	—	—	—	—	—	—	—	7,184	119.50	235,635

(1) Amounts shown include the payouts under the AIP for 2017 financial performance at the three goals plus individual performance at maximum for each. The performance goals used in determining AIP payments are discussed in the above *Compensation Discussion and Analysis* above. Actual amounts paid for 2017 performance are shown in the "Non-Equity Incentive Plan Compensation" column in the Summary Compensation Table above.

(2) For a description of the performance-based stock units, see *Compensation Discussion and Analysis-Equity-Based Incentives Granted in 2017*.

(3) The amounts listed reflect service-based restricted stock units and stock options granted under our 2006 Incentive Compensation Plan and are described in the Outstanding Equity Awards Table below.

(4) The awards are reported based on the fair value of such award as of the grant date determined pursuant to ASC Topic 718. The assumptions that we used with respect to the valuation of equity awards are set forth in Note 2 to our Consolidated Financial Statements in our Annual Report on Form 10-K filed with the SEC on February 28, 2018. The option exercise price has not been deducted from the amounts indicated above and we disregard an estimate of forfeitures. Regardless of the value placed on an equity award on the grant date, the actual value of the equity award will depend on the market value of our common stock at such date in the future when the restricted stock unit vests or the stock option is exercised, and the performance of our common stock in relation to the Russell 3000 on the measurement date with respect to the performance-based stock unit. For informational purposes, if the maximum level of performance was achieved for the performance-based stock units, the values as limited by the 400% value cap are $1,619,464, $1,374,728, $1,229,416 and $1,122,344 for Dr. Scherbakov and Messrs. Mammen, Ness and Lopresti, respectively.

2017 Outstanding Equity Awards at Fiscal Year-End

		Option Awards (1)				Stock Awards (1)			
Name	Year of Grant	Securities Underlying Unexercised Options Exercisable (#)	Securities Underlying Unexercised Options Unexercisable (#)	Option Exercise Price ($)(2)	Option Expiration Date	Number of Shares or Units of Stock That Have Not Vested (#)	Market Value of Shares or Units of Stock That Have Not Vested ($)(3)	Equity incentive plan awards: Number of unearned shares, units or other rights that have not vested (#)(1)(4)	Equity incentive plan awards: Market or payout value of unearned shares, units or other rights that have not vested ($)(4)
Valentin P. Gapontsev	—	—	—	—	—	—	—	—	—
Eugene A. Scherbakov	2/26/2010	1,000	—	15.82	2/25/2020	—	—	—	—
	3/1/2011	3,000	—	53.76	2/28/2021	—	—	—	—
	2/14/2012	1,500	—	58.65	2/13/2022	—	—	—	—
	3/1/2013	3,000	—	60.11	2/28/2023	—	—	—	—
	2/28/2014	—	13,000	71.77	2/27/2024	2,000	428,620	—	—
	2/25/2015	—	7,326	97.65	2/24/2025	3,663	785,018	7,326	1,430,768
	2/18/2016	—	7,592	81.89	2/17/2026	3,796	813,521	7,592	1,243,418
	2/17/2017	—	10,367	119.50	2/16/2027	3,388	726,082	6,776	1,619,464
Timothy P.V. Mammen	2/14/2012	10,000	—	58.65	2/13/2022	—	—	—	—
	3/1/2013	15,000	—	60.11	2/28/2023	—	—	—	—
	2/28/2014	—	14,200	71.77	2/27/2024	2,200	471,482	—	—
	2/25/2015	—	7,326	97.65	2/24/2025	3,663	785,018	7,326	1,430,768
	2/18/2016	—	7,592	81.89	2/17/2026	3,796	813,521	7,592	1,243,418
	2/17/2017	—	8,799	119.50	2/26/2027	2,876	616,356	5,752	1,374,728
Trevor D. Ness	2/14/2012	4,000	—	58.65	2/13/2022	—	—	—	—
	3/1/2013	2,000	—	60.11	2/28/2023	—	—	—	—
	2/28/2014	—	11,000	71.77	2/27/2024	1,700	364,327	—	—
	2/25/2015	—	5,994	97.65	2/24/2025	2,997	642,287	5,994	1,170,628
	2/18/2016	—	6,227	81.89	2/17/2026	3,114	667,361	6,228	1,020,022
	2/17/2017	—	7,871	119.50	2/16/2027	2,572	551,205	5,144	1,229,416
Angelo P. Lopresti	3/1/2011	9,500	—	53.76	2/28/2021	—	—	—	—
	3/1/2013	13,000	—	60.11	2/28/2023	—	—	—	—
	2/28/2014	—	11,000	71.77	2/27/2024	1,800	385,758	—	—
	2/25/2015	—	5,661	97.65	2/24/2025	2,831	606,712	5,662	1,105,789
	2/18/2016	—	5,861	81.89	2/17/2026	2,930	627,928	5,860	959,751
	2/17/2017	—	7,184	119.50	2/16/2027	2,348	503,200	4,696	1,122,344

(1) The vesting dates assume the continued service of the Named Executive Officer. All awards granted in 2014, 2015 and 2016 vest in one installment on March 1, 2018, 2019 and 2020, respectively. Service-based stock options and restricted stock units granted in 2017 vest in four annual installments commencing on March 1, 2018 and performance-based stock units granted in 2017 vest in one installment on March 1, 2020.

(2) Represents the closing common stock price of a share on the grant date.

(3) Based upon the closing common stock price on December 31, 2017, which was $214.31 per share.

(4) The performance-based stock unit performance determination dates are March 1, 2018, 2019 and 2020 for units granted in 2015, 2016 and 2017, respectively. The numbers of unearned awards range from 0% to 200% based upon achievement of performance metrics and assumes attainment of the maximum performance levels not limited by dollar value cap. The dollar payout values represent estimated values assuming attainment of maximum performance levels as limited by the dollar value cap of 400% of target values on the dates of grant.

Option Exercises and Stock Vested in 2017

	Option Awards		Stock Awards	
Name	Number of Shares Acquired on Exercise (#)	Value Realized on Exercise ($)(1)	Number of Shares Acquired on Vesting (#)	Value Realized on Vesting ($)(2)
Valentin P. Gapontsev	—	—	—	—
Eugene A. Scherbakov	31,954	3,290,285	2,200	265,650
Timothy P.V. Mammen	37,850	4,251,554	2,500	301,875
Trevor D. Ness	25,000	2,435,923	1,900	229,425
Angelo P. Lopresti	11,750	1,230,011	2,000	241,500

(1) The value realized is based on the difference between the reported closing common stock price on the date of exercise and the exercise price of the stock option.
(2) The value realized is based on the reported closing common stock prices on the vesting dates of the restricted stock units.

Potential Payments upon Termination or Change in Control

If the Company terminates the employment of any of the Named Executive Officers without cause (as defined in the respective employment agreements) or any of the Named Executive Officers terminates his employment for good reason (as defined in the respective employment agreements) ("cause" and "good reason" are referred to below as "Involuntary Terminations"), then the officer would receive:

(a) continuation of salary for eighteen months, except in the case of Dr. Gapontsev, who would receive continuation of salary for thirty-six months,

(b) a portion of the annual bonus that the executive would have received had he remained employed through the end of the applicable bonus period, based on actual performance, including the individual performance element (the portion based upon the percentage of the year that he was employed by the Company),

(c) cash reimbursement for continuation of health benefits for up to eighteen months, except in the case of Dr. Gapontsev, who would receive continuation of health benefits by payment of the officer's COBRA premiums for thirty-six-months; and

(d) accelerated vesting of equity compensation awards that otherwise would have vested within twelve months of termination of employment.

Upon an Involuntary Termination within twenty-four months following a change in control of the Company, the Named Executive Officer would be entitled to continuation of salary and reimbursement of COBRA premiums for health benefits for twenty-four months, the pro-rated bonus for the year of termination plus a payment of two times the average annual bonus paid to the Named Executive Officer for the three full years preceding the year of termination. In the case of the Chief Executive Officer, he would be entitled to continuation of salary and health benefits for thirty-six months, the pro-rated bonus for the year of termination plus a payment of three times the average annual bonus paid to him for the three full years preceding the termination. Under the employment agreements, all equity awards vest fully if a change in control occurs followed within two years by an Involuntary Termination. Upon a change in control, the officers' employment periods under the agreements would automatically be extended to the second anniversary of the change in control if such date is later than expiration of the current term.

If the total value of all payments and benefits, including any equity vesting ("total payments"), made to a Named Executive Officer following a change in control would result in an excise tax under the provisions of Internal Revenue Code Section 4999 (the "golden parachute tax"), the total payments will be reduced so that the maximum amount of total payments (after reduction) is $1.00 less than the amount that would cause the total payments to be subject to the golden parachute tax; provided, however, that the total payments will only be reduced to the extent that the after-tax value of amounts received by the officer after application of the above reduction would exceed the after-tax value of the total payments received without application of such reduction (so called "best after-tax treatment").

If the employment period of any of the Named Executive Officers terminates and the Company does not offer such officer continued employment in the same or a substantially similar position or in a higher position than the officer's position at the end of the employment period and at a compensation level that is the same or substantially similar to the compensation level in effect at the end of the employment period, then such officer may resign from employment and would receive continuation of salary and health benefits for twelve months, except for the Chief Executive Officer who would receive the same for twenty-four months, plus a pro-rated bonus for the year of termination.

If a Named Executive Officer's employment is terminated by death or disability, the officer would receive a pro-rated bonus for the year of termination. Under the employment agreements, the Company would not be obligated to make any cash payments if employment were terminated by the Company for cause or by the executive not for

good reason. Additionally, if the officer's employment is terminated due to death, the non-vested portions of stock options, service-based restricted stock units and performance-based stock units would immediately vest.

Severance payments to the officers are conditioned upon the release of claims by the Named Executive Officer in favor of the Company. Each of the Named Executive Officers also has an agreement with the Company that prohibits him from competing with the Company for a period of one year after the termination of his employment with the Company for any reason and from hiring or attempting to hire the Company's employees or soliciting customers or suppliers of the Company for a period ending eighteen months following the termination of his employment for any reason. Each of the Named Executive Officers is entitled to receive his base salary for the period during which the Company enforces the non-competition provisions of the agreement but not for more than one year following termination of his employment.

The following table provides information regarding compensation and benefits that would be payable to our Named Executive Officers as of December 31, 2017, upon an Involuntary Termination absent a change in control and preceded by a change in control and upon terminations in other circumstances. The incentive plan severance was calculated using the actual amount awarded under the 2017 AIP. There can be no assurance that the event triggering payments would produce the same or similar results as those described below if such event occurs on any other date or at any other price, or if any other assumption used to estimate the potential payments and benefits is incorrect. Any actual payments and benefits may be different due to a number of factors that affect the nature and amount of any potential payments or benefits.

Name	Benefit	Termination Without Cause or For Good Reason ($)	Termination Without Cause or For Good Reason Following a Change in Control ($)	Termination following Death ($)	Termination following Disability ($)	Termination following Non-Renewal ($)
Valentin P. Gapontsev	Salary Severance and Benefits Continuation	2,539,383	2,539,383	—	—	1,692,922
	Incentive Plan Severance	1,399,100	3,431,506	1,399,100	1,399,100	1,399,100
	Equity Acceleration	—	—	—	—	—
	Total	3,938,483	5,970,889	1,399,100	1,399,100	3,092,022
Eugene A. Scherbakov	Salary Severance and Benefits Continuation	816,921	1,089,228	—	—	544,614
	Incentive Plan Severance	769,300	1,473,816	769,300	769,300	769,300
	Equity Acceleration	2,324,502	11,785,651	11,785,651	—	—
	Total	3,910,723	14,348,695	12,554,951	769,300	1,313,914
Timothy P.V. Mammen	Salary Severance and Benefits Continuation	719,973	959,963	—	—	479,982
	Incentive Plan Severance	577,000	1,215,050	577,000	577,000	577,000
	Equity Acceleration	2,495,550	11,453,574	11,453,574	—	—
	Total	3,792,523	13,628,588	12,030,574	577,000	1,056,982
Trevor D. Ness	Salary Severance and Benefits Continuation	647,523	863,363	—	—	431,682
	Incentive Plan Severance	516,200	1,068,970	516,200	516,200	516,200
	Equity Acceleration	1,932,267	9,483,276	9,483,276	—	—
	Total	3,095,990	11,415,609	9,999,476	516,200	947,882
Angelo P. Lopresti	Salary Severance and Benefits Continuation	664,023	885,363	—	—	442,682
	Incentive Plan Severance	530,000	1,051,163	530,000	530,000	530,000
	Equity Acceleration	1,953,698	8,997,062	8,997,062	—	—
	Total	3,147,721	10,933,589	9,527,062	530,000	972,682

(1) Equity acceleration is calculated using the full value of service-based restricted stock units and the maximum amount of shares for performance-based stock units based upon the closing sale price of our common stock on December 31, 2017 of $214.31 per share and the aggregate difference between the exercise prices of outstanding stock options and the closing sale price of our common stock on December 31, 2017.

CEO PAY RATIO

As required by Section 953(b) of the Dodd-Frank Wall Street Reform and Consumer Protection Act and Item 402(u) of Regulation S-K, we are providing the following information on the relationship of the annual total compensation of our employees and the annual total compensation of Dr. Valentin P. Gapontsev, our Chief Executive Officer. The pay ratio included in this information is a reasonable estimate calculated in a manner consistent with rules promulgated by the SEC.

Determining our Median Employee: As of December 31, 2017, the measurement date, we employed 5,389 employees, 63% of whom were located outside of the U.S.A. This includes all full-time, part-time, and temporary employees. It does not include independent contractors.

We have employees in nineteen countries. As permitted by the SEC rules, in identifying our median employee, we excluded 158 workers in the following jurisdictions (employees excluded in parenthesis): Belarus (38), Korea (29), India (23), Turkey (15), Poland (13), United Kingdom (10), Brazil (7), France (6), Spain (5), Czech Republic (5), Mexico (5) and Russia (2). We also excluded approximately 107 employees who became our employees as a result of our 2017 acquisitions of OptiGrate Corporation, Innovative Laser Technology, LLC and Laser Depth Dynamics, Inc.

The SEC rules required us to identify our median employee by use of a consistently applied compensation measure ("CACM"). We chose a CACM that closely approximates the annual total cash compensation of our employees. Specifically, we identified the median employee by looking at total wages and bonuses paid in 2017. After applying our CACM methodology and excluding the employees listed above, we identified the median employee.

Calculating the Pay Ratio: As required by the SEC rules, we then calculated our median employee's total annual compensation in accordance in accordance with the requirements of Item 402(c)(2)(x) of Regulation S-K (which is the calculation method for reporting CEO compensation in the Summary Compensation Table).

The compensation of our median employee was $32,676. Our CEO's compensation as reported in the Summary Compensation Table was $2,231,100. Therefore, our CEO to median employee pay ratio is approximately 68.3:1.

This information is being provided solely for compliance purposes. The Compensation Committee does not consider this ratio when evaluating compensation arrangements.

AUDIT COMMITTEE REPORT

The primary role of the Audit Committee is to assist the Board of Directors in fulfilling its oversight responsibilities by reviewing the financial information proposed to be provided to stockholders and others, the adequacy of the system of internal control over financial reporting and disclosure controls and procedures established by management and the Board, and the audit process and the independent registered public accounting firm's qualifications, independence and performance.

Management has primary responsibility for the financial statements and is responsible for establishing and maintaining the Company's system of internal controls over preparation of the Company's financial statements. The Company's independent registered public accounting firm, Deloitte & Touche LLP, is responsible for performing an integrated audit of the Company's consolidated financial statements and the effectiveness of internal controls over financial reporting in accordance with standards of the Public Company Accounting Oversight Board (United States) (PCAOB) and issuing an opinion on the financial statements and the effectiveness of internal controls over financial reporting. The Audit Committee also employs an international auditing firm to conduct internal audits throughout the Company of various financial, operational and information technology areas as selected each year by the Audit Committee. The Audit Committee periodically met and held separate discussions with the internal auditors and the Company's independent registered public accounting firm, with and without management present, to review the adequacy of the Company's internal controls, financial reporting practices and audit process.

The Audit Committee has reviewed and discussed the Company's audited consolidated financial statements for the year ended December 31, 2017 with management and the independent registered public accounting firm. As part of this review, the Audit Committee discussed with Deloitte & Touche LLP the required communications described in Auditing Standard No. 16, *Communication with Audit Committees,* and those matters required to be reviewed pursuant to Rule 2-07 of Regulation S-X as well as the results of their audit of the effectiveness of internal controls over financial reporting.

The Audit Committee has received from Deloitte & Touche LLP a written statement describing all relationships between that firm and the Company that might bear on their independence, consistent with PCAOB Ethics and Independence Rule 3526, *Communications with Audit Committees Concerning Independence.* The Audit Committee has discussed the written statement with the independent registered public accounting firm and has considered whether its provision of any other non-audit services to the Company is compatible with maintaining the auditors' independence.

Based on the above-mentioned reviews and discussions, the Audit Committee recommended to the Board of Directors that the Company's audited consolidated financial statements be included in its Annual Report on Form 10-K for the year ended December 31, 2017, as filed with the SEC.

The information in this Audit Committee Report shall not be considered "soliciting material" or "filed" with the SEC, nor shall this information be incorporated by reference into any previous or future filings under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended, except to the extent that the Company incorporated it by specific reference.

AUDIT COMMITTEE

Thomas J. Seifert, *Chair*
Henry E. Gauthier
William S. Hurley
Catherine P. Lego

March 28, 2018

PROPOSAL 2: RATIFY INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

Deloitte & Touche LLP currently serves as our independent registered public accounting firm and audited our consolidated financial statements for the year ended December 31, 2017. Our Audit Committee has appointed Deloitte & Touche LLP to serve as our independent registered public accounting firm for 2018, and to conduct an integrated audit of our consolidated financial statements for the year ending December 31, 2018 and of our internal control over financial reporting as of December 31, 2018. Deloitte & Touche LLP has served as the Company's auditor since 1999.

The Audit Committee is solely responsible for the appointment, retention, termination and oversight of the work of our independent registered public accounting firm, including the approval of all engagement fees, terms, and the annual audit plan. In determining whether to reappoint Deloitte & Touche LLP as the Company's independent external auditor, the Audit Committee took into consideration several factors, including an assessment of the professional qualifications and past performance of the lead audit partner and the Deloitte & Touche LLP team, the quality and level of transparency of the Audit Committee's relationship and communications with Deloitte & Touche LLP. The Audit Committee considered, among other things, the knowledge and skills of Deloitte & Touche LLP's auditing experts that would be providing services to the Company, international scope and knowledge of the Company and its operations. After its assessment, the Audit Committee concluded that the best course of action was to reappoint Deloitte & Touche LLP as the Company's independent external auditor for 2018. Lead and concurring audit partners are subject to rotation requirements that limit the number of consecutive years an individual partner may provide services. The maximum number of consecutive years of service in that capacity is five years and 2019 will be a year of lead audit partner rotation. The Audit Committee was directly involved in the selection process of the current and prior lead audit partners. In 2014, the process for rotation of the Company's lead audit partner involved a meeting between the Audit Committee and the successor candidate, as well as meetings with management.

Fees Paid to Deloitte & Touche. The fees for services provided by Deloitte & Touche LLP, member firm of Deloitte Touche Tohmatsu, and their respective affiliates, to the Company were:

	Fees	
Fee Category	**2017**	**2016**
Audit fees	$ 1,873,535	$ 1,662,214
Audit-related fees	$ 212,072	$ 150,258
Tax fees	$ 95,200	$ 278,753
All other fees	$ —	$ —
Total Fees	$ 2,180,807	$ 2,091,225

Audit fees. These fees comprise fees for professional services rendered in connection with the audit of the Company's consolidated financial statements that are customary under auditing standards generally accepted in the United States. Audit fees also include fees for consents and reviews related to SEC filings and quarterly services with respect to the preparation of our unaudited quarterly financial statements.

Audit-related fees. These fees comprise fees for services that are reasonably related to the performance of the audit or review of the Company's financial statements. The increase in audit-related fees in 2017 primarily relate to additional audit work required for acquisitions completed in 2017.

Tax fees. Fees for tax services consist of fees for tax compliance services and tax planning and advice services. Tax compliance services are services rendered based upon facts already in existence or transactions that have already occurred to document, compute and obtain government approval for amounts to be included in tax filings. Tax planning and advice are services rendered with respect to proposed transactions or that alter a transaction to obtain a particular tax result. The tax fees in 2017 and 2016 relate primarily to assistance with the analysis of research and development tax credits and incentives and assistance. The decrease in tax fees relates to one-time work for research and development tax incentives outside the United States in 2016.

All other fees. These are fees for any services not included in the other three categories.

Policy on Pre-Approval of Audit and Permissible Non-Audit Services. The Audit Committee pre-approves all audit and permissible non-audit services provided by the independent registered public accounting firm. These

services may include audit services, audit-related services and tax services as well as specifically designated non-audit services that, in the opinion of the Audit Committee, will not impair the independence of the independent registered public accounting firm. Pre-approval is generally provided for each fiscal year, and any pre-approval is detailed as to the particular service or category of services and is generally subject to a specific budget. The independent registered public accounting firm and our management are required to periodically report to the Audit Committee regarding the extent of services provided by the independent registered public accounting firm in accordance with the pre-approval, including the fees for the services performed to date. In addition, the Audit Committee also may pre-approve particular services on a case-by-case basis, as required.

Our Audit Committee is solely responsible for selecting and appointing our independent registered public accounting firm, and this appointment is not required to be ratified by our stockholders. However, our Audit Committee has recommended that the Board submit this matter to the stockholders in a non-binding advisory vote as a matter of good corporate practice. If the stockholders fail to ratify the appointment, the Audit Committee will reconsider whether to retain Deloitte & Touche LLP, and may retain that firm or another without re-submitting the matter to our stockholders. Even if the appointment is ratified, the Audit Committee may, in its discretion, direct the appointment of a different independent registered public accounting firm at any time during the year if it determines that such a change would be in the best interests of the Company and our stockholders.

OUR BOARD OF DIRECTORS RECOMMENDS A VOTE "FOR"

RATIFICATION OF DELOITTE & TOUCHE LLP AS OUR

INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

OTHER MATTERS

Section 16(a) Beneficial Ownership Reporting Compliance

Section 16(a) of the Exchange Act requires our directors and executive officers, and persons who beneficially own more than 10% of a registered class of our equity securities to file reports of ownership of, and transactions in, our securities with the SEC. These directors, executive officers and 10% stockholders are also required to furnish us with copies of all Section 16(a) forms that they file. Based solely on its review of such forms received by it and the written representations of its Reporting Persons, the Company has determined that no such persons known to it were delinquent with respect to their reporting obligations as set forth in Section 16(a) of the Exchange Act.

2019 Annual Meeting and Nominations

Stockholders may present proposals for action at a future meeting and nominations for director if they comply with applicable SEC rules and our by-laws. If you would like us to consider including a proposal in our proxy statement pursuant to Rule 14a-8 under the Exchange Act, it must be received by our Secretary, at IPG Photonics Corporation, 50 Old Webster Road, Oxford, Massachusetts 01540, on or before December 10, 2019. If you would like to present a proposal at the 2019 annual meeting of stockholders or nominate a director next year, but not to have such proposal or nominee included in our proxy statement relating to that meeting, such proposal or nomination must be received by our Secretary not earlier than February 5, 2019 and not later than March 7, 2019. Our by-laws contain additional specific requirements regarding a stockholder's ability to nominate a director or to submit a proposal for consideration at an upcoming meeting. Our by-laws require that the notice to the Company include (i) information relating to the name, age and experience of the nominee and such other information concerning such nominee as would be required under the then-current rules of the SEC to be included in a proxy statement soliciting proxies for the election of the nominee, (ii) the nominee's written consent to being named in the proxy statement and serving as a director, if elected and (iii) the name and address of the record holder and beneficial holder of the shares, the number of shares held of record or beneficially owned, and representations as described in our by-laws. If the Nominating and Corporate Governance Committee or the Board determines that any nomination made by a stockholder was not made in accordance with the Company's procedures, the rules and regulations of the SEC or other applicable laws or regulations, such nomination will be void. If you would like a copy of the requirements contained in our by-laws, please contact our Secretary.

No Incorporation by Reference

In our filings with the SEC, information is sometimes "incorporated by reference." This means that we are referring you to information that has previously been filed with the SEC and the information should be considered as part of the particular filing. As provided under SEC regulations, the *Compensation Committee Report* and the *Audit Committee Report* contained in this proxy statement specifically are not incorporated by reference into any of our other filings with the SEC, are not to be deemed soliciting materials or subject to the liabilities of Section 18 of the Exchange Act. In addition, this proxy statement includes several website addresses. These website addresses are intended to provide inactive, textual references only. The information on these websites is not part of this proxy statement.

Stockholders Sharing the Same Address

Under the rules adopted by the SEC, we may deliver a single set of proxy materials to one address shared by two or more of our stockholders. This delivery method is referred to as “householding” and can result in significant cost savings. To take advantage of this opportunity, we have delivered only one set of proxy materials to multiple stockholders who share an address, unless we received contrary instructions from the impacted stockholders prior to the mailing date. We agree to deliver promptly, upon written or oral request, a separate copy of the proxy materials, as requested, to any stockholder at the shared address to which a single copy of these documents was delivered. If you prefer to receive separate copies of the Notice, proxy statement or annual report, call 877-373-6374 if you are a stockholder of record, or contact your bank or broker if you own shares in "street name."

In addition, if you currently are a stockholder who shares an address with another stockholder and would like to receive only one copy of future notices and proxy materials for your household, you may notify your bank or broker if your shares are held in "street name." You may notify us if you are a stockholder of record by calling 877-373-6374.

Directors

Valentin P. Gapontsev, Ph.D.
Chief Executive Officer and Chairman of the Board

Eugene Scherbakov, Ph.D.
Director

Igor Samartsev
Director

Michael C. Child [1]
Director

Henry E. Gauthier [2]
Director

William S. Hurley [2] [3]
Director

Catherine P. Lego [2] [3]
Director

Eric Meurice [1] [3]
Director

John R. Peeler [1] [3]
Director

Thomas J. Seifert [1] [2]
Director

Executive Officers

Valentin P. Gapontsev, Ph.D.
Chief Executive Officer and Chairman of the Board

Eugene Scherbakov, Ph.D.
Chief Operating Officer,
Managing Director, IPG Laser GmbH
and Senior Vice President, Europe

Timothy P.V. Mammen
Chief Financial Officer and Senior Vice President

Angelo P. Lopresti
General Counsel, Secretary and Senior Vice President

Alexander Ovtchinnikov, Ph.D.
Senior Vice President, Components

Trevor D. Ness
Senior Vice President, World Wide Sales and Marketing

Igor Samartsev
Chief Technology Officer and Senior Vice President

Felix Stukalin
Senior Vice President, North America Operations

George BuAbbud, Ph.D.
Vice President, Telecommunication Products

Thomas Burgomaster
Vice President and Corporate Controller

Yuri Erokhin, Ph.D.
Vice President, Strategic Marketing

Ekaterina Golovchenko
Vice President, Telecommunications Systems

James Hillier
Vice President, Investor Relations

Dan Perlov, Ph.D.
Vice President of Laser Crystal Materials

Thomas Petersen
Vice President, Materials Processing Systems

John Weaver
Vice President, Human Resources Worldwide

General Information

CORPORATE OFFICE
IPG Photonics Corporation
50 Old Webster Road
Oxford, Massachusetts 01540
Tel: (508) 373-1100
http://www.ipgphotonics.com

INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM
Deloitte & Touche LLP
200 Berkeley Street, Boston, MA 02116

TRANSFER AGENT
Computershare Investor Services
250 Royall Street, Canton, MA 02021
Tel: (800) 942-5909

STOCK SYMBOL
IPG is listed on the Nasdaq Global Market.
Ticker symbol:

IPGP

INVESTOR RELATIONS
Corporate news releases, our Annual Report, Forms 10-K and 10-Q, our Investor Guidebook, and our Financial Data Workbook are available online at: http://investor.ipgphotonics.com.

ANNUAL MEETING
The Annual Meeting of Stockholders will be held at 10:00 a.m. ET on Tuesday, June 5, 2018

IPG Photonics Corporation
50 Old Webster Road
Oxford, Massachusetts

FORWARD-LOOKING STATEMENTS
This Annual Report contains forward-looking statements that involve risks and uncertainties that could cause results to differ materially from those projected. Please refer to the introductory paragraphs which precede Item 1 and "Risk Factors" in Item 1A of the Annual Report on Form 10-K for a discussion of these risks and uncertainties.

(1) Nominating and Corporate Governance Committee
(2) Audit Committee
(3) Compensation Committee


IPG
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