

Shandong LEIMING CNC Laser Equipment Co., Ltd.



## LM2513E Technique Scheme

Technical Department  
Jan 6 2017

# 1. Company description

Shandong LEIMING CNC laser equipment Co., Ltd is located in the Lingang road 6333, Lingang economic development zone of Licheng district, Ji'nan city. The company has become modern enterprises in the development and production of optical mechanical and electrical equipment, national high-tech enterprise, technology innovation enterprise of Shandong province, enterprise with excellent credit standing, and unit of consumer satisfaction. It also is the industry university research collaboration unit of Shandong University. This company registered capital of one million Yuan, more than 300 employees.

The company is committed to the development, production and sales of medium and high power laser equipment. Relying on the advantages of high and new technology talents of the famous universities in Shandong, developed mechanical processing industry and software park industrialization in Jinan, using the strong momentum of Shandong economic development, our company is growing steadily and rapidly after many years of hard work. Now dozens of industrial laser equipment, sheet metal cutting equipment have been produced and sales. Products have passed the ISO9001:2008 quality management system certification, EU security compulsory certification (CE certification) and the FDA certification of U.S. food and drug administration. Products are widely used in the industries of sheet metal, metal parts, kitchen utensils, metal crafts, iron and steel, automobile, chemical industry, metallurgy, electronics, rail transportation, engineering machinery, food machinery, textile machinery, air conditioning manufacturing, elevator, construction machinery, environmental protection machinery, ad decoration.

Branch companies are registered to be set up in the United States, Guangzhou, offices have be established in Kenya, Vietnam, Thailand, Shanghai, Jiaxing, Yiwu, Changzhou, Putian and other places. Sales network coverage of the provinces, municipalities and specialized manufacturing city. Having powerful strength, high quality product and customer first service concept, the company has won the praise of customers at home and abroad. The business relations with more than 100 countries has been established, Products are exported to the European Union, the United States Canada, Latin America, Africa, Brazil, Russia, India, the Middle East, Southeast Asia and other countries.

LEIMING mission: Let laser cutting to be the essential metal processing equipment.

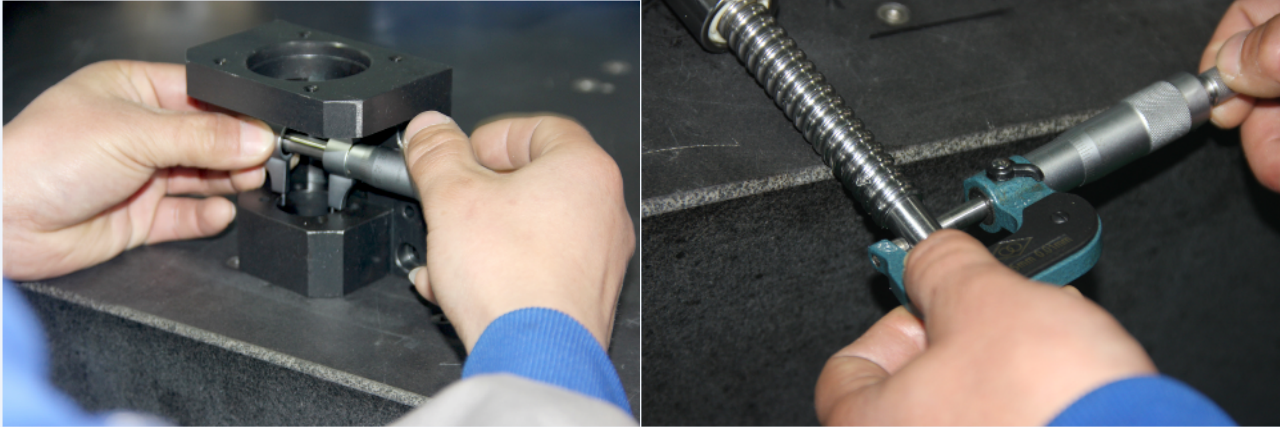
LEIMING vision: Become the leading brands of global CNC laser industry.

LEIMING Core values: Customer first, team work, professional dedication, integrity innovation.

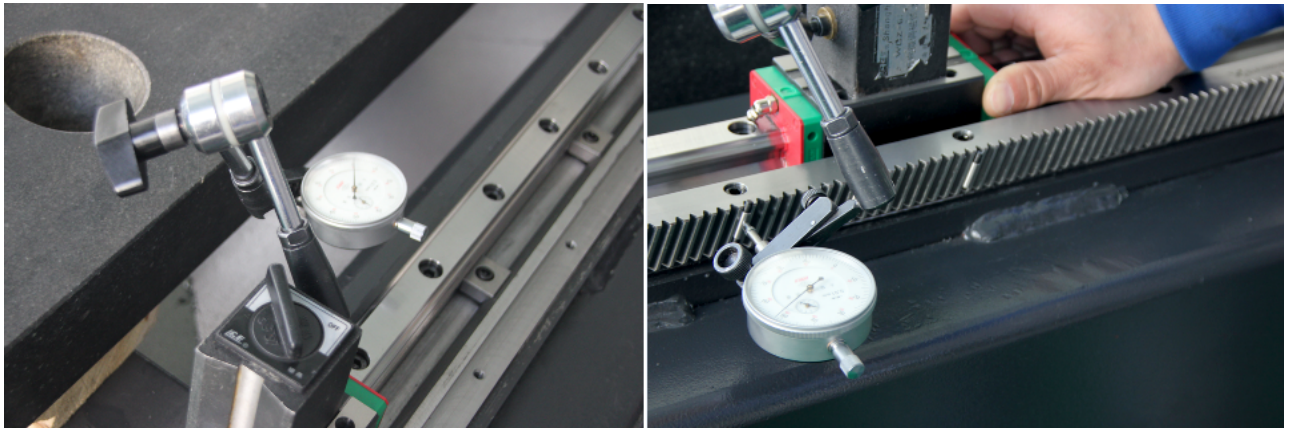
## 1.1 Enterprise scene



## 1.2 international quality



Every part has been detected by the quality department

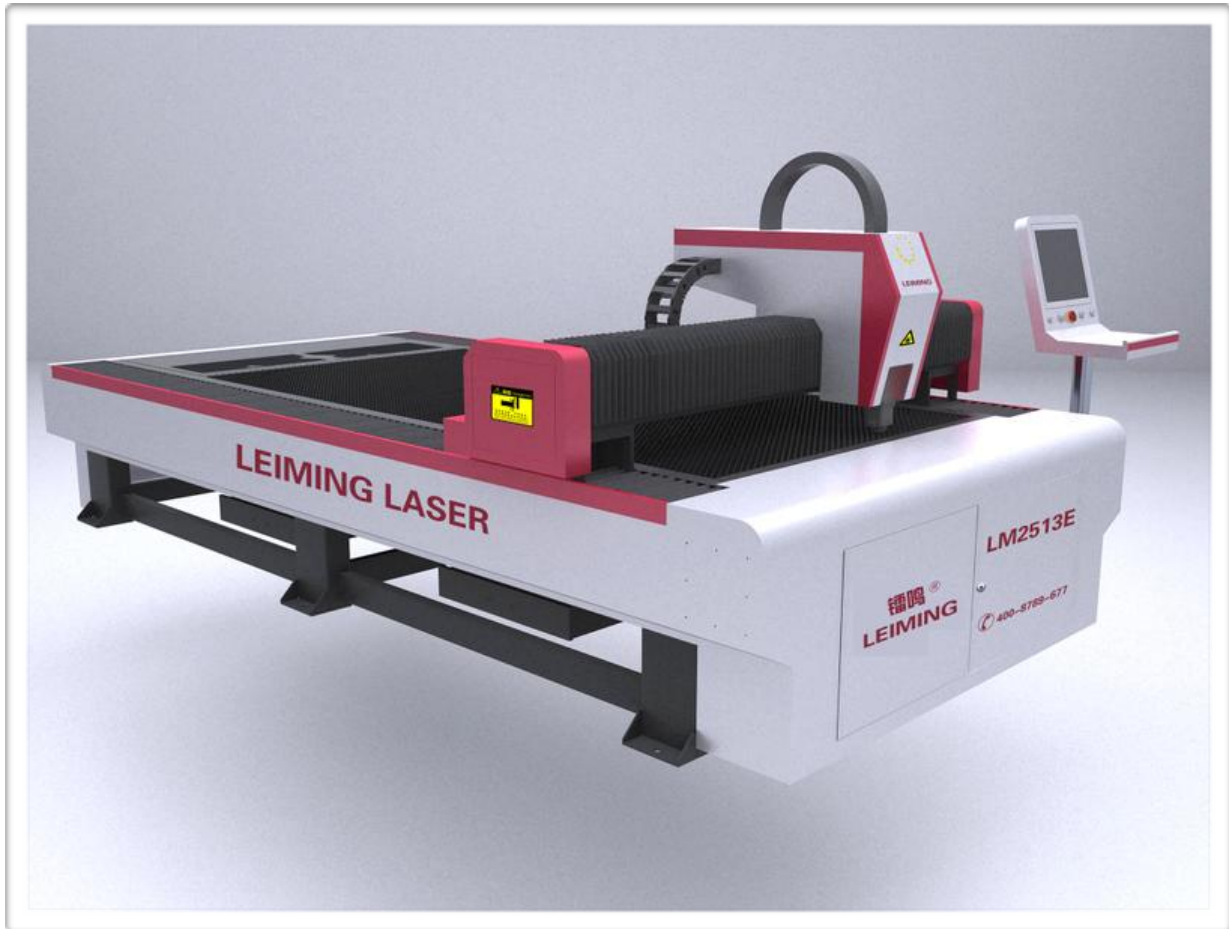


Installation process improvement



Use international high-end laser interferometer to detect machine dynamic performance

## 2. Machine description



LM2513E Optical Fiber Laser Cutting Machine

The most advanced optical fiber laser is adopted by the LM2513E optical fiber laser cutting machine, which output high energy density laser beam that focuses on the surface of the workpiece and the region irradiated by an ultra fine focal spot will be instant melting and gasification. Position of the spot can be changed by the numerical control mechanical system to finish automatic cutting.

Designed into gantry structure and double driving, this fiber laser cutting machine has the characteristics of stability, good rigidity and high speed. Its movement speed can reach 80m/min above.

The bed is formed by welding and more times aging treatment is done. Some transmission components equipped, such as the reducer, guide rail and rack and pinion, are foreign well-known brands. The structure that beams and columns are combined into one part, the transmission between Rack and pinion, these all ensure that the machine is fast dynamic response and good stability. That represents the direction of the development of laser cutting machine.

## 3. Product advantage

- ❖ Professional laser optical system and imported lens, stable and reliable (laser warranty for two years)
- ❖ Efficient and stable programming and control system, simple and easy to learn and humanization, compatible with a variety of CAD drawing formats, intelligent arrangement cost saving, automatic cutting path matching saves processing time.
- ❖ Less energy consumption and low cost; high stability, simple and convenient maintenance and low maintenance cost.
- ❖ No mold, flexible processing, can meet the processing requirements of various special-shaped workpiece.
- ❖ High cutting efficiency, high cutting quality, no noise, and the Cutting speed is up to 30m/min when cutting sheet; Seam deformation is small, the appearance is smooth, beautiful.
- ❖ Imported high precision servo motor, guide rail, Germany gear rack, ensure the machining efficiency and machining accuracy, the stability and reliability of the equipment is greatly improved.

### 3. 1 Mechanical motion system

The motion system consists of the translation system of beam and height compensation system of cutting head and the beam is driven by double power at two sides. The limited switches are located at ends of displacement stroke in both X and Y direction, and the elastic buffer pad are installed at two sides of stroke. Transmission components, such as transmission, guide rail and rack and pinion are all foreign imports of well-known brands.

### 3. 2 Control system

Special numerical control system for laser cutting, with a high degree of reliability and stability, is adopted. This system has been gradually developed to form the most simple and refined system that has the following functions:

- Professional laser cutting operating system, multi language (including Chinese) interface, easy to operate;
- Using AC servo drives system and AC servo motor, reliable performance, fast response, maintenance free;
  - Fast response surface follow;
  - Cutting back function is convenient to operate;

- Linear / circular interpolation and slotting compensation function;
- With USB and broadband interface, to achieve communication, file transfer is convenient;
- Equipped with professional laser cutting automatic programming software, the software has manual or automatic arrangement cutting function.

## 3. 3 Optical fiber laser

### 3.3.1 Main features:

- Excellent beam quality (BPP) , constant BP in full power range, a very small spot can still be got using long focal length.
- Special wavelength (1070nm), unique ability to cut high reflective materials such as aluminum, copper and brass.
- Laser electro-optic conversion rate > 25%, far greater than CO2 (< 10%), reduces greatly the power loss.
- Laser transmission through optical fiber, almost no transmission loss.
- Modular design, "plug and play", Compact, easy to install, no need for laser and beam transmission system maintenance.
- Pump source life > 100 thousand hours.
- Accurate beam quality, with a very small divergence angle
- Incomparable product life. The single core junction diode pumped laser is used as the pumping source of the optical fiber laser. Fiber laser has long service life, and its minimum service life has been more than one hundred thousand hours.
- Low power consumption, maintenance free products. Fiber laser has excellent thermal performance, high electro-optic efficiency, water saving and electricity saving, in particular, it is important to long-term maintenance free use, can save a lot of maintenance funds and time, improve work efficiency.

### 3.3.2 Optical characteristics

Optical characteristics	RFL-C300L	RFL-C500
<b>operation mode</b>	CW	CW
<b>Emission wavelength</b>	1070nm	1070nm
<b>Nominal output power</b>	260	500
<b>BPP(mm*mrad)</b>	<0.5	<0.5
<b>Core fiber</b>	25μm	25μm
<b>Long-time power instability</b>	<3%	<3%
<b>Operating voltage</b>	AC220±20VAC	AC220±20VAC
<b>Maximum power consumption</b>	1500	2500

### 3.4 Safety protection system

Because the power is bigger, the laser radiation can produce certain harm to the human body, so, the security measures, so whole system is very important.

- Laser protection section
  - ◆ There are icons indicating that there is a laser output, to avoid damage to the human body for direct radiation.
  - ◆ The laser external shell is grounded to avoid leakage of external shell to cause injury to human body.
  - ◆ Equipped with appropriate laser protective glasses, operator must wear protective glasses in the whole operation process.
  - ◆ Before operating the equipment, first check whether the protective device is damaged.
  - ◆ At any time when the device is powered on, it is not allowed to look directly at the laser outlet.
  - ◆ Laser equipment is equipped with emergency stop switch, you can press the emergency stop switch in an emergency, and the laser power is off.
  - ◆ When the laser equipment is running, the three color condition indicator can display the operation status of laser equipment.
- External transmission optical fiber protection section
  - ◆ High-quality slide pulley and limiting device imported are used to fix and guide cable at external optical fiber transmission of the station.
  - ◆ The transmission fiber is protected by the special laser protection material to prevent the laser leakage.
  - ◆ The transmission optical fiber protection cover is provided with a laser leakage protection, and if the optical fiber is broken, the laser leakage can be monitored. If the leak is found, the signal should be transmitted to the control center, the control center stops giving out light and warning.



## 4. Suitable for materials and Applications

The laser cutting machine can be used in these industries, such as metal cutting, electrical switch manufacturing, aerospace, food machinery, textile machinery, construction machinery, locomotive manufacturing, agriculture, forestry machinery, elevator manufacture, special automobile, household appliances manufacturing, processing tools, IT manufacturing, petroleum machinery manufacturing, food machinery, diamond tools welding, welding gear, metal surface treatment, advertisement decoration, laser processing services, etc.

It is suitable for cutting a variety of medium and thin sheet metal, particularly suitable for cutting carbon steel plate. Some metal materials, such as stainless steel plate, aluminum alloy plate, galvanized plate, electrolytic plate, silicon steel, titanium alloy, galvanized plate, etc can be cut in this machine also.

### 4.1 Cutting capacity

carbon steel:0.4mm-6mm, stainless steel:0.4mm-4mm, aluminum:0.4mm-2mm. Brass:0.4mm-1mm. Main cutting parameter as follow:

metal	thinkness (mm)	300speed (m/ min)	500speed (m/ min)	gas
CS	1	7-9	8-12	Oxygen
CS	2	2.1-2.7	5	Oxygen
CS	3	0.9-1.1	1.5-2.5	Oxygen
CS	5		1.0-1.2	Oxygen
CS	6		0.8	Oxygen
SS	1	5.4-7.2	9-12	Nitrogen
SS	2	0.96-1.2	2-3	Nitrogen
SS	3		0.5-0.8	Nitrogen
SS	4		1.2-1.5	Oxygen
Aluminum	1		3	Nitrogen
Aluminum	2		0.9	Nitrogen
Brass	1		3	Nitrogen

## 5. Technical parameter

MAIN TECH PARAMETER	
AREA	
PROCESSING AREA	2500MM*1300MM
X-Axis travel	1300mm
Y-Axis travel	2500mm
Z-Axis travel	100mm
ACCURCAY	
Table axial positioning accuracy	±0.05
Table Repeated positioning accuracy	±0.03
Z-Axis positioning accuracy	±0.02
Z-Axis Repeated positioning accuracy	±0.01
SPEED	
Maximum no-load running speed	60M/MIN
Maximum acceleration speed	0.6G
POWER RATING PARAMETERS	
phase	1
rated voltage	220V
frequency	50HZ
Total power protection level	IP54
WEIGHT AND MEASURES	
WEIGHT	2000KG
MAX TABLE LOAD	450KG
MACHINE DIMENSION (MM)	4050*2350*1400

## 6. configuration instructions

### 6.1 Main configuration instructions

No.	Name	Model	Number	Origin
1	Bed	LM2513E	1	LEIMING
2	Optical fiber laser	RFL-C300L/500	1	Raycus
3	Laser head	Au3tech	1	domestic
4	Precision cold water unit	CW5300/CW6000	1	Domestic
5	dust-removal system		1	LEIMING

### 6.2 key components instructions

No.	components	Configuration content	Brand
1	<b>PC control system</b>	CPU: Intel Celeron RAM: 2G ROM: 500G WINDOWS7 USB: 8, RS232: 2, COM: 10, FDD: 1 17 inch liquid crystal display	ADVANTECH
2	<b>Pneumatic system</b>	Reducing valve Non-returning valve barometer cylinder solenoid valve	AirTAC, China
3	<b>Transmission system</b>	precision guide rails Precision servo speed reducer Servo motor and driver Rack and pinion	HIWIN from TAIWAN, MOTOVARI from France, Schneider Electric, WMH from Germany
4	<b>software</b>	SC1000	CHINA
5	<b>electrical system</b>	Contactors, Switch, Optoelectronic switch, Cable Intermediate relay	Siemens, Schneider, IGUS from Germany,

## 7. Analysis of cost of equipment

### 7.1 Consumption of laser cutting equipment

project	Name	power consumption(KW/h)	Total power (KW)	Factor	Total consumption electricity	Consumption(yuan/h)
<b>power consume</b>	laser	2	8	8*60%=4.8	4.8KW·H	4.8*1=4.8
	water chilling unit	1.3				
	machine tools and accessories	4.7				

### 7.2 Consumption of cutting auxiliary gas

#### 7.2.1 Consumption of oxygen

Hourly gas consumption of about 1 oxygen bottles, a bottle of oxygen (pressure 14MPa, 99.5% purity) about 15 yuan, per hour auxiliary gas consumption: 15 yuan / hour.

Recommends that customers use liquid canned gas, per tank is about 120KG, price is 320 yuan / tank. With 5 mm steel cutting for example, per tank of liquid oxygen can be used for about 48 hours. Oxygen cost per hour is about 6.7 yuan.

Such as the use of large capacity liquid gas cans, such as fast and easy cold tank will lower the cost of leasing.

#### 7.2.2 Consumption of nitrogen

Recommends that customers use liquid gas, but a gasifier must be equipped, per tank is about 120KG, price is 320 yuan / tank. With 1 mm stainless steel cutting for example, per tank of liquid nitrogen can be used for about 12-16 hours. Nitrogen cost per hour is about 20 yuan.

Hourly gas consumption of about 3 nitrogen bottles, a bottle of nitrogen (pressure 14MPa, 99.99% purity) about 25 yuan, per hour auxiliary gas consumption: 75 yuan / hour.

#### 7.2.3 Air cut extra consumption:

Project	Name	Power consumption(kw/h)	Total power(kw)	Factor	Total consumption electricity	Consumption (yuan/H)
<b>power consume</b>	Air compressor	11	13.5	13.5*50%=6.75	6.75KW·H	6.75*1=6.75
	Dryer	2.5				

## 7.3 Other consumable cost

- Focus lens: Depending on the maintenance of the case, generally replacement is not needed.
- Protective lens: Depending on the use of the case, the general 2 piece is needed in 1 month. Each value is 150 yuan, can be used for 300 hours, so the cost per hour is 1yuan.
- Ceramic ring: Depending on the using case, the average annual loss is about 2. Each value is 300-400 yuan, can be used for 7200 hours, so the cost per hour is 0.11yuan.
- Copper nozzle: Each value is 50 yuan, can be used for 300 hours, so the cost per hour is 0.17 yuan.

## 7.4 Cumulative total cost

NO.	Cost	carbon steel(5mm)	stainless steel(1mm)
1	electricity fees		4.8
2	working gas	15/6.7	75/26.7
3	protective lens		1
4	ceramic ring		0.11
5	nozzle		0.17
6	total cost	21.08/12.78	81.08/32.78

(This data is for reference only, the consumption may be slightly different.)

## 8. Installation, training and after sales service

### 8.1 Customers must be prepared for the following content when installing the equipment

- Confirm equipment installation site;
- Confirm the power supply, socket, air source is ready in the workshop;
- Workshop environmental requirements
  - Storage temperature range: 10 ~ 45 degrees
  - Relative humidity: 45% - 85%
  - Six no: no flammable and explosive, no volatile solvent, no dust, no smoke, no corrosion.

### 8.2 Relevant personnel requirements

- Operators should have a certain working experience and computer skills;
- Equipment maintenance personnel should be able to skillfully operate a common computer system, preferably with a certain electrical and CAD software foundation.

### 8.3 Equipment transportation and installation

According to the contract, our company free of charge in the specified time to the equipment to the user specified installation location, and send technical service engineer on-site installation. When meeting the installation and debugging conditions, the technical service engineer will be installed in 3-5 days to complete the installation and debugging of the machine, to ensure that the installation and debugging of the scene in a neat, clean and orderly environment.

Equipment acceptance criteria

- Hardware is configured according to basic requirements, options and accessories are itemized confirmation.
- Check machine performance indices according to the machine specifications, others are all checked according to the criteria developed by both parties.

### 8.4 Equipment debugging and training

Equipment debugging:

Our service staff should inform that the customer prepare the relevant materials required for debugging the machine before debugging equipment. The customer shall provide our service staff with reasonable process parameters, so

that our service staff is clear on the goal when debugging the equipment.

Customer training:

We will provide our customers with a period of two working days of business training. Training content include, CypCUT, drawing operation, equipment operation, daily maintenance, trouble shooting, etc.

- Drawing operation

Use the company's laser cutting system to operate the equipment and cut a variety of patterns of the workpiece.

- Equipment operation

Starting and closing sequence of equipment and matters needing attention

Set up the data of the equipment, including current, frequency, mode, etc.

Adjustment and positioning of working table and assembly line

Safety issues in equipment operation

- Daily maintenance of equipment

Equipment maintenance

Optical path maintenance

- Training site: Customer factory or the factory of our company (agreed by both sides)

## 8.5 Equipment after sales service

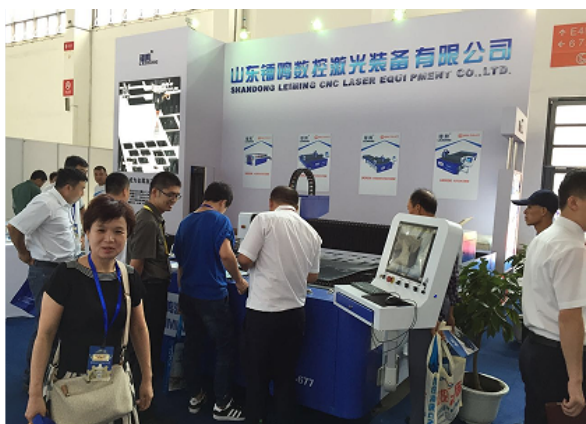
- Free warranty for two years (except for the protective lens, nozzle and other vulnerable parts), life-long maintenance.
- Warranty period start from the date of acceptance of qualified. Our company will be free to repair the failure to meet warranty conditions under warranty.
- Service after the warranty period: Our Company can provide service after the warranty period. Charges include personnel service fees and parts costs.
- Our Company will conduct regular visits or telephone interviews, to understand the customer's equipment usage.

# Cooperative Customer

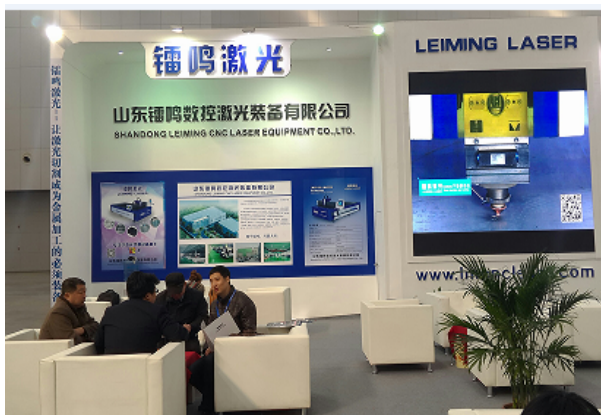




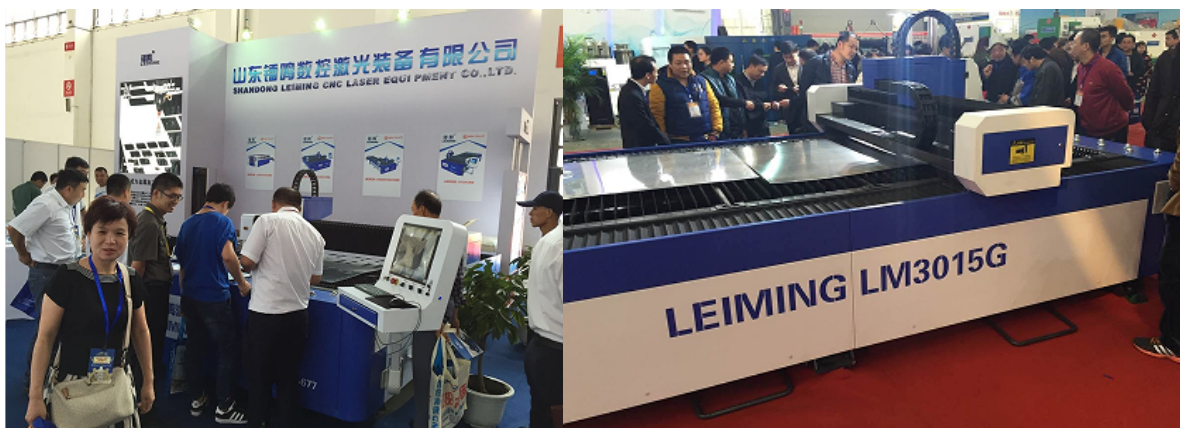
## LEIMING laser exhibition presence



Qingdao farm machinery exhibition



Tianjin exhibition site



Shenyang exhibition

xian exhibition

**LEIMING laser**  
**Let laser cutting be the essential metal processing equipment**