

# ■ IPG Photonics' LaserCube

from the World Leader in Fiber Lasers



**Small Parts Made Easy™**



Applications



Features



Advantages



[www.ipgphotonics.com](http://www.ipgphotonics.com)

■ The Power to Transform®

# Overview

## IPG Photonics' LaserCube



### Leader in Innovation

IPG Photonics is the world leader in high power fiber lasers and amplifiers. Founded in 1990, IPG pioneered the development and commercialization of optical fiber-based lasers for use in a wide range of venues such as materials processing, medical, scientific and other advanced applications. Fiber lasers have revolutionized the industry by delivering superior performance, reliability and usability at a lower cost of ownership compared with conventional lasers, allowing end users to increase productivity and decrease operating costs. IPG is headquartered in Oxford, MA with additional facilities throughout the world.



IPG Photonics World Headquarters, Oxford MA, USA



### System Overview

IPG's LaserCube flat bed cutter is optimized for cutting small parts. Using high-force linear motors built on a granite stage, it has the stability and acceleration needed for high-speed precision machining. Utilizing IPG's fiber lasers and cutting head technology, the LaserCube is inherently reliable with low operating and part-processing costs.

The LaserCube is the ideal cutting tool for metals, including mild steel, stainless steel, aluminum, copper, brass and exotic alloys. Being right-sized for smaller parts, prototypes and smaller production runs, the LaserCube provides the most cost-effective capacity addition and lowest cost of ownership of any professional laser cutter.

## Wide Range of Metals & Thicknesses

IPG Photonics' LaserCube



### System Versatility

The LaserCube is truly a general-purpose laser cutting system: high-velocity stages and high CW power lasers provide the fast cutting of carbon steel parts and reflective metals such as copper, brass and aluminum.

System Control is the key to flexibility. Stored process parameters allow precise setting and automatic adjustment of laser power based on changes in cutting head velocity for complex contoured parts. The system has computerized control of two process gasses, with automatic monitoring of cutting head conditions.

With many alloys or higher-value metals only available in smaller-size sheets, the 48 inch (1225 mm) cutting bed of the LaserCube is optimally sized for economic material processing. Available in many different power configurations, you can buy exactly the power you need.



### LaserCube Service & Support

As the world leader in fiber lasers, IPG Photonics is your ideal partner to provide service and support for your precision laser cutting system. IPG has over 100 field service engineers, specializing in servicing industrial lasers and laser systems used in 24x7 manufacturing. North American applications and field service offices are located in Oxford, MA, Santa Clara, CA and Novi, MI. IPG's Field Service Team is comprised of experienced and highly-skilled engineers, supported by a global infrastructure including parts warehousing, applications scientists and the design and manufacturing teams that build the products.

IPG understands the rigors of today's manufacturing line and can provide customer support 24/7 depending on your needs. In addition to warranty coverage, IPG offers support packages ranging from on-demand and hourly paid service to scheduled preventive maintenance and guaranteed response times. Whatever your service preference, IPG has an option that will meet your needs.

# Benefits of Fiber Lasers

IPG Photonics' LaserCube



## Benefits of Fiber Lasers

No Need for Laser Gasses

Adjustment & Maintenance Eliminated

Smaller Spot Size for Finer Cutting

Better Cutting Efficiency

>37% Wall-plug Efficiency

Fiber lasers are entirely solid state, with no mechanical cavity resonators or mirrors and no adjustable or replaceable parts within the laser. Light is outputted along a flexible optical fiber pipe that is plugged directly into the laser cutting head, eliminating the need for optics and adjustments in the beam delivery path.

With an emission wavelength of 1 micron, fiber lasers' efficiency in cutting metals is better than CO<sub>2</sub> alternatives, allowing for faster cutting of parts or the option of using a lower power laser. Typical estimates show an IPG fiber laser cutting 1 mm thick steel approximately 3.5 times faster than an equivalently powered CO<sub>2</sub> system.

IPG's fiber lasers offer the highest wall-plug efficiency of any commercial laser. Not only is less electricity consumed in the cutting of parts, but the cooling to remove unwanted heat is also proportionally reduced, decreasing the size of the electrical service needed to support the cutting tool installation. Achieving over 37% wall-plug power efficiency, combined with improved material coupling characteristics, IPG lasers typically use 70% less electrical energy than traditional CO<sub>2</sub> alternatives in metal cutting applications.



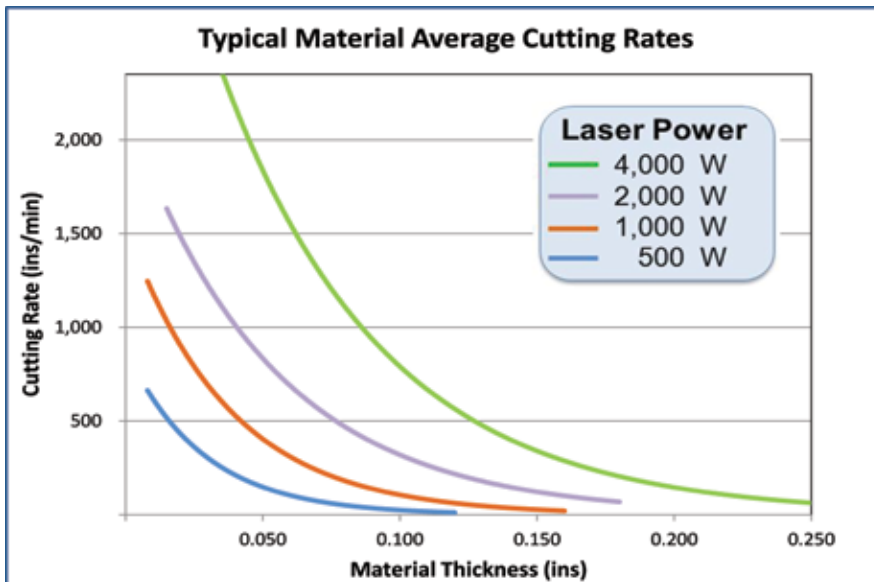
### IPG's Diode Burn-in Facility

Each laser diode is tested for a minimum of 1,000 hours with an elevated temperature and current before being certified for inclusion in the laser. Complete lasers are further tested for an additional 100 hours to ensure maximum reliability in the field.



## Fiber Laser Selection

### Choice of Fiber Laser Power



The LaserCube is offered with lasers ranging in power from 500 W to 4000 W. By offering such a broad range of options, IPG enables users to buy exactly the cutting solution they need.

For thinner materials, the YLR-500 provides good cutting performance in a small package that is integrated within the workcell, reducing overall system footprint. The laser is air-cooled, eliminating the need for a chiller and further reducing electrical supply demands.

Higher power YLS-series lasers are mounted externally to the workstation. They are water-cooled and housed in a NEMA 12, air-conditioned and sealed cabinet, providing additional protection for harsh environments.

IPG YLS lasers are modular, with output of several fiber laser modules combined into a single output fiber. In the unlikely event of a module failure, the remaining modules will immediately compensate for the loss by maintaining the output power and allowing part cutting to continue without interruption.

Each laser is equipped with a 50 micron output fiber and can be used over a dynamic operating range from 10% to full power with no change in beam divergence or beam profile throughout the entire range. This allows a single laser to be utilized for both high and low power applications, ideal for processing different thicknesses of metal.



# Overview

IPG Photonics' LaserCube

## System Enclosure

- CDRH Class 1 Laser System
- Safety Interlocked
- Front Door with Laser-safe Viewing Windows
- Manual or Automatic Door Options
- Access Panels on Sides of Workcell for Easy Access

## FLC-30 Cutting Head

- Lightweight for High-speed Part Processing
- Maintenance-free Fiber Feed to Head
- Integrated Height Sensor
- Computer Control of Two Process Gas Supplies

## Motion System

- Granite-based Stage for Stability
- High Force Direct Drive Linear Motors
- Position Encoder Resolution 1.0  $\mu\text{m}$
- Stages Sealed and Air-purged to Minimize Contamination
- 48 x 48 inch (1225 x 1225 mm) Cutting Area
- Motorized Z-axis Travel 75 mm

## User Interface

- Intuitive HMI for Machine Control
- Multiple Screens for Programming All Process Parameters
- G/M-code Programming (Optional)
- CAD/CAM Software (Optional)





#### Workcell

- Compact Footprint Minimizes Floor Space
- Rear Pass-through Door Option
- Light Tower Status Indicator (Optional)



## Why IPG's LaserCube?

### Fast Cutting for Small Parts

High-force Linear Drives and  
Low-mass Head

### IPG's Fiber Reliability

No Laser Maintenance  
No Mirrors to Clean or Align

### Low Operating Costs

Low Facilities Costs  
Some Models Don't Require Chillers

### Size Matters

Requires only 62 square feet of  
Floor Space

### Affordable

The Right-sized Machine  
for Your Parts

### Expanded Capabilities

Cut Brass and Copper  
*with Great Results*

### Single Point Service & Support

Laser and Workstation  
*Designed, Built and Supported by IPG*

**Position your Business  
for Growth with IPG**



# Cutting Heads

## IPG Photonics' FLC-30 Cutting Head



### Cutting Head Standard Features

IPG has designed the FLC-30 specifically for metal cutting applications. Taking advantage of the IPG fiber delivery, it has an extremely low weight to minimize moving mass when cutting small parts at high speed. Rated for laser power up to 10 kW and having an integrated height sensor, the FLC-30 head is compatible across the LaserCube product range.

Within the cutting head, a user-replacable cover slide is situated between the cutting nozzle and the focusing lens and provides protection for the lens against any debris. An integrated sensor monitors the condition of the cover slide and provides a notification when a contamination threshold is exceeded. Cover slide replacement is a simple procedure that requires no tools or alignment and is completed in a few seconds.

With options for coaxial viewing, process monitoring and enhanced vision with image recognition for automated operation, the FLC-30 is designed by IPG to provide the best possible delivery of the fiber laser light to the cutting surface.

Lightweight  
2.95 kg as shown

Dual Locking Connector  
available with HLC-8 or LCA bayonet

Interchangeable IPG Collimator  
with integrated aperture/ cooling

Ethernet connection  
for electronics

X, Y, Z adjustment  
of focus lens

X, Y, Z manual or  
motorized piercing  
version for Z

Easy to replace  
cover slide

Nozzle holder assembly  
with height sensor to  
maintain constant distance

Monitoring of cover slide  
presence & contamination

Wide range of cutting nozzles





## System Software & Control Interface

Operator Control of the LaserCube is through a

15 inch touchscreen monitor interface to a Windows-based CNC controller. The monitor, together with a full-size keyboard and mouse is mounted to a swing arm at the front of the machine. System programming is in industry standard G-code and M-code, reducing training demands and allowing for accelerated learning.

The LaserCube is compatible with customers' existing CAD/CAM software packages with the adoption of tool-specific post process parameters. CAM packages

typically provide repair of data to remove any gaps and overlaps and output cutting files in standard G-M Code. The LaserCube provides additional programmability that includes laser power, feed rate and control of cutting assist gas; all parameters being stored in an editable materials and laser parameter database. Please contact IPG for details of CAD/CAM software options.



Windows-based HMI



IPG Photonics Midwest Operations  
Novi, MI



## Application Support and System Training

IPG maintains 12 Applications Labs throughout North America, Europe and Asia. These centers are staffed by PhD Scientists and engineers with expertise in laser-material interactions. In addition to performing internal research, these resources are available to the IPG user community through custom process development contracts. The overriding mission of these groups is to help IPG's customers.

IPG provides training to LaserCube customers at company headquarters following factory acceptance and again at the customer's facility after installation. IPG factory training allows access to product engineers and applications specialists and gives a thorough overall grounding in the system and how it is used in your target application. Customer site training recaps factory training for additional team members and can also cover preventive and first-line maintenance. IPG understands that new applications for the system continue to arise, and new employees continue to require training. We are happy to quote follow-on training tailored specifically to meet your organizations ongoing and changing needs.

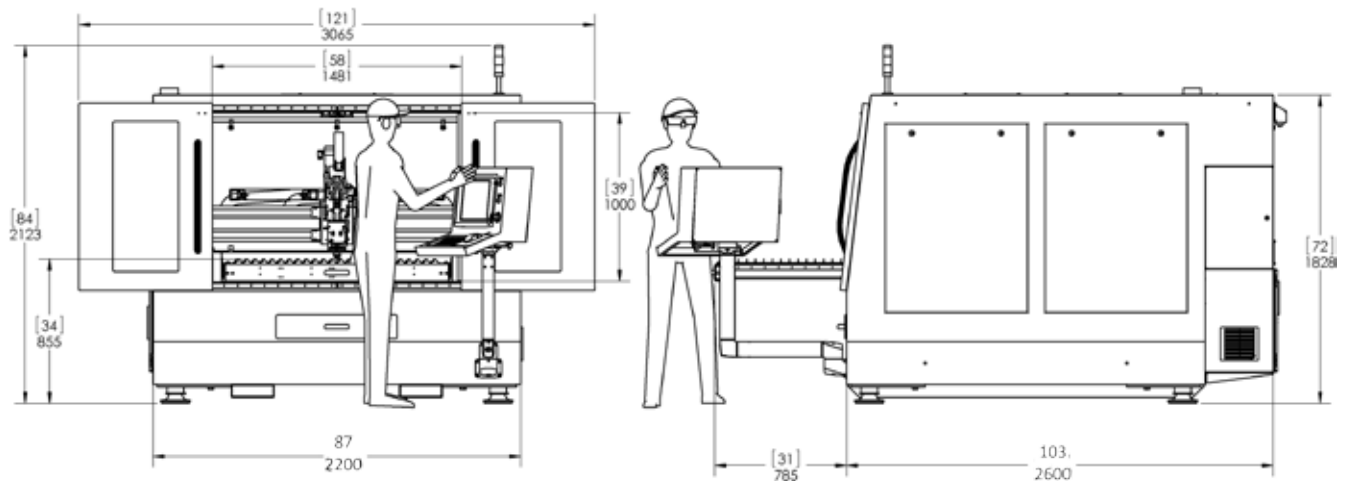
## System Specifications

Choice of Model	
SYS-4x4-YLR-500	LaserCube Workcell with Integrated 500 W Laser
SYS-4x4-YLR-1000	LaserCube Workcell with Integrated 1000 W Laser
SYS-4x4-YLS-1000	LaserCube Workcell with Externally Mounted 1000 W Laser
SYS-4x4-YLS-2000	LaserCube Workcell with Externally Mounted 2000 W Laser
SYS-4x4-YLS-4000	LaserCube Workcell with Externally Mounted 4000 W Laser
Beam Delivery	IPG Photonics' FLC-D30 Cutting Head with Automatic Capacitive Height Sensing Replaceable Cover Window, Integrated Coaxial Cutting Assist Gas Includes 1 Collimator & 1 Focus Lens per Customer Selection
Work Envelope	X: 48.25 in. (1225 mm); Y: 48.25 in. (1225 mm); Z: 2.9 in. (75 mm)
Motion Platform	Linear Stage H-gantry 1.0 $\mu$ m Resolution Linear Encoders Max Acceleration: 1G (10 m/s <sup>2</sup> )
Maximum Speed	39.0 in. (1000 mm)/ sec.
Accuracy: Positioning	$\pm 25 \mu$ m ( $\pm 0.001$ in.)
Repeatability	$\pm 2 \mu$ m ( $\pm 0.0001$ in.)
Cutting Surface	Telescoping Drawer with Metal Saw Tooth Cutting Points; Honeycomb Inserts (optional) Removable Debris Collection Bin; 200 lbs (91 kg) Load Capacity
Controls/ Interface	Industrial Motion Controller, Full Look-ahead Contouring Capability Laser Power Proportional to Velocity, Windows-based CNC Interface G/M-code Programming, Editable Materials & Laser Parameter Database
Process Gas	Electronically Controlled Pressure Regulator for Gas up to 250 psi (1,725 kPa) Regulator for Cutting Inputs for Two Cutting Gasses. On/Off & Pressure Controls
Exhaust	Exhaust Plenum for Cutting Box & Debris Drawer Requires Customer to Provide House Exhaust
External Dimensions, WxDxH, mm	2200 x 2600 x 1800
in.	86.6 x 102.3 x 70.8
Weight, lbs.	7720
kg	3500
Power (excluding laser & chiller)	208-230 VAC, 47-63 Hz, 3 PH, 7000 W, 30 A Breaker
<b>System Options:</b>	
Automated Doors	Power Operated Front Doors for Easy Part Loading & Unloading
Honeycomb Insert	Honeycomb Insert Cutting Table Slats are Reversible to Quickly Convert Cutting Table to Accept Honeycomb Inserts
Jog Pendant	Pendant & Control Software for 3-axis Manual Stage Positioning
Light Tower	System Status Indicator with Three Light Colors; Each with Solid, Flashing or Off Conditions
Collimating Lens	Selectable from 50 mm to 100 mm
Focus Lens	Selectable (at time of order) from 120-250 mm
Cutting Nozzle	Selectable from 1.0 mm to 2.5 mm Tip

## Facility Requirements

Workcell, WxD	87 x 103 in. (2200 x 2600 mm) Additional 36" (900 mm) Service Access Required on All Sides	
YLS Laser, WxD	34 x 32 in. (856 x 806 mm) Locate within 15' (5m) of Workcell	
Chiller, WxD	33 x 41 in. (840 x 1030 mm) Locate within 10' (3 m) of Laser	
Electrical Power		
Workstation with YLR-500 Laser	460 V	20 A
Workstation Only for YLS Lasers	460 V	20 A
YLS-1000 including Chiller*	460 V	20 A
YLS-2000 including Chiller*	460 V	40 A
YLS-4000 including Chiller*	460 V	65 A
Chilled Water	Cutting head cooling. Approximately 0.25 CFM (0.75 l/min.) of DI water between 70°-75°F (21°-25°C) for Laser Powers up to 4,000 W	
Exhaust	3200 CFM	
Process Gas	Typically Nitrogen or Oxygen Pressure Range 10-250 psi (69-1,725 kPa)	

*\*Externally mounted fiber lasers are powered independently from the cutting workstation and require a separate power feed*



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

## IPG Photonics Corporation

World Headquarters  
 Oxford, MA USA  
 +1 508 373 1100  
[sales.us@ipgphotonics.com](mailto:sales.us@ipgphotonics.com)

## IPG Laser GmbH

European Headquarters  
 Burbach, DE  
 +49 2736 44200  
[sales.europe@ipgphotonics.com](mailto:sales.europe@ipgphotonics.com)

## IRE- Polus Co.

IPG Russia  
 Fryazino, Moscow RU  
 +7 (495) 702 95 89  
[mail@ntoire-polus.ru](mailto:mail@ntoire-polus.ru)

### China

+86 10 6787 3377 ext. 1020  
[sales@ipgbeijing.com](mailto:sales@ipgbeijing.com)

### France

+33 (0) 388 674 974  
[sales.france@ipgphotonics.com](mailto:sales.france@ipgphotonics.com)

### India

+91 80 2852 4861  
[sales@ipgphotonics.in](mailto:sales@ipgphotonics.in)

### Italy

+39 0331 170 6900  
[sales.italy@ipgphotonics.com](mailto:sales.italy@ipgphotonics.com)

### Japan

+81 45 716 9831  
[info@ipgphotonics.co.jp](mailto:info@ipgphotonics.co.jp)

### Poland

+48 32 721 22 20  
[sales.poland@ipgphotonics.com](mailto:sales.poland@ipgphotonics.com)

### Singapore

+65 62722663  
[sales.singapore@ipgphotonics.com](mailto:sales.singapore@ipgphotonics.com)

### South Korea

+82 42 930 2000  
[ipgk@ipgphotonics.com](mailto:ipgk@ipgphotonics.com)

### Spain & Portugal

+34 937 999 971  
[sales.spain@ipgphotonics.com](mailto:sales.spain@ipgphotonics.com)

### Turkey

+90 (216) 306 0317  
[sales.turkey@ipgphotonics.com](mailto:sales.turkey@ipgphotonics.com)

### United Kingdom

+11 203 178 21 11  
[sales.uk@ipgphotonics.com](mailto:sales.uk@ipgphotonics.com)

**IPGP**  
**NASDAQ**  
 LISTED

[www.ipgphotonics.com](http://www.ipgphotonics.com)