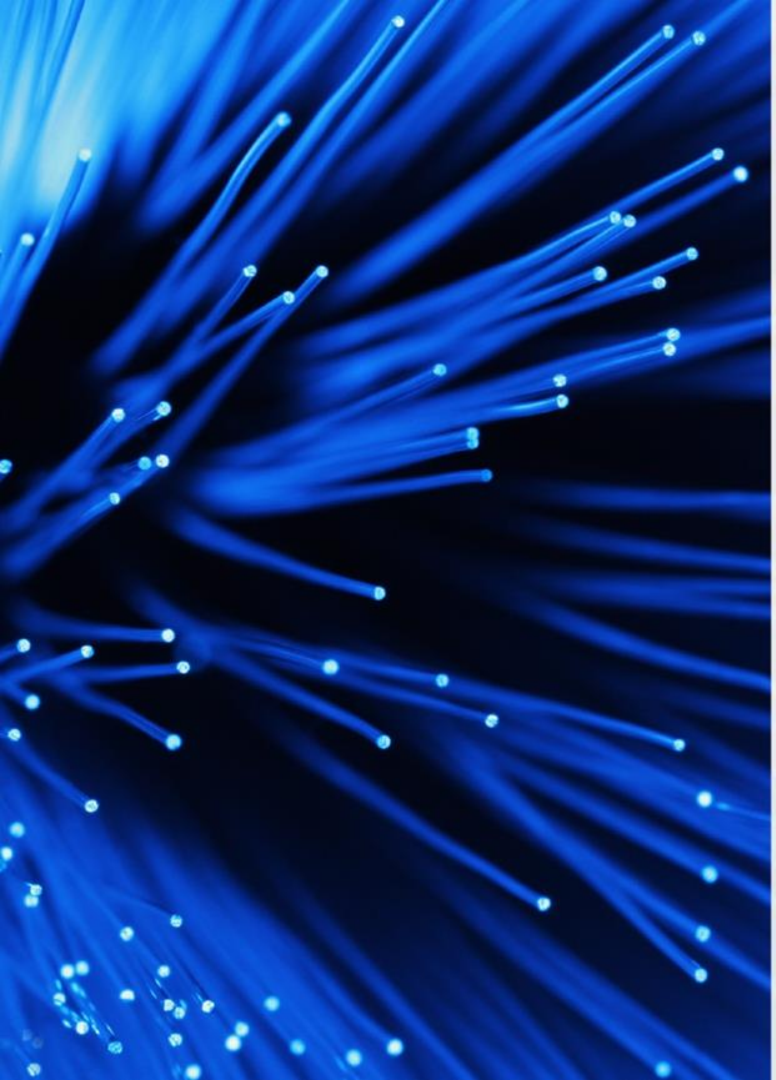


INVESTOR GUIDEBOOK

November 2018

James Hillier
Vice President of Investor Relations

Table of Contents

The Power to Transform®

Safe Harbor Statement

The statements in this guidebook that relate to future plans, market forecasts, events or performance are forward-looking statements. These statements involve risks and uncertainties, including, risks associated with the strength or weakness of the business conditions in industries and geographic markets that IPG serves, particularly the effect of downturns in the markets IPG serves; uncertainties and adverse changes in the general economic conditions of markets; IPG's ability to penetrate new applications for fiber lasers and increase market share; the rate of acceptance and penetration of IPG's products; inability to manage risks associated with international customers and operations; foreign currency fluctuations; high levels of fixed costs from IPG's vertical integration; the appropriateness of IPG's manufacturing capacity for the level of demand; competitive factors, including declining average selling prices; the effect of acquisitions and investments; inventory write-downs; intellectual property infringement claims and litigation; interruption in supply of key components; manufacturing risks; government regulations and trade sanctions; and other risks identified in the Company's SEC filings. Readers are encouraged to refer to the risk factors described in the Company's Annual Report on Form 10-K and its periodic reports filed with the SEC, as applicable. Actual results, events and performance may differ materially. Readers are cautioned not to rely on the forward-looking statements, which speak only as of the date hereof. The Company undertakes no obligation to release publicly the result of any revisions to these forward-looking statements that may be made to reflect events or circumstances after the date hereof or to reflect the occurrence of unanticipated events.

Our Mission

Making our **fiber laser** technology the tool of choice in mass production

Key Takeaways

1 Global market leader in fiber laser technology across multiple end markets and applications

2 Vertical integration, manufacturing scale, and technology driving industry-leading margins

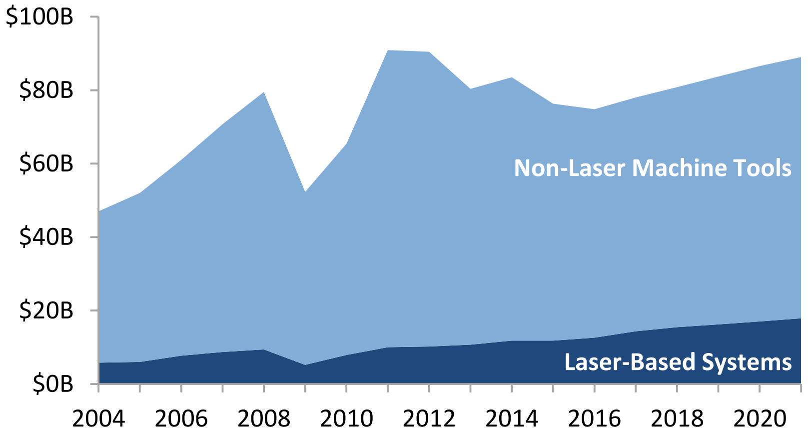
3 Expanding multi-billion dollar addressable market opportunity

4 Rapidly growing earnings and cash flow

Dual Secular Growth Strategies

(1) Conversion from Non-Laser to Laser Technologies

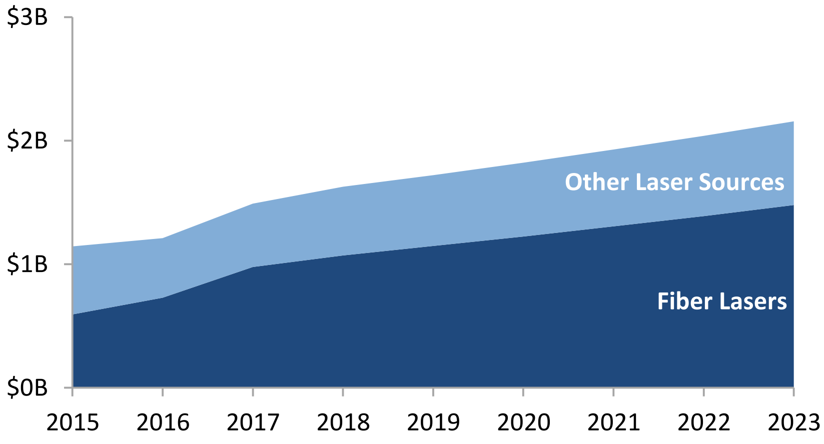
Global Machine Tool Consumption in 2017: ~$78B
Global Laser Systems for Materials Processing in 2017: ~$14B
Laser Systems 18% of Worldwide Machine Tools and Growing



Source: Oxford Economics, Optech Consulting and IPG Photonics Corporation

(2) Conversion from Traditional Lasers to Fiber Lasers

Fiber Lasers a Growing Percentage of Annual Demand for High-Power Industrial Laser Sources



Source: Optech Consulting and IPG Photonics Corporation

The Pioneering Force Behind Fiber Lasers

IPG Photonics Overview

IPG Photonics is the inventor and world's leading producer of high-power fiber lasers, which enable greater precision, higher-speed processing, more flexible production methods and enhanced productivity within industrial, semiconductor, instrumentation, medical, scientific, defense and entertainment applications. Fiber lasers 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. IPG has continually pioneered the development and commercial production of numerous unique technologies related to fiber lasers combining deep materials science expertise and process know-how with a vertically-integrated business model. The company produces all key components of its fiber laser technology in-house, enabling: (1) better performing, higher quality solutions; (2) faster product development; (3) more efficient production methods with high yields throughout the process; (4) industry-low product delivery times; and (5) rapid ongoing cost reduction with an industry-best margin profile.

IPG's History of Innovation

1990: IPG first to propose high-power fiber laser solution at OSA Conference
1990: first 5 W fiber laser
1991: first 2 W single-mode fiber laser
1993: first single-mode pumping solution powered by multi-mode diodes and 200-500 mW erbium-doped fiber amplifier
1996: first 10 W single-mode fiber laser and nanosecond pulsed ytterbium fiber laser
2000: first 100 W single-mode fiber laser
2001: first erbium doped fiber laser for medical applications
2002: first single emitter diode pumping solution and 1 kW, 2 kW and 6 kW ytterbium doped fiber lasers
2003: first multi-chip on submount diode packages
2004: first 1 kW single-mode and 10 kW multi-mode fiber laser
2005: first 2kW single-mode and 20kW multi-mode fiber lasers and 40 W/110 W thulium doped fiber lasers for medical applications
2006: first 3 kW single-mode fiber laser
2008: first 5 kW single-mode fiber laser and 50 kW multi-mode fiber laser
2009: first high-brightness 100 W fiber-coupled laser diode and 10 kW single-mode fiber laser
2010: first QCW lasers with 1.5 kW single-mode beam quality
2013: first 100 kW multi-mode fiber laser
2014: first kW class fiber lasers with wall-plug efficiency >45%
2017: first 120 kW multi-mode fiber laser

Pioneering Technology Development

Distributed Side Pumping – uniquely enables fiber lasers with high beam quality, superior electrical efficiency and a completely monolithic design without alignment or vibration concerns and with no free space optics (more on slide 10).

Active Optical Fiber – produce active optical fiber of varying core diameter with higher efficiency, lower loss and greater protection against photo darkening and light scattering than competing solutions.

Assembly, Splicing, Testing – employ low-loss assembly and splicing techniques throughout our core technologies while utilizing unique IPG-designed testing solutions that improve reliability at a significantly lower cost per channel than commercially available solutions.

Thin film Technologies – includes highly-reflective and anti-reflective coatings and narrowline filters of industry-leading quality and performance.

Laser Diodes – produce multi-mode laser diodes that are more efficient than competing solutions. Today we produce more than 10 million tested diode chips, significantly more than the next largest producer of these diode chips.

Distributed Single Emitter Pumping Solution – allows for significantly higher coupling and wall-plug efficiency, along with greater reliability vs. diode bar technology (more on slide 10).

Acousto-Optic Crystal Technology – employ unique crystal growth processes to produce acousto-optic modulators (used in pulsed lasers) and other components not available in the commercial market.

Volume Bragg Gratings – unique and leading-edge technology for pulse compression within ultrafast pulsed fiber lasers.

Nonlinear Crystals – unique crystal growth technology for producing nonlinear crystals for visible and UV lasers with uniquely low absorption and near 100% high-quality material yield vs. competing technologies with ~50-70% material yield.

Laser 101

Light
Amplification by
Stimulated
Emission of
Radiation

What is a Laser?

An optical amplifier that converts energy into highly concentrated beams of light by stimulated emission of photons (light particles) from excited matter. The unique properties of laser light enable numerous uses within the industrial, communications, semiconductor, medical, scientific, defense and entertainment industries.

How a Laser Works

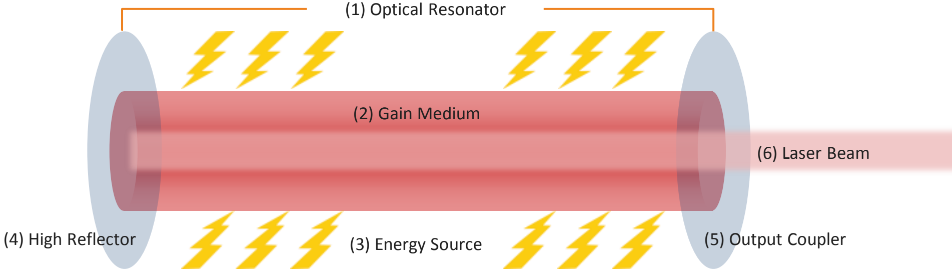
A laser consists of: **(1) an optical resonator**, typically two mirrors between which a coherent light beam travels in both directions; **(2) a gain medium** material within the resonator with properties that allow light amplification by stimulated emission; and **(3) an energy source** of light or electric current that excites atoms in the gain medium, known as **pumping**. Light in the gain medium travels back and forth between the two mirrors – the **(4) high reflector** and the **(5) output coupler** – being amplified each time. The output coupler is partially transparent, allowing some of the photons or **(6) laser beam** to exit.

Types of Lasers

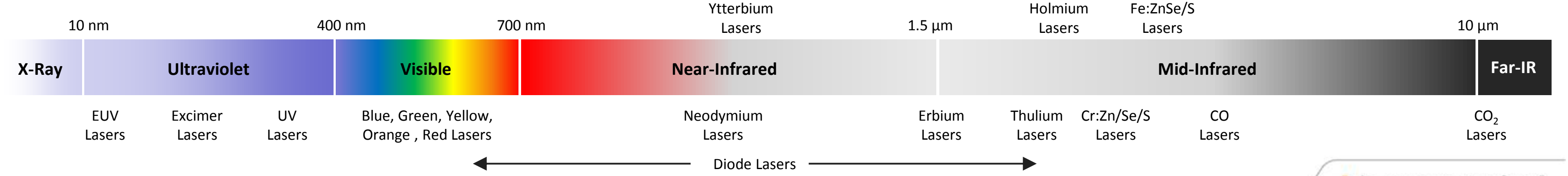
Lasers are often categorized by the type of gain medium (gas, crystal, fiber, semiconductor) but are also distinguished according to: (1) wavelength of operation (typically ~0.3 µm to ~10 µm); (2) pump energy source (electrical discharge, flashlamp, laser diode); (3) mode of operation (continuous wave or pulsed); (4) power (typically milliwatts to kilowatts); and (5) beam quality.

Unique properties of Laser Light

- **Collimated/non-divergent** beam, consisting of parallel light waves traveling in a single direction with minimal divergence, allowing laser light to be focused to very high intensity or over long distances
- **Monochromatic** (single frequency or wavelength) enabling specific light energy to be delivered for a precise application
- **High energy density** enables materials processing and advanced applications
- **Coherent** nearly identical photons/waves that move together in both space and time, allowing holographic and interferometric applications
- **Mode of operation** can be continuous wave (constant power over time) to ultrashort pulses, which are much shorter than non-laser sources



Wavelengths of Commercially Available Lasers



Laser Technologies

Lasers Diodes

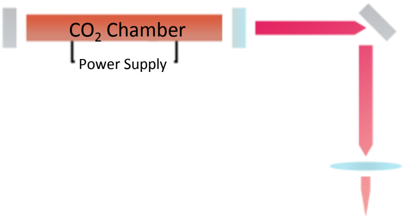
Laser diodes are electrically-pumped semiconductor lasers in which the gain medium is the p-n junction of a semiconductor diode, similar to light-emitting diodes (LED). Laser diodes are compact, inexpensive and commonly used in communications, optical storage, consumer products and as the light source within fiber and other types of lasers.

Fiber Lasers

Fiber lasers are monolithic devices that use high-power semiconductor diodes to pump an active optical fiber, which serves as the gain medium and the optical resonator (see slide 10 for diagrams and additional detail). The active fiber core is infused or doped with rare-earth atoms (e.g. ytterbium, erbium, thulium) and contains fiber Bragg gratings at both ends that serve as mirrors. Within IPG fiber lasers, light emitted from semiconductor diodes is inserted into the external layer (cladding) of an active gain fiber. The pump light undergoes multiple reflections within the fiber cladding while frequently intersecting the fiber core, generating highly-focused light of exceptional efficiency. Use of diodes as a pumping source enable fiber lasers to achieve power conversion (wall-plug efficiencies) of 50% or better. Fiber lasers are compact and deliver high output power because of: (1) the scalability of the technology and (2) the high surface area to volume ratio of optical fiber. The monolithic design of a fiber laser eliminates the need for free space transmission and mirrors to guide the light. Instead, as the light amplification happens within the glass fiber, the output light can be coupled directly into a flexible delivery fiber, which can be easily integrated with a moveable focusing element and combined with automated production processes that move in multiple dimensions (e.g. robotics). Finally, ytterbium fiber lasers produce light at 1 µm wavelength, which is better-absorbed in metals. Because of these advantages, fiber lasers are rapidly gaining share within materials processing and other applications.

Gas Lasers

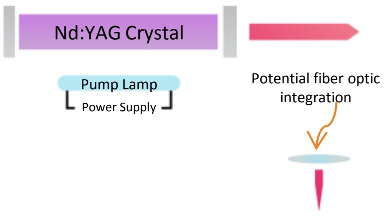
CO_2 lasers, traditionally used in materials processing applications, produce light in the infrared (IR) spectrum (10.6 µm) by stimulating electrons in a gas mixture and delivering the beam through free space using mirrors to provide direction. As a result, they occupy a much larger footprint and are more delicate to handle compared with fiber lasers. Wall-plug efficiency of these lasers is typically 7-8% including the cooling element (chiller); thus a 6 kilowatt CO_2 laser requires at least 75 kilowatts of input power. CO_2 lasers operate at a wavelengths that are optimal for use on many non-metallic materials, including organic materials like wood and fabrics.



Excimer lasers use combination of noble gases and a halogen, which produce a molecule called an excimer when stimulated. The excimers act as a gain medium and generate nanosecond pulses in the UV range. These lasers are primarily used in microelectronics applications including photolithography and flat panel displays.

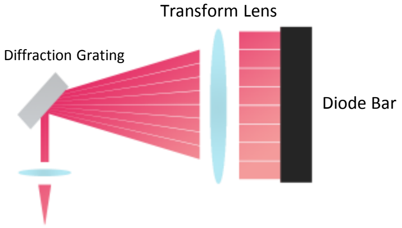
Crystal Lasers

Employing artificial crystals infused with rare-earth atoms as the gain medium, crystal lasers are used in a variety of materials processing, scientific, medical and advanced applications. **Nd:YAG lasers** (yttrium aluminum garnet infused with neodymium) produce light at 1 µm wavelength, utilizing mirrors and lenses to focus the light output., which can be integrated into a fiber optic system or delivered to the work surface with mirrors. Although well-suited for metals, Nd:YAG wall-plug efficiency is extremely low at ~2% for lamp-pumped lasers and in the 20% range for diode-pumped devices. **Disk lasers** use small diode pumps outputting multi-mode light. This light is reflected by mirrors onto a small disk crystal (typically Ytterbium doped YAG). Many of these diode-crystal modules are combined to create the final laser output. Wall-plug efficiency is typically in the 20% range, but with a much larger form factor compared with fiber laser technology.



Direct Diode Lasers

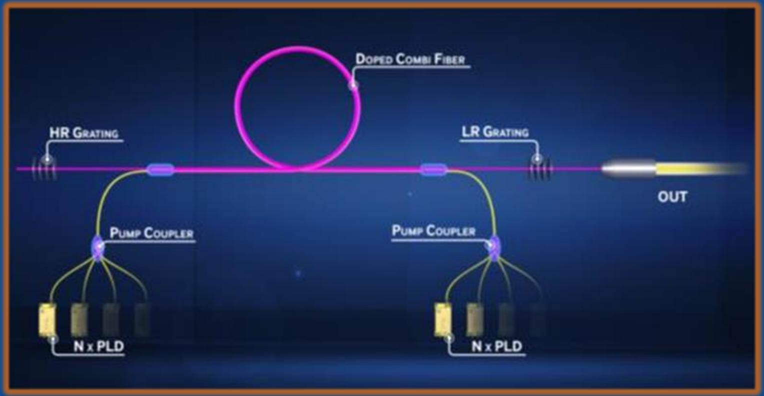
In an effort to move into higher-power applications, **direct diode lasers** have been developed that focus light from diode bars directly into an output fiber, rather than using diodes for pumping another laser, such as in fiber or crystal laser technology. Although this theoretical simplification of laser architecture could potentially result in improved efficiency, it has drawbacks as well. Most direct diode lasers use diode bar emitters, which are less reliable, have no inherent cost advantage, and may emit light at slightly different wavelengths making coherent combining of the light a challenge. In addition the beam quality of a diode laser is inferior to a fiber laser and the technology is less scalable.



IPG's Unique Approach to Fiber Lasers

Single-Emitter Diode Architecture

In IPG fiber lasers, the energy source is comprised of many multi-mode, or broad area, single-emitter diodes. IPG's single-emitter semiconductor diodes together form an assembly of independent light-generating elements that provide an electrically efficient and reliable light source, as the failure of any single-emitter pump does not affect the performance of the remaining pump assembly. Other fiber lasers often use diode bars or stacks, which combine multiple emitters (10-100) along a large-area chip, forcing all emitters to share an electrical current source and a complex thermal management system consisting of expensive and unreliable microchannel coolers using high-pressure deionized water. While packaging costs can be lower with diode bar technology, thermal and electrical cross-talk limits bar lifetime and constrains performance. In addition, our single-emitter diodes have significantly higher coupling efficiency (90-95%) and wall-plug efficiency (50-60%) vs. bar-stack alternatives at 50-75% and 25-35%, respectively.

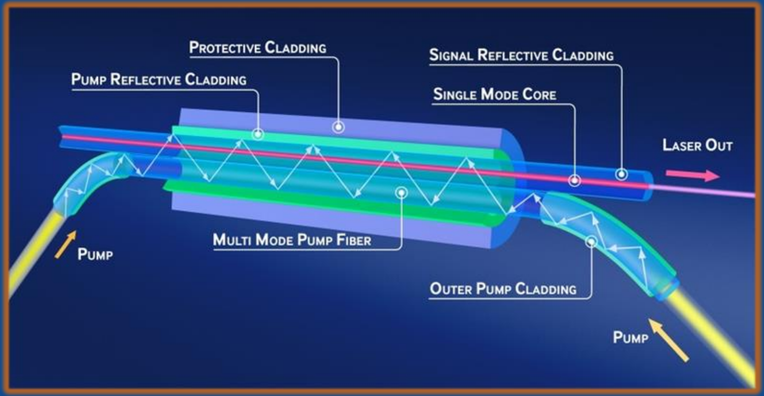


Leading-Edge Modular Platform

- Master oscillator power amplifier (MOPA) architecture with fully integrated (spliced) multiple cascades
- Multi-chip high-power pump laser diode packages
- Darkening-free optical fiber, which is highly doped and produced in industry-leading quantities
- Multi-port facet couplers with no-loss multi-mode coupling techniques
- Beam combining techniques including single-mode to multi-mode couplers
- Splicing mode matching of different fiber types
- Leader in fiber Bragg gratings with volume Bragg grating technology for ultra-short pulse compression
- Power scaling by parallel combining of fiber resonators

Cladding (Side) Pumping

IPG fiber lasers use a proprietary side- or cladding-pumping process to transfer energy from a large number of multi-mode single-emitter semiconductor diodes into a small (single-mode) fiber core for amplification. In cladding pumping, IPG uses a dual fiber construction consisting of a multi-mode pump fiber and a single-mode doped core fiber. The light from many pump diodes is coupled into the multi-mode pump fiber and undergoes multiple reflections while frequently intersecting the single-mode core. During these intersections, the pump light is absorbed and re-emitted by rare-earth ions, converting multi-mode diode light into single-mode fiber laser light with exceptional efficiency and high brightness. This approach enables a completely monolithic design without alignment or vibration concerns and with no free space optics. Other fiber lasers generally use end pumping, which is less efficient, reduces beam quality, often requires the use of mirrors to focus the light source into the fiber and may require maintaining positive air pressure within the laser to avoid dust and other contaminants.



Complete Portfolio of Components

IPG fiber laser components are designed and manufactured internally, at higher-performance, smaller form factor and lower cost than competing products.

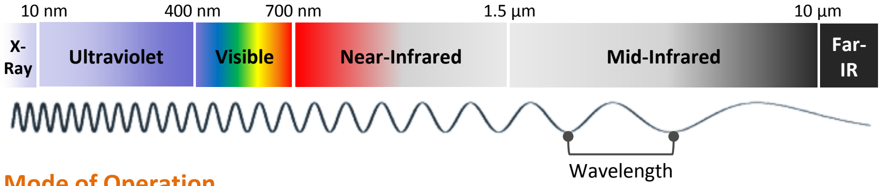
- Acousto-optic Modulators
- Isolators
- Beam Couplers
- Pump Combiners
- Collimators
- Laserline Narrowing and Stabilization
- Spectral and Spatial Filters
- Raman Filters
- Multiband Filters
- Compressors for fs and ps lasers
- Spectral Beam Combining
- Coherent Beam Combining
- Wavelength Multiplexing
- High-Power Beam Splitting
- Beam Steering and Deflection
- Angular Magnifiers
- Single Photon Counting
- Wavelength Tunable Lasers

Categorizing Lasers by Key Attributes

Wavelength

Electromagnetic radiation can be viewed as waves or photons and measured by: (1) wavelength; (2) photon energy; or (3) oscillation frequency. Wavelength is the distance between two successive points in the wave with the same phase of oscillation (e.g. crest to crest or trough to trough). The shorter the wavelength, the higher the frequency; that is, more crests within a second. Because laser light is monochromatic (single wavelength), lasers are often characterized by the wavelength of light they emit.

IPG Photonics produces lasers from 0.3 to 4.5 µm and the majority of the lasers we sell for materials processing applications contain active fibers infused with ytterbium, which produces light at a wavelength of 1 µm. CO_2 lasers produce light at 10.6 µm. The shorter wavelength possible with fiber lasers compared to their CO_2 counterparts makes them more efficient at metal processing as metals more readily absorb the laser's energy, reducing the power needed to heat the metal to cut or weld. We also infuse active fibers with erbium and thulium to producing lasers with wavelengths of 1.5 µm and 2 µm for a variety of telecom, medical, R&D and non-metal processing applications. Furthermore, we produce nonlinear crystals for frequency doubling and frequency tripling of the 1064 nm beam from our ytterbium fiber lasers to produce 532-nm green and 355-nm UV lasers, also known as second-harmonic generation and third-harmonic generation, respectively.



Mode of Operation

Lasers can run in a variety of modes, each effectively representing a compromise between average and maximum power. With a continuous wave mode, the laser is continuously producing the same wattage, making its average power equal to its maximum. Other modes rely on pulses of varying lengths to increase maximum power by reducing the time in which this maximum power is available; with incredibly short pulses, very high amounts of power are possible, reducing as pulse length increases.

IPG produces continuous wave (CW), quasi-continuous wave and pulsed lasers, with pulse durations ranging from milliseconds (thousandths of a second) to femtoseconds (quadrillionths of a second).

Power

The output power of a laser is its wattage (joules per second), which is the rate at which power is transferred to the workpiece. The higher a laser's power, the more rapidly one can deliver energy to the workpiece (e.g. cut or weld materials). However, as laser power increases, the electricity needed must increase as well. As cutting speeds improve, other mechanical components in which the laser is integrated must also keep up, making systems investments in linear motors and gantry speeds necessary to fully make use of higher powered lasers.

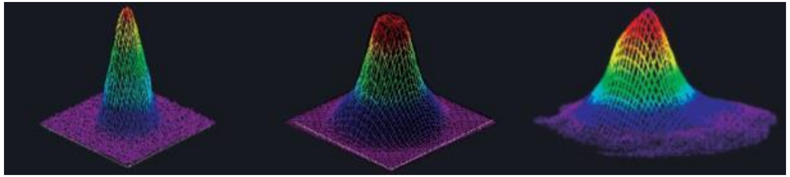
Today we produce lasers at power levels from milliwatts to kilowatts, with our 120 kW multi-mode ytterbium fiber lasers the highest-powered continuous wave laser commercially produced on the market by an order of magnitude. We also have the ability to make even higher-powered lasers to meet specialized customer-specific application needs.

Beam Quality

M^2 or the beam quality factor represents the degree of variation between a laser beam and the ideal single-mode or diffraction-limited Gaussian beam where $M^2 = 1$. M^2 indicates how well a beam can be focused on a small spot and remain focused over longer-distances. In most lasers, beam quality is sensitive to output power, with M^2 increasing as output power increases. However, 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 and with greater flexibility.

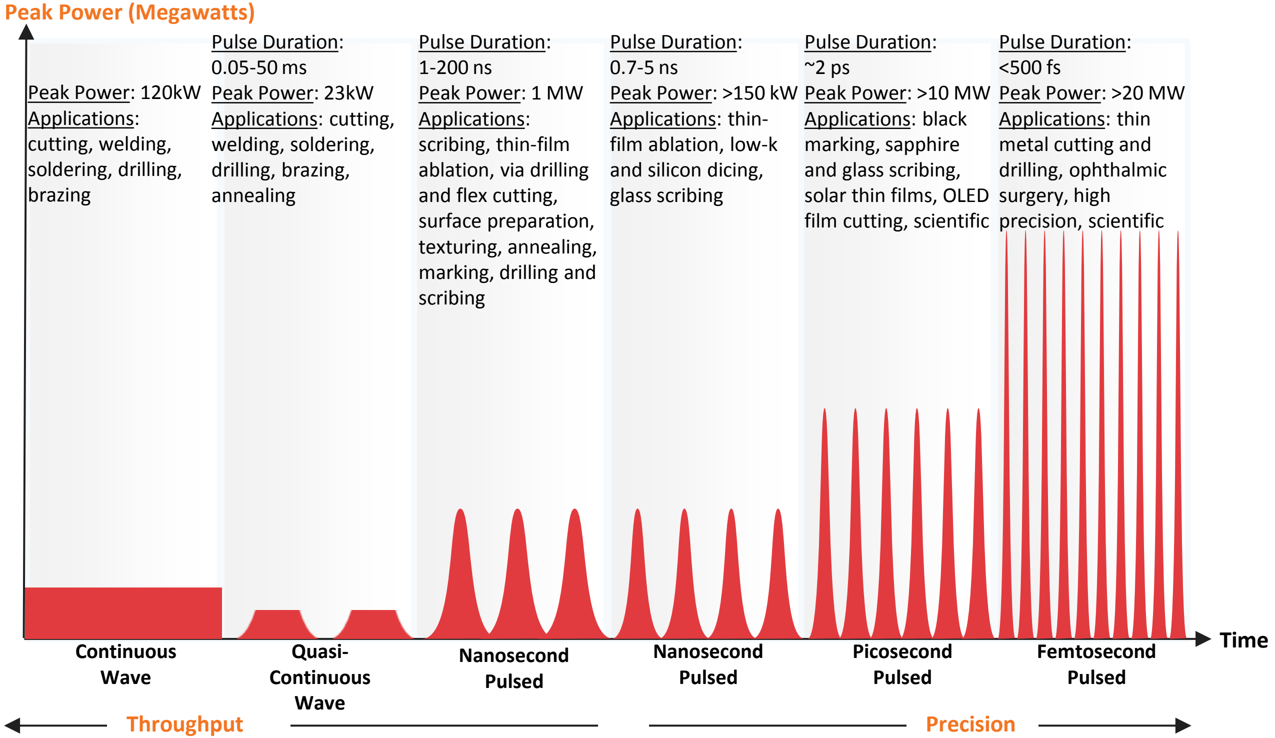
Diffraction-limited single-mode beams with M^2 factors nearing 1 are required for certain telecommunications, sensor, directed energy and remote materials processing applications. Other types of materials processing, including many cutting and welding applications, will use laser sources with M^2 factors of 10 and above depending on the application. IPG produces both single-mode lasers with an M^2 factor <1.1 as well as multi-mode lasers with higher M^2 factors to meet a variety of application- and industry-specific needs.

$M^2 = 1$ $M^2 = 9$ $M^2 > 20$



Broadest Portfolio of Fiber Lasers

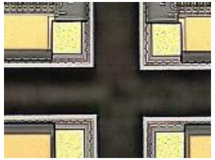
▶ Delivering any wavelength, mode of operation, power, beam quality or application



Thick steel cut with a continuous wave laser

Drilling using a quasi-continuous wave laser

Surface Cleaning using a pulsed laser



Micromachining using an ultrafast laser

Advantages of Our Fiber Lasers

Monolithic Design

- IPG fiber lasers have no moving components, enabling a rugged design that eliminates optics misalignment and the vibration-free installation required for many gas and solid state lasers.
- Because of our cladding pumping technology and advanced splicing techniques, IPG produces a unique "all fiber" solution. Competing fiber lasers often utilize mirrors to focus the light source into the fiber, requiring positive air pressure to be maintained within the laser to avoid dust and other contaminants.

Highest Power

- IPG commercially-available high-power CW ytterbium fiber laser technology can scale to record power levels of up to 10 kW single-mode and 120 kW multi-mode output power. We have the ability to produce even higher power levels for specialized customer-specific application needs.

Record Power Efficiency

- Because we use more efficient diodes, active optical fiber, splicing techniques and transmission components, IPG produces kilowatt-scale fiber lasers with record wall-plug efficiency of ~45% to 50%.
- Including the cooling element (chiller), our lasers use 50% less electricity than competing fiber and disk laser solutions, 84% less electricity than CO_2 lasers and 96% less electricity than lamp pumped Nd:YAG lasers.

Beam Quality

- IPG produces fiber lasers with the highest (near-diffraction-limited) beam quality, including single-mode fiber lasers with a M^2 factor <1.1.
- High beam quality means that IPG fiber laser can serve a wider range of applications within materials processing, medical, scientific and defense, including directed energy solutions.

MOPA Configuration

- Unlike gas or crystal lasers, fiber lasers can be produced using a MOPA or master oscillator power amplifier configuration.
- Consisting of a master or seed laser (laser diodes) and an optical amplifier (cladding-pumped fiber amplifier) to boost output power, MOPA configuration decouples laser performance aspects from the generation of high powers, offering significant advantages in terms of output power, beam quality and pulse duration.

Reliability

- Utilizing our rigorously-tested, long-lived semiconductor diodes, unique active fiber to prevent photo darkening and other leading-edge, proprietary technology, IPG fiber lasers have demonstrated greater reliability, less required maintenance and fewer service interventions than competing fiber, solid state and gas lasers. We typically provide one to three-year parts and service warranties on our lasers.

Modular / Scalable Architecture

- The basic structure of our lasers is modular in design, with core building blocks (e.g. diodes, fiber blocks, etc.) that are the same regardless of power or configuration.
- Our higher-power lasers simply require more modules.
- IPG fiber laser production is easily scalable with superior process control and repeatability, enabling industry-low product delivery times for our customers.

IPG Lasers Enable Greater Productivity

Faster Processing Speed

- A 6 kW fiber laser cuts 0.25-inch think steel at 200 inches per minute (IPM), about double the speed of a 6 kW CO_2 laser, which cuts at 110 IPM. Moreover, a 10 kW fiber laser cuts 0.25-inch thick steel at 500 IPM, about five times faster than a 6 kW CO_2 laser.

Lower Operating Costs

- Fiber laser hourly operating costs are >50% lower than CO_2.
- CO_2 maintenance tasks consuming several hours per month, such as beam alignments, are not required for fiber lasers.
- In addition, CO_2 consumable costs such as mirrors, lasing gases and beam delivery bellows are not incurred with fiber lasers.

Easy Systems Integration

- Fiber laser light is transmitted through a flexible cable, delivering much better beam quality and allowing for easy integration with robotics and other automated manufacturing processes since there are no mirrors that need to be aligned and no free space optical transmission.
- In a simple process the cable can be attached to a wide variety of automated systems.

Small Footprint

- Fiber lasers are incredibly compact because they convert diode energy into useful laser beams within a fiber no thicker than a human hair, as opposed to the bulkier gas-filled chambers of CO_2 lasers.
- Thanks to our leading-edge component technologies, IPG fiber lasers are significantly smaller than competing fiber and solid state lasers, taking up less space within a factory setting.

Efficient Cooling

- IPG fiber lasers utilize smaller-form-factor cooling elements because of the: (1) efficiency of our laser diodes and (2) small diameter of our optical fiber combined with its looping, which more effectively dissipates heat due to the high surface area to volume ratio.
- Our rack-mounted and lower-power fiber lasers dissipate heat so efficiently they can be air cooled instead of water cooled.

Significant Barriers to Entry

Technology:
IP & Process Know-How

Business:
Vertical Integration & Scale

Continuous Innovation → >270 Patents
>420 Pending

Vertically Integrated → Lowest-Cost Provider

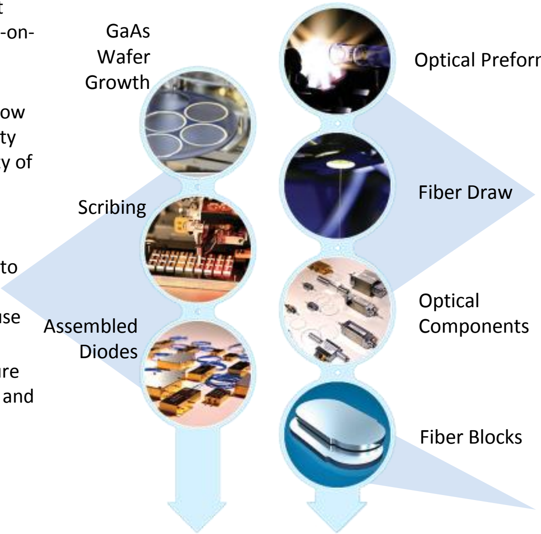
Manufacturing, Distribution & Service Scale → Thousands of Lasers Shipped Each Quarter

Advantages of Our Vertical Integration

We view our in-house component supply and process know-how as crucial competitive advantages, providing us an enhanced ability to increase the power and functionality of our products at an industry-low cost point.

Diodes

- In 2017 we produced an industry-leading 10 million tested **semiconductor diode chips** for our **pump laser diodes (PLDs)** that power all our fiber lasers. IPG PLD's come in 1-, 3-, 6- and 12-chip-on-submount (COS) configurations.
- We utilize multiple molecular beam epitaxy (MBE) wafer growth systems, along with proprietary recipes and reactor settings to grow gallium arsenide (GaAs) wafers. We believe MBE yields high-quality optoelectronic material for low-defect density and high uniformity of optoelectronic parameters as compared to other techniques like MOCVD.
- Within our wafer fab operation, we employ proprietary wafer process equipment and facet passivation and coating techniques to ensure industry-best performance and reliability. IPG produces submounts internally, with COS assembly performed using in-house automated equipment and proprietary processes.
- We have the industry's largest test and burn-in operation to ensure long-term PLD reliability. Test and burn-in equipment is designed and manufactured internally at a significantly lower cost per channel than the market, with every COS undergoing rigorous high-temperature and high-current screening.
- Our PLD packaging operation utilizes equipment designed and manufactured internally with better performance and lower cost than open market alternatives. We also produce micro optics and package mechanical subcomponents internally, enabling a lower packaging cost compared with overseas contract manufacturing.



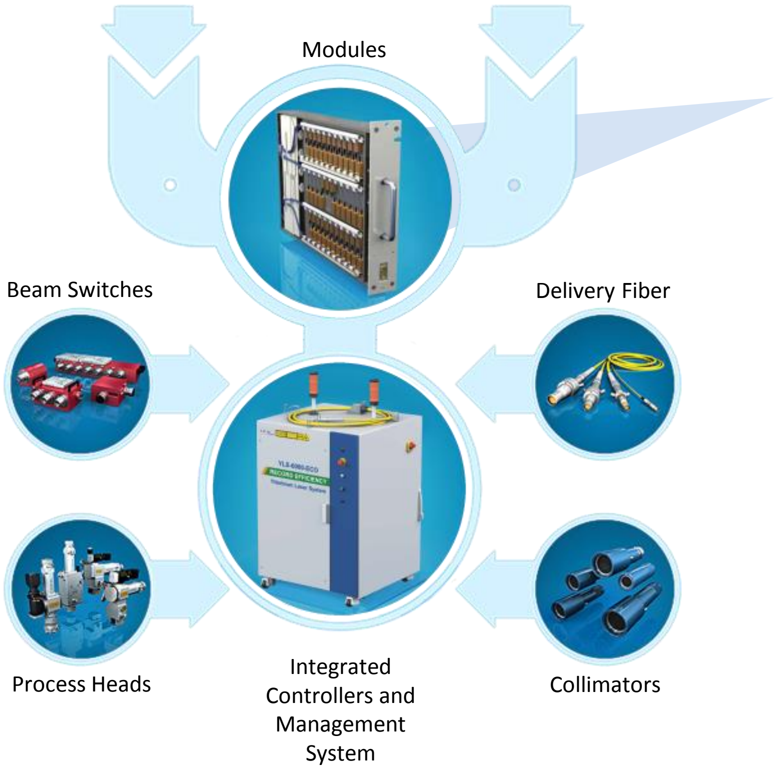
Specialty Optical Fiber and Components

- We are a leading global producer of **active optical fiber**, which is used internally in our products. Active optical fibers with embedded mirror gratings form the laser cavity or gain medium in which lasing or amplification of light occurs in our products. Our active fibers consist of an inner core that is infused with rare earth atoms, 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 optical fibers has a number of advantages including: (1) higher concentrations of rare earth ions; (2) improved reliability; (3) higher lasing efficiency; and (4) a greater ability to achieve single-mode outputs at high powers while withstanding the high optical energies at these power levels.
- We have 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, combiners, bulk-optics, micro-optics and crystals among others. We also developed special methods and expertise in splicing fibers together with low optical energy loss and on-line loss testing.

Fiber Blocks

- 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.

Advantages of Our Vertical Integration



Modules

We package hermetically-sealed **pump laser diodes** and **fiber blocks** into **pump modules**. Our module design is scalable and modular, permitting us to make products with high output power by coupling a large number of diodes with fiber blocks. 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 our modules.

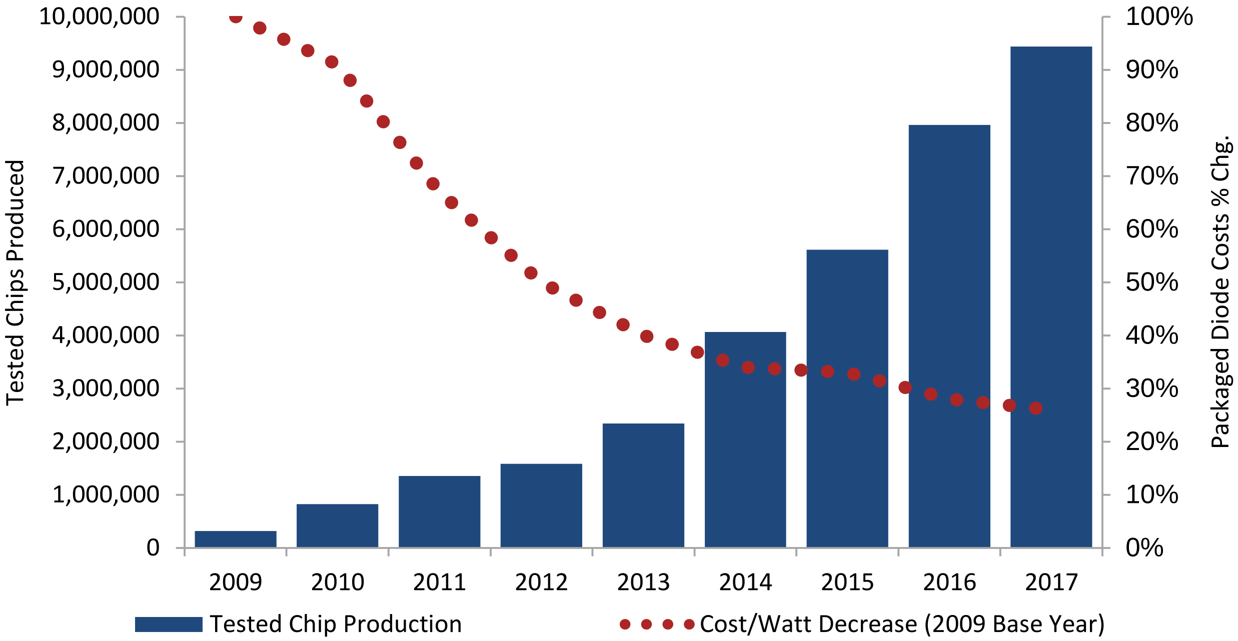
Fiber Laser

We produce **high-power fiber lasers** by combining multiple **modules** together with associated **power supplies**. Our proprietary process for combining fiber modules allows us to produce industrial-grade fiber lasers at over 100 kilowatts of power. We build, design and assemble fiber laser modules and power supplies in-house, enabling a more robust, compact and efficient design at low cost.

Complementary Products

Optical delivery fiber cables bring the light source to the work surface. We produce delivery fiber with core diameters from 50 µm to over 1000 µm at lengths of more than 100 meters. Within certain applications, it is necessary to transform light output from an optical fiber into a free-space collimated beam, and IPG produces both water or air cooled **collimators**. IPG also manufactures a complete line of **couplers**, **beam shutters** and **multi-channel beam switches** that dramatically expand functionality. They enable the use of a single laser at multiple working cells, increasing process speed and maximizing throughput by allowing multiple applications simultaneously. Finally, IPG produces a wide range of **process heads**, including cutting and welding heads and optical scanners that enables applications like welding, precision cutting, marking and surface treatment.

Cost Reduction on Semiconductor Diodes



Diode Production in Oxford, Massachusetts

Source: IPG Photonics Corporation

We believe that our diodes are the lowest cost in the industry, enabling a significant advantage in our total bill-of-materials and our ability to price products competitively versus other lasers and non-laser technologies.

Applications

Cutting and Drilling

54% of revenue

Lasers cut and drill material not through mechanical grinding, but by focusing a high-powered beam and rapidly heating the material, which either melts or vaporizes it. There is no contact between the machinery and the item, with the laser working at a distance. There is still a kerf (material removed through cutting) as with traditional methods, but the kerf can be greatly reduced in size by using a laser.

Welding

Brazing

20% of revenue

The ability of a laser to rapidly heat a small section of material makes it more efficient than traditional materials processing methods, even more so in the case of welding and brazing where consumables are used and heat transfer to the workpiece is an important concern. The high power density provided by a laser system allows welding of: (1) different alloys together; (2) high-strength and multi-layered steel; and (3) aluminum, which was traditionally riveted.

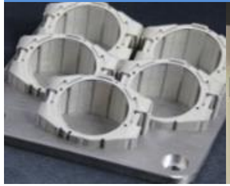
Marking

Engraving

9% of revenue

Fiber lasers can be used to oxidize surfaces, darkening sections to form a design. Different colors can be attained through the addition of powders, which when heated bind to the workpiece and create the intended shape. Engraving involves the vaporization of a shallow layer, leaving behind a permanent and low maintenance mark.

Additive Manufacturing

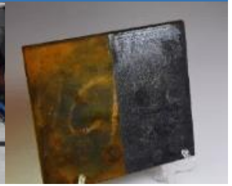


Cladding

Cladding and additive manufacturing function in largely the same way, heating metallic powders until they bind to one another or to the workpiece when cladding. Additive manufacturing enables the construction of unique, completely metallic parts and cladding allows for repair and increased functionality of components through the addition of a protective layer.

Ablation

Cleaning



In ablation, the exterior coating absorbs the energy and vaporizes, leaving behind only the underlying material which has a higher vaporization temperature. Lasers can also be used to clean rust, paint and other coatings from surfaces without any chemicals through pulsed laser emissions which vaporize the surface damage or coating but keep the underlying material intact.

Advanced

Medical

Our products are used in a variety of advanced applications including obstacle warning and light detecting and ranging, directed energy applications for security and defense, scientific projects and research and cinema projection systems. We also produce multiple laser types for medical applications including general surgery and urology, dental and skin rejuvenation and wrinkle removal.

Telecom, Systems, Service and other – due to their monolithic and largely maintenance free design, fiber lasers require little servicing compared to other laser technologies.

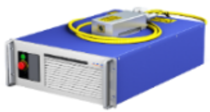
Products

High Power CW

1. ~60% of revenue

High Powered Continuous Wave ytterbium fiber lasers make up the majority of IPG revenue and have average powers from 1 to 120 kW, ideal for materials processing applications like cutting and welding. They present a flexible manufacturing solution since they not only operate at their peak power, but can also be used for low power applications with ease. Their modular design enables redundancy as failure of any one module can be compensated by the others, decreasing service time significantly. IPG high power lasers are the most efficient on the market with wall plug efficiencies from 40-50%-plus, reducing cooling needs significantly. In addition, we also produce single-mode ytterbium fiber lasers with power levels up to 10 kW for advance applications.

Mid/Low Power CW



2. ~8% of revenue

Mid and low power lasers have output ranges below 1 kW, and those under 500 W are generally air cooled, further reducing costs. They have the same leading efficiency as high powered ytterbium fiber lasers and the same high beam quality. IPG produces these units as OEM modules or as easily integrated rack units directly for the end consumer. These lasers present an economic choice for additive manufacturing, R&D, scientific and commercial uses with a wide range of wavelengths available, from .5-5 µm, including erbium and thulium fiber lasers with output power levels up to 500 W.

Pulsed

3. 10-15% of revenue

Pulsed lasers deliver high peak power with much lower average power use, making them very useful for applications where material integrity is important. Pulsed lasers allow for applications like ablation, marking, trimming, drilling. Pulsed lasers are offered in a wide range of wavelengths: .36 - 5 µm with adjustable repetition and peak power rates making a single laser flexible for many different uses with lower energy consumption and a smaller footprint than a CW laser.

Ultrafast

4. <5% of revenue

A fast growing range of advanced applications require ultra-short pulse durations in the 10^{-11} (picosecond) to 10^{-13} (femtosecond) range. Based on a master oscillator power amplifier (MOPA) architecture, IPG ultrafast fiber lasers generate very short pulses at extremely high power, which are particularly well suited for micro materials processing since they enable drilling and dicing with no thermal damage to surrounding materials. Our ultrafast lasers can also be used in a variety of medical and scientific applications.

QCW

5. 5-7% of revenue

Quasi-continuous wave lasers produce pulses in the millisecond to microsecond range, similar to Nd:YAG lasers but with greater power efficiency and flexible beam delivery. Even the relatively long pulses of a QCW laser enable a peak power ~10x higher than average power. The smaller variation in output compared to other pulsed lasers makes them practical for fine welding, percussion hole drilling and fine cutting in the consumer electronics and aerospace industries.

Systems

6. <5% of revenue

IPG not only produces laser modules for OEMs and end users, but also manufactures complete machine tool systems, integrating laser modules with motion systems, optics, beam switches, processing heads and software. These integrated precision systems allow for easy automation and are customizable to meet consumer needs as well as providing unified readymade solutions suitable for most typical needs.

Accessories

7. <5% of revenue

In order to expand the capabilities of fiber laser technology, IPG manufactures a complete set of optical beam delivery components. Products include state-of-the-art welding heads, cutting heads and scanning-based processing systems. In addition, IPG sells delivery fiber and optics, beam couplers, switches and sharers, collimators and process control and tooling solutions.

Telecom

8. <5% of revenue

IPG produces fiber amplifiers, Raman pump lasers and optical transceivers for the telecom and datacom markets. IPG's fiber amplifiers are deployed in some of the world's largest broadband and fiber-to-the-home networks. In addition, we design and manufacture transceivers and transponders featuring proprietary mixed signal ASIC and DSP technology for interconnecting electronic equipment within telco, cable and data center networks.

9. Service and other — 5-10% of revenue

Markets Served by Our Products

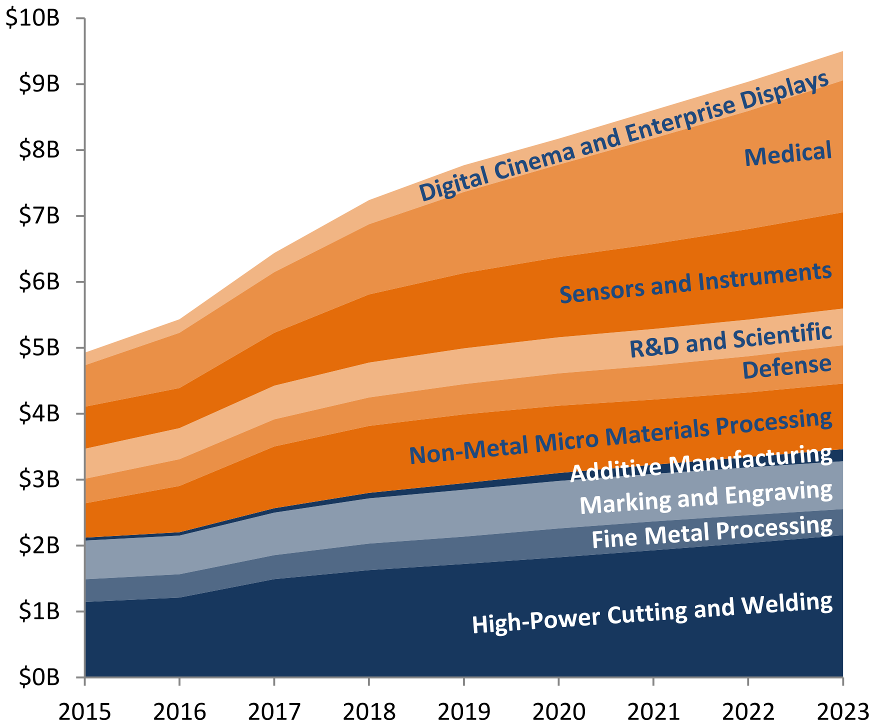
Product	Markets		Applications	
High-Power Ytterbium CW Lasers (1,000 to 120,000 W)	Automotive Heavy Industry General Manufacturing	Natural Resources Aerospace	Cutting/Drilling Welding/Brazing Annealing	Cladding 3D Printing
Mid-Power Ytterbium CW Lasers (100-999 W)	General Manufacturing Consumer Medical Devices	Printing Electronics	Cutting 3D Printing Welding	Wafer Scribing/Inspection Ablation Engraving
Pulsed Ytterbium Lasers (0.1-200 W)	General Manufacturing Semiconductor Medical Devices	Consumer Electronics Panel Displays	Marking/Engraving Ablation/Coating Removal Dicing/Scribing	Cutting Drilling Solar
Ultrafast Pulsed Ytterbium Lasers	General Manufacturing Semiconductor Medical Scientific	Consumer Electronics Panel Displays	Marking/Engraving Ablation/Coating Removal Dicing/Scribing	Cutting Drilling Solar
QCW Ytterbium Lasers (100 W-4.5 kW)	Medical Devices Computer Components	Fine Processing	Welding/Brazing Drilling – percussion hole	Cutting Metals and Crystals
Pulsed & CW Green Lasers	Micro Processing Semiconductor	Solar General Manufacturing	Silicon Wafer Cutting/Scribing Silicon Wafer Annealing	Marking/Engraving Plastics Thin Film Ablation
Pulsed Ultraviolet Lasers	Consumer Pharmaceutical	Semiconductor 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	Communications	Cable TV Data Center Networking	SONET/SDH Optical Transport	Ethernet Switching IP Routing

Revenue by Channel:
~75% sold directly through OEMs & distributors
~25% sold directly to end users

Revenue by End Market:
Because three-quarters of our sales are to original equipment manufacturers and distributors of laser-based systems and not to the end users of those systems, we do not have good visibility into our revenue split by end market. In addition, lasers systems sold in the cutting market (our largest application) may be used to process materials in a variety of end markets.

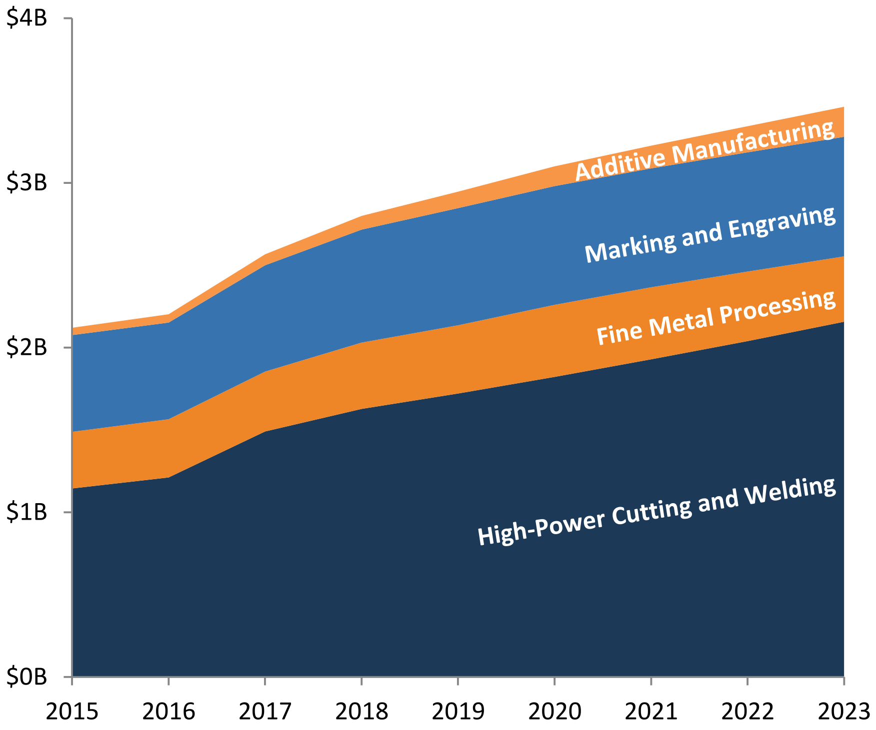
Our largest end markets include:
- General Manufacturing
- Automotive
- Household Appliances, Building, and Housing Equipment
- Industrial Machinery
- Electrical Equipment
- Aerospace, Shipbuilding, Railcar, and Other Transportation
- Consumer Electronics

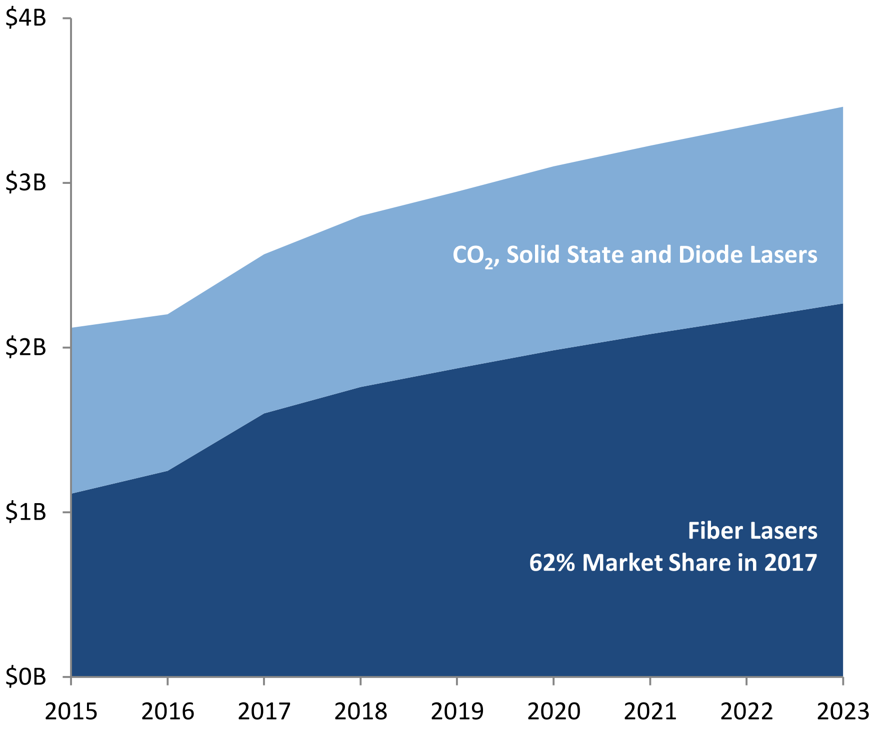
Total Addressable Market



Source: Optech Consulting, Strategies Unlimited and IPG Photonics Corporation

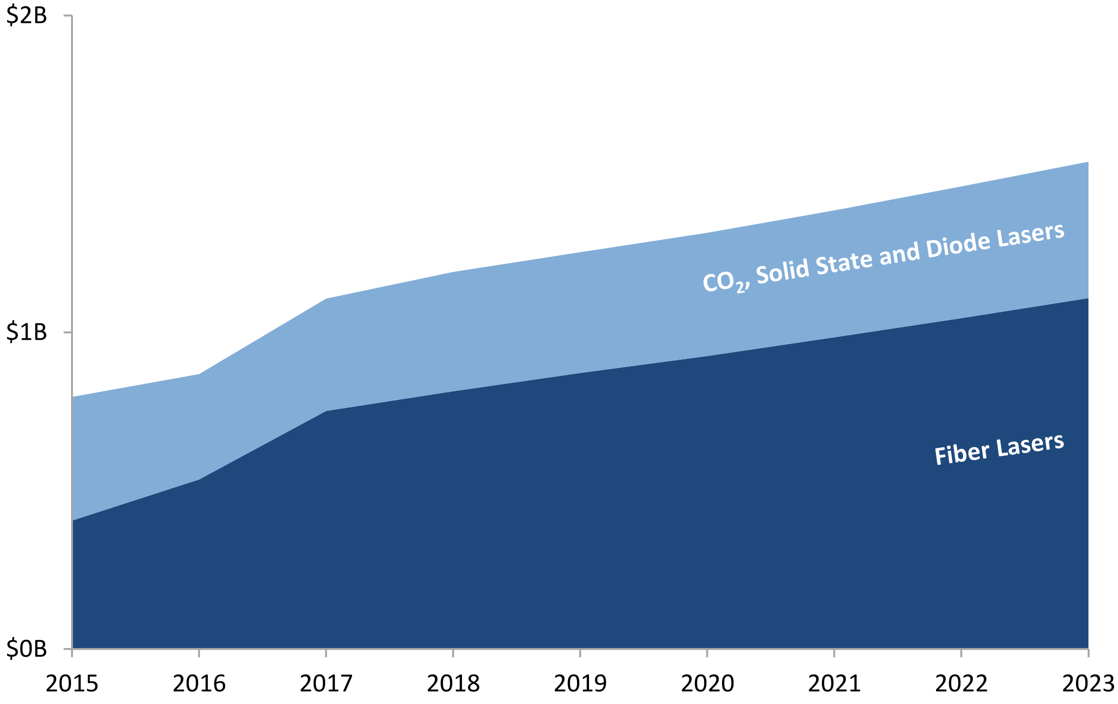
Industrial Laser Market

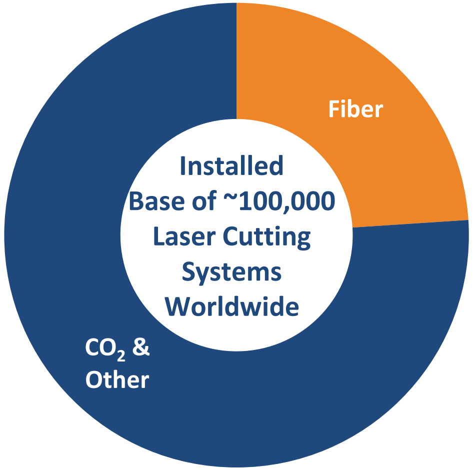




Source: Optech Consulting, Strategies Unlimited and IPG Photonics Corporation

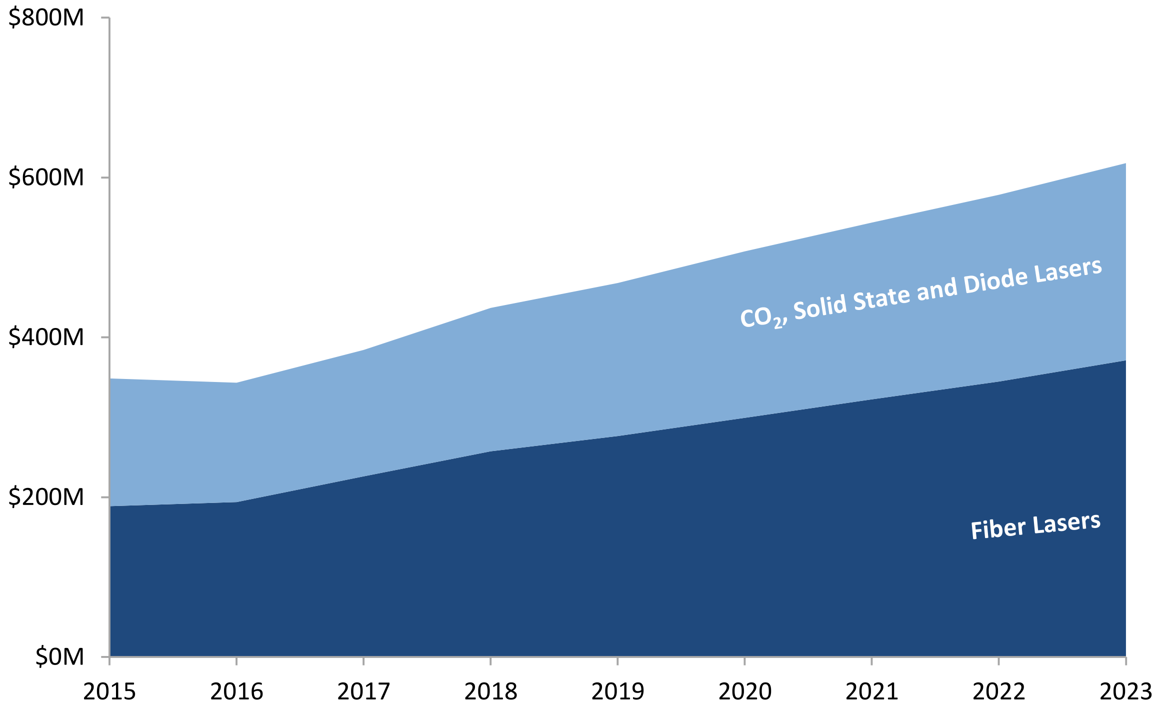
Metal Cutting





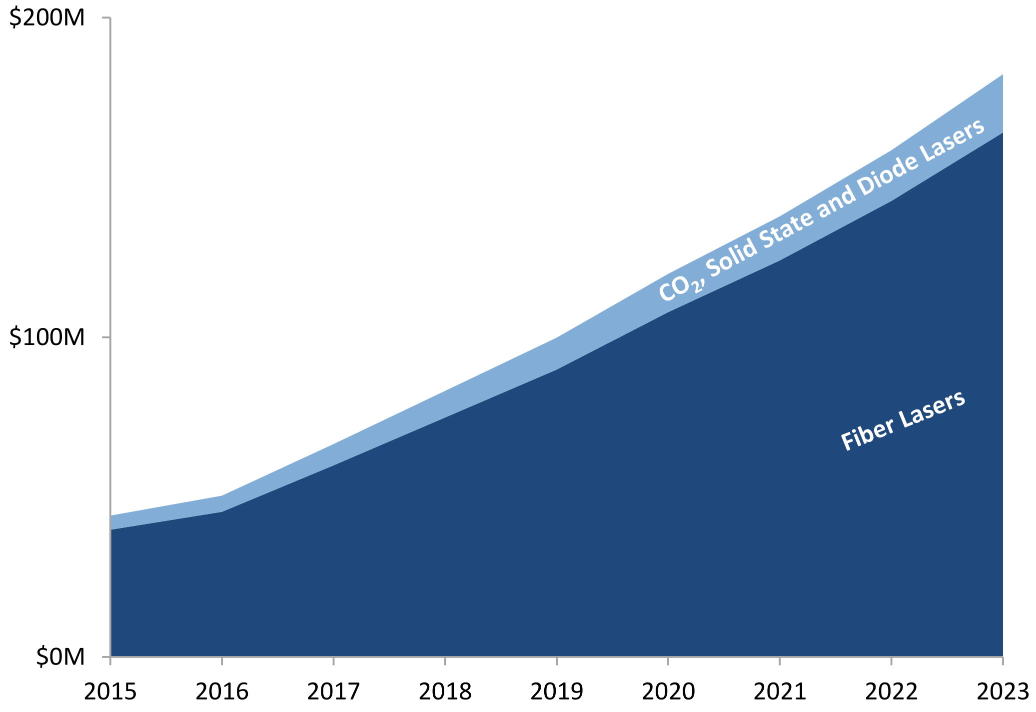
Source: Optech Consulting and IPG Photonics Corporation

Metal Joining (Welding & Brazing)



Source: Optech Consulting, Freedonia Group and IPG Photonics Corporation

Metal-Based Additive Manufacturing

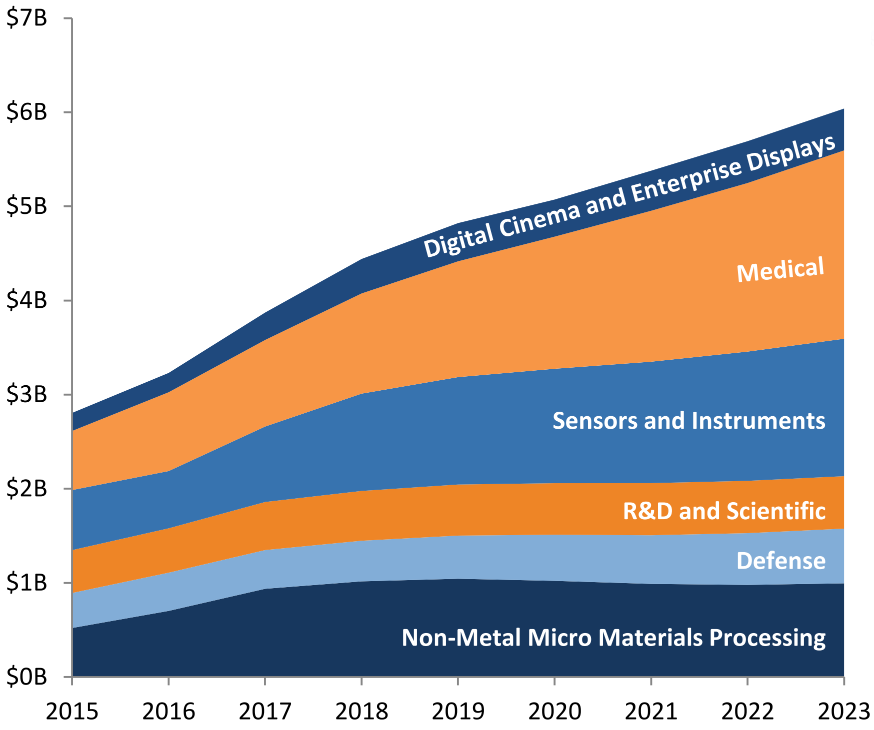


Source: Smartech Markets, Strategies Unlimited and IPG Photonics Corporation

- Metal additive manufacturing revenue predicted to grow at 20%+ CAGR into 2025
- Metal additive manufacturing market reaching $6.6B by 2026 from $950M in 2016.

YLM-400-AC Series Laser

New Laser Applications



Source: Strategies Unlimited and IPG Photonics Corporation

Ultrafast: ~$300M+ addressable opportunity across: (1) micro processing applications, including dicing and scribing of semi wafers, scribing and cutting of sapphire and glass and fine hole drilling; (2) medical, including laser eye surgery; and (3) scientific applications. IPG ultrafast solutions offer higher wall-plug efficiency, smaller footprint, more consistent energy per pulse, faster cold start time and lower cost of ownership compared with competing products.

Ultraviolet Fiber Laser: ~$100M+ addressable opportunity for UV laser marking module with two-axis scanner for marking of white plastics and cabling. IPG UV solutions offer high performance and reliability at a competitive cost point.

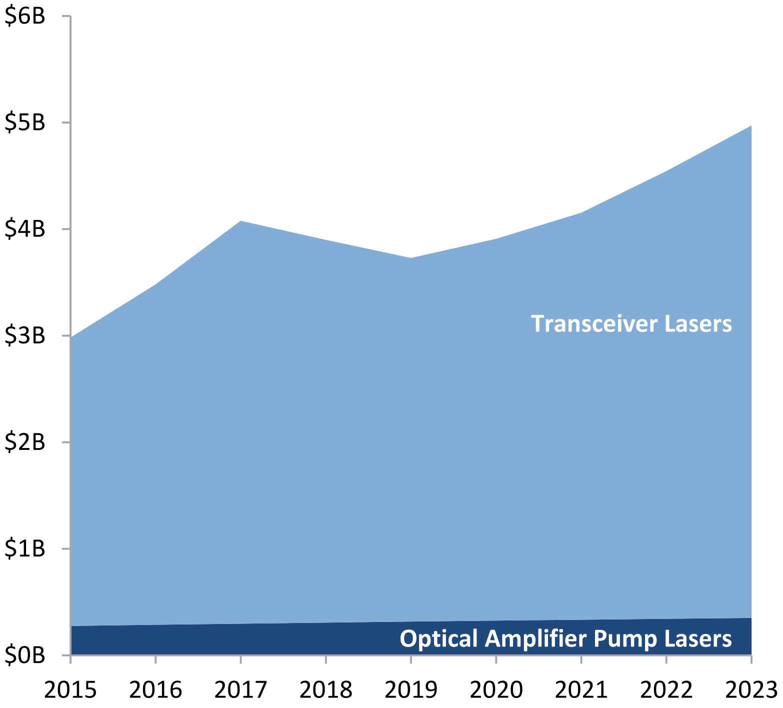
Systems: IPG's systems provide precise laser and beam delivery components tailored to customer-specific application needs. Our systems include multi-function workstations for precision welding, cutting and drilling, small form 2D cutting machines, microsystems for a variety of micromachining applications, a laser seam stepper combining clamping with a laser welding tool, laser cladding, annealing & welding cells and coating & cladding workstations, among others.

Medical: IPG Medical develops lasers and laser-based medical systems. Our thulium-doped fiber lasers can be used in surgical (urology) and skin resurfacing applications, our mid-IR lasers for diagnostic imaging, ablative skin resurfacing and dental (hard tissue) applications, and our diode lasers for tissue regeneration (dental and dermatological) and surgical (tissue cutting) applications.

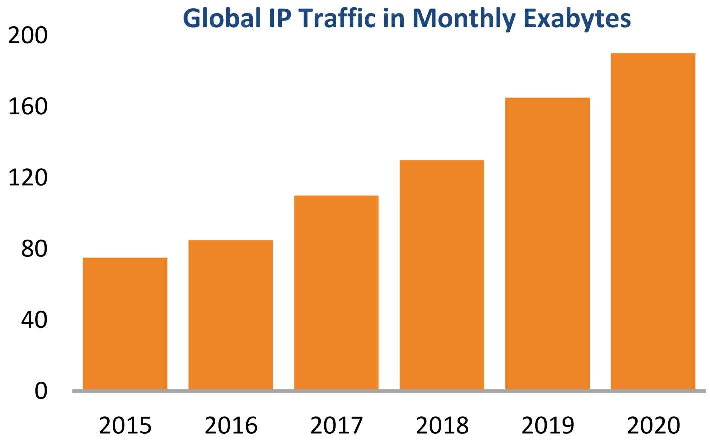
Projection Display: leveraging IPG lasers in the visible light spectrum, our laser-based projection system provides a high brightness and color purity solution for the digital cinema and laser projection industries. With 55,000 medium to premium cinema screens, we see potential for a >$1B addressable opportunity over 8-10 years, with additional opportunities in signage and entertainment.

The Power to Transform®

Communications Amplifiers and Transceivers



Source: Laser Markets Research and IPG Photonics Corporation



Global IP traffic is predicted to grow 3x over the next 5 years

Source: Cisco Visual Networking Index: Forecast and Methodology, 2016–2021

Tunable OTN XFP MSA Compliant DWDM 11.1 Gb/s Transceiver with Integrated G.709 Framer and FEC

Tunable Duo Binary DWDM CFP

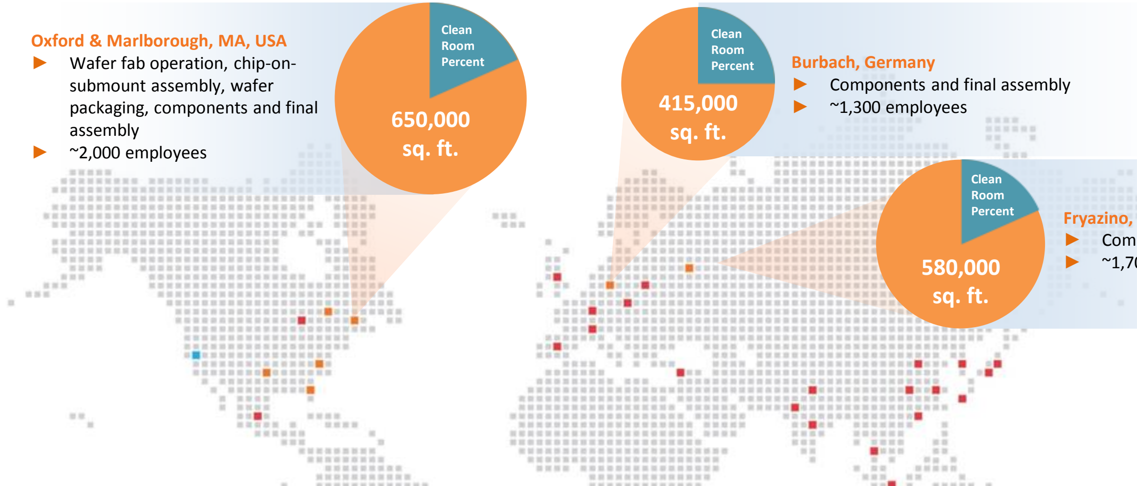
Optical Amplifier

Global Presence

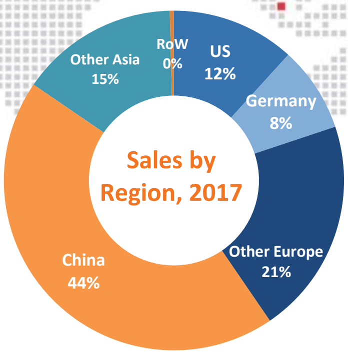
Oxford & Marlborough, MA, USA
- Wafer fab operation, chip-on-submount assembly, wafer packaging, components and final assembly
- ~2,000 employees

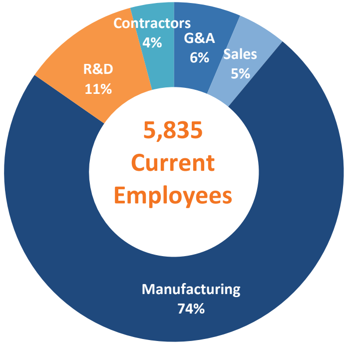
Burbach, Germany
- Components and final assembly
- ~1,300 employees

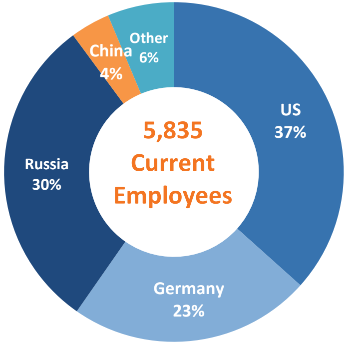
Fryazino, Russia
- Components and final assembly
- ~1,700 employees



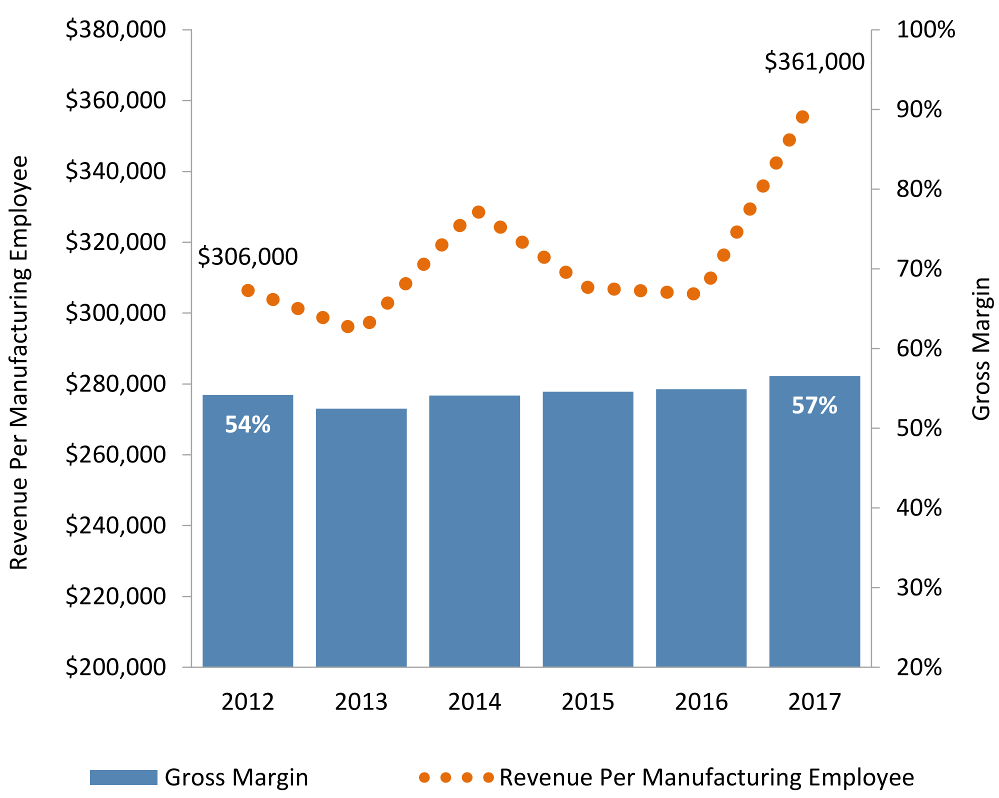
Sales & Service
Development, Sales & Service
Manufacturing, Development, Sales & Service







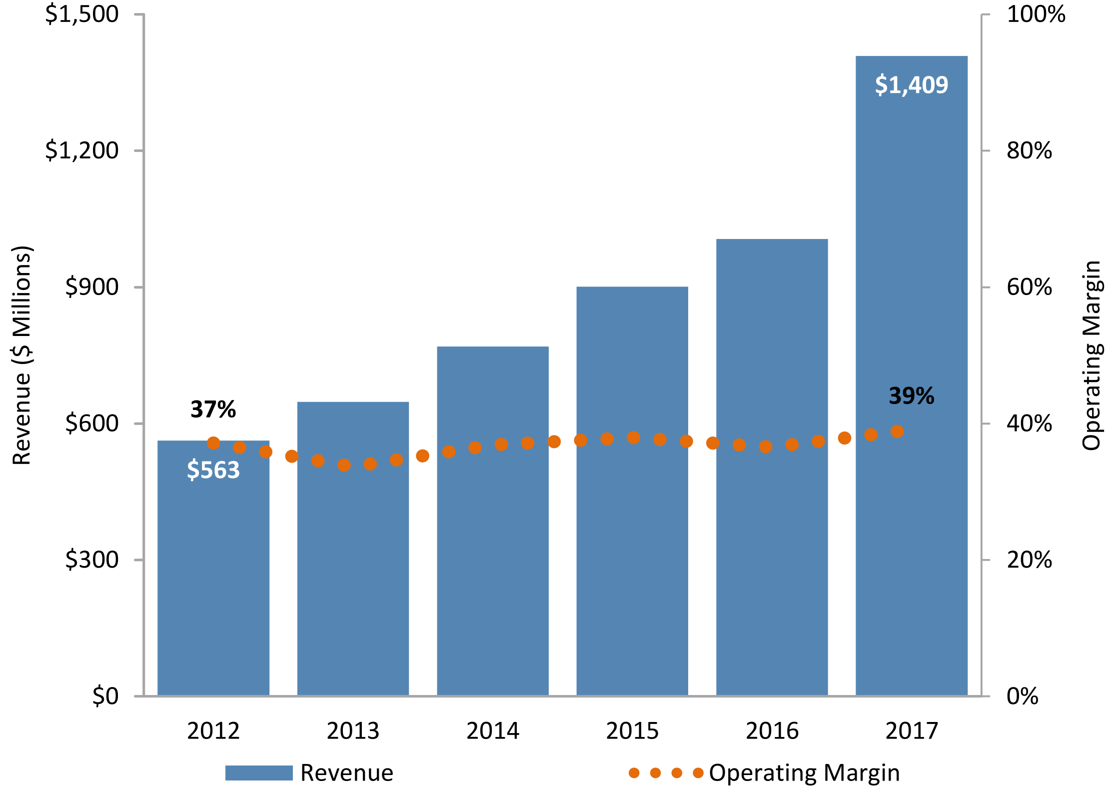
Gross Margin & Cost of Goods Sold



- Gross margin from 2011 to 2017 at upper end of 50% to 55% target range
- Gross margin primarily affected by product mix, competition and absorption of fixed costs
- Manufacturing employees 78% of total headcount; labor costs represent the majority of manufacturing expenses
- Purchased materials ~10% to 15% of total cost of goods sold, which include common and specialized mechanical, electrical and optical parts and raw materials; IPG's proprietary manufacturing processes drive significant value-add
- Fixed costs <10% of cost of goods sold

Diode Production in Oxford, Massachusetts

Operating Margin & Expenditures



Sales and Marketing Expenses

- Target: 3% to 5% of revenue
- Primarily compensation, trade shows, professional and technical conferences, travel, facilities and depreciation of demonstration equipment.

Research and Development Expenses

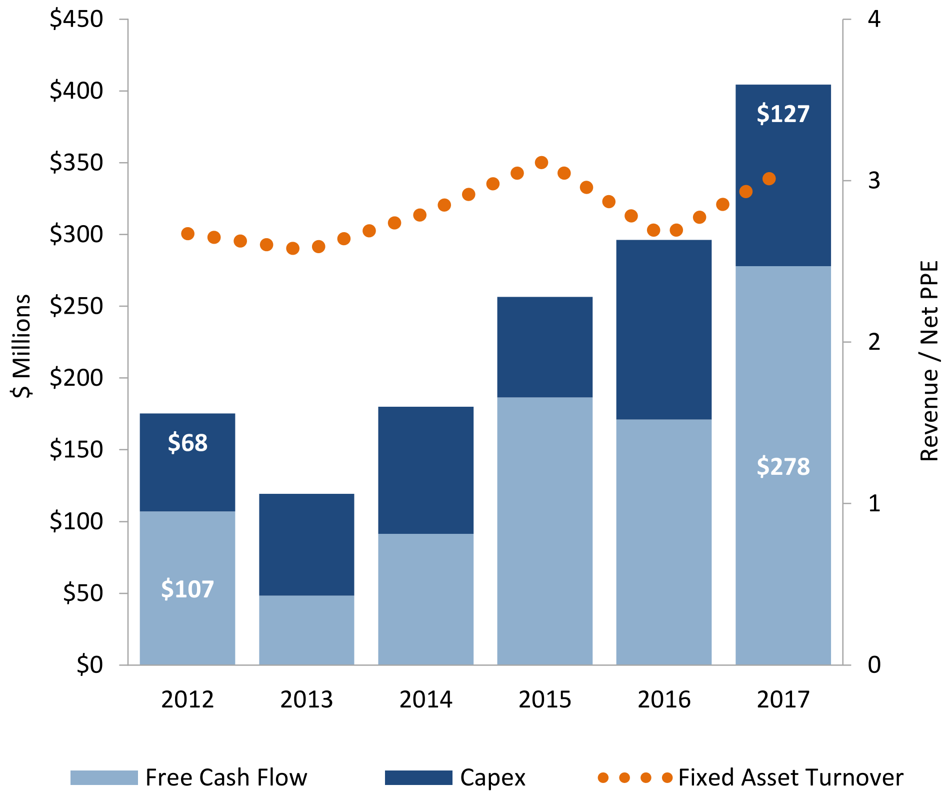
- Target: 6% to 8% of revenue
- Primarily compensation, product and component design development, cost of prototype materials, testing and facilities costs.

General and Administrative Expenses

- Target: 6% to 7% of revenue
- Primarily compensation, executive management, finance, legal, IT, professional services, facilities costs and charges and benefits related to the change in allowance for doubtful debt.

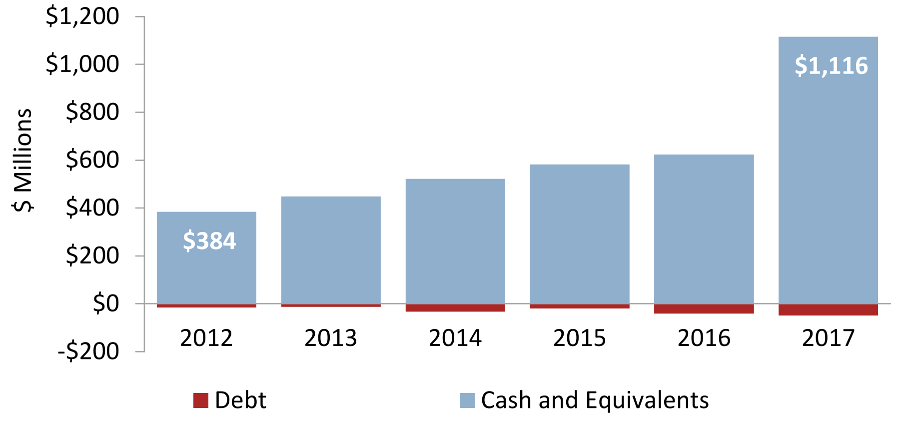
The Power to Transform®

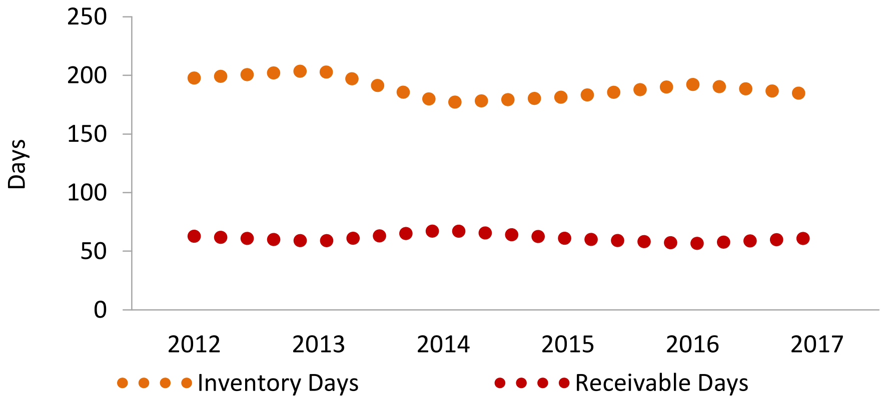
Operating Cash Flow & Capital Expenditures



- Operating cash flow generally consistent with net income
- Capex ~8% to ~12% of revenue since 2010, in keeping with our long-term target range
- Majority of our capex related to expansion of our manufacturing capacity, including the acquisition, build-out and preparation of our facilities
- Historically, every $1.00 of fixed investment (net PPE) yields over $2.50 of revenue

Key Balance Sheet Metrics





Net Cash

- IPG maintains a strong balance sheet with ample cash and liquidity.
- Investment in R&D and capital expenditures to grow our business and increase our share of the global laser market remains our highest priority given the large opportunity and the high returns this investment has generated historically for our shareholders. We also prioritize acquisitions that accelerate innovation and enhance our competitive positioning. In addition, we are offsetting dilution from equity-based compensation with a $100M stock repurchase authorization.

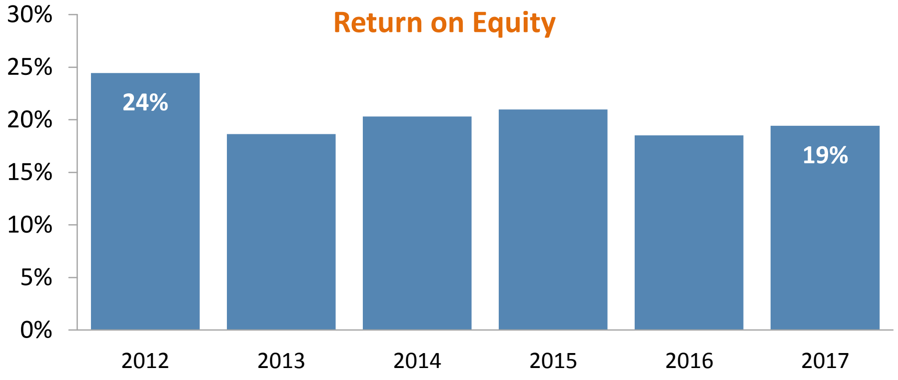
Inventory

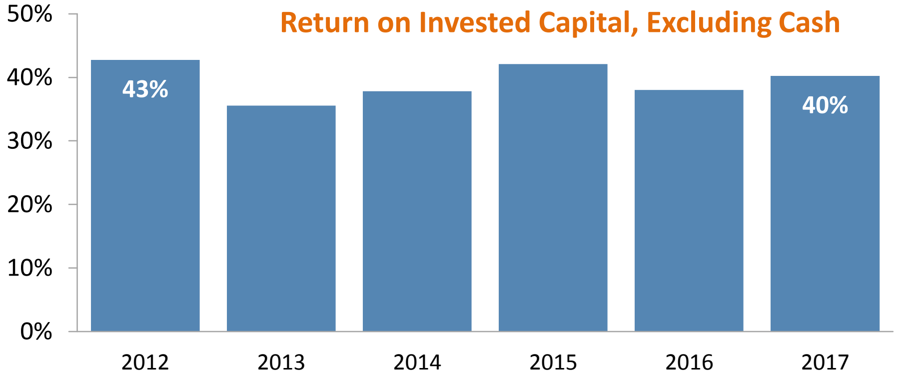
- The rate at which we turn inventory has historically been about **2x per year or 180 days** due to our vertical integration, rigorous and time-consuming testing procedures and the lead time required to manufacture components used in our finished products. We invest in inventory in order to provide short delivery times to our customers, providing what we believe is a competitive advantage.

Receivables

- Our receivables balance is affected by the timing of when revenue is recognized during the quarter and can fluctuate from period to period. We target days sales outstanding of 60 or lower.

Return Profile and Capital Allocation

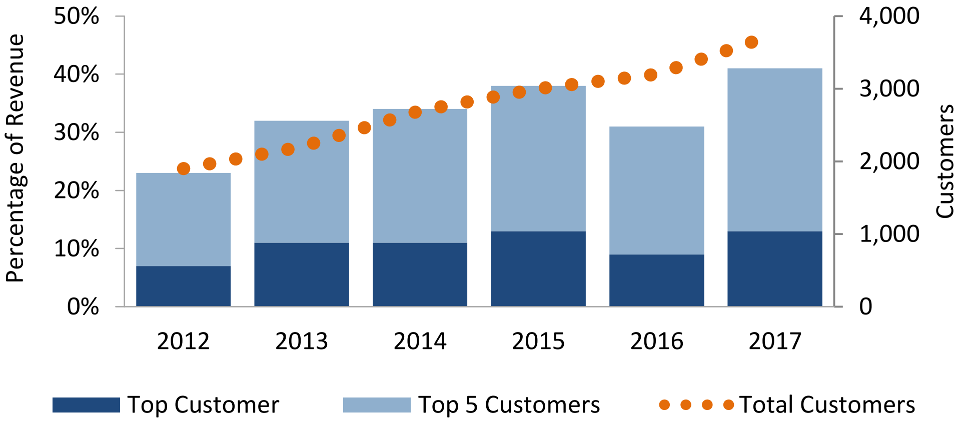


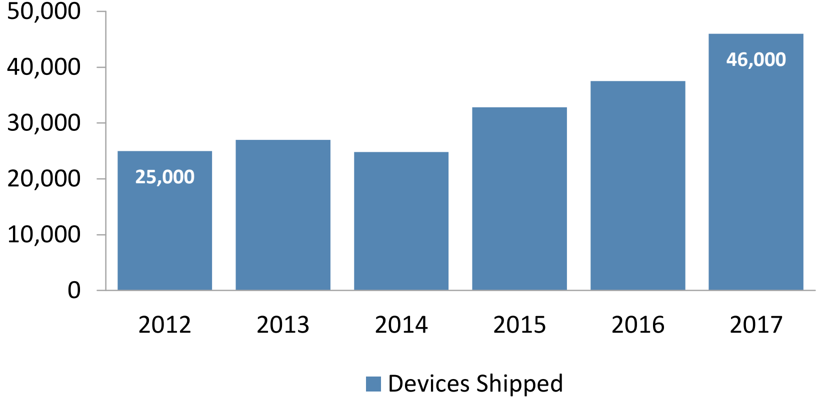


Capital Allocation

- We are committed to allocating capital in a manner that maximizes returns and increases shareholder value.
- There are few companies that possess the growth opportunity, balance sheet strength and free cash flow generation of IPG, providing us a unique opportunity to deploy capital to enhance and accelerate this growth opportunity.
- We believe organic investment in our business will continue to deliver the greatest return to shareholders, and this remains our highest priority. Since 2006 we have spent more than $700 million on capital expenditures and $450 million on research and development to grow our business.
- We also recognize that we cannot capitalize on our tremendous growth opportunity through organic investment alone. Maintaining a strong balance sheet provides us maximum flexibility to pursue value-creating acquisitions that accelerate time to market, as well as transformative deals during times of market disruption. Since 2006 we have spent more than $130 million on select technology acquisitions.
- In addition to these investment areas, we have a $125 million stock repurchase authorization in effect.

Customer Base and Devices Shipped





General Manufacturing & OEM

Bystronic, Mitsubishi Electric, Han's Laser, Ermaksan, Mazak

Automotive

VW, FCA Fiat Chrysler Automobiles, BMW

Heavy Industry

Prima Power, Mitsubishi Heavy Industries

Aerospace

Boeing, Lockheed Martin

Additive Manufacturing

SLM Solutions, eos e-Manufacturing Solutions

Semiconductor & Electronics

esi Designed for Brilliance. Engineered for Production., Ultratech A division of Veeco

Company History

IPG was founded in 1990 by our Chairman and CEO, Dr. Valentin Gapontsev, a physicist and pioneer in the field of fiber lasers. Prior to founding the company, 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 (IRE) in Moscow. In 1991, Dr. Gapontsev formed NTO IRE-Polus company in Russia, which produced fiber optic lasers, components and test equipment for medical and industrial markets.

In its first two years of existence IRE-Polus shifted focus toward development of high-power fiber lasers and amplifiers, adopting the acronym IPG, which stood for **I**RE-**P**olus **G**roup. In 1993, IPG won its first significant contract from the large Italian telecommunications carrier Italtel, for a high-power erbium doped fiber amplifier. Italtel convinced Dr. Gapontsev to transfer component production to Italy, and IPG established a subsidiary in Europe.

The following year, IPG began working with DaimlerBenz Aerospace (Dornier branch). DBA needed an eye-safe laser transmitter for a helicopter obstacle warning system. Dr. Gapontsev proposed a new fiber solution, and DBA agreed to fund the development if it was produced in Germany. As a result, Dr. Gapontsev formed IPG Laser GmbH in Germany and in 1995, constructed a research and manufacturing facility in Burbach Germany, near Frankfurt. In 1996, IPG launched a 10 watt industrial class fiber laser and pulsed fiber lasers for marking and micromachining applications.

In 1997 IPG achieved its first large OEM customer win for high-power amplifiers with Reltec Communications, a manufacturer of fiber-to-the-home (FTTH) systems being deployed by US telecommunications carrier BellSouth. To satisfy demand from Reltec and BellSouth, as well as a growing number of US-based customers, IPG incorporated in the US in December 1998 and began operations in Massachusetts in 1999.

In 2000, IPG obtained $100 million in venture financing and undertook a reorganization, making IPG Photonics the parent company and majority owner of IPG Laser in Germany, IPG Fibertech in Italy and NTO IRE-Polus in Russia. IPG also began constructing its primary US manufacturing and research facility in Oxford, Massachusetts, where the company would invest to manufacture its own pump laser diodes, a major component of its fiber lasers and amplifiers. Communications represented a majority of product sales during this period; however, IPG continued to make significant advancements in materials processing, releasing the first 100 watt fiber laser in 2000, and in medical products with erbium and thulium fiber lasers.

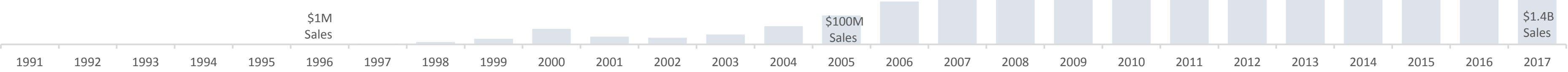
By the end of 2000, telecom capital spending had evaporated, and IPG revenue declined from $52 million to $22 million by 2002. In these turbulent times, IPG decided to invest much of its remaining capital in the development of: (1) high-power products; (2) mass production lines; and (3) high-power pump laser diode technology. This vertical integration strategy enabled IPG to produce all the fundamental parts of a fiber laser at costs significantly below those of their leading suppliers and competitors. With a vertically integrated model IPG was able to continue to raise its maximum wattage affordably.

By 2006, IPG was able to achieve power levels on ytterbium fiber lasers up to 50 kilowatts and producing single-mode output fiber lasers with power levels up to 2 kilowatts (ytterbium) and 200 watts (erbium and thulium). Sales grew from $22 million in 2002 to $143 million in 2006 when IPG raised $93 million (net of proceeds) in an initial public offering.

Over this period IPG continued to expand its global footprint, opening offices near Detroit, Michigan (2006), Beijing, China (2007) and its Silicon Valley Technology Center (2009). Beginning in 2010 the company introduced its first quasi-continuous wave lasers into the market and has continued to raise peak and average power on these products ever since.

In 2013 IPG sold its first 100 kilowatt commercial fiber laser to NADEX Laser R&D in Japan for welding 300 millimeter thick metal parts. In 2014, the company introduced a new line of kilowatt-class ytterbium fiber lasers with wall-plug efficiencies exceeding 45%, as well as visible light and high-power pulsed laser products. In addition to expanding its Oxford manufacturing facility, IPG acquired three buildings in Marlborough, Massachusetts for capacity expansion, new products and additional office space.

In 2016 IPG introduced its Laser Luminaire RGB light source for the digital projection and display market. The company also expanded its presence in the communications market with the acquisition of Menara Networks, a provider of optical transmission modules and systems used in data networking and telecom equipment. Closing the year, IPG exceeded $1 billion in annual sales for the first time. During 2017, IPG acquired OptiGrate, a pioneer and leading provider of grating technology used in ultrafast pulsed lasers, ILT a leading producer of systems for the medical device industry and LDD, an innovative provider of in-process quality monitoring and control solutions for laser-based welding applications.



1991
- NTO IRE-Polus formed in Russia

1992
- First fiber lasers produced

1993
- First major contract with Italtel
- IPG Fibertech founded in Italy

1994-95
- Contract with DaimlerBenz Aerospace
- IPG Laser founded in Germany

1997
- Contract with Reltec

1998-99
- IPG Photonics incorporated in US
- US operations begin in Massachusetts

2000
- First 100 W fiber laser produced

2002
- IPG begins producing pump laser diodes in-house

2004
- 1 kW single-mode ytterbium fiber laser introduced
- IPG opens office in Japan

2006
- Initial Public Offering

2007
- IPG opens office in China

2009
- Silicon Valley Tech Center opened in Santa Clara
- First 10 kW single-mode fiber laser

2010
- QCW lasers introduced
- Photonics Innovations and Cosytronic acquired

2012-13
- JPSA acquired
- 100 kW laser sold
- Mobius Photonics acquired
- Facilities expansion in Oxford, MA

2014
- Facilities expansion in Russia
- Marlborough, MA facilities acquired

2016
- Menara acquired
- Facilities expansion in Germany

2017
- OptiGrate, ILT and LDD acquired
- First 120 kW fiber laser

Acquisitions of Emerging Technology Groups

Nearly all of IPG's growth has been driven by organic investment in our business. From time to time, we have supplemented this investment with the acquisition of emerging technology groups to expand our technology breadth, vertical integration capabilities and product offering.

2010

PII

Photonics Innovations, Inc., based in Birmingham, Alabama, produces middle-infrared (~2-5 micron) laser technology for scientific, biomedical, technology and eye-safe range finding applications.

COSY

Cosytronic KG, based in Wissen, Germany, specializes in automated laser welding equipment including a fiber-based seam stepper.

2011

2012

JPSA

JPSA Laser, based in Manchester, New Hampshire, manufactures specialized laser systems for fine-processing, precision cutting, drilling and micromachining of non-metals, including glass, semiconductors and ceramics.

2013

mobius PHOTONICS

Based in Mountain View, California, Mobius Photonics provides high-power pulsed ultraviolet (UV) lasers for micromachining, such as dicing and scribing of wafers and VIA drilling and solar hybrid panel processing.

2014

2015

RuchTech

Based in Minsk, Belarus, RuchTech produces automated multi-axis laser systems for macro- and micro processing of metals and composite materials.

2016

Menara NETWORKS

Menara Networks, based in Dallas, Texas, develops high-speed optical transmission modules based on proprietary mixed signal ASIC and DSP technology. Menara pluggable transceivers and transponders are deployed in leading telco and data center networks.

Biophotonic SOLUTIONS INC

Based in East Lansing, MI, BSI's proprietary MIIPS technology provides automatic measurement and compression of laser pulses, improving the utility of ultrafast lasers.

2017

OptiGRATE HIGH EFFICIENCY FOR HIGH POWER

OptiGrate, based near Orlando, Florida, pioneered Chirped volume Bragg Grating technology, used in ultrafast lasers for pulse compression, enabling improved performance and cost reduction.

INNOVATIVE LASER TECHNOLOGIES ILT

Based in Minneapolis, Minnesota, ILT produces high-precision laser systems for the medical device industry, incorporating significant automation and software expertise.

LaserDepth DYNAMICS

Based in Ontario, Canada, LDD provides in-process quality monitoring and control solutions for laser-based welding applications.

The Power to Transform®

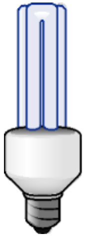
ESG: Efficiency in the Laser Marketplace

Incandescent = Nd:YAG Laser

2% Wall-Plug Efficiency

Lamp-pumped Nd:YAG laser wall-plug efficiency is around 2% which is equivalent to a traditional filament bulb. The other 98% of input energy is mostly lost as heat. In a laser setting, this means that more electricity is needed to get the required output power, necessitating powerful chillers to dissipate the significant heat which is effectively lost energy.

Fluorescent = CO_2 Laser



7% to 8% Wall-Plug Efficiency

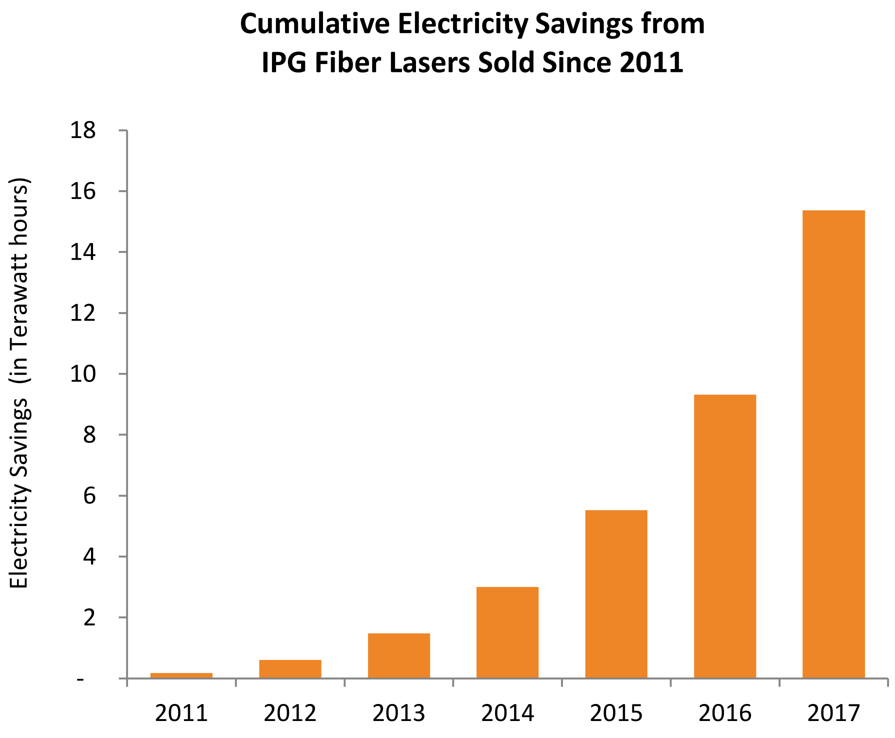
Although CO_2 lasers are 3-5 times more efficient than lamp-pumped Nd:YAG lasers, more than 90% of input energy is lost, mostly as heat, which can be likened to a compact fluorescent lamp (CFL). Including the chiller, a 6 kilowatt CO_2 laser requires 85-100 kilowatts of input power to run.

LED = IPG Fiber Laser

45% to 50% Wall-Plug Efficiency

Fiber lasers improve upon CO_2 lasers' efficiencies significantly. IPG fiber lasers have efficiencies from 45% to more than 50%, dramatically reducing the input power needed compared to their predecessors. In addition, fiber's high surface area to volume ratio combined with its efficiency, significantly reduce heat output and the corresponding cooling cost in chiller purchasing and use.

ESG: Electricity Savings & Lower CO_2 Emissions



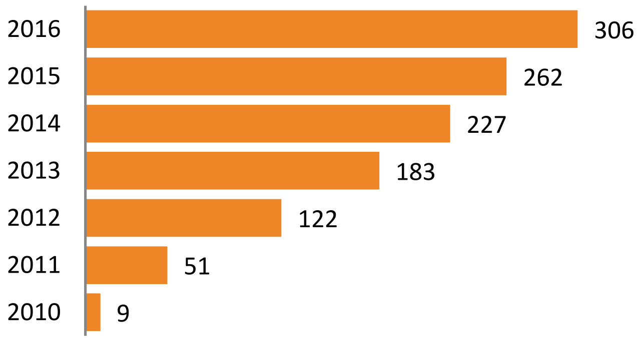
Note: annual electricity savings calculation based on IPG's total megawatts of power sold, and assumes IPG fiber lasers are replacing laser sources that include lamp-pumped and diode-pumped Nd:YAG, CO_2 and disk lasers

- **We estimate cumulative electricity savings from operating all IPG lasers sold since 2011 at more than 15 terawatt hours.**
  (1 terawatt = 1,000 gigawatts = 1,000,000 megawatts)
- **According to the World Bank, approximately two-thirds of the world's energy is produced from oil, gas and coal sources.**
- **According to the US Energy Information Administration (EIA), typical oil, gas and coal power plants produce ~1.9, ~0.9 and ~2.2 pounds of CO_2 for every kilowatt hour of electricity produced.**
- **We estimate electricity savings from operating IPG fiber lasers instead of other lasers enabling 18 billion pounds less global CO_2 emission since 2011 and 7 billion pounds less CO_2 emission in 2017 alone.**
- **To put this savings into perspective, 18 billion pounds of CO_2 emission approximates the annual output of four 500 megawatt coal-fired electric plants.**

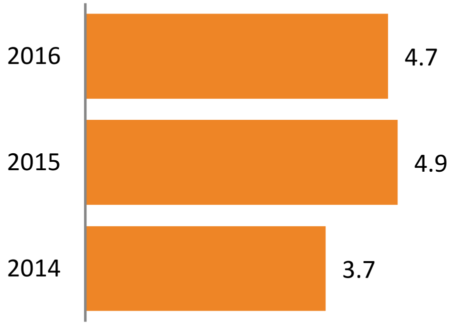
ESG: Environmental Initiatives in Our Operations

- IPG operations are compliant with the Restriction of Hazardous Substances (RoHS) and Waste Electrical and Electronic Equipment (WEEE) Directives and the Toxic Substances Control Act (TSCA).
- Since 2006, a cogeneration plant has been operating in Oxford, reducing emissions by using waste heat from power generation to heat and cool buildings, saving more than 1.1 tons of greenhouse gases yearly.
- In 2015, a second 1MW generator was installed and reduces greenhouse gas emissions by an additional 5 tons yearly, and a 3 MW generator is being installed in 2017. There are additional cogeneration facilities in Italy.
- 138 variable-frequency drives have been installed in Oxford. They adjust electricity output to the needs of the motor, saving electricity equivalent to 357 American households yearly. Chillers are currently being replaced with high efficiency versions.
- All new construction is built at a level higher than energy code requirements.
- All new construction uses LED light fixtures, reducing electricity use by 75% compared to incandescent bulbs.
- All new construction utilizes the most water conservative plumbing fixtures available.
- From 2010 to 2016, machine shop recycled metal grew 34 times to 306 thousand pounds.
- IPG has implemented a metal recycling program which saves thousands of pounds of aluminum, copper and steel.
- Coatings for printed circuit boards are not carcinogenic and RoHS compliant.
- Solvent vapor degreasers have been installed to reduce risk of irritation from inhalation.

Machine Shop Metal Recycled (thousands of Pounds)



Packaging and Diodes Metal Recycled ($ millions)



The Power to Transform®

ESG: Employee Initiatives

Non Discrimination

- IPG is an equal opportunity employer. All US employment decisions and actions are administered without regard to race, color, religion, creed, national origin, ancestry, sex, age, qualified mental or physical disability, gender identity, sexual orientation, or any other category or class protected by federal, state or local laws

Ethical Conduct

- All IPG employees undergo comprehensive ethics and anti-corruption training to ensure that they are aware of and understand all global laws, rules and regulations relating to anti-bribery, anti-corruption and ethical behavior.
- IPG prohibits employees from using corporate funds to make political contributions. IPG has not made any "independent expenditures" in connection with federal and state elections and has no plans to do so in the foreseeable future.

Safety

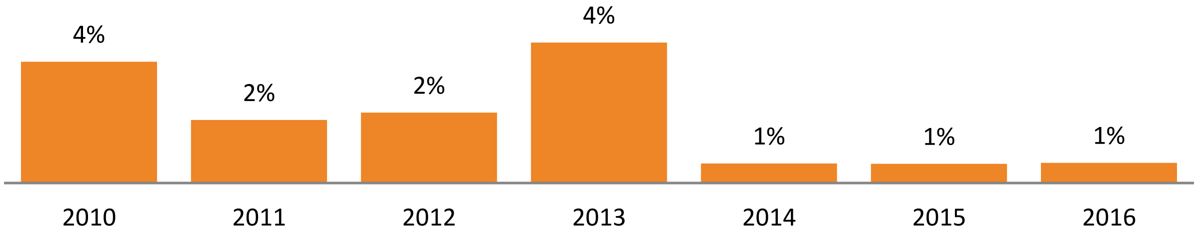
- All IPG manufacturing employees must undergo comprehensive safety training.
- Medical complaints per employee were 0.6% in 2016, down from 2.4% in 2013

Conflict Minerals

- IPG is committed to legal compliance with the Dodd-Frank Wall Street Reform Act, including the due diligence requirements relating to the responsible sourcing of tin, tantalum, tungsten and gold ("3TG") used in the manufacturing of its products.
- To ensure that IPG's 3TG does not fund the conflict in the Democratic Republic of Congo and its neighboring countries, IPG employees work diligently toward obtaining disclosures from its suppliers concerning whether any of IPG's 3TG originates from the conflict region or funds conflict there. IPG requires its suppliers to comply with all legal requirements relating to responsible sourcing of 3TG. If any of our suppliers cannot demonstrate sufficient compliance with their due diligence and disclosure obligations, IPG will seek alternative sources of these 3TG metals.

Wafer Inspection

OSHA Recordable Accidents as % of Oxford Employees



ESG: Giving Back to Our Communities

- IPG sponsors Masters and Ph.D. physicists at Imperial College London and is involved in Project Photon training local teachers in laser use.
- We established the IPG Photonics Laboratory at Worcester Polytechnic Institute (WPI) , supporting engineering opportunities for students with the donation of photonics equipment and other resources. Elsewhere in Massachusetts, IPG sponsors internships with local community colleges.
- Our charitable contributions committee funds community programs up to $50,000 targeting: (1) education; (2) community welfare; (3) civic and social service programs; and (4) arts and culture.
- We support only public charities that are nondiscriminatory in their policies and demonstrate program sustainability and measurable results.
- In Russia, IPG has a long history of support for the students of the Institute of Radio-Engineering.
- IPG sponsors the Society of Women Engineers, promoting the advancement of women in the engineering field.
- IPG is a co-founder of the Siegman International School on Lasers, created by the Optical Society of America to expand access to laser education. IPG has provided funds for lecturers, achievement awards and travel grants with the goal of fostering future research in the laser industry.

Imperial College London

WPI

Kotel'nikov Institute of Radio-engineering and Electronics of RAS

SWE Society of Women Engineers Aspire / Advance / Achieve

OSA Foundation | Siegman International School on Lasers *Co-founded by IPG Photonics*

"IPG is honored to support the Siegman International School on Lasers. The future of the laser industry depends on tomorrow's scientists and innovators; IPG is happy to provide some of the building blocks for their success."

-**Valentin P. Gapontsev, Ph.D.**
CEO and Chairman of the Board

ESG: Corporate Governance

The Board of Directors:

- 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"
- annually review charters to ensure alignment with evolving Committee responsibilities
- engage in a bi-annual self-evaluation process
- have active Committee member engagement with each director participating in more than 75% of the applicable Committee meetings

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

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

Board of Directors

IPG PHOTONICS

Valentin P. Gapontsev, Ph.D.
Chairman and CEO

See executive team biography

Henry E. Gauthier
Director since 2006

Previously Chairman and Vice Chairman of the board, and President at Coherent, Inc. Also was Chairman of the Board at Reliant Technologies, Inc. Attended the US Coast Guard Academy, San Jose State University and the Executive Institute of Stanford University Graduate School of Business.

Catherine P. Lego
Director since 2016

Principal and founder of Lego Ventures, LLC, a consultancy to early-stage technology companies. Previously general partner of The Photonics Fund. Currently serves on the boards of Lam Research and Fairchild Semiconductor, among others. She holds a B.A. in Economics and Biology from Williams and an M.S. in Accounting from NYU.

John R. Peeler
Director since 2012

CEO and a director of Veeco Instruments Inc., also Chairman of the Board. He was EVP of JDS Uniphase Corp. and President of the Communications Test & Measurement Group of JDSU. He holds a B.S. and an M.E. in Electrical Engineering from the University of Virginia.

Thomas J. Seifert
Director since 2014

Mr. Seifert is EVP and CFO of Symantec. He has also served as EVP and CFO of Brightstar Corp. and was SVP, interim CEO and CFO at AMD. Mr. Seifert has a Bachelor's and Master's degree in Business from Friedrich Alexander University and a Master's in Mathematics and Economics from Wayne State University.

Michael C. Child
Director since 2000

Has worked at TA Associates Inc., a private equity investment firm, since 1982, where he serves as Senior Advisor and was previously Managing Director. He holds a B.S. in Electrical Engineering from UC Davis and an MBA from Stanford University Graduate School of Business.

Eric Meurice
Director since 2014

Was President, CEO and Chairman of ASML and EVP of Television at Thomson. Currently on the board of NXP Semiconductors. Earned a Master's in mechanics and energy generation at École Centrale de Paris, a Master's in Economics from Sorbonne University and an MBA from Stanford.

Igor Samartsev
Director and CTO

See executive team biography

Eugene Scherbakov, Ph.D.
Director and COO

See executive team biography

◆ Chair of the Board   Chair   Member   𝕀 Independent Director   ℙ Presiding Director

Committee Composition	Audit	Compensation	Nominating and Corporate Governance
Valentin P. Gapontsev, Ph.D. ◆			
Michael C. Child 𝕀			Member
Henry E. Gauthier 𝕀	Member		
Catherine P. Lego 𝕀	Member	Chair	
Eric Meurice 𝕀		Member	Chair
John R. Peeler ℙ		Member	Member
Igor Samartsev			
Eugene Scherbakov Ph.D.			
Thomas J. Seifert 𝕀	Chair		Member

Senior Management Team

Valentin P. Gapontsev, Ph.D.

Chairman and CEO

Dr. Gapontsev founded IPG in 1990. He was previously a senior scientist in laser material physics and was the head of the laboratory at the Soviet Academy of Sciences' Institute of Radio Engineering and Electronics in Moscow. He holds a Ph.D. in Physics from the Moscow Institute of Physics and Technology.

Eugene Scherbakov, Ph.D.

Managing Director, SVP and COO

Dr. Scherbakov was previously Technical Director from 1995-2000 at IPG Laser in Germany, he was also senior scientist and head of the optical communications laboratory at the Russian Academy of Science, Moscow. He has an M.S. in physics from the Moscow Physics and Technology Institute, a Ph. D in Quantum Electronics and a D.Sc. in Laser Physics from the Lebedev Physical Institute.

Timothy P. V. Mammen

SVP and CFO

Between 1999 and 2000, Mr. Mammen served as the Group Finance Director and General Manager for IPFD a commodities trading firm in the UK. In addition, Mr. Mammen was Finance Director and General Manager of United Partners Plc from 1995 to 1999 and 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 LSE. He is also a member of the Institute of Chartered Accountants of Scotland.

Igor Samartsev

CTO, Board Member and Deputy General Manager and Director of NTO IRE-Polus

Mr. Samartsev previously served in a variety of technical leadership roles at NTO IRE-Polus before becoming Deputy General Manager. He also holds an M.S. in Physics from the Moscow Institute of Physics and Technology and is one of the founders of IPG.

Angelo P. Lopresti

General Counsel, Secretary and SVP

Mr. Lopresti was partner at the law firm of Winston & Strawn LLP from 1999-2001 before coming to IPG. He was also a partner at Herzog, Calamari & Gleason between 1998-1999 and an associate between 1991-1998. He has a Bachelor's in Economics from Trinity College and a J.D. from New York University School of Law.

Alexander Ovtchinnikov, Ph.D.

SVP, Components

Dr. Ovtchinnikov was Director of Material Science at IPG since 2001 before becoming Vice President. He was previously Material Science Manager at Lasertel, Inc. from 1999-01 and developed high power diode pump technology at the Ioffe Institute, Tampere Institute of Technology, Coherent Inc. and Spectra-Physics Corporation for 15 years. He has an M.S. in Electrical Engineering from the Electrotechnical University of St. Petersburg and a Ph. D from the Ioffe Institute at the Russian Academy of Sciences.

Trevor D. Ness

SVP, World Wide Sales

Mr. Ness has served as Senior Vice President of World Wide Sales since 2013. He became Vice President of Asian Operations in 2011. Prior to joining IPG, he was Director of GSI Precision Technologies China between 2005 and 2010. He has 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

SVP, U.S. Operations

Mr. Stukalin was VP, Devices from 2009 and became SVP of US Operations in 2013. He previously was VP, Business Development of GSI Group from 2002-2008 and VP, Components and President of Wave Precision at GSI Lumonics from 2000-02. He has a B.S. in Mechanical Engineering from the University of Rochester and graduated from the Harvard Business School General Management Program.

Oxford, Massachusetts Headquarters

ipgphotonics.com

Thank You

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