

**SENFENG**

NO: SF-202604-XYH



# SF6012T

**Tube Laser Cutting Machine (Adaptive-Following Version)**

# Contents

## **Tube Laser Cutting Machine (Adaptive-Following Version)**

- 01 Model
- 02 Technical Parameters
- 05 Cutting Parameters
- 06 Cost-Benefit Analysis
- 07 Configuration List

## **Core Components and Systems**

- 08 Laser Source, Laser Head
- 09 Chuck
- 10 Host Machine
- 11 CNC System
- 12 Optional Configuration

## **After-Sales Service**

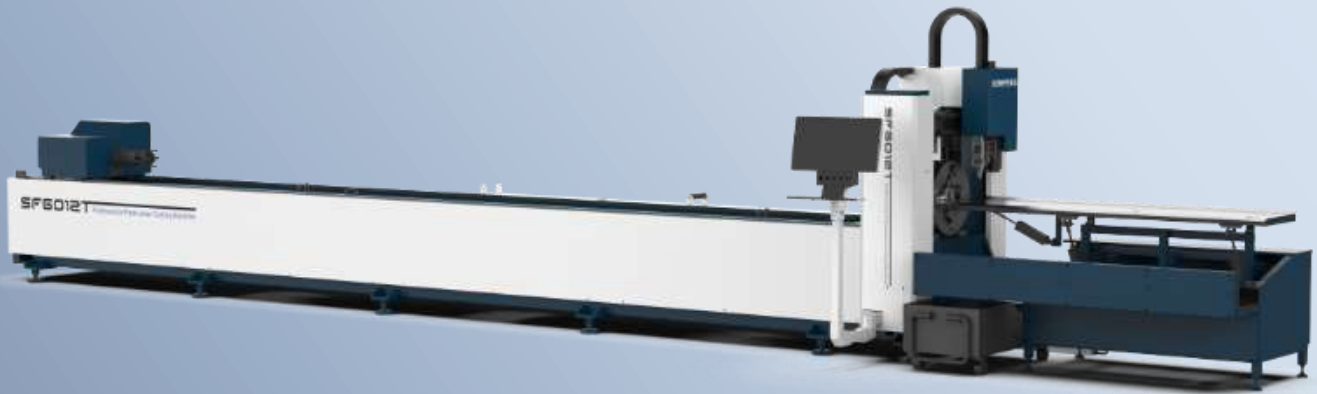
- 13 Automated Metal Fabrication Solutions
- 14 Personnel Training, Packaging and Transportation
- 15 Installation and Customization
- 16 Five-Star Fast Service
- 17 Customer Testimonials



# Versatile & Efficient

SF6012T

Tube Laser Cutting Machine (Adaptive-Following Version)



1

Superior cutting stability

2

Powerful dynamic performance

3

Automated system for greater efficiency

4

Pneumatic self-centering chuck

※ The picture is for reference and the actual appearance and size shall prevail.

# Technical Parameters

SF6012T

No.	Item	Parameter	Remarks
1	Tube Length Range	1000~6500mm	
2	Tube Diameter Range	Φ15~Φ120mm	National standard tube
3	Side Length of Square Tube	□15~□120mm	National standard tube
4	X/Y-axis Positioning Accuracy	±0.05mm	
5	X/Y-axis Repeated Positioning Accuracy	±0.03mm	
6	Maximum Rapid Traverse Speed	150m/min	As tube weight increases, processing speed and moving parameters decrease.
7	Maximum Chuck Rotation Speed	180r/min	
8	Maximum Acceleration	1.5G	
9	Weight	2500 kg	Depends on actual factory delivery
10	Maximum Load	120kg Tube Weight ≤20kg/m	
11	Dimension (L×W×H)	9100*1800*2100mm	Depends on actual factory delivery
12	Phase	Three-phase	
13	Rated Supply Voltage	380V	
14	Frequency	50Hz	
15	Main Power Protection Level	IP54	

Note: 1. The achievable workpiece accuracy partly depends on factors such as the workpiece type, pretreatment condition, sheet size, and the sheet position within the working area.

2. The above technical parameters are subject to change without prior notice. The final technical parameters shall be as specified in the actual order agreement.

# Technical Parameters

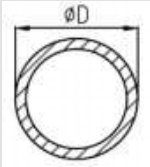
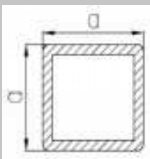
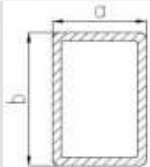
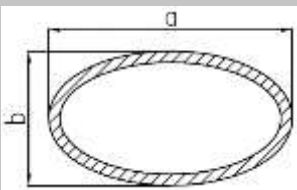
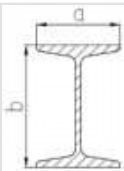
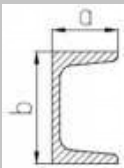
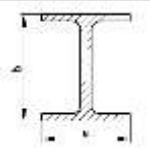
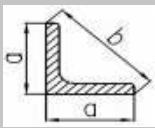
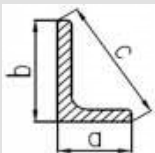
SF6012T

## Precautions

1. Pipes being processed should be free from significant rust, as it can affect the cutting section quality.
2. Pipes should not be stored in the open air and should be placed flat, preferably with surface oil coating or packaging. Ensure that the front end is even, and the burr height at both ends is  $\leq 5\text{mm}$ . Bundled pipes should have consistent lengths, with a deviation of less than 300mm.
3. For welded pipes, the external weld seam should be relatively flat, with a height of less than 0.3mm. The internal weld seam should have a height of less than 2mm.
4. The distortion and bending of the pipe should be lower than the tolerances specified in "GB/T 6728-2002 Dimensions, Shape, Weight, and Permissible Deviations of Cold-formed Hollow Sections for Structural Use."
5. The pipe should be straight, with a bending curvature of less than 1mm/1m (3mm/6m).
6. For the lengthwise torsion of the pipe, the total torsion should be less than 0.02% of the total length.
7. The outer diameter tolerance of the profile should not exceed  $\pm 0.5\%$  of the outer diameter, with a minimum of 0.2mm (according to the standard deviation level D4 specified in GB/T 17395-1998 for standardized outer diameter deviations).
8. When loading the pipes, ensure the safety of personnel and equipment. Bundle loading should be carried out using cranes operated by qualified and certified professionals. The crane should have both fast and slow speed functions, and slow speed should be used when approaching the loading platform.
9. Considering material errors, the positional error should be within IT12, and the shape and profile error should be within IT12.
10. The surface roughness of the pipe cross-section varies with the material and thickness.
11. Users must perform regular maintenance of the machine as instructed in the manual. Failure to do so may result in damage to the machine, and our company reserves the right to refuse repairs in such cases.
12. To ensure cutting effectiveness and minimize pipe deformation, the pipe thickness should meet the following criteria based on the pipe diameter:
  - ① For pipe diameters greater than  $\phi 50$ :  $1/40 \leq \text{pipe thickness} \leq 1/10$  of the pipe diameter.
  - ② For pipe diameters smaller than  $\phi 50$ :  $0.8\text{mm} \leq \text{pipe thickness} \leq 1/10$  of the pipe diameter.
  - ③ For cases where the bending deflection exceeds the relevant standards, the cutting quality cannot be guaranteed.
13. Equipment temperature requirements: 0–40 °C (If the ambient temperature of the equipment installation site exceeds this range, the Buyer shall provide written notice to the Supplier at the time of purchase); the laser source should be placed in an environment with a temperature of 18–25 °C. If the ambient temperature of the installation site exceeds this range, it is recommended to install air conditioning.
14. Equipment humidity requirements:  $\leq 70\%$  (laser source only).
15. Cutting gas purity requirements: Nitrogen  $\geq 99.7\%$ ; Oxygen  $\geq 99.5\%$ .

# Cutting Parameters

SF6012T

Type	Cross-sectional shape	Clamping range min~ max a(mm)
Round tube		min~ max D (mm) : 10~120 ★: φ10-φ120
Square tube		min~ max a (mm) : 10~120 ★: □10x10-□120x120
Rectangular tube		min~ max a (mm) : 10~120 min~ max b (mm) : 10~120 ★: □10x10-□120x120
Oval tube		For better clamping effect, please provide detailed drawing then we can design the jaws accordingly.
I beam		min~max a (mm) : 10-80 min~max b (mm) : 10-80  The minimum size is 10# as per GB standard, which cannot be clamped.
U beam		min~max a (mm) : 10-80 min~max b (mm) : 10-80  5-8#
H beam		min~max a (mm) : 10-80 min~max b (mm) : 10-80
Equal angle steel		min~max a (mm) : 20~80  2.5-8#
Unequal angle steel		min~max a (mm) : 10~80 min~max b (mm) : 20~80  2.5/1.6-8/5#

Note: To ensure better machining accuracy, the tube diameter must be  $\geq 15$  mm.

# Cutting Parameters

SF6012T

Material	Thickness [mm]	1.5kW	2kW	3kW
		Speed[m/min]/Gas		
Carbon Steel	1	10-13(N2/Air)	15-20(N2/Air)	25-35(N2/Air)
	2	4-5(O2)	6-8(N2/Air)	13-17(N2/Air)
	3	3-4(O2)	3-4(O2)	7-10(N2/Air)
	4	2.3-2.8(O2)	2.5-3(O2)	5-8(N2/Air)
	5	1.8-2.3(O2)	2.2-2.6(O2)	3-3.2(O2)
	6	1.6-2.0(O2)	1.8-2(O2)	2.3-2.5(O2)
	8	/	1.2-1.6(O2)	1.8-2.2(O2)
	10	/	/	1.4-1.8(O2)
	12	/	/	1-1.4(O2)
Stainless Steel	1	15-20(N2/Air)	15-20(N2/Air)	25-35(N2/Air)
	2	7-10(N2/Air)	8-14(N2/Air)	13-17(N2/Air)
	3	4.5-5.5(N2/Air)	6-7(N2/Air)	6-10(N2/Air)
	4	2.0-2.5(N2/Air)	2.8-3.5(N2/Air)	5-6(N2/Air)
	5	1.4-1.8(N2/Air)	1.5-2.5(N2/Air)	3-4(N2/Air)
	6	0.7-0.9(N2/Air)	1-1.5(N2/Air)	2.3-3(N2/Air)
	7	/	/	1.0-1.5(N2/Air)
	8	/	/	0.8-1(N2/Air)
Aluminum Alloy	1	10-13(N2/Air)	15-20(N2/Air)	25-35(N2/Air)
	2	4-5(N2/Air)	8-13(N2/Air)	13-17(N2/Air)
	3	1.5-2.5(N2/Air)	4-4.5(N2/Air)	6-8(N2/Air)
	4	1-1.3(N2/Air)	2.5-3(N2/Air)	4-5(N2/Air)
	5	/	1.5-2(N2/Air)	2.5-3.5(N2/Air)
	6	/	/	2-2.3(N2/Air)
	8	/	/	0.8-1.3(N2/Air)

Note:

1. When processing carbon steel tubes with a thickness > 5 mm and a diameter or side length < 50 mm, it is not recommended to use oxygen as the assist gas. For tubes of the above dimensions, please consult the process engineering team.

2. The parameters are for reference only! The above values are theoretical values; tube dimensions, equipment speed, and other factors will affect the cutting speed.

# Cost-Benefit Analysis

SF6012T

Laser Power		1.5kW			2kW			3kW		
Item		Air	O <sub>2</sub>	N <sub>2</sub>	Air	O <sub>2</sub>	N <sub>2</sub>	Air	O <sub>2</sub>	N <sub>2</sub>
Peak Power Consumption	Laser Source Power(kW)	5	5	5	5	5	5	10	10	10
	Chiller Power (kW)	3	3	3	3	3	3	3	3	3
	Air Compressor Power(kW)	15	/	/	15	/	/	15	/	/
	Host Power (kW)	10.45	10.45	10.45	10.45	10.45	10.45	10.45	10.45	10.45
	Dust Removal Power (kW)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	Loading & Unloading Power (kW)	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85
Consumables and Gas Consumption (CNY/H)		0.5	4.5	60.5	0.5	4.5	60.5	0.5	4.5	60.5
Total Power (kW)		38.8	23.8	23.8	38.8	23.8	23.8	43.8	28.8	28.8
Total Power Consumption (kW/H)		23.28	14.28	14.28	23.28	14.28	14.28	26.28	17.28	17.28
Total Operating Cost (1RMB/kWh)		23.78	18.78	74.78	23.78	18.78	74.78	26.78	21.78	77.78

If the cutting auxiliary gas is dried compressed air, the cost includes air compressor electricity, machine power consumption, and consumables (protective lenses, cutting nozzles).

Note:

1. The electricity and gas prices are for reference only and may vary by region.
2. Auxiliary gas consumption varies with plate thickness. The oxygen data is based on cutting 8mm carbon steel, and nitrogen on 1mm stainless steel. For reference only; actual usage may vary.

# Configuration List

SF6012T

No.	Item	Qty	Brand
Laser Source			
1	Fiber Laser Source	1	MAX/Raycus
Laser Cutting Head			
1	Laser Cutting Head	1	BOCI Auto-Focus
Machine Tool · Host			
1	Transmission System	8	SENFENG
2	Machine Tool and Accessories	1	SENFENG
3	Reducer	6	TECHMECH / MOTOREDUCER
4	Cutting Gas Circuit System	1	AVENTICS (Germany)
5	Main Machine Air Circuit System	1	AIRTAC (Taiwan, China)
6	AC Servo Motor and Driver	8	France SCHNEIDER / INOVANCE
7	Water Chiller	1	HANLI/TONGFEI/S&T
CNC Cutting Software System			
1	CNC System	1	FSCUT 3000DE-A
2	Nesting Software	1	Small tube version--TubesT nesting software (free, no USB dongle required)
Automation System (optional)			
1	Loading System	1	Fully automatic/simplified fully automatic/semi-automatic (three options available)
2	Unloading System	1	Standard: 2m Optional: 3m/4m

Note:

1. This is SENFENG's optimized configuration. Changes in brand or configuration may cause irreversible effects.

2. The warranty period for the entire machine (excluding consumables, non-force majeure natural disasters, war, improper operation, and human damage) is 1 year.

# SF6012T-Laser Source



1. Small Fiber Core: Better beam quality.
2. Faster Cutting Speed: Enhanced cutting efficiency.
3. Improved High-Reflection Resistance: New optical components with multi-layer anti-reflection design for efficient processing of various metals.
4. Enhanced Intelligence: Next-gen software with smart app mode for real-time monitoring.
5. High Electrical-Optical Conversion: Over 40% efficiency, reducing power consumption.
6. Upgraded Components: New generation pump sources offer greater reliability and stability, with improved beam quality and 30%-40% increased brightness due to patented nonlinear suppression technology.
7. Lightweight and Compact: Small size and compact design for easier integration.
8. Enhanced Safety: Improved safety features.

# SF6012T-Laser Head



Optional BOCI brand

1. Efficient water cooling: Effectively resolves overheating issues.
2. High sealing: Dust protection rating of IP65.
3. Optimized structure: Integrated body design.
4. Manual focus adjustment: Flexible focus scale adjustment for uniform zero-focus position.

1. Closed-loop system with active feedback alarms for precise issue detection.
2. Protective lens temperature monitoring detects contamination during operation and triggers immediate alarms to stop the machine, preventing damage such as head burning or lens breakage.
3. Monitors cutting gas pressure in real-time, triggering alarms for insufficient gas supply, low pressure, or unstable pressure.
4. Cutting head anti-collision design enables easy replacement of components after impact, reducing downtime.
5. This cutting head supports an upgrade to an automatic focusing system.

# SF6012T-Chuck



1. Pneumatic self-centering chuck: Fast clamping speed, high efficiency.
2. Low chuck inertia: High speed and acceleration.
3. Front chuck with double rollers: Increases clamping surface, reduces vibration, and ensures high-speed, high-precision cutting for small, low-rigidity pipes.
4. Internal gears, external jaws: Better dust-proof performance, longer lifespan, higher precision, and easier adjustment and maintenance.
5. Integrated chuck structure: Uses high-precision rotary bearings inside, providing higher equipment stability.
6. Front chuck with square hole structure: Increased clamping range, wider application in various industries.

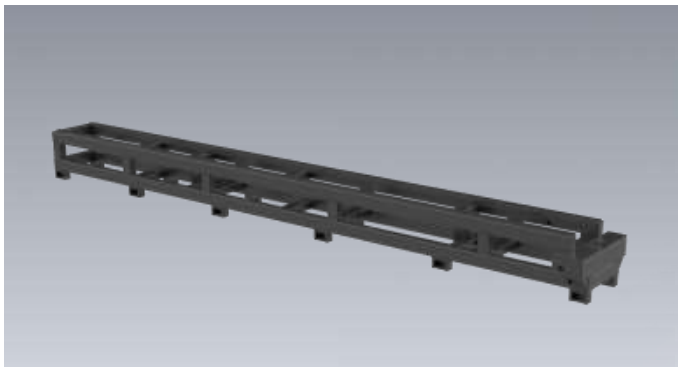
# SF6012T-Host Machine

1

## Machine Bed

Stability, Vibration Reduction, and Durability

1. The machine bed is welded using rectangular tubes, providing greater stability, higher load-bearing capacity, significantly improved vibration damping, and better operational performance.
2. The design is based on structural dynamic principles and variable analysis using the finite element method (FEM). After precise welding, the bed undergoes stress-relief annealing and secondary aging treatment, followed by precision machining on a large gantry milling machine, resulting in high rigidity and extended service life.



2

## Follow-up Support

Provides effective support for the tube

1. Equipped with servo control, it automatically adjusts the tube center to stay coaxial with the chuck center, ensuring constant contact with the tube surface and more precise lifeting movements.
2. The intelligent segmented layout effectively solves the problems of tube sagging, which can lead to reduced machining accuracy when processing long tubes.

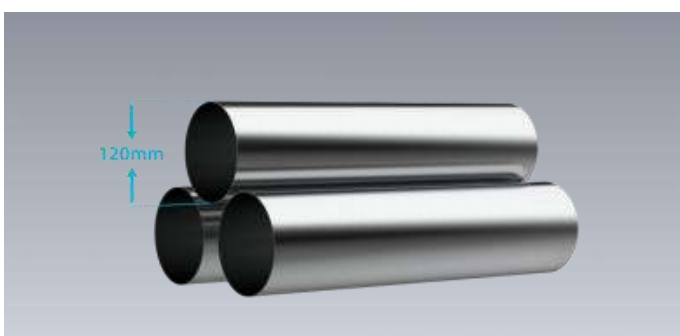


3

## Exceptional Tube Processing Capability

Wide Size Range & High Single-Tube Load Capacity

1. Size Range: Round tubes with a diameter of  $\Phi 15-120$  mm; square tubes with side lengths of  $15 \times 15-120 \times 120$  mm.
2. Supported Shapes: Round, square, and rectangular tubes.
3. High Single-Tube Load: Each tube can weigh up to 120 kg, offering outstanding value in the tube cutting field.

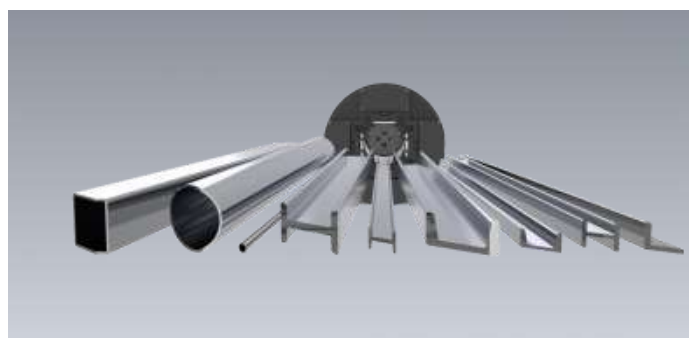


4

## Powerful Dynamic Performance

Ultra-High Precision

The all-new tube laser cutting machine combines exceptional performance with ultra-high precision, fully meeting the stringent requirements of the tube cutting industry



# SF6012T-CNC System

FSCUT3000DE-A CNC System  
Quick Operation & Efficient Cutting



**FSCUT3000DE-A is a bus control system specifically developed for processing small tubes with diameters up to 120 mm. It supports high-precision, high-efficiency cutting of square tubes, round tubes, racetrack-shaped tubes, elliptical tubes, and other special-shaped tubes (excluding L-, C-, and H-shaped profiles). Its key performance features are as follows:**

- Real-time tube center deviation compensation reduces clamping requirements and improves efficiency, ensuring higher piercing accuracy and more precise cutting.
- Built on a real-time bus control system with integrated following control, it delivers faster corner cutting, smoother corner tracking, and more reliable cutting quality.
- Supports follow-up support function, ensuring consistent cutting quality for full-length tubes.
- Compatible with hollow chuck feeding and cutting, significantly reducing the overall machine length and enhancing automation.
- Supports automatic loading/unloading and cyclic processing, including standard automated feeding actions.
- Achieves trajectory accuracy of 0.02 mm, positioning accuracy of 0.001 mm, and repeatability of 0.003 mm.
- Supports real-time encoder feedback and error measurement tools to help optimize machine motion parameters.
- Supports tube process library for convenient export and storage of cutting processes.
- Enables sensorless piercing for smoother operation and greatly improved piercing efficiency.
- Compatible with TubePro and TuebsT nesting software (free download available).
- **Supports processing of special-shaped tubes within 120 mm (excluding L-, C, and H-shaped profiles).**
- **Compatible with manual focus cutting heads, with an optional BOCI cutting head that allows free upgrade to an auto-focus system.**

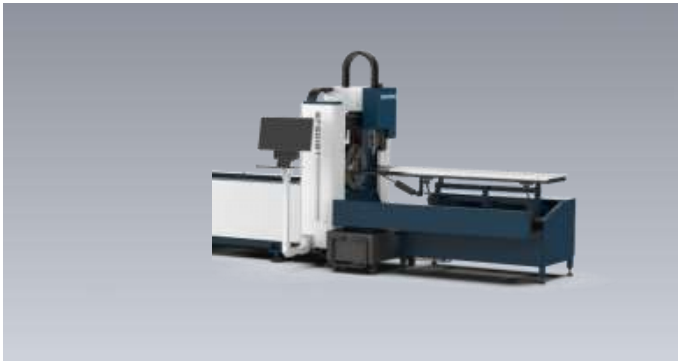
# SF6012T-Optional Configuration

1

## 2m Unloading Unit (Optional)

Dimensions (mm)	1950×1060×770
Maximum tube length (mm)	3000
Unloading weight (kg)	300

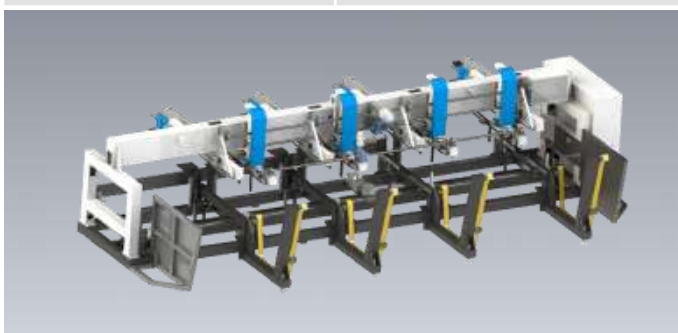
1. Equipped with an automatic sorting system that separates scrap from finished tubes without manual intervention. The receiving cart and unloading rack adopt an integrated design, offering high system integration and a compact footprint.  
 2. A self-developed servo-following support system automatically adjusts to the tube surface, ensuring optimal support during processing. After processing, the flip plate discharges the finished tubes, which slide into the finished product cart.



3

## Fully Automatic Loading Unit (Optional)

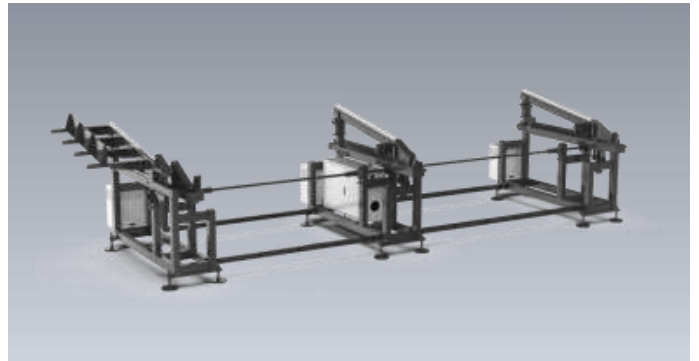
Loading tube length (mm)	3500 - 6100
Tube section side length (or diameter) (mm)	20x20-120x120; Φ20-Φ120
Maximum single pipe weight capacity	120 kg
Warehouse weight capacity	3T
Tube type	Round tube, square tube



2

## Inclined Semi-Automatic Loading Unit (Optional)

Minimum loading tube length (mm)	5200
Maximum loading tube length (mm)	6200
Tube section side length (or diameter) (mm)	20x20-120x120; Φ15-Φ120
Maximum single pipe weight capacity	120 kg
Tube type	Round tube, square tube, rectangular tube, channel steel



4

## Simplified Fully Automatic Loading Unit (Optional)

Loading tube length (mm)	3500 - 6100
Tube section side length (or diameter) (mm)	20x20-120x120; Φ20-Φ120
Maximum single pipe weight capacity	120 kg
Warehouse weight capacity	3T
Tube type	Round tube, square tube



## Providing Global Users with Automated Metal Fabrication Solutions

SENFENG provides automated metal fabrication solutions globally, integrating cutting, bending, welding, cladding, automation, and new energy. With core technologies in laser cutting, welding, and cladding, the company also offers intelligent manufacturing systems like flexible laser processing lines and panel benders. These solutions serve industries including automotive, construction, energy, and petrochemicals, and are used in over 100 countries.



7

International PCT Patents

700

Chinese technology patents

SENFENG has developed key components like laser generators, processing heads, Feng Cloud systems, and CNC systems, used in cutting, welding, cladding, and automation. The company offers a complete industry chain, including laser cutting, welding, cladding, cleaning machines, bending centers, and flexible production lines. These solutions are used in sectors like power towers, construction machinery, shipbuilding, bridges, and aerospace, helping businesses accelerate production and reduce costs for greater economic benefits.

# After-sales Service

## Technical Training to enhance customer production efficiency

### 1 Before equipment delivery

The buyer can arrange for 1-2 operators to attend a one-week training at the SENFENG factory. The specific dates should be confirmed with our customer service department.

### 2 During the warranty period

The buyer can apply for one more session of free training for 1-2 operators at SENFENG.

### 3 Training

The training includes laser principles, equipment structure, process explanation, equipment maintenance, laser safety protection, operating procedures, and basic troubleshooting.

### 4 Requirement

Trainees must be mechanical, electrical, or optical engineers and pass assessments on equipment operation, laser principles, safety, and maintenance before starting work.

## Packaging & Transportation to ensure equipment quality

### 1 Packaging

Standard packaging, suitable for long-distance transportation, moisture-proof, rust-proof, and shock-resistant. Designed for full lifting with marked lifting points and center of gravity.

### 2 Transportation

Domestic transportation within China is fully handled by our company, including freight and insurance.

### 3 Packing List & Certificate

Each package includes a packing list and certificate of conformity. The user manual and other documents are inside the box, while the packing list is on the outside.



## Installation professional and high-quality

### 1 Installation

SENFENG engineers will install the equipment at the client's site.

### 2 Equipment Debugging

After installation, the equipment will be debugged for client use.

### 3 Door-to-door training

On-site training will be provided on equipment maintenance, safety, operation procedures, and basic troubleshooting, with 7 days of guaranteed usage.

### 4 On-site acceptance

After completing the above steps, the engineer may leave the site only after the customer's acceptance (the customer can veto).

# After-sales Service

## Premium Customization

In the digital era, intelligent transformation in metal processing is essential. Building unmanned factories is key to upgrading, with customized automation solutions being a top priority.

1

SENFENG understands the client's industry status and specific production processes, identifies issues, and assesses their needs.



2

Through in-depth on-site communication, customize metal fabrication automation solutions based on the client's pain points and needs.



3

A tailored solution, different from competitors' standardized models.



4

Provide a one-stop R&D and production service from design to final machine, with thorough quality checks until customer satisfaction and acceptance.



# SENFENG

## 5-star Fast Service

### Efficient

- Our repair hotline is available 24/7.
- A professional engineer will respond to customer inquiries within 10 minutes and provide a repair plan within 1 hour.



### Professional

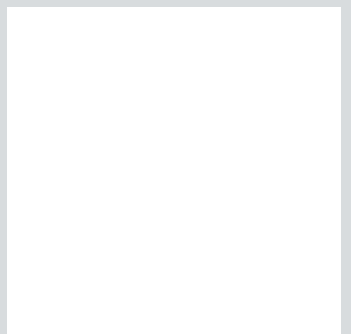
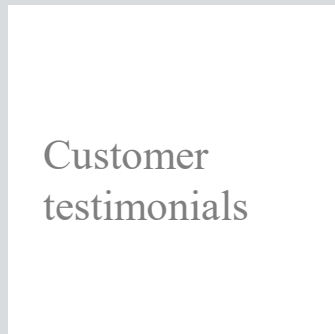
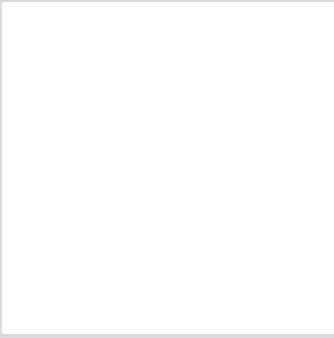
- **Custom Service:** Tailored service plans based on the specific needs of the customer.
- **Service Engineer Certification System:** Each service engineer undergoes rigorous training and assessment before being certified to work.
- **Common Issues Training:** Create a manual for common issues based on equipment models, with certified engineers providing customer training.
- **Online Guidance:** Experienced senior engineers offer support through phone or video calls to help customers resolve issues.
- **Professional Technical Support:** The equipment is properly calibrated during the first installation, and similar issues are resolved in one go.



### Comprehensive

- **Pre-service:** Theoretical and hands-on operation training, common fault self-diagnosis training, quick repair guidance for troubleshooting, usage reminders.
- **Regular Service:** Regular maintenance reminders, on-site services, periodic promotional activities.
- **Value-added Service:** Equipment software and hardware upgrades, financing lease services, extended warranty services.







## Senfeng CNC Laser Germany GmbH

E-mail: [info@sflaser.de](mailto:info@sflaser.de)

Tel: +49 2951 7079924

Website: [www.senfenglaser.com](http://www.senfenglaser.com)

Add: Oberer Westring 33, 33142 Büren, Deutschland