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# Fiber Laser Cutting Machine

## GF3015 Technical Proposal



**FARLEY • LASERLAB**



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## Introduction

- 40+ years of brand history and technology accumulation;
- 6000+ typical projects running worldwide, varies from Sheet Metal, Steel, Shipyard, Railway, Airplane industries;
- 30+ initial global dealers/agents, 24/7 global service, devote to provide lifetime care and build a century global brand;

Farley Laserlab is one of the oldest builders of plasma and laser systems around the world, establish in 1977. The company headquarters and manufacturing plant is based in Melbourne, Australia and has offices and technical centers in Chicago, USA, manufacturing in Wuhan, China from 2,000 years.

As the World's specialist in cutting and welding technology, Farley Laserlab specializes in the engineering and development of advanced plasma, laser and drilling technologies for mechanical, shipyard, automobile, war, aerospace industries, etc



Austrilia company

# FARLEY LASERLAB

CUTTING SYSTEMS



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Wuhan, China Plant



New HQ in Wuhan, under building



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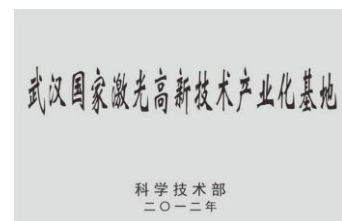
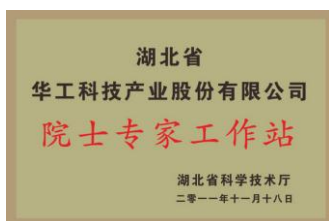
### ➤ Patents

**94 Patents, 10 Product certificates and 14 Software copyrights in Laser cutting and welding technology.**

The detailed documents will be submitted and transferred to Buyer separately if needed.

### ➤ Certifications and Awards

CE, ISO9001, ISO14001, The State Technological Invention Award, the TORCH plan, Laser Processing National Engineering Research Centre (NERC), Academician and expert working station, State Laser Machine Standardization Committee Member, State Laser Industrialization Base...





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## Typical customers





### What is a GF3015 laser cutting machine?

The GF3015 laser cutting machine by Farley Laserlab adopts a gantry-motion structure, linear guide and rack & pinion, AC servo motor and drives, dual-side fume extraction system that delivers high performance laser cutting quality by equipping with a world leading RAYCUS-1500W fiber laser source. Not only it is highly recommend for carbon steel cutting, but also excellent for SS plate, aluminum alloy plate and copper plate cutting.

### GF3015 technical parameters:

Machine model		GF3015
Cutting area(length x width)		3000mm×1500mm
Laser model		HG Tech- RAYCUS-1500W
Laser wavelength		1,070±10nm
CS cutting thickness		Max. 12mm
SS cutting thickness		Max. 6mm
Interface		USB,RJ45
X-axis	Moving speed	80m/min
	Stroke	3050mm
	Position Accuracy	±0.05mm/m
	Repeatability Accuracy	0.03mm
Y-axis	Moving speed	80m/min
	Stroke	1530mm
	Position Accuracy	±0.05mm/m
	Repeatability Accuracy	0.03mm
Z-axis	Stroke	100mm
Power supply requirement		380V 50/60Hz 50A



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Continuous working time	24Hours
Machine weight	Approximate 3500kg~4000kg
Max Loading (Kg)	600Kg
Dimension (lengthxwidthxheight)	4250mmx2430mmx1800mm

### 1. 1 Mechanical motion systems

The traveling gantry laser cutting machine generally includes the machine tool bed, beam and other basic components for the installation of laser cutting head, mechanical automatic processing is achieved through control system. Therefore, the drive design and manufacturing of beam device play an important role in quality processing. Especially during the cutting process, when the beam is moving, only its excellent stability and flexibility can ensure a faster processing speed and processing quality.

This high quality machine tool bed has gone through strict machining process to reduce laser equipment's vibration during the process of high speed operation.

The X,Y axis are use Rack & Pinion, and Z axis using high-precision ball-screw drive. Machine tool bed works as X axis and has a stroke of 3m. With sufficient static, dynamic and thermal state rigidity, It ensures that the system has good dynamic qualities. Meanwhile, this machine tool bed has advantages of stable performance, non-deformation in transportation, high machining precision and easy installation etc. . With a stroke of 1.5m and driven by servo motor, the beam is moving in high speed on the 3m long machine tool bed to have a one-time processing area of 3m x1.5m. Therefore it has following advantages: larger processing area, high-precision one-time processing, reduced auxiliary time and easy installation etc. Since there is a lighting system under the beam, therefore,





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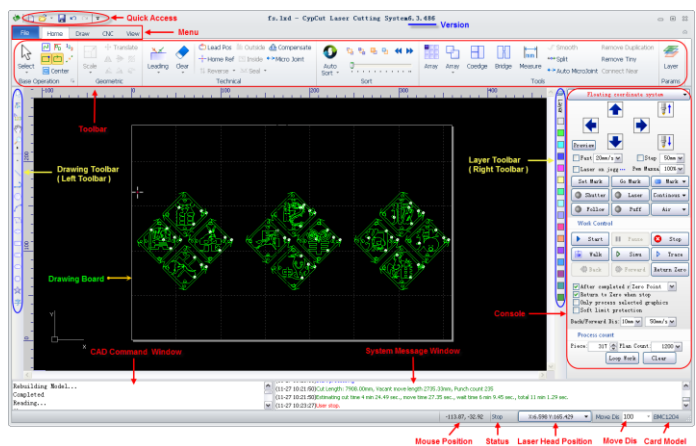
no matter where the cutting head is, the operator can monitor the cutting conditions so as to facilitate the maintenance.

### Working table:

The processing area of working table is 3m x 1.5m with plate bearing load less than 900kg. There are waste collection drawers for slag discharging and work piece collection. Since there is a large space under the processing area of working table, dual ventilation dust pipe are equipped.

## 1. 2 Control system

The control system consists of numerical control systems, PLC and control cabinet.etc.



### 1.2.1 Numerical control system

GF3015 is equipped with international standard FSCUT Cypcut CNC control system that guarantees its high stability and reliability, it has following functions:

- User-friendly interface with built-in English operating system, greatly enhanced operation efficiency.
- AC servo motor and drive: a combination of reliability, quick response and free of maintenance.



- Fast-response surface following
- Easy-operated cutting-retraction
- Straight line/circular arc interpolation fitting and kerf compensation
- USB and broadband interface available for data communication

### 1.2.2 The advantages of using CNC control system

- High stability
- IWS type service and parts replacement
- CNC system for complex tasks
- High performance and flexibility, especially for high-speed cutting

S.N.	Item	Unit	Quantity	Spec
1	CNC control system	set	1	Brand: FSCUT
2	Number of linkage axis	axis	2	X/Y/Z
3	USB interface	piece	1	USB2.0
4	RJ45 network interface	piece	1	
5	Memory	piece	1	SATA
6	Operating station	set	1	17"LCD display, control panel

### 1.2.3 Professional laser cutting functions

- Fast-response height following

This height following function is achieved through a capacitor system, high frequency is transmitted to cutting head through the capacitor system installed on the metal part of cutting head, once a distance change occurred between the cutting workpiece and the metal part of cutting head, frequency will change accordingly, an information will be sent to adjust Z-floating to appropriate position.

- Laser Pointer: Assistance in optical path adjustment



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- Micro-joints Cutting: Guarantee end product rate when cutting thin plate
- Edge-shared Cutting function to maximize plate utilisation efficiency
- Cutting-retraction function to process non-performing cuttings
- Adjustable power of corner cutting to ensure corner-cutting qualities

### 1. 3 Laser

China RAYCUS 1500W Fiber laser has following advantages:

- ✧ No lens inside laser generator, no need maintenance
- ✧ Beam delivery system consists of fibers
- ✧ Compact size and easy for integration
- ✧ No start-up time
- ✧ Excellent cutting ability
- ✧ Good beam quality and high power density



### Model

Rated power	1500 W RAYCUS China
Pointing stability	<2.5 mm mrad
Wavelength	1070nm
Modulation	CW – 5KHz
Power stability	+ /-2 %
Electricity load	6kW ~ 25 % Photoelectric conversion efficiency

### 1.4 Chillers

The laser resonator, laser cutting head and other key components all get sufficient cooling to ensure machine's smooth and safety running.

The temperature control is precise, stable and reliable.



The chillers have comprehensive protection functions of over-temperature, phase-loss, over-pressure, water-shortage, low-voltage, overload and so on. Since all the key-components and parts are imported, the chiller has the advantages of high stability, easy-maintenance and being in line with the cooling indicator requirement of the laser source and optical path.

## 1. 5 CAD/CAM software package

- ◆ This software package can convert the geometric information obtained from CAD system(like Autocad) into the NC code. The off-line programming software CAD/CAM can directly transfer the NC code generated from planar graph to CNC system; non-manual programming can also be achieved since the DXF graph file can be automatically converted into NC program. The generated NC code has all the laser features, thus the machine can use it to process the workpiece directly.
- ◆ The software simplifies the programming for complex components, also it is easy to modify the exist program, and the component will be always displayed in graph.
- ◆ CAD system is powerful and has many perfect features to generate graphs, additional information will be retained on the graphs for future use.
- ◆ Powerful nesting function
- ◆ Edge-shared cutting function
- ◆ Micro-connection function
- ◆ Providing continuous software upgrade support according to the actual situation of the user

## 1. 6 Auxiliary system

- ◆ Ventilation dust removal device: Under cutting table's processing zone, there are ventilation dust removal devices for partition ventilation. With this device, the cutting



emissions and metallic vapor can be effectively discharged outdoor to make the working environment clean.

- ◆ Slag discharging device: At the bottom of the working table, there is a waste collection drawer to facilitate slag discharging;

- **Spare parts list (including consumable) and tool list :**

S.N.	Item	Quantity	Spec	Origin
1	Nozzle	5pieces	1.0mm	China
2	Nozzle	5pieces	1.5mm	China
3	Nozzle	5pieces	2.0mm	China
4	Protection lens	5pieces		China
5	Goggles	2pairs		China
6	Metric wrench	1set	Special use	China

- **Technical training and after-sales service**

"HG-Laser-FarleyLaserlab" invested 80 million CNY in the establishment of China's largest and international leading Laser Processing Development Center, which brings together well-known experts, engineers and technicians. All of them are, in close connection with actual business and customer needs, engaged in the development and promotion of laser processing technology. We can provide our customer with expert guidance and process software data service in terms of laser cutting.

The laser processing industry has become a high-tech industry, which requires high quality operators and maintenance personnel not only to better operating but also maintaining the machine in a good condition. Our Laser Processing Technology Training Center can provide free training to customer's technical staff (college degree or above, 1-3 staffs) in



terms of equipment operation, maintenance and process technology. The training lasts for 5 days. After installation and commissioning at user's site, our technical expert will continue to stay on site for further training and guidance until user's technical staffs can work independently.

### Training plan 1:

S.N.	Item	Contents	Notes
1	Time	Before machine delivery	
2	Location	Manufacturer factory	
3	Training contents	① <b>Maintenance:</b> Routine maintenance, lubrication, assembling and disassembling lens; ② <b>Operation:</b> Equipment operation and basic trouble shooting; ③ <b>Programming:</b> the machine tool programming, transfer operations of programming procedures, the use of programming software and so on;	

**HG Laser- Farley Laserlab provide free training course at seller's side, buyer should bear the travel and accommodation cost of the people come from Buyer.**

### Training plan 2:

S.N.	Item	Contents	Notes
1	Time	Carried out simultaneously with the commissioning on customer's site	
2	Location	Customer's installation site	
3	Training contents	Participate in the whole process of installation and commissioning. Pls refer to the Customer Training Program for other informations	



**HG Laser- Farley Laserlab installation and training at customer side for free, but the buyer has to bear the travel and accommodation cost for the people from Seller's side. Normally two engineers.**

## After sales service

1. Warranty period: From the acceptance qualified date, the warranty period will be 1 (one) year, but in any case, not more than 18 months after B/L date. Seller is responsible to offer free fittings in these years (except consumable part.) Buyer has to send the damaged fitting to sellers.

After the warranty, we will also provide favorable service of long term technical supports and spares supply to ensure machine's stable and continuous running.

2. The artificial damage in the warranty period and damage after warranty period, Seller offers paid service.

3. The Seller will give 24 hours service support during warranty time, and giving technical guide by email, telephone, Fax for daily maintenance, if need local support, Buyer has to pay for the travel and accommodation & meal cost for the people from seller's side, no labor charge require.

If products are out of warranty and require on site service, Buyer have to pay for the travel and accommodation & meal cost for the people from seller's side, labor charge is require.

4. About the transportation expanses of spare parts will be supported by both parties in the warranty period, like Buyer support the cost of transportation for damage spare part back to supplier; Seller support the new spare part deliver to Buyer.



- **Equipment installation and Acceptance**

#### 4. 1 Equipment installation

The seller is responsible for installation, commissioning and delivery, the consumed materials and workpieces that needed for commissioning are to be borne by the buyer, special materials used by the machine are to be borne by the seller. The buyer is required to assist in following :

- The buyer is required to do the preparatory works in accordance with the foundation drawing, user self-preparation list and equipment working conditions that provided by the buyer.
- The buyer is responsible for unloading and placing of the machine at installation site, the seller is responsible for the installation, commissioning and training.
- The buyer is required to provide the conventional tools for installation and commissioning.

#### 4. 2 Final acceptance

The final acceptance is to be carried out after the completion of commissioning at buyer's site, qualified inspection and demonstration of CNC control system. Meanwhile, the technical training of machine operation and maintenance will also be carried out after acceptance. The final acceptance will come into effect after the signature from both the buyer and seller.

Final acceptance is executed in accordance with the following criteria.

No.	Item	Contents	Notes
1	Time	After installation and commissioning	
2	Location	User's site	





3	Acceptance contents	Machine appearance, operation and functional demonstration	In accordance with the product specifications and technical proposal	Including spare parts, tools (list have mentioned above)
		Sample cutting	In accordance with technical proposal	

**Equipment warranty period:** The machine period is one year (optical lenses, ceramic rings, nozzles and other consumables are not included ) from the date of qualified acceptance.

### ● Documentation list

N.o	Item	Qty	Notes
1	Basic machine installation drawing and documents	1set	2 weeks after signing the contract, the seller is required to provide buyer with the Machine Plane Locations, basic machine installation drawing and documents, technical requirement of water, electricity and gas source.
2	Operation and Maintenance Manual	1book	
3	Electrical schematic diagram of laser cutting machine	1book	



4	Operation manual of CNC system	1book	
5	Product manual of peripheral equipments	1copy	
6	Certificate	1copy	

### ● Equipment working conditions

S.N	Sub item	Item	Requirements	Notes
1	Power	Laser	6KVA	The total installed capacity is not less than 30KVA
		Chiller	4KVA	
		Machine tool	6KVA	
		Other accessories	3KVA	
		Stability of 3-phase power	380V±5%	
		Instability of 3-phase power	<2.5%	
		Earthing	<4Ohm	
2	Water	Water for Chiller	Distilled water without minerals	
3	Gas	Cutting gas	N <sub>2</sub> >99.5%	The processing parameters will differ with different materials
			O <sub>2</sub> >99.5%	
			AIR pressure should not less than 0.8MPA	
4	Working condition	Temperature requirements	5-40 Degree	
		Humidity requirements	Less than 70%	
		Foundation requirement	There should be no vibration source nearby	If there is a vibration source on site or nearby, the user is required to dig an



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				anti-vibration trench around the foundation
5	Work piece	For CS and SS: quality surface and no rust		

### ● Running cost analysis (for reference)

Power Supply Consumption	Laser	4kw/h	<b>Total power: <math>6+4+6=16(\text{kw/h})</math></b> <b>Total power consumption: <math>16 \times 0.15=2.4\text{USD/Hour}</math></b> 1. Power price(assumed): 0.15USD/kwh
	Chiller	4kw/h	
	Machine tool	6 kw/h	
Gases Consumption (for cutting different material with different thickness, the consumption is different.)	Assistant Gases (Purity 99.5%O <sub>2</sub> )	3 m <sup>3</sup> /h	<b>Cost: Oxygen cutting <math>2.5 \div 5.5 \times 3= 1.36\text{USD/Hour}</math></b> <b>Air cutting costs as low as 0.3USD/Hour</b> 1. Gas price(assumed): 2.5USD/5.5m <sup>3</sup> 2. Working condition(assumed): 10~300Kpa, continuous processing
Consumable and spare parts consumption	Focusing lens	About 1piece/year	<b>Cost: <math>1600 \div 4000=0.4 \text{ USD/Hour}</math></b> 1. Lens price(assumed) : 800USD/piece 2. Working time(assumed):4000Hours
	Protection lens	About 1piece/30hours	<b>Cost: <math>30 \div 30=1 \text{ USD/Hour}</math></b> 1. Lens price(assumed) :25USD/piece 2. Working time(assumed) 30 Hours
	Nozzle	200 hours lifetime	<b>Cost: <math>10 \div 200=0.05 \text{ USD/h}</math></b> 1. Nozzle price(assumed) : 8 USD/piece
GF3015 running cost analysis			<b>Total cost:</b>



$$2.4+1.36+0.4+1+0.05=5.48\text{USD/h}$$

1. This table takes RAYCUS 1500W laser as an example to make the running cost analysis of laser cutting machine;
2. This table carried out the analysis of power consumption, gas consumption and consumables consumption and so on. But it do not include the analysis of site rent, management cost, staff salary ,depreciation of machinery and so on;
3. This table is only for reference since the specific consumption will slightly differ with different users under different conditions;

- **GF3015 1500W cutting speed (Farley lab test result base on good cutting quality, for reference.)**

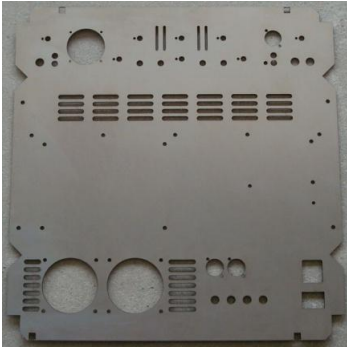
Material	Thickness(mm)	Gas	Suggested Cutting Speed(m/min)
M.S	1	O2	10
	2	O2	5
	3	O2	3.5
	4	O2	2.5
	5	O2	2
	6	O2	1.6
	8	O2	1.2
	10	O2	1
S.S	12	O2	0.8
	1	N2	15
	2	N2	6
	3	N2	2.5
	4	N2	1.8
	5	N2	1.2
	6	N2	0.8



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## ● Delivery

Production circle: Around 30 days after PO



Steel cutting



Saw cutting



Spare parts cutting

## LASER CUTTING SAMPLES

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