



INVESTOR GUIDEBOOK

December 2023

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Safe Harbor Statement

The statements in this guidebook that relate to future plans, market forecasts, events or performance are forward-looking statements.

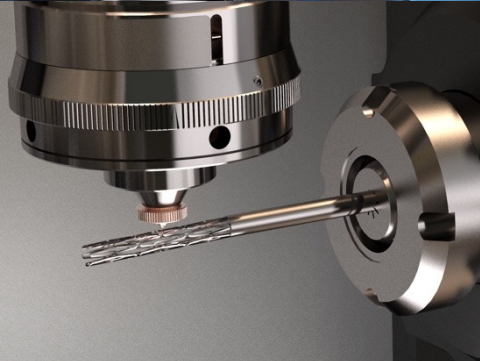
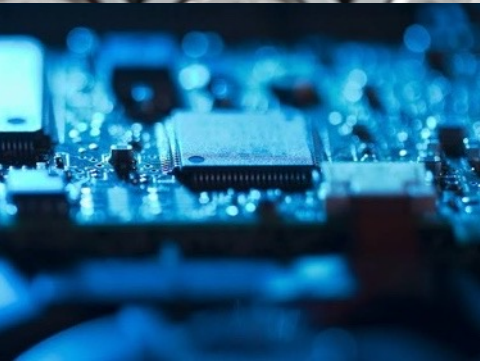
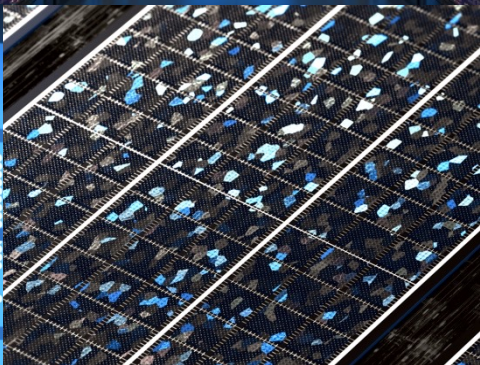
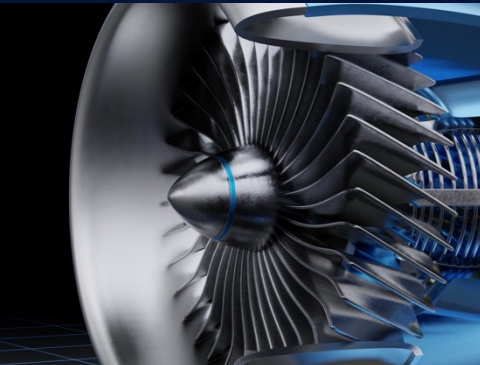
These statements involve risks and uncertainties, including, risks associated with the strength or weakness of the business conditions in industries and geographic markets that IPG serves, particularly the effect of downturns in the markets IPG serves; uncertainties and adverse changes in the general 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; changes in trade controls and trade policies; 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

Innovative **Laser Solutions**
making the world a better place

PRODUCTS ACROSS **ALL INDUSTRIES**



are made better AND at lower cost with
IPG FIBER LASERS

Revolutionizing | the Laser Industry

IPG FIBER LASERS



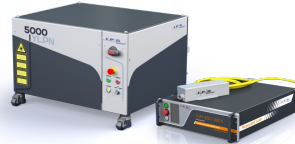
Ultra High Power
Continuous Wave (CW) Lasers

Ultra Compact Lasers



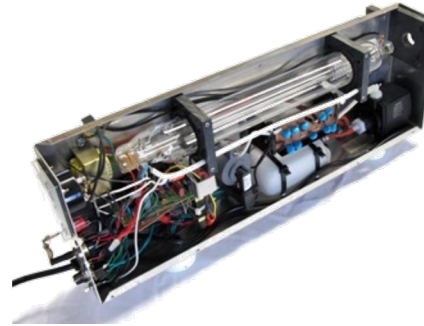
Adjustable Mode Beam and
QCW Lasers

High Power Nanosecond Pulsed
Pico and Femtosecond Pulsed



- Higher Productivity
- Compact
- Reliable
- Robust
- Efficient
- Minimal Maintenance
- No Consumables
- Scalable

TRADITIONAL LASERS



Carbon Dioxide (CO₂)



Lamp-Pumped Nd: YAG



- Expensive
- Bulky
- Unreliable
- Difficult to Operate
- Inefficient
- Frequent Maintenance
- Costly Consumables
- Not Scalable

Key Takeaways

1

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

2

Vertical integration, manufacturing scale & technology driving best-in-class margins

3

Expanding multi-billion dollar addressable market opportunity

4

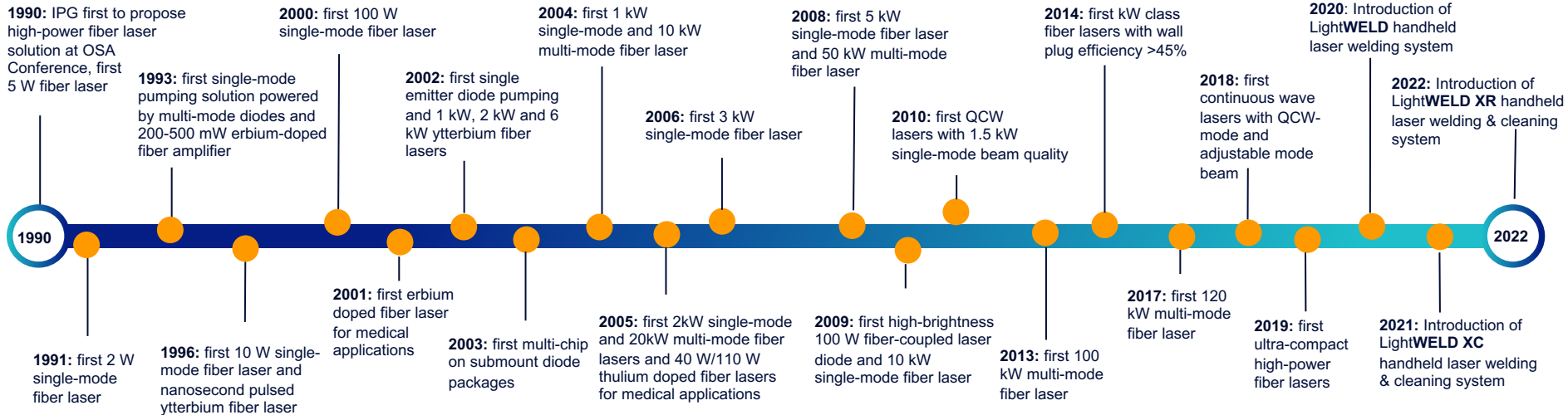
Industry-leading earnings and cash flow

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



The Pioneering Force | Behind Fiber Lasers

Leading 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).

Thin film Technologies

includes highly-reflective and anti-reflective coatings and narrow line filters of industry-leading quality and performance.

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.

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.

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.

Volume Bragg Gratings

leading-edge technology for pulse compression within ultrafast pulsed fiber lasers.

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.

Distributed Single Emitter Pumping Solution

allows for significantly higher coupling and wall-plug efficiency, along with greater reliability vs. diode bar technology.

Nonlinear Crystals

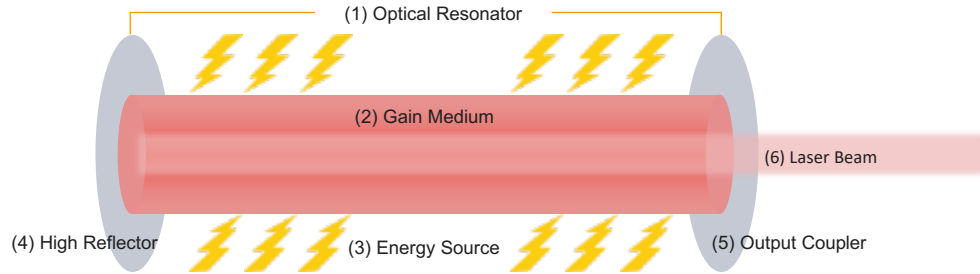
crystal growth technology for producing nonlinear crystals for visible and UV lasers with uniquely low absorption and near 100% high-quality material yield vs. competing technologies with ~50-70% material yield.

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 more powerful, precise and flexible processing within numerous industries and applications.



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

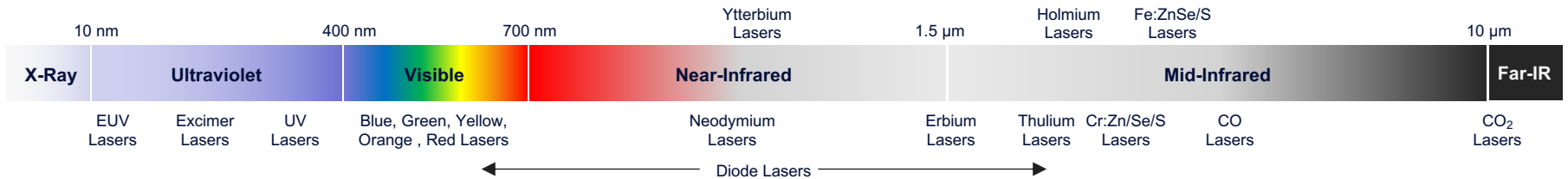
Lasers are often categorized by the type of gain medium (gas, crystal, fiber, semiconductor) but are also distinguished according to: (1) wavelength of operation (typically $\sim 0.3 \mu\text{m}$ to $\sim 10 \mu\text{m}$); (2) pump energy source (electrical discharge, flashlamp, laser diode); (3) mode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

Laser 101

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



Semiconductor Lasers

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.

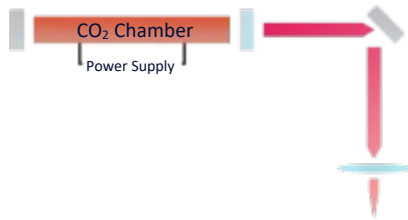
Fiber Lasers

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.

Laser | Technologies

Gas Lasers

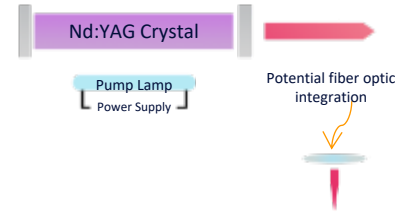
CO₂ lasers, traditionally used in materials processing applications, produce light in the infrared (IR) spectrum (10.6 μm) by stimulating electrons in a gas mixture and delivering the beam through free space using mirrors to provide direction. As a result, they occupy a much larger footprint and are 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 CO₂ laser requires at least 75 kilowatts of input power. CO₂ 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.

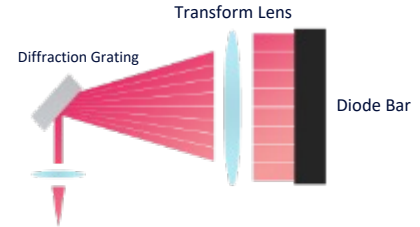
Crystal Lasers

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

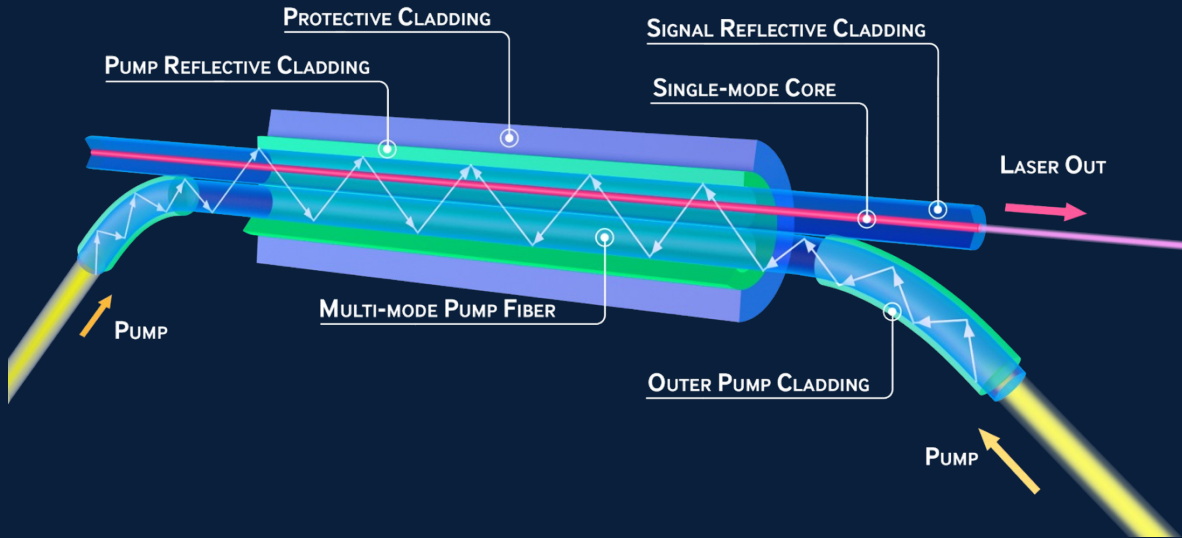
In an effort to move into higher-power applications, **direct diode lasers** have been developed that focus light from diode bars directly into an output fiber, rather than using diodes for pumping another laser, such as in fiber or crystal laser technology. Although this theoretical simplification of 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 Proprietary Side Pumping Technology

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

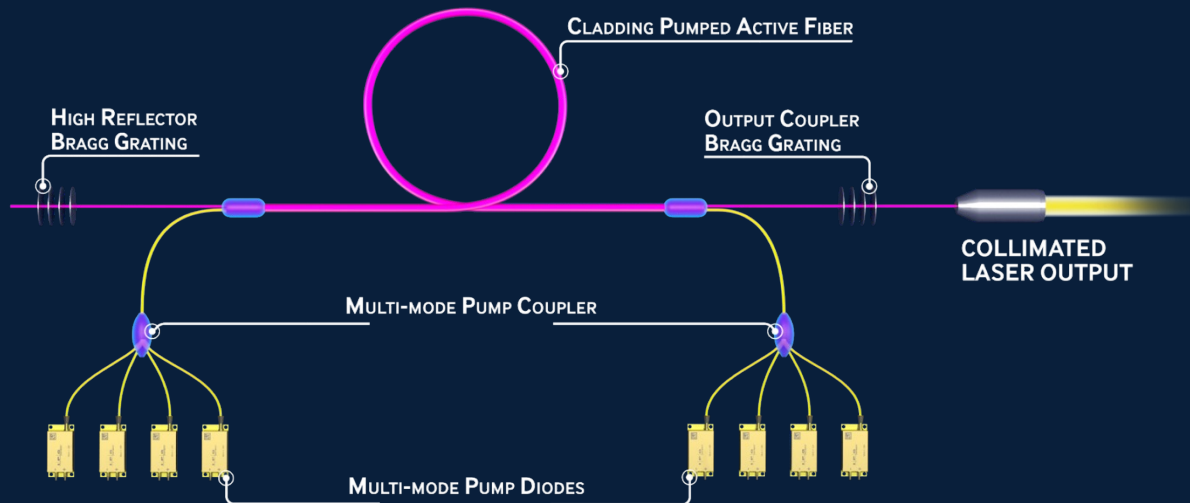
IPG fiber laser components are designed and manufactured internally, at higher-performance, smaller form factor and lower cost than competing products.

- ▶ 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

IPG Single-Emitter Diode Architecture

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

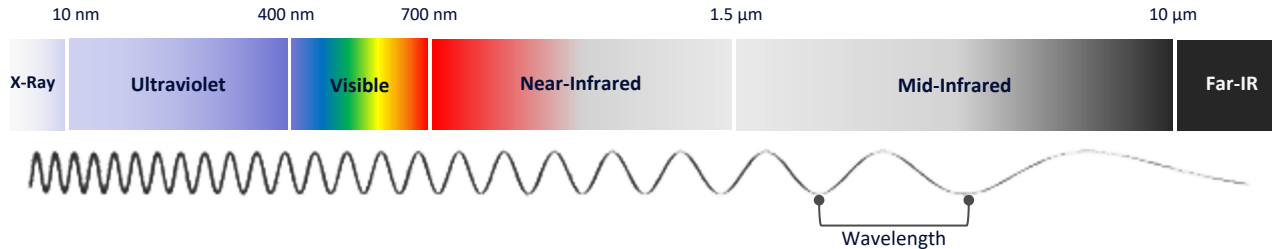
- ▶ Master oscillator power amplifier (MOPA) architecture with fully integrated (spliced) multiple cascades
- ▶ Multi-chip high-power pump laser diode packages
- ▶ Darkening-free optical fiber, which is highly doped and produced in industry-leading quantities
- ▶ Multi-port facet couplers with no-loss 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

Categorizing Lasers I 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 . CO₂ lasers produce light at 10.6 μm . The shorter wavelength possible with fiber lasers compared to their CO₂ 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.



Categorizing Lasers I by Key Attributes

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

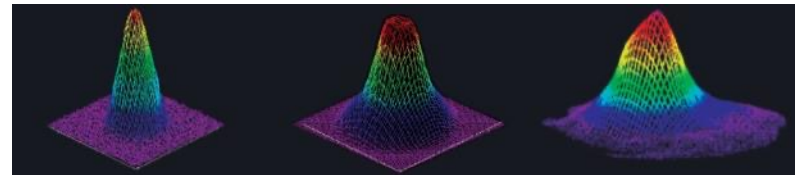
M^2 or the beam quality factor represents the degree of variation between a laser beam and the ideal single-mode or diffraction-limited Gaussian beam where $M^2 = 1$. M^2 indicates how well a beam can be focused on a small spot and remain focused over longer-distances. In most lasers, beam quality is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

$M^2 = 1$

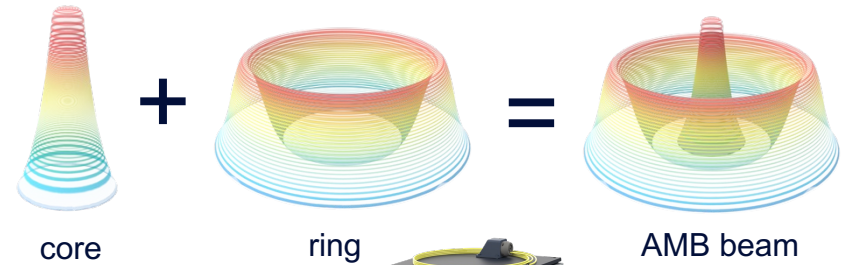
$M^2 = 9$

$M^2 > 20$



Adjustable Mode Beam (AMB)

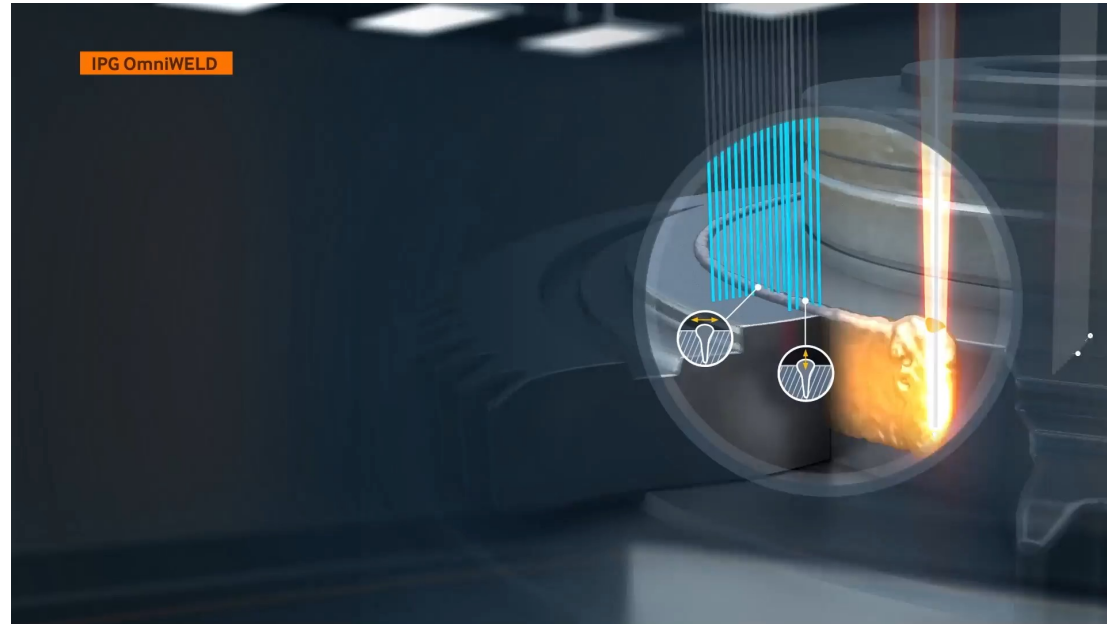
- **Broadest range of beam profile tune-ability:**
programmable, independent control of size and intensity of the core and ring beams
- **Single & Multi-Mode:**
beam options for consistent, high-quality welds including high-speed welding in EV battery manufacturing
- **Virtually eliminates welding spatter:**
molten material is deflected towards the bottom of weld pool where large keyhole openings allow molten vapor to escape
- **High-speed welding for e-Mobility and automotive applications:**
300 mm/s or higher speeds welding AI battery enclosures and drivetrains
- **Maximizes uptime:**
less rework of parts, drastically reduces sensor contamination



Any combination of a small-spot high intensity bright core and a larger ring-shaped beam

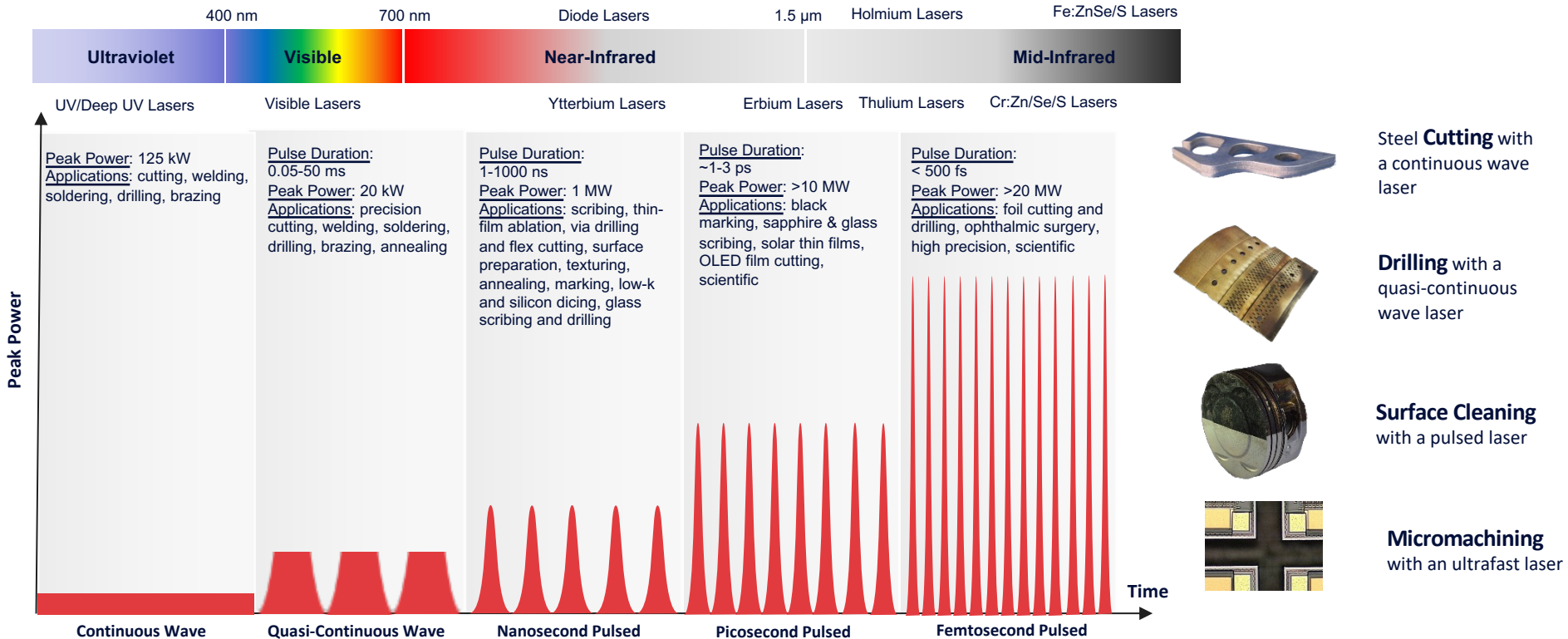
Real-Time Laser Weld Measurement for Unmatched Weld Quality Assurance

Using **real-time inline coherent imaging (ICI)** the **LDD-700 weld monitoring system** consolidates weld results into concise and actionable quality data from a single system



Broadest Portfolio | of Fiber Lasers

The widest choice of wavelengths, modes of operation, power and beam quality



IPG Fiber Laser Advantages

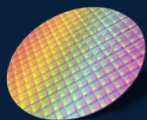
- Highest Powers
- Record Energy Efficiency
- Industry Leading Reliability
- Smallest Form Factors
- Easy System Integration
- Lower Operating Costs
- Best-in-Class Portfolio
- Modular & Scalable
- Leading-Edge Beam Quality



IPG Vertical Integration



Fab Operations
Semiconductor wafer growth
Diode processing, chip mounting & burn-in



Laser Diode Packaging
Up to 200 Watts of power



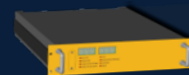
Optical Fiber
Silica based glass doped with rare earth ions



Fiber Blocks
Fiber Bragg Gratings
Isolators, Modulators



Laser Modules
Up to 3 kW



Power Supplies
Control Electronics



Industrial Lasers
Coupling | Final burn in | Shipment

Process Heads, Monitoring and Switches
All fiber beam delivery



INTEGRATED SYSTEMS

**WELDING | ABLATION
DRILLING | CLADDING
CUTTING | CLEANING**

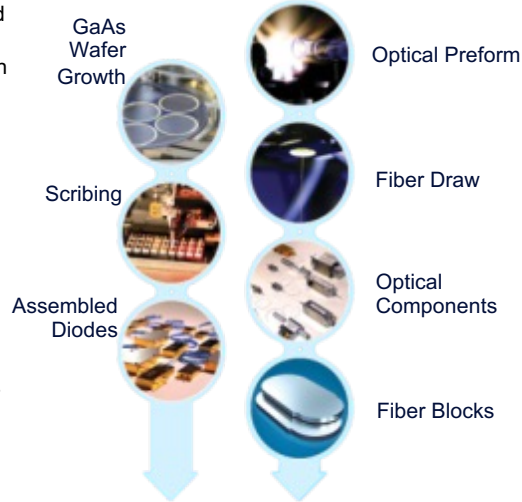
DEEP IN TECHNOLOGY DEEP IN EXPERIENCE

Benefits of 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 2019 we produced more than 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 9-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.



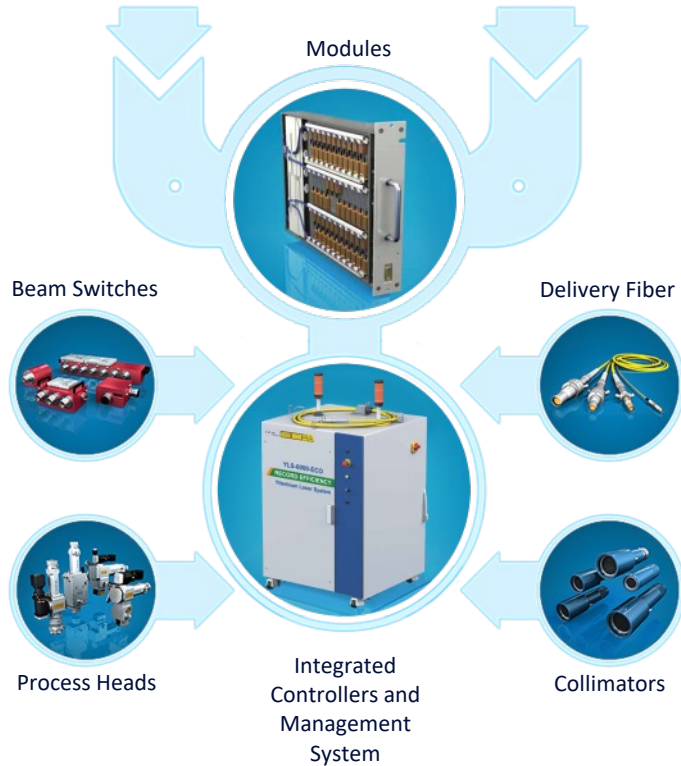
Specialty Optical Fiber and Components

- ▶ 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.

Benefits of 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 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.

Benefits of Vertical Integration

Vertical integration has allowed IPG to deliver kilowatt class power in increasingly smaller form factors – saving our Customers valuable **FLOOR SPACE** and **OPERATING COSTS**

1 kW

1,5
kW

0,5
kW

2000

2005

2010

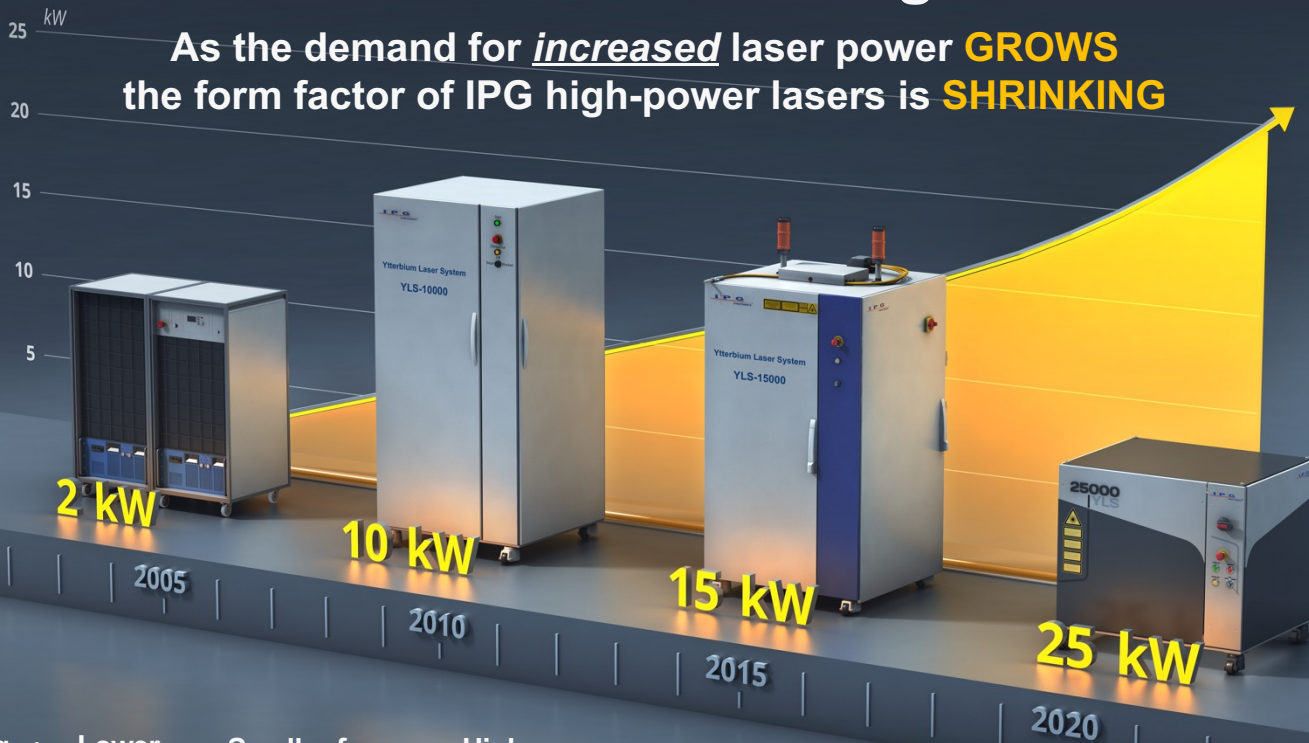
2015

2020

>75% form factor **REDUCTION** over the past 20 years
Always providing **RELIABLE** IPG kilowatt power

Benefits of Vertical Integration

As the demand for *increased* laser power **GROWS**
the form factor of IPG high-power lasers is **SHRINKING**



- Faster cutting speeds
- Lower \$/Watt
- Smaller form factors
- Higher efficiency

IPG Laser | Systems

**Robotic Laser Cells
for Larger Parts**

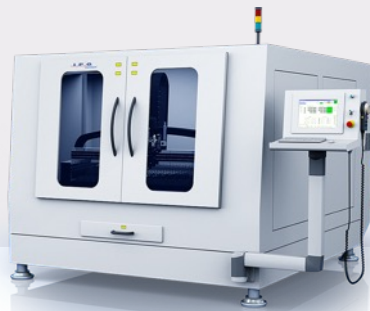


**Fully Automated EV
Battery Welding Systems**

**Multi-Axis Laser
Workstations
for Industrial Parts**



**Turnkey Flatbed Laser
Cutting Systems**



**Precision Laser Systems
for Medical Parts**



**Compact & Flexible
Precision Laser
Welding**



Applications

Cutting and Drilling



35-40% 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

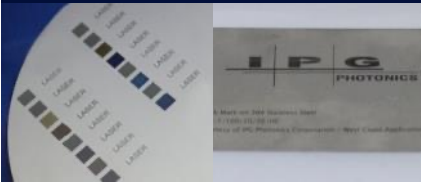


30-35% OF REVENUE

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



7-9% 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

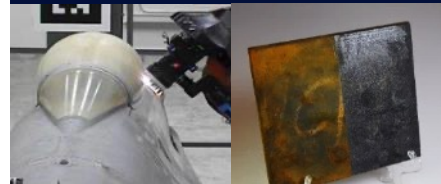
Cladding



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.

Products

High Power CW



40-45% 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 Power CW



~5% of revenue

Mid 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



15-20% 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



<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.

Products

QCW



~5% 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



~10% 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.

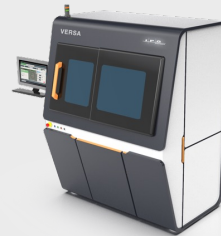
Accessories



<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.

Medical



5-7% of revenue

IPG is at the forefront of laser-based solutions for medical device and contract manufacturers. Laser cutting, drilling, welding and marking systems for both metal and polymer machining are adaptable across many product lines and processes. Applications include pacemakers, implantable devices, endoscopic instruments, surgical devices, dental tools, medical tube welding, medical probes, guide wires, microfluidic sensors, catheters and stents.

Service and other — 5-10% of revenue

Markets Served by Our Products

Materials Processing

End Market	Applications	Principal Products
General manufacturing	Flat sheet, tube and 3D cutting Welding, brazing and hardening Marking, engraving and printing 3D printing Ablation and cleaning	Continuous Wave ("CW") lasers (1-20 kW) CW lasers (1-50 kW) Nanosecond ("NS") pulsed lasers (10-100 W) CW lasers (200-1,000 W) NS pulsed lasers (100-2000 W)
Automotive	Cutting of high-strength steel and aluminum Welding tailored blanks, frames and auto parts Seam welding and brazing Electric vehicle battery processing	CW lasers (1-20 kW) CW lasers (1-50 kW) CW lasers and IPG systems CW lasers and NS pulsed lasers
Consumer goods	Micro welding, cutting and marking Marking of plastic and non-metal material	Quasi-CW ("QCW") lasers and NS pulsed lasers Ultraviolet pulsed lasers
Medical devices	Stent, pacemaker and device manufacturing	CW lasers and NS pulsed lasers
Energy	Hardening and welding of pipes Cladding of turbine blades and drill bits	CW lasers (4-50 kW) CW lasers (1-20 kW) and IPG systems
Aerospace, rail, shipbuilding	Welding titanium and welding/cutting thick plates Percussion drilling of parts Non-destructive inspection	CW lasers (1-50 kW) and IPG systems QCW lasers Genesis systems
Micro electronics	Wafer inspection and annealing Solar cell processing Processing of glass, ceramics, sapphire, silicon	CW lasers and NS pulsed lasers Green pulsed lasers Picosecond ("PS") pulsed lasers

Other Markets

End Market	Applications	Principal Products
Aerospace and Defense Scientific	Directed energy Sensing, spectroscopy and research	Single-Mode CW lasers, amplifiers and diodes Mid-infrared and other lasers
Medical procedures	General surgery, urology and soft tissue Skin, wrinkle/hair removal and dental	Thulium lasers Erbium and diode lasers

Revenue by Channel:

- ~50% direct sales to machine tool original equipment manufacturers
- ~50% direct sales to end users or integrators working with end users

Revenue by End Market:

Because approximately half of our sales are to original equipment manufacturers 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.

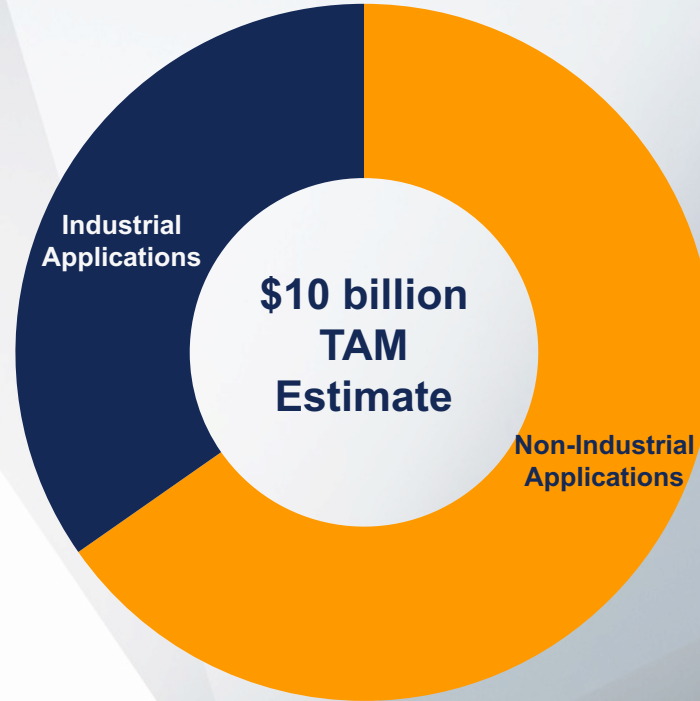
Our largest end markets include:

- General Manufacturing
- Automotive
- Household Appliances, Building, and Housing Equipment
- Industrial Machinery
- Electrical Equipment
- Aerospace, Shipbuilding, Railcar, and Other Transportation
- Consumer Electronics

IPG Total | Addressable Market

IPG Holds Leading Share in Industrial Applications

High-Power Cutting and Welding
Marking and Engraving
Additive Manufacturing
Precision Processing



Future Growth Opportunities

Medical
Microprocessing
Sensors and Instruments
R&D and Scientific
Aerospace & Defense

Source: Optech Consulting, Strategies Unlimited and IPG Photonics Corporation

Laser Penetration in Industrial Applications

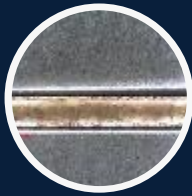
Continued adoption of laser tools in many industrial applications



CUTTING



WELDING



BRAZING



DRILLING



ABLATION



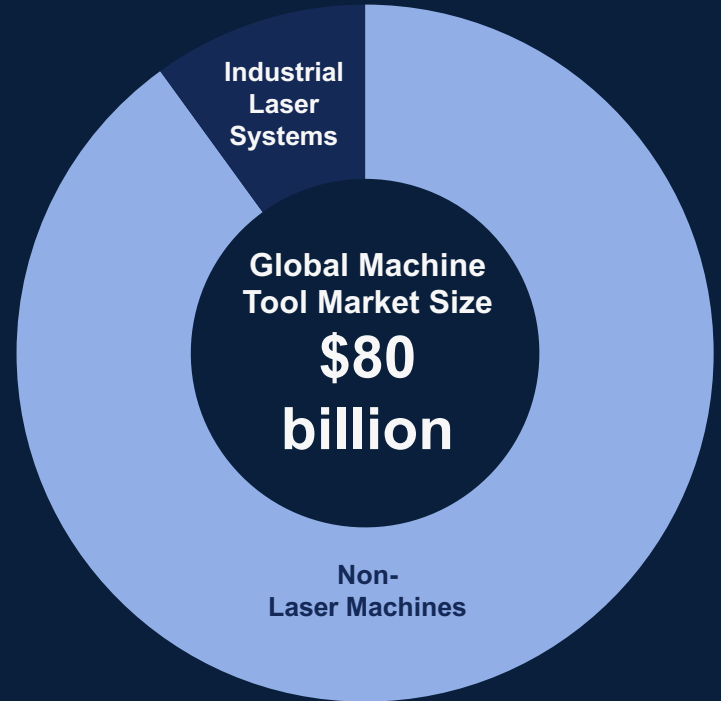
ADDITIVE MFG



MARKING

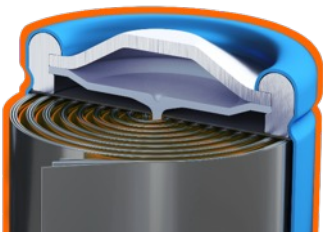


CLEANING



Source: Optech Consulting, Strategies Unlimited and IPG Photonics Corporation

Laser Applications in Electric Vehicle Manufacturing



Laser Welding,
Cutting & Marking
of Battery Cells:

Foil
Welding



Pressure Relief
Valve Welding



Cap to Can
Welding



Injection Pin
Welding



Tab to Terminal
Welding



Tab to Pole
Welding



Foil
Cutting



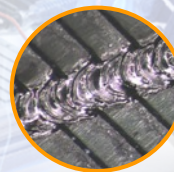
Battery Cell
Marking



Hairpin Welding



Rotor and Stator Stacks Welding



Electrical Steel Sheet Cutting



Laser Welding,
Cutting & Ablation
for Electric Motors:

Hairpin Ablation



IPG Solutions for Electric Vehicle Manufacturers

IPG laser welding technologies enable battery module welding that is **10X faster and more reliable** than traditional bonding methods



Solutions include machines for prototype development, dedicated high-speed module welding, and flexible robot-based manufacturing cells



In addition to world-leading equipment, IPG provides process development and part tooling services that **accelerate customers' system installation and achievement of high-yielding production**

These combined technologies create battery welding solutions with integrated process monitoring, traceability and non-destructive testing

ADJUSTABLE MODE BEAM (AMB) LASERS

- Spatter reduction on EV batteries for **improved reliability and safety**
- **Superior welding quality** of challenging dissimilar materials
- **Faster, more uniform high-speed welding**



MID & HIGH POWER SCAN HEADS

- **Consistent, precise, high-speed** welding of cells to bus bars
- **High strength welds** with **no seal damage**
- **Consistent penetration depth**



INLINE WELD MEASUREMENT

- Real-time weld measurement for **optimal battery welds**
- **Eliminates the need** for destructive testing
- **Reduces scrap and increases overall throughput**
- **Identifies problems before processing begins**



WOBBLE WELDERS

- **Reliable, high-speed** welds for battery enclosures
- **Superior aesthetic finishes** with **no pitting or cracking**
- **Pressure-tested hermetic seals**



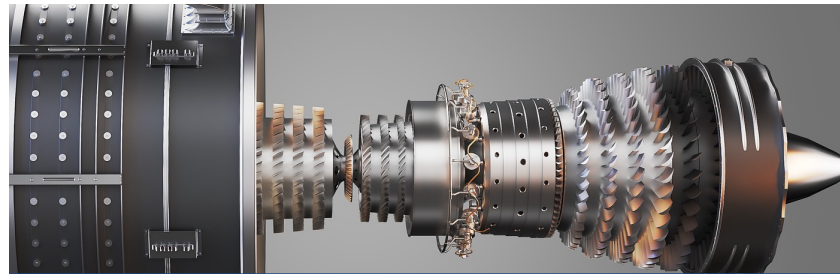
Safe and reliable production of EV batteries, motors and other components rely on these technologies for their unique ability to deliver:

- Weld quality control and depth consistency
- Spatter-free and porosity-free welds
- High throughput manufacturing and high-quality results

Expanding Market Opportunities | in New Applications



Medical



**Advanced Applications
(Defense, R&D & Instrumentation)**

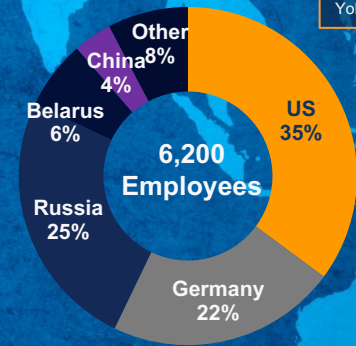
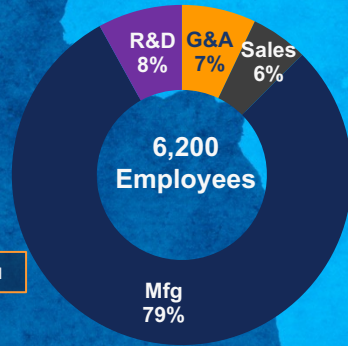
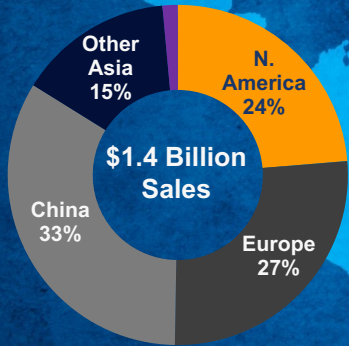
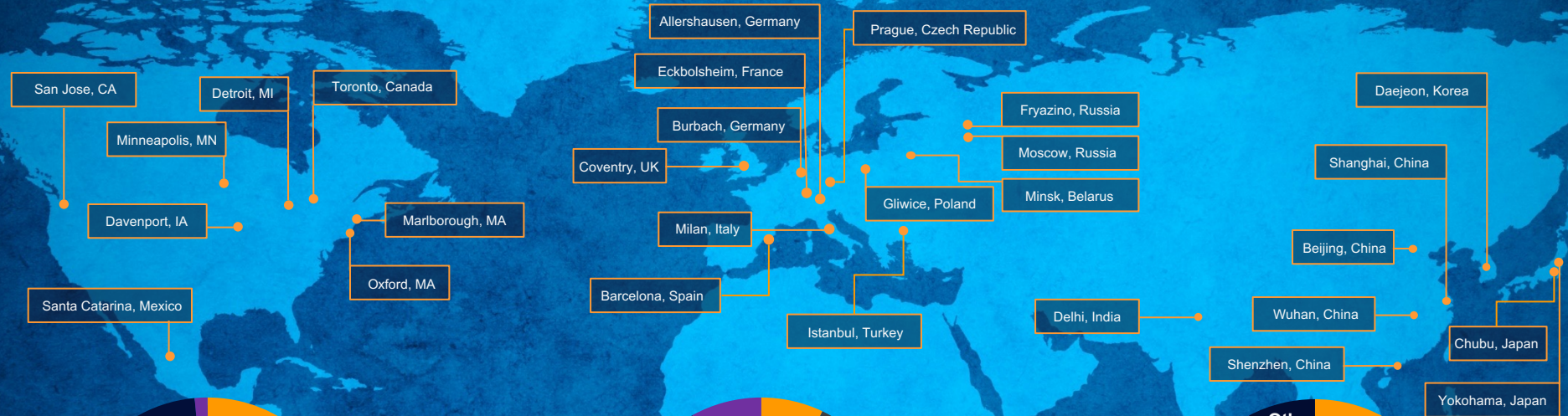


Systems

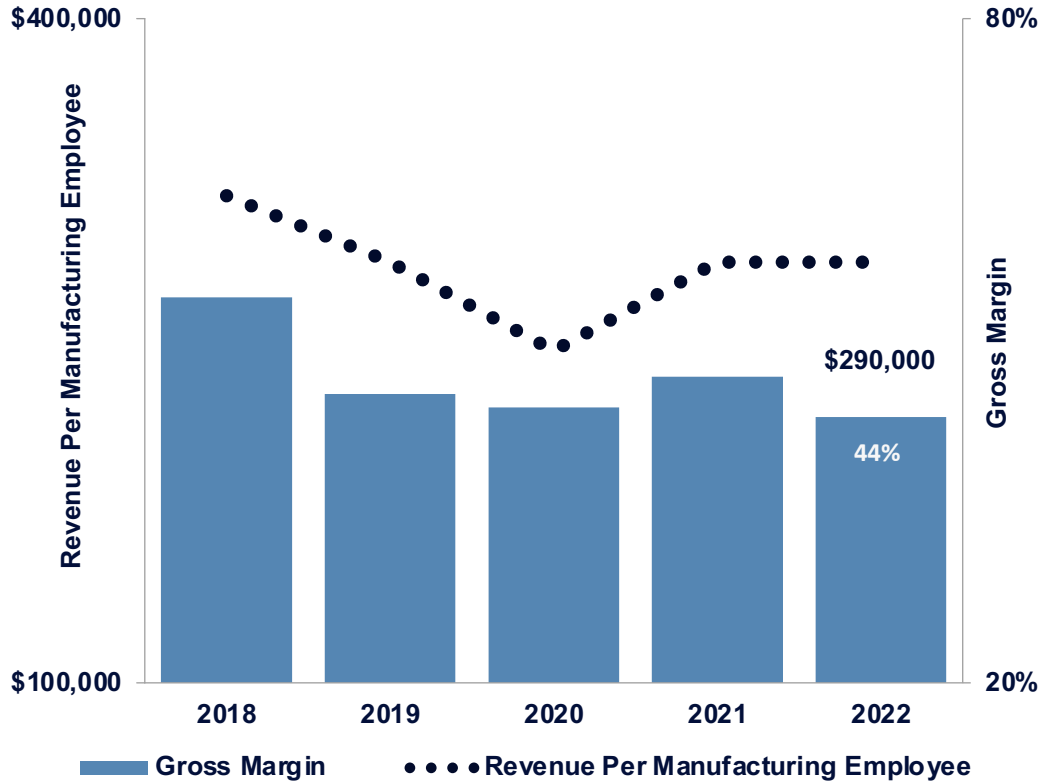


Microelectronics Processing

Global Presence



Gross Margin and Revenue Per Manufacturing Employee



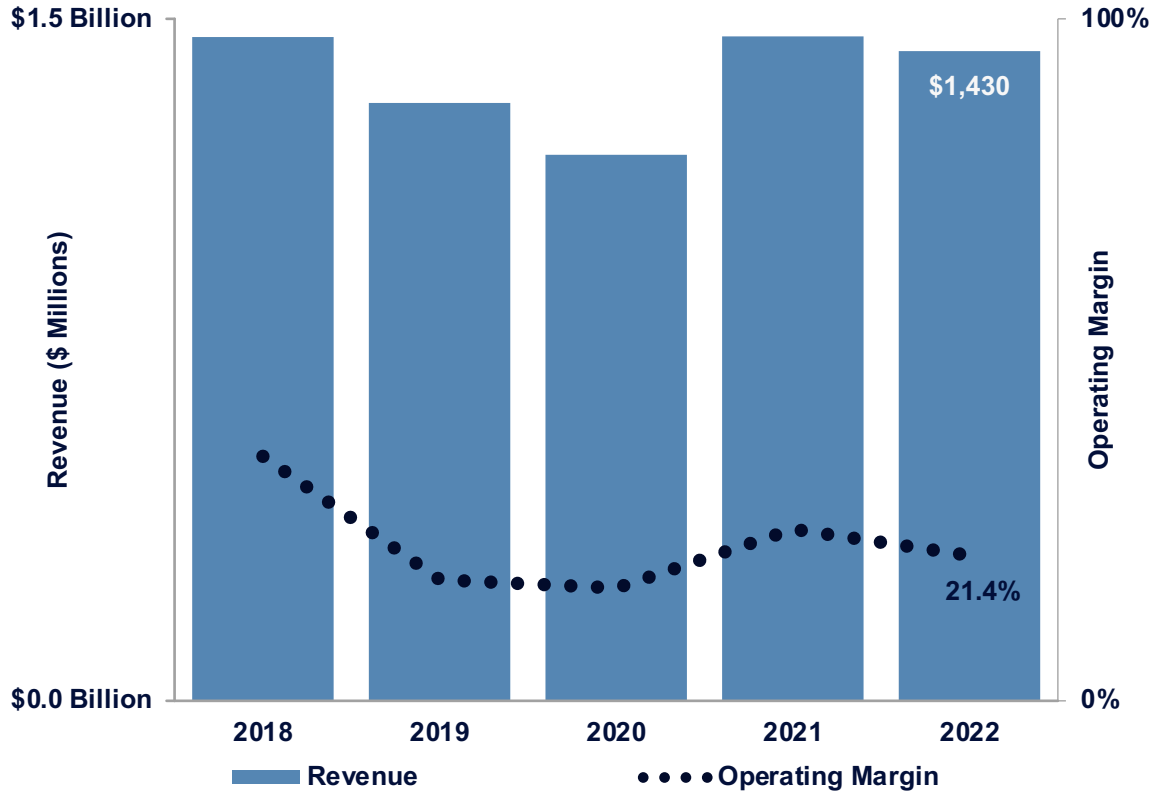
(1) Excludes inventory related charges of \$74 million

- ▶ Gross margin primarily affected by product mix, competition and absorption of fixed costs
- ▶ Labor costs represent the majority of manufacturing expenses; manufacturing employees account for ~75% of total headcount
- ▶ Purchased materials represent ~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 and Expenditures



Sales and Marketing Expenses

- ▶ Primarily compensation, trade shows, professional and technical conferences, travel, facilities and depreciation of demonstration equipment

Research and Development Expenses

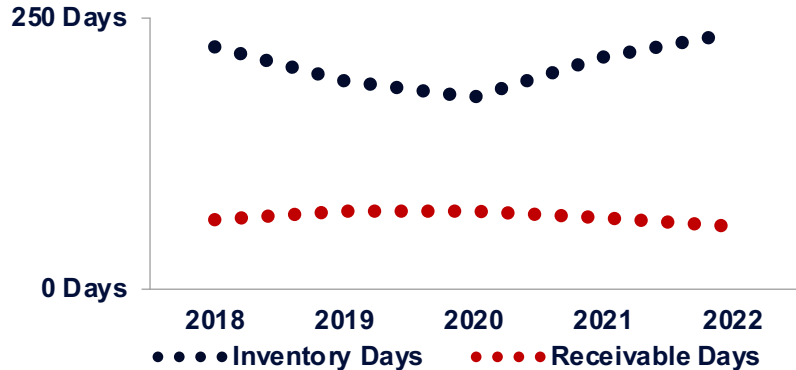
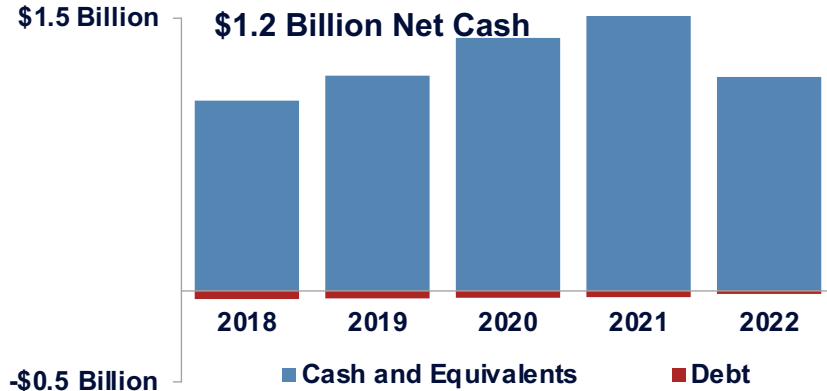
- ▶ Primarily compensation, product and component design development, cost of prototype materials, testing and facilities costs

General and Administrative Expenses

- ▶ Primarily compensation, executive management, finance, legal, IT, professional services, facilities costs and charges and benefits related to the change in allowance for doubtful debt

⁽¹⁾ Excludes gains and losses on foreign exchange, inventory related charges of \$74 million, impairment of long-lived assets of \$79 million and the gain on sale of assets, primarily related to the disposal of the Company's aircraft, of \$10 million

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 buying back stock.

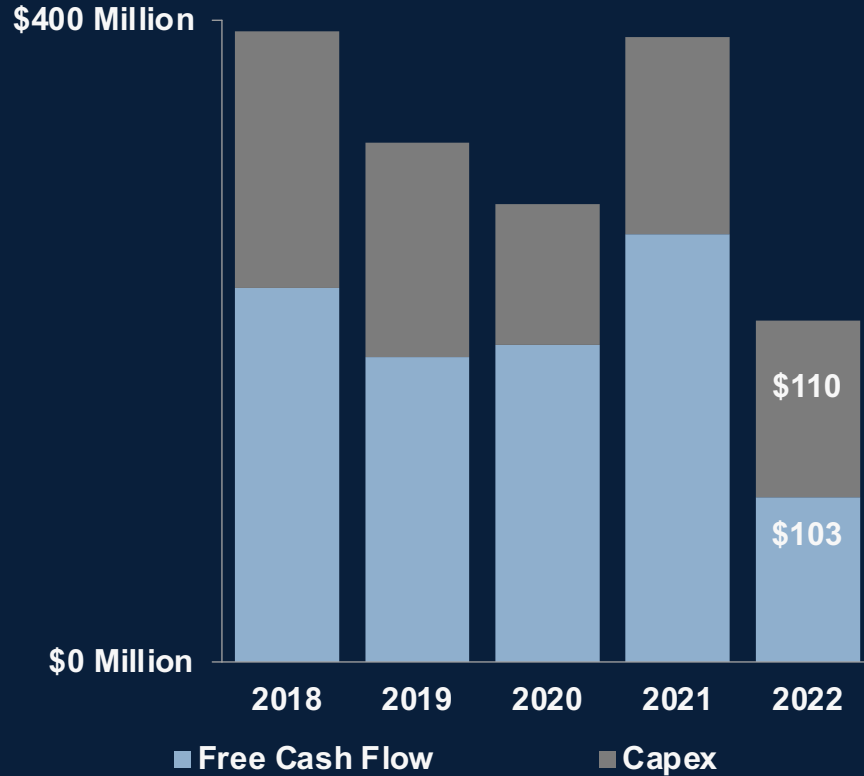
Inventory

- ▶ 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.

Strong Cash Returns



2022 Return on Equity ⁽¹⁾

10%

2022 Return on Invested Capital ^(1, 2)

19%

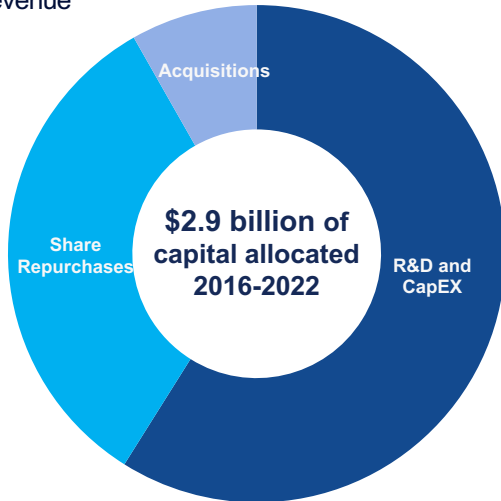
¹ Exclude gains and losses on foreign exchange, inventory related charges of \$74 million, impairment of long-lived assets of \$79 million and the gain on sale of assets, primarily related to the disposal of the Company's aircraft, of \$10 million

² excludes cash

Cash Flow and Capital Allocation

Cash Flow and Capital Expenditures

- ▶ 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 and new product introductions
- ▶ Historically, every \$1.00 of fixed investment (net PPE) yields over \$2.50 of revenue



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 2016 we have spent approximately \$900 million on capital expenditures and \$800 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 approximately \$250 million on select technology acquisitions.
- ▶ In addition to these internal investments, we completed over \$900 million of share repurchases since 2016.

Financial Performance and Target Model

GAAP Metrics	2018	2019	2020	2021	2022	Long-Term
Revenue Growth	4%	(10%)	(9%)	22%	(2%)	Double-Digit Growth *
Gross Margin	55%	46%	45%	48%	44% ⁽¹⁾	45%-50% *
Operating Margin	36%	18%	17%	25%	21% ⁽²⁾	25%-30% *

⁽¹⁾ Excludes inventory related charges of \$74 million

⁽²⁾ Excludes gains and losses on foreign exchange, inventory related charges of \$74 million, impairment of long-lived assets of \$79 million and the gain on sale of assets, primarily related to the disposal of the Company's aircraft, of \$10 million

* Revenue growth and margins can be below long-term targets during periods of macroeconomic weakness that give rise to lower demand for our products

Promoting | Stakeholder Engagement

- We engage with key stakeholders to communicate our efforts to protect the planet and to secure a safe working environment
- We continue to evaluate the concerns of our customers, employees and stockholders to ensure that our sustainability strategy is consistently updated to prioritize industry-specific as well as global material issues
- In 2021, we commenced our first materiality assessment involving our key stakeholders and expect to share in our next sustainability report

Our Key Stakeholders

Customers

Dedicated to helping our customers grow their businesses while helping them achieve their energy reduction goals from using our efficient and environmentally-friendly lasers

Employees

We focus on attracting and retaining talent from diverse backgrounds and experiences

Stockholders

Our sustainability activities are inspired by the ideals and values of our stockholders

IPG recognizes the value of transparency and accountability to our various stakeholders

Company History

1990: **IPG was founded in Russia by Chairman and CEO, Dr. Valentin Gapontsev**, a physicist and pioneer in the field of fiber lasers. The company was originally named NTO IRE-Polus but soon became known as IPG, an acronym for IRE-Polus Group.

1993: **IPG won its first significant contract** from the large Italian telecommunications carrier Italtel for a high-power fiber amplifier. Italtel convinced Dr. Gapontsev to transfer component production to Italy. Thus, the first subsidiary in Europe was formed.

1995: **IPG Laser GmbH was formed in Burbach Germany**. This was a result of a contract with DaimlerBenz Aerospace, who needed a solution for their helicopter obstacle warning system. Dr. Gapontsev proposed a new fiber solution which DBA agreed to fund if it was produced in Germany.

1996: **IPG launched a 10 watt industrial class fiber laser** and pulsed fiber lasers for marking and micromachining applications.

1997: **IPG acquired 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 decided to begin operations in the US.

1998: **IPG incorporated in the US**

1999: **IPG began operations in Massachusetts**

2000: **IPG obtained \$100 million in venture financing and undertook a reorganization**. IPG Photonics became 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. It is here, the company would begin to manufacture their own pump laser diodes, a major component of IPG fiber lasers and amplifiers. The year 2000 was also the year that IPG released the first 100 watt fiber laser, launching into the materials processing market. Erbium and thulium fiber lasers followed soon after, allowing IPG to enter the medical market.

2002: **IPG incorporated a vertically integrated business model**. This was in response to the evaporation of telecom spending by the end of 2000. By 2002, revenue had declined significantly, from \$52 million to \$22 million. As a result, 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.

2006: **sales grew from \$22 million in 2002 to \$143 million in 2006 when IPG raised \$93 million in an initial public offering**. At this time, 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). Offices began opening across the US and China.

2010: **IPG introduced its first quasi-continuous wave lasers** into the market

2013: **IPG sold its first 100 kilowatt commercial fiber laser** to NADEX Laser R&D

2014: **IPG 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.

2016: **IPG exceeded \$1 billion in annual sales**, introduced its Laser Luminaire RGB light source for the digital projection and display market and acquired Menara Networks.

2017: **IPG increased revenue 40% and acquired OptiGrate, ILT and LDD**.

2018: **the company introduced a family of ultraviolet and ultrafast pulsed lasers** and a new generation of high-power fiber lasers including QCW mode CW lasers, adjustable mode beam capability, and ultra compact designs.

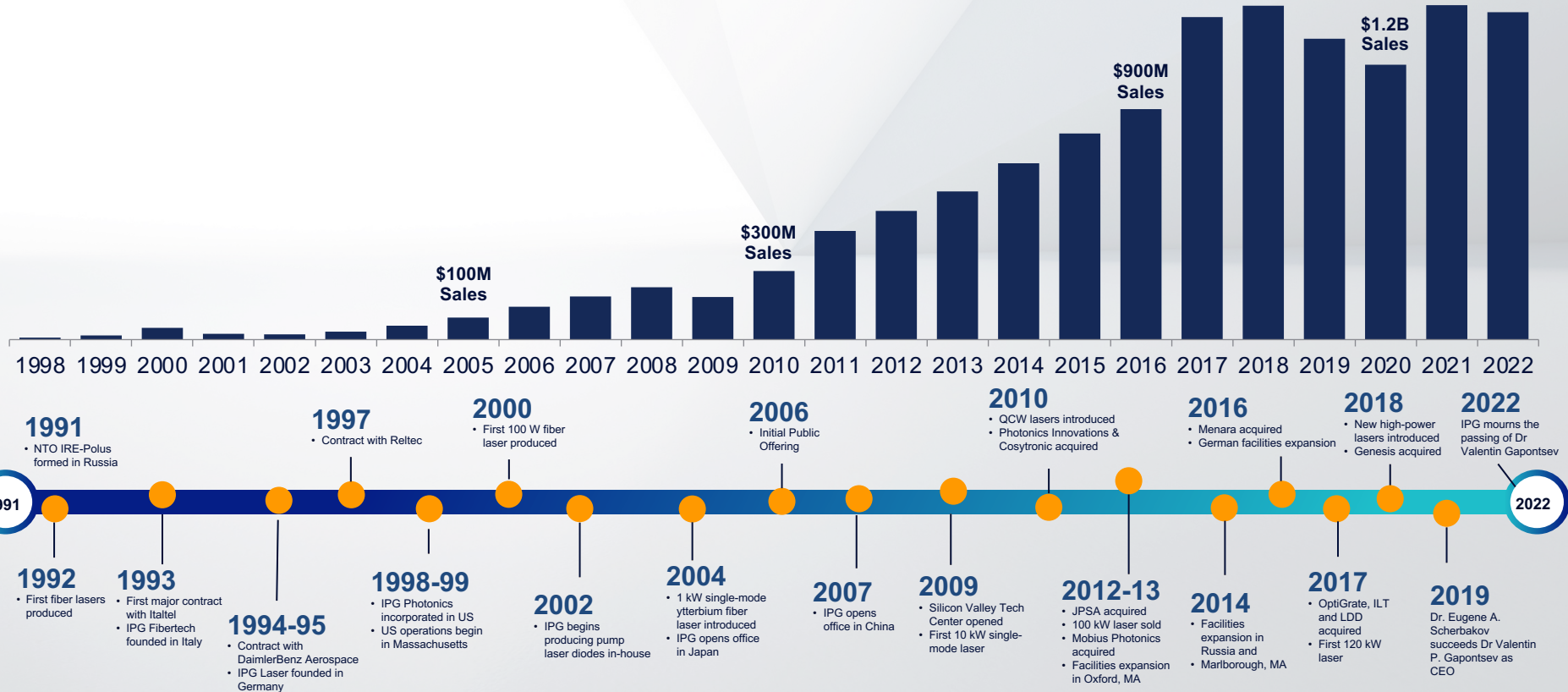
2018: **IPG acquired Genesis Systems Group**.

2019: **IPG megawatts of high power lasers shipped reached a record level**, and the company sold a **120 kilowatt solution for the first time**.

2021: **Eugene A. Scherbakov Ph.D.**, Chief Operating Officer, Managing Director of IPG Laser GmbH, Senior Vice President, Europe and Director, **succeeds Valentin P. Gapontsev, Ph.D.**, as IPG Photonics CEO.

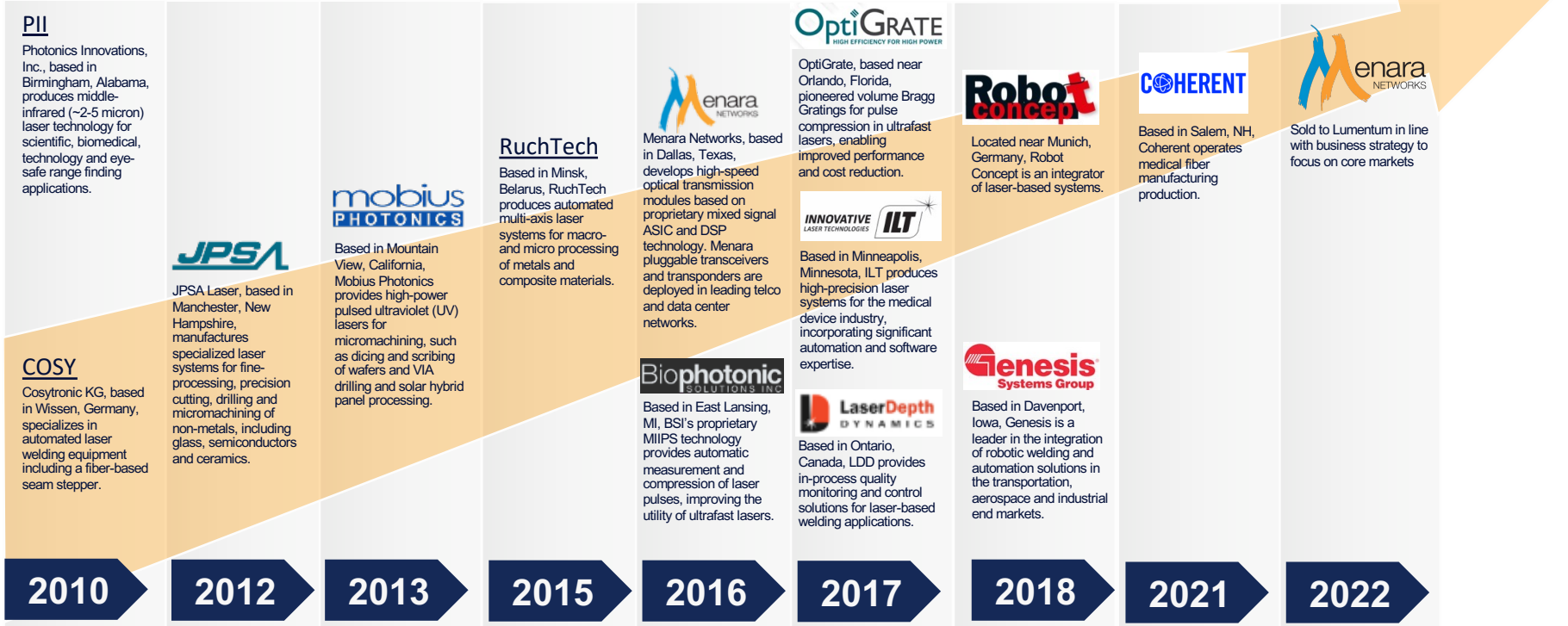
2022: **IPG announces the passing of beloved founder and Chairman and former CEO Dr. Valentin P. Gapontsev**.

Company History | Continued



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.





Our Mission

Innovative laser solutions
making the world a better place

Our Vision

Working together to apply
light in ways that improve life

IPG operates around our three central pillars of corporate ethics: environment, governance and communities. IPG values our diverse and highly talented employees who allow us to develop new solutions and provide the best possible service to our global customer base.

IPG is committed to being accountable and transparent when interacting with our customers, employees, suppliers and stockholders. We are dedicated to supporting local organizations and conducting business with the highest integrity.

Governance



IPG is committed to running an ethical business where all of our employees are given the respect and professionalism they need to thrive. IPG upholds uncompromisingly high ethical standards that are defined by our Code of Business Conduct.

Every day, IPG employees implement our values into their operations and interactions. IPG employees and board directors receive comprehensive ethics training upon hire and bi-annually in their local language

[Code of Business Conduct](#)

[Corporate Governance Guidelines](#)

Planet

IPG Photonics values innovation, accountability and transparency, which is why we continually strive to advance our sustainability strategy to align with the fundamental principles of our stakeholders and local communities. We integrate safety, reliability and sustainability fundamentals within our operations and product development initiatives. It is our responsibility to utilize our unique innovation capabilities in response to societal and environmental challenges.

Sustainability Achievements



44 million metric tons less CO₂ emissions when operating IPG lasers compared to traditional lasers 2013-2022



85 terawatts hours of electricity savings since 2013 from customer use of IPG lasers



IPG fiber lasers are **35-50%** energy efficient with efficiency & compactness improving each year



Charitable giving of **~\$4.1 million** since 2018



IPG recycled **2,800 metric tons** of metals since 2013



Approximately **10 million metric tons** of CO₂ saved in 2022 from using IPG lasers



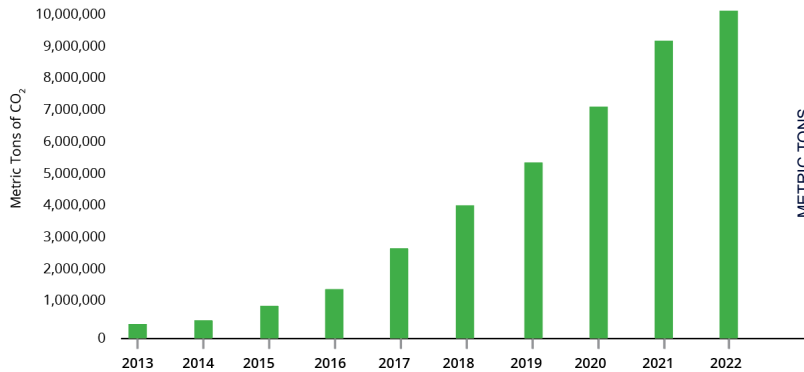
529 metric tons of recycled metals in 2022 alone



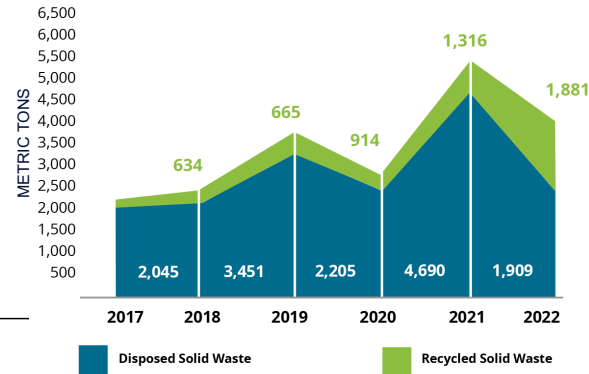
Less water used in 2022 than 2017 despite 62% increase in optical power manufactured

Energy & Resource | Conservation

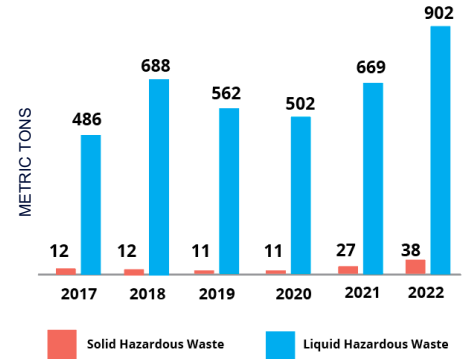
CO₂ Savings From IPG Fiber Lasers Sold Since 2013



Non-hazardous Waste Generation & Diversion



Solid & Liquid Hazardous Waste Generation



IPG invented high-power fiber lasers and successfully commercialized them. Our novel fiber laser technology is substantially more electrically efficient than traditional laser technologies enabling our customers to substantially reduce their greenhouse gas emissions and achieve their sustainability targets. We estimate that IPG lasers saved our customers approximately 44 million metric tons of CO₂ emissions cumulatively from 2013 to 2022 as compared to the use of traditional laser technologies.

- Electricity savings calculation based on IPG total megawatts of power sold, and assumes IPG fiber lasers are replacing lamp-pumped and diode-pumped Nd:YAG, CO₂ and disk lasers
- According to the World Bank, ~ 2/3rds of energy globally is produced from oil, gas and coal
- According to the US Energy Information Administration, typical oil, gas and coal power plants produce ~1.9, ~0.9 and ~2.2 pounds of CO₂ for every kilowatt hour of electricity

Energy & Resource Conservation

Since 2017, our energy intensity decreased 31%

IPG has increased laser production over the last three years, but is actively lowering greenhouse gas emissions and preserving natural resources to protect balanced ecosystems.

		2017	2018	2019	2020	2021	2022
Energy Consumed MWh	Heating Oil	323	265	341	203	196	290
	Natural Gas	73,811	66,515	85,631	74,321	73,703	77,419
	Electricity	100,630	92,898	88,925	89,946	114,690	113,292
	Diesel	0	0	16	33	0	49
Total Energy Consumption		174,764	159,678	174,913	164,502	188,589	191,049
Emissions Metric Tons	Greenhouse Gas Emissions	54,035	48,856	50,897	49,217	63,073	59,924
Laser Production kW		34,436	40,384	48,963	53,746	62,447	55,723
Carbon Intensity	GHG Emissions per Laser Sold (t/kW)	1.57	1.21	1.04	0.92	1.01	1.08
Water Consumption Cubic Meters	Freshwater	198,698	178,540	182,917	192,628	200,766	189,304
Water Intensity	Water/kW Lasers Sold	5.8	4.4	3.7	3.6	3.2	3.4

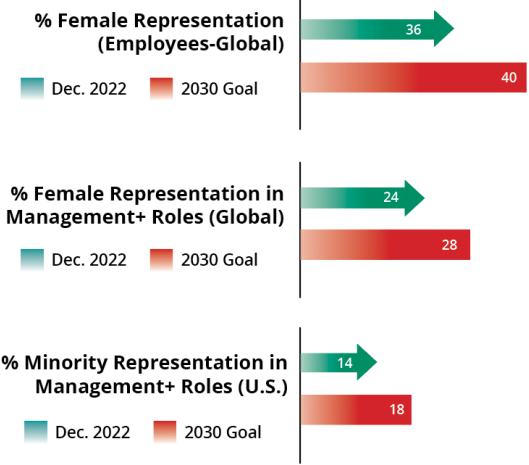
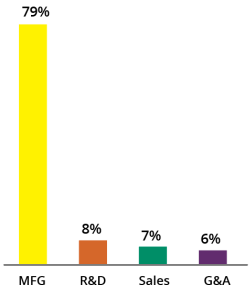
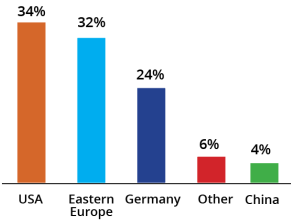
ESG data is reported for all global manufacturing facilities and facilities over 50,000 square feet and/or with over 100 employees. Data since 2019 includes Genesis Systems. We use the CO₂ conversion rates provided by US Environmental Protection Agency (EPA).

People

Our employees are our most valuable asset and are the definition of IPG Photonics. We are committed to attracting and retaining the best talent, and we believe that an engaged, diverse and thriving workforce will drive a sustainable future for our company and society. IPG is proud of our supportive culture, innovative spirit and workplace programs.



~6,200 Employees Worldwide

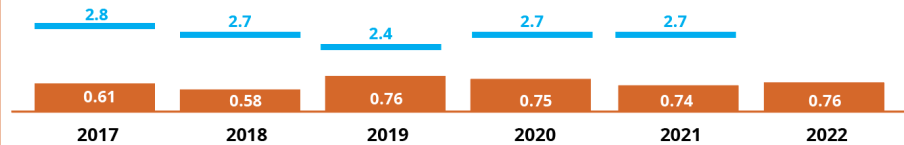


We are tracking new metrics focused on increasing female and minority representation in our workforce, and providing professional development opportunities for employees. In 2023, we established diversity and inclusion goals for the first time.

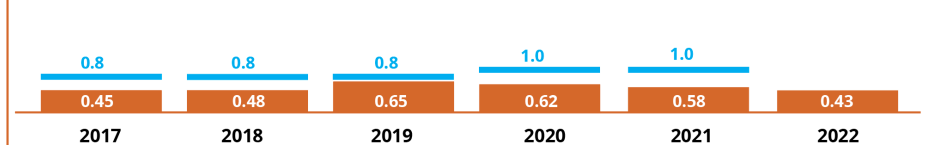
Safety in the Workplace

Our manufacturing employees undergo comprehensive training to help reduce and prevent work place accidents, which contributes to our low incident rates. As a result of IPG's efforts, our injury rates have stayed below the industry averages since the base year.

Recordable Incident Rate (TRIR)



Days Away from Work Rate (DAFW)



■ IPG ■ Industry Average

Data includes facilities in US, Germany, Italy, Russia and Belarus.

TRIR = Recordable cases x 200,000 / total hours worked by all employees;

DAFW = Lost time cases x 200,000 / total hours worked by all employees.

Industry average represents goods-producers with more than 1,000 employee published by US Bureau of Labor Statistics. 2022 BLS data was not available at time of publication.

Senior I Management Team

Eugene Scherbakov, Ph.D.

CEO and Director

Dr. Scherbakov has served as CEO of the Company since May 4, 2021. He previously served as Chief Operating Officer from February 2017, Managing Director of IPG Laser GmbH, our German subsidiary, from August 2000 and Senior Vice President - Europe from February 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. He has an M.S. in physics from the Moscow Physics and Technology Institute, a Ph. D in Quantum Electronics and a Dr.Sci.degree in Laser Physics from the Lebedev Physical Institute.

Timothy P. V. Mammen

CFO and SVP

Mr. Mammen has served as CFO since July 2000 and SVP since February 2013. Previously he was CFO and VP from 2000. 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.

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 and CTO

Dr. Ovtchinnikov has served as SVP and Chief Technology Officer since February 2022. He previously served as VP, Components from September 2005 and Director of Material Sciences since 2001. 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, Sales and Strategic Business Development

Mr. Ness has served as SVP, Sales and Strategic Business Development since February 2022. He previously served as SVP of World Wide Sales since February 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.

Igor Samartsev, Ph.D.

SVP and Chief Scientist

Mr. Samartsev has served as SVP and Chief Scientist since February 2022. Since 2011, he served as CTO. From 2005-2018 he also served as Deputy General Manager of IPG's Russian subsidiary, NTO IRE-Polus. He also holds an M.S. in Physics from the Moscow Institute of Physics and Technology and is one of the founders of IPG.

Board of Directors

<p>John R. Peeler Chair since 2021 Director since 2012 Former CEO and Chairman of Veeco. 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</p>	<p>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 the Stanford University.</p>	<p>Gregory P. Dougherty Director since 2019 Former CEO and director of Oclaro until its 2018 acquisition by Lumentum. He also served as a director of Avanex and Picarro and COO of JDSU. Prior to JDSU, he was COO of SDL. He received a bachelor's degree in optics from the University of Rochester.</p>	<p>Gregory R. Beecher Director since 2023 Previously served as a Vice President and Chief Financial Officer of Teradyne, Inc. ("Teradyne"), a supplier of automation equipment, from March 2001 to April 2019.</p>
<p>Eugene Scherbakov, Ph.D. Director and CEO See senior management team biography</p> <p>Agnes K. Tang Director since 2022 Currently a founding partner at Ducera Partners LLC. She was previously managing director of Perella Wineberg Partners.</p>	<p>Natalia Pavlova Director since 2021 A significant stockholder with family association to founders of the Company.</p> <p>Kolleen T. Kennedy Director since 2023 Former President, Proton Solutions & Chief Growth Officer at Varian Medical Systems. She serves as a member of the board of ICU Medical, Inc., and the non-profit Wayne State University Foundation. She holds B.S. degrees in Radiation Oncology and Psychology and a M.S. in Medical Physics from the University of Colorado, Denver.</p>	<p>Jeanmarie F. Desmond Director since 2021 Former Executive Vice President and Chief Financial Officer of DuPont. Serves on the board of Trinseo S.A and Sylvamo Corporation. She has earned a B.S. in Accounting from Mt. St. Mary's University and is a certified public accountant (inactive).</p>	<p>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.</p>

Board Member	Role	Audit Committee	Compensation Committee	Nominating and Corporate Governance Committee
John R. Peeler	Chair of the Board		Member	Member
Gregory R. Beecher	Independent Director	Member		Member
Michael C. Child	Independent Director			Member
Gregory P. Dougherty	Independent Director	Member	Chair	
Jeanmarie F. Desmond	Independent Director	Chair	Member	
Eric Meurice	Independent Director		Member	Chair
Natalia Pavlova				
Eugene Scherbakov, Ph.D.				
Kolleen T. Kennedy	Independent Director			
Agnes K. Tang	Independent Director	Member		

The IPG Difference



**FUTURE
GROWTH
OPPORTUNITIES**

**BROADEST PORTFOLIO
FIBER LASERS**

**INDUSTRY
LEADING
MARGINS**

**HIGH
QUALITY
SOLUTIONS**

**WORLD LEADER
FIBER LASERS**

**STRONG
BALANCE
SHEET**



THANK YOU