



Handheld laser welder

LASER AS A TOOL!



▶▶▶ LASER TECH ▶▶▶

GW(Shanghai)Laser technology Co.,Ltd
www.gwlaser.tech

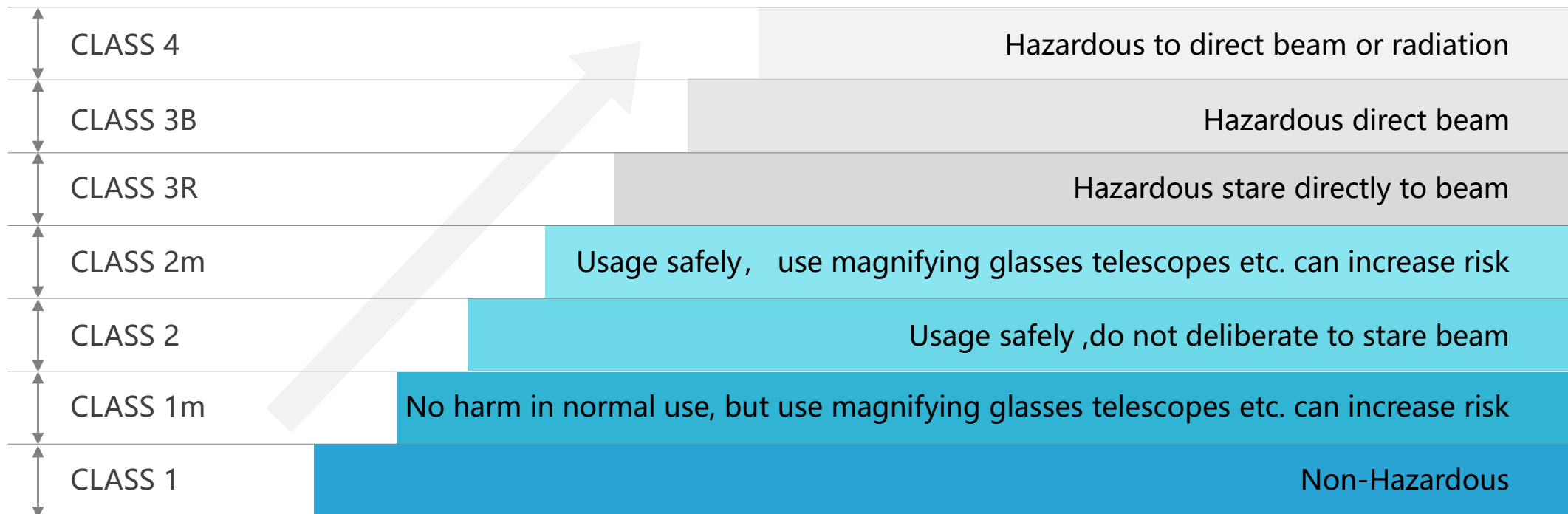
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- 02** Basic knowledge of laser welding
- 03** Laser safety precautions
- 04** Air - cooled handheld welding machine introduction
- 05** Handheld laser welding process

01

Laser safety precautions

The products is high power **class 4 laser** . It can be output up to **1500W non-visible** infrared light Radiation wavelength is between **900~1100nm**,which may cause eyes or skin injury .



WARNING

Do not directly stare at fiber output, and make sure to wear goggles when using



WARNING

Do not point the laser at people, and ensure that there are laser shields around the use environment

WARNING

Do not disassemble the laser, all repairs can only be carried out by service personnel authorized by GW LASER

Environment and precautions >>

Before to use

Use suitable grounding and stable voltage

Before to use

Ensure temperature and humidity not out of limit

During usage

Do not put clamp to welding torch

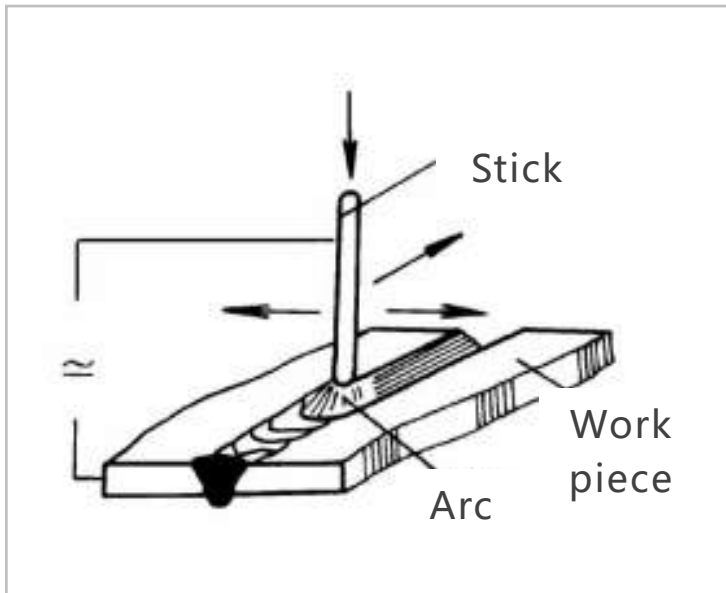
Keep nozzle clean

Don't use fingers to touch lens and don't clean it with liquid
If necessary to clean , please use cleaning tissue.

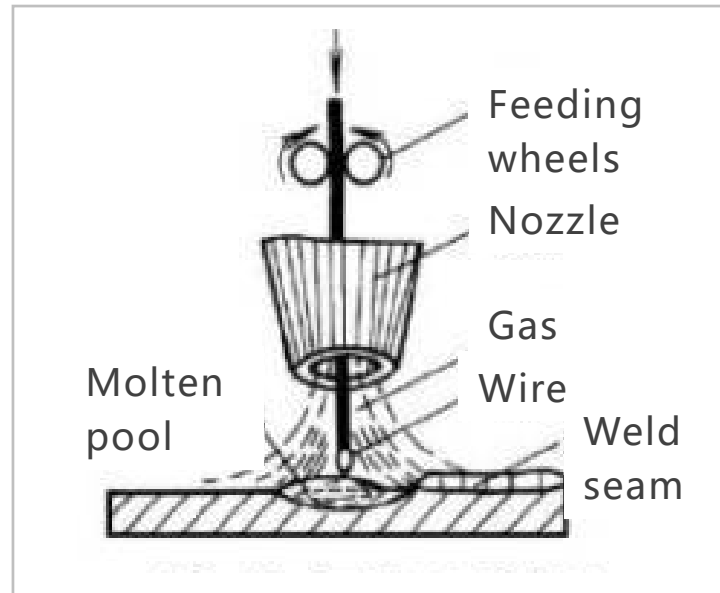


02 | Basic knowledge of laser welding

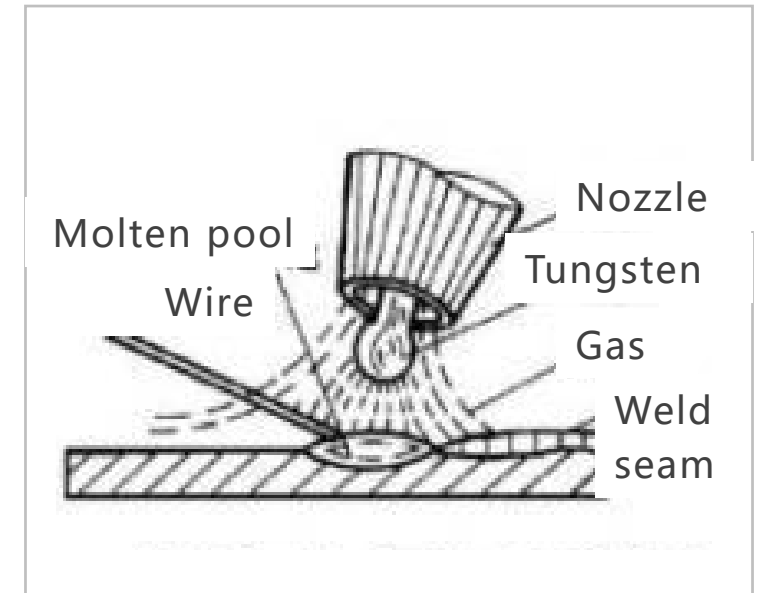
The metal is melted by using the electric arc generated between the electrode and the workpiece



Stick welding

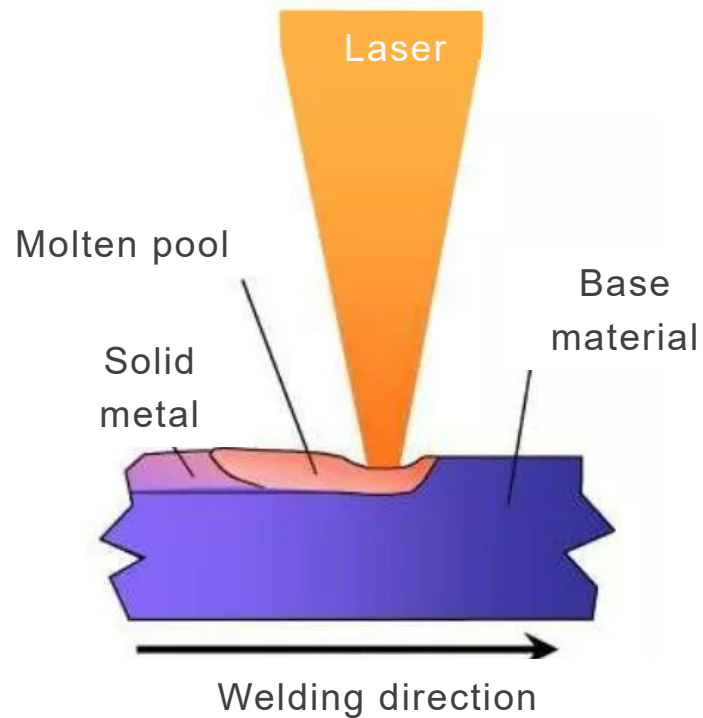


MIG welding



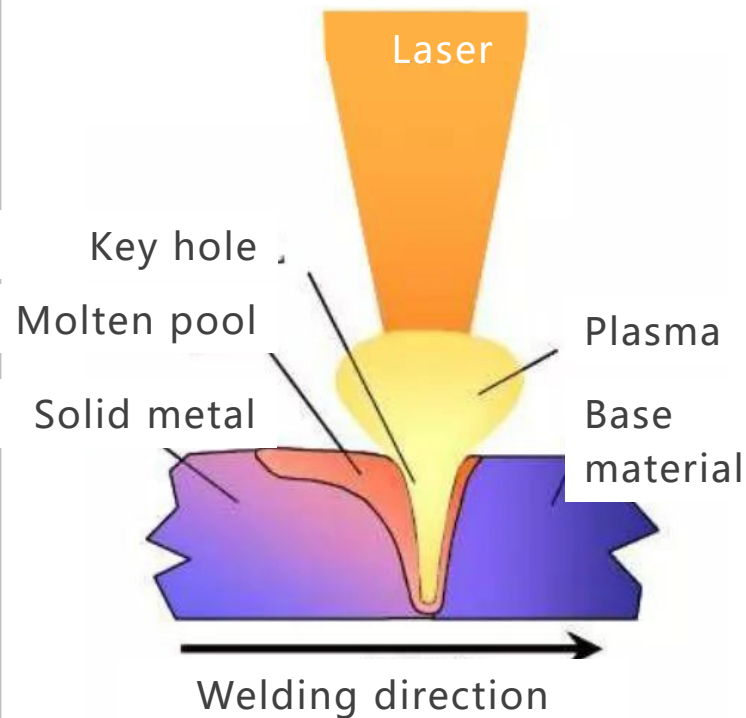
TIG welding

Thermal conduction welding



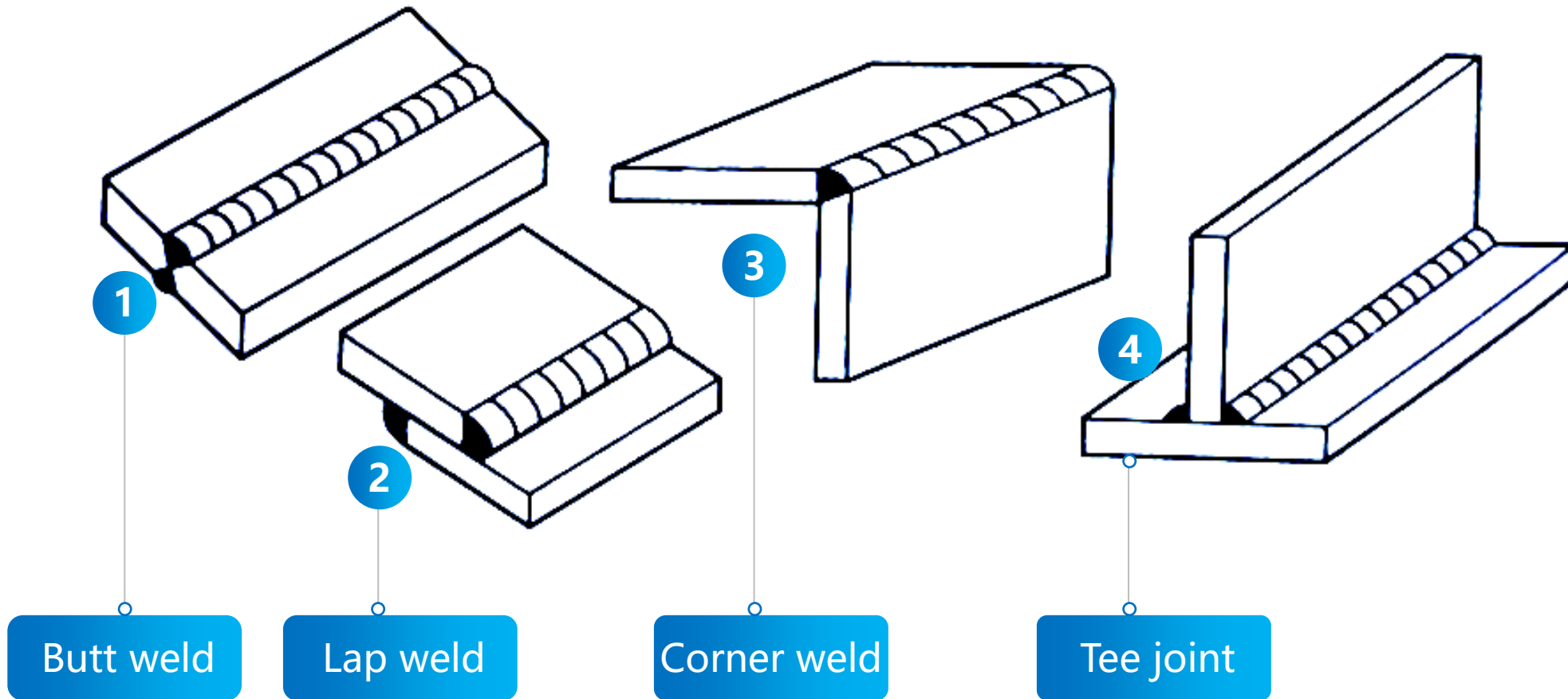
The beam power density used in welding is low. After the workpiece absorbs the laser, the temperature only needs to reach the surface melting point, and then rely on heat conduction to transfer heat to the inside of the workpiece to form a molten pool.

Deep welding



Deep welding not only melts the metal, but also vaporizes it. The molten metal is discharged under the pressure of metal vapor to form small holes. The laser beam continues to illuminate the hole low, so that the small hole continues to extend

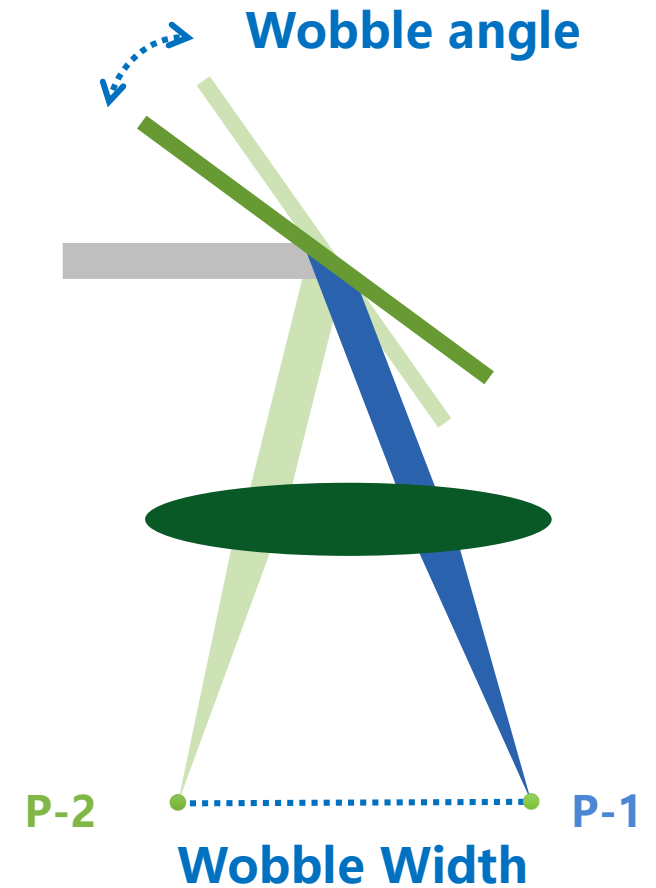
After deep welding, a narrow and uniform weld is formed. The process is characterized by fast processing speed and small heat affected zone. Therefore, the material deformation is small, and it is often used for welding thick plates



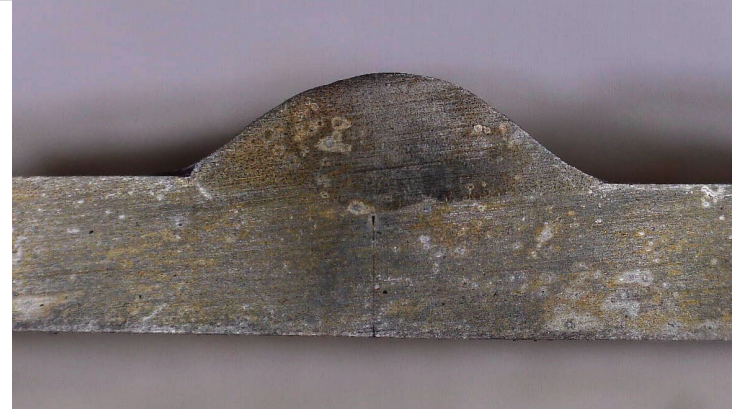
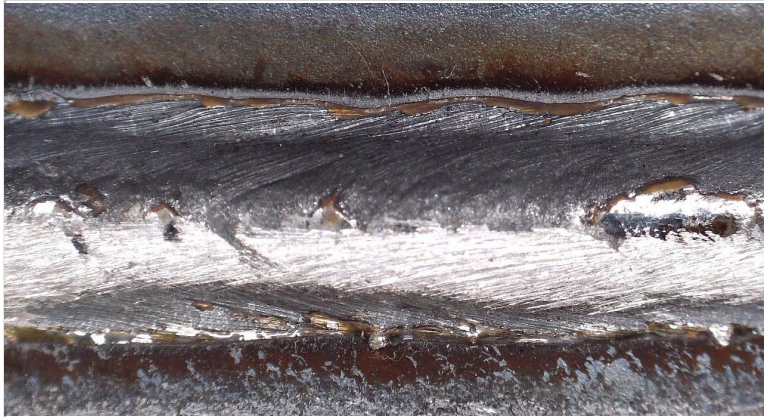
- Direct output laser beam size 0.1mm
- The process capability of laser welding is limited to some extent

Wobble welding technology

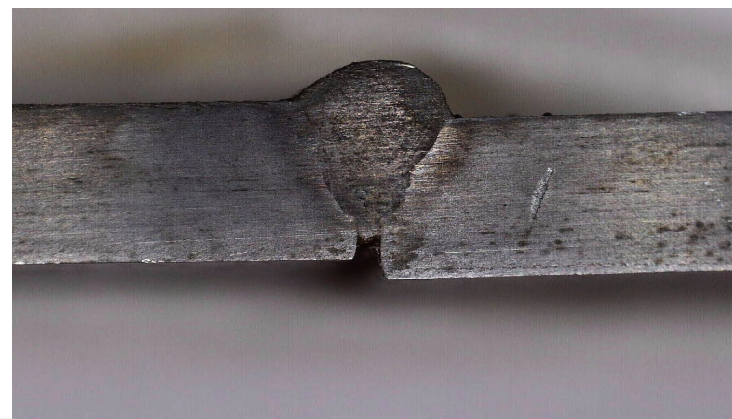
- It can make laser welding more widely used, and reduce the basic process and assembly accuracy of the product





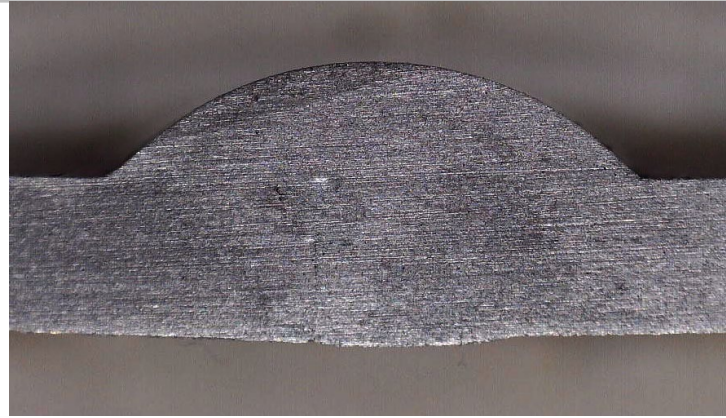
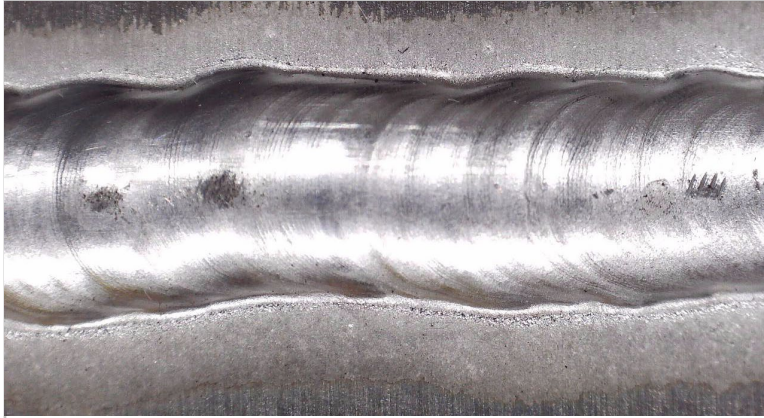


Arc welding
Wide not
deep

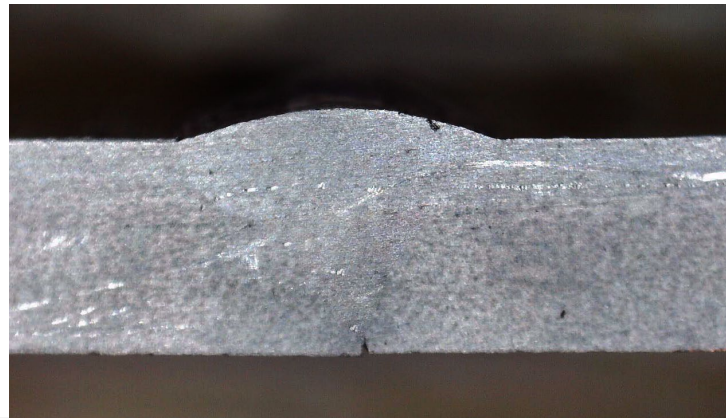


Laser welding
Narrow
and deep

3mm Steel with wire



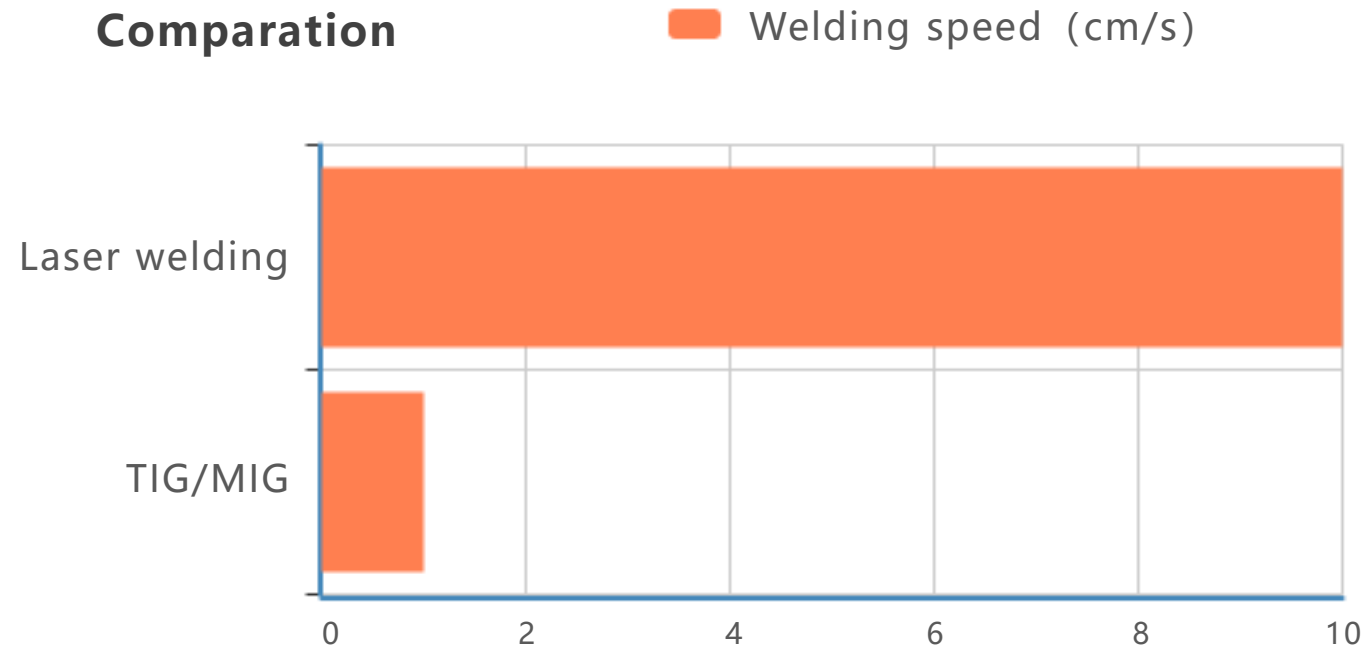
Arc welding
Wide not
deep



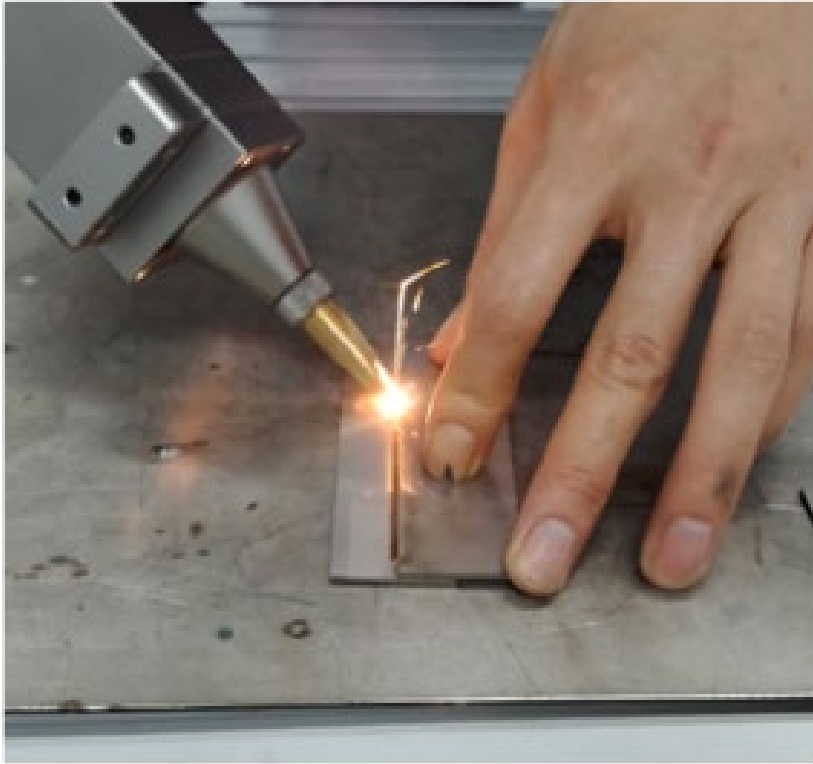
Laser welding
Narrow
and deep

2mm Aluminum with wire

Faster than Arc welding 2-10times, saving Labor cost



The operation is simple, you can work without a license, and you can weld beautiful products without a teacher



The smooth and beautiful weld seam, small deformation , which reduces the subsequent grinding process and saves time and cost



No welding scars



Good finished

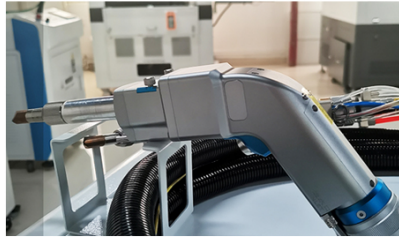


No deformation

		Arc welding	Laser welding
Quality	Thermal input	Big	Small
	Deformation	Big	Small
	Welding seam	Broad, shallow	Narrow, Deep
Operation	Difficulty	Difficult	Easy
	Welder requirement	High	Low
	Welding speed	Slow	Fast
Cost	Consumption	High	affordable
	Welder price	Cheap	Expensive

03

Air - cooled handheld laser welder introduction



Handheld welding head

Welding precision
Flexible alignment



Control system

Software



Laser source

Multiple power options



Cooling system

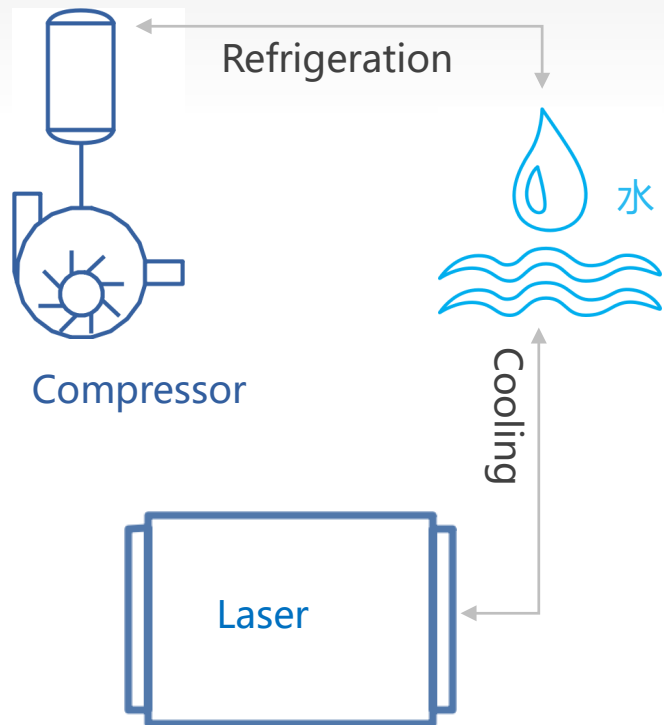
Smart cooling System



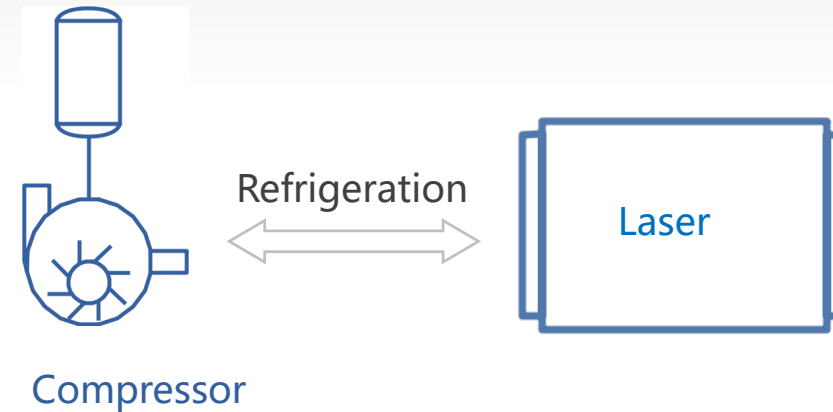
All in one



Water cooling solution



GW Air cooled solution



- Combine the chiller and laser into one
- No water exist, reduce the heat storage link
- Much higher integration, smaller volume and light weight ,better cooling efficiency

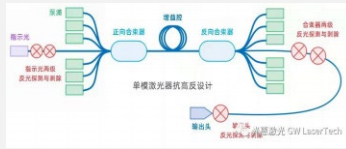
Optical	1000/1500 W
Collimator focal length	50mm
Focal length	100mm
Wobble width	0-5mm
Wobble Frequency	0-300Hz
Fiber core dia.	50 μ m (20 μ m optional)
Light wavelength	1075 \pm 10nm
Guiding wavelength	650nm

Mechatronics	1000 W	1500 W
Max output	1000W	1500W
Dimension	650 \times 300 \times 621mm (L \times W \times H)	
Weight	60kg	65kg
Input Voltage	220VAC/50Hz/60Hz	
Power consumption	3050W	4650W
Delivery cable length	Standard 5m (10m optional)	
Preset parameters	20 [User] + 55 [Preset]	

Air cooled laser welder —Advantages

Anti back reflection

Optimized optical path ,
Fiver layers stripped the back reflection light



Simple:

Modulation design, free maintenance



Energy saving

Based on 976nm pump technology , electrical-optical conversation efficiency



Flexible:

cutting, welding and cleaning



Portable

Light weight with wheels
The whole weight is 60kg, small size



Safety:

Triple protections



Environmental protection:

Low consumption input voltage 220VAC-16A



Multi modes:

Pulse, continuous mode switching



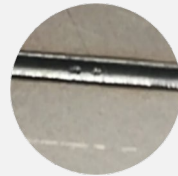
01 → ○ Adjustable wobble width
0-5MM



05 → ○ Light deformation



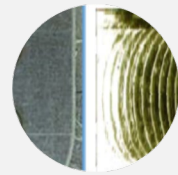
02 → ○ Welding stable



06 → ○ Welding smoothly



03 → ○ Spot or continuous



07 → ○ Welding seam with
wires to 0.8-1.6MM



04 → ○ Strong welding
penetrability



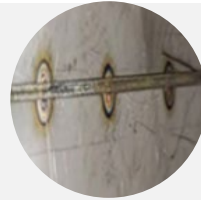
08 → ○ Only for ≤ 5 mm thickness



01 → ○

Spot weld

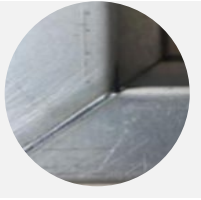
Stainless steel, 0.5-5MM



05 → ○

Butt joint

Carbon steel, 0.5-4MM



02 → ○

Butt joint

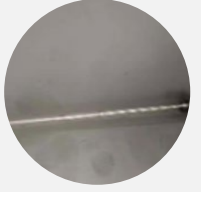
Aluminum 0.5-3MM



06 → ○

Tee joint

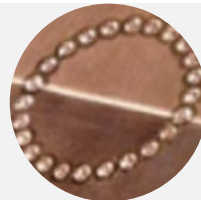
Galvanized sheet 0.5-4MM



03 → ○

Lap joint

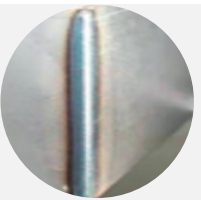
Red copper 0.5-6MM



07 → ○

Corner joint

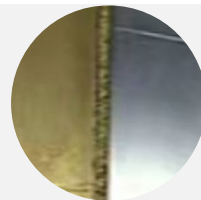
Combination 0.3-3MM



04 → ○

Combination

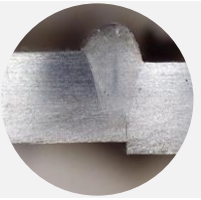
Copper & Stainless steel



08 → ○

Wire feeding

Al wire, Copper wire, SS wire 0.8-1.6MM



Sheet metal equipment



Sorting

Cooling system



Manufacturing

Advertising

Market

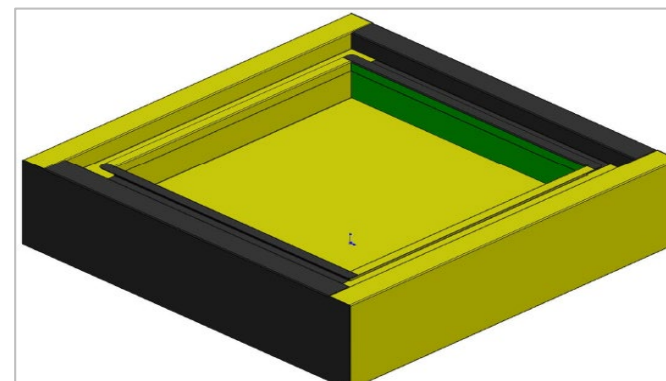
Public works

Communication



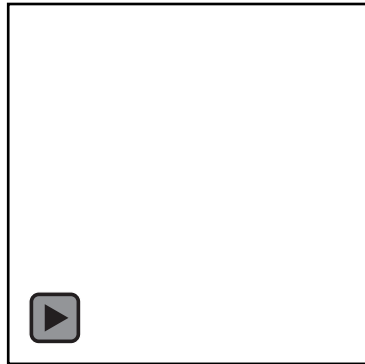
Furniture

Advertisement



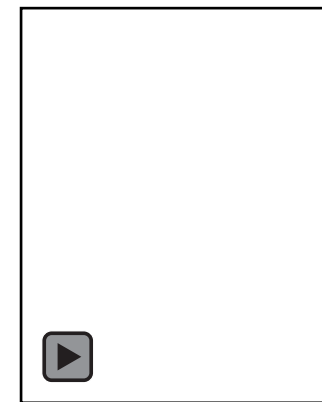
Communication cabinet

Windows welding

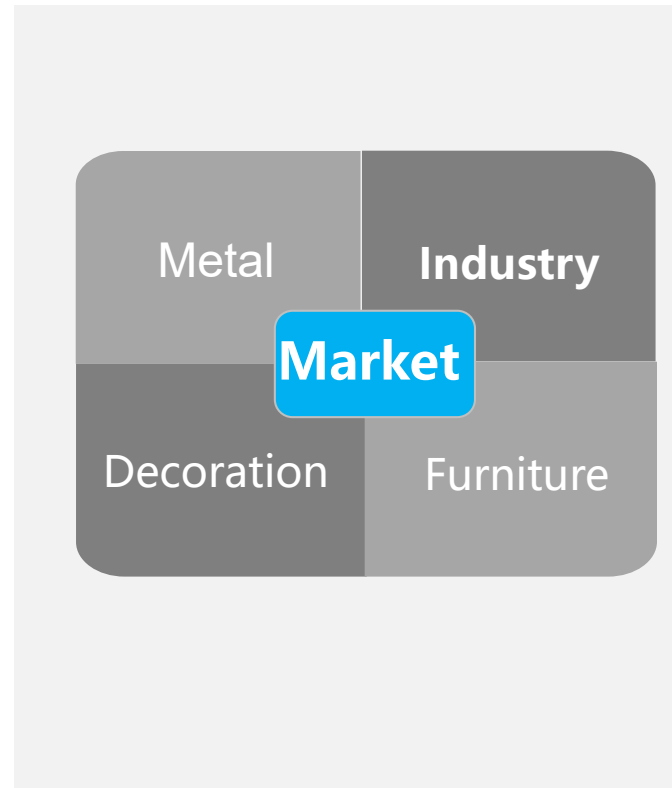


Brass welding

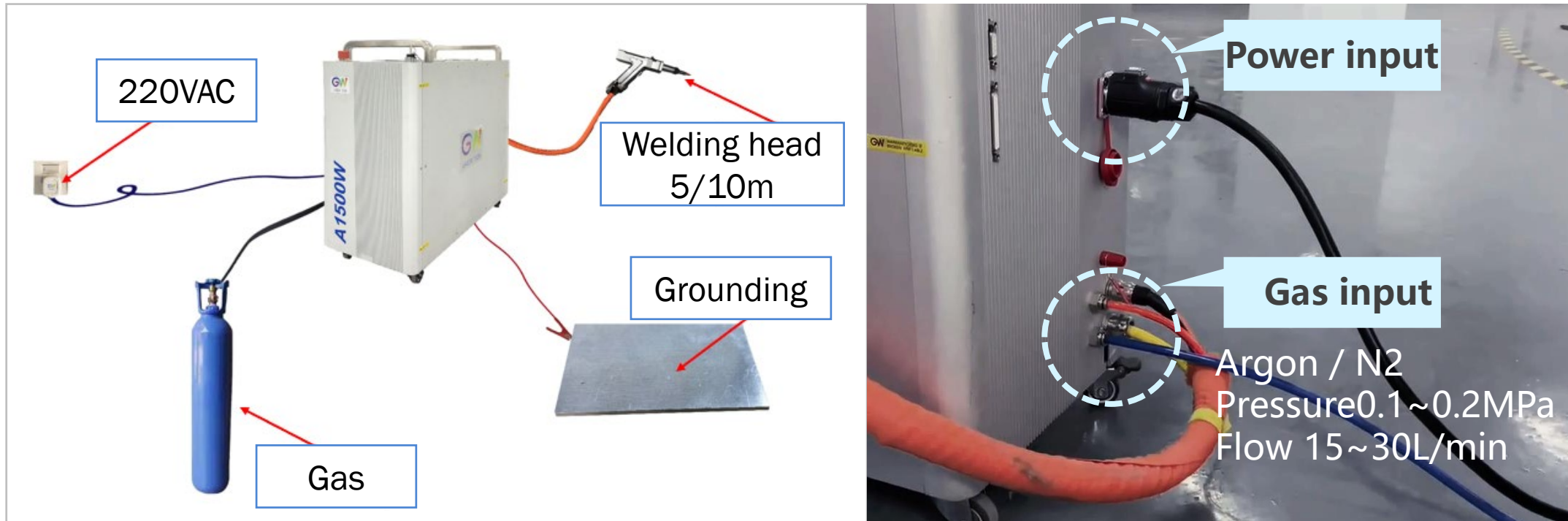
Container welding

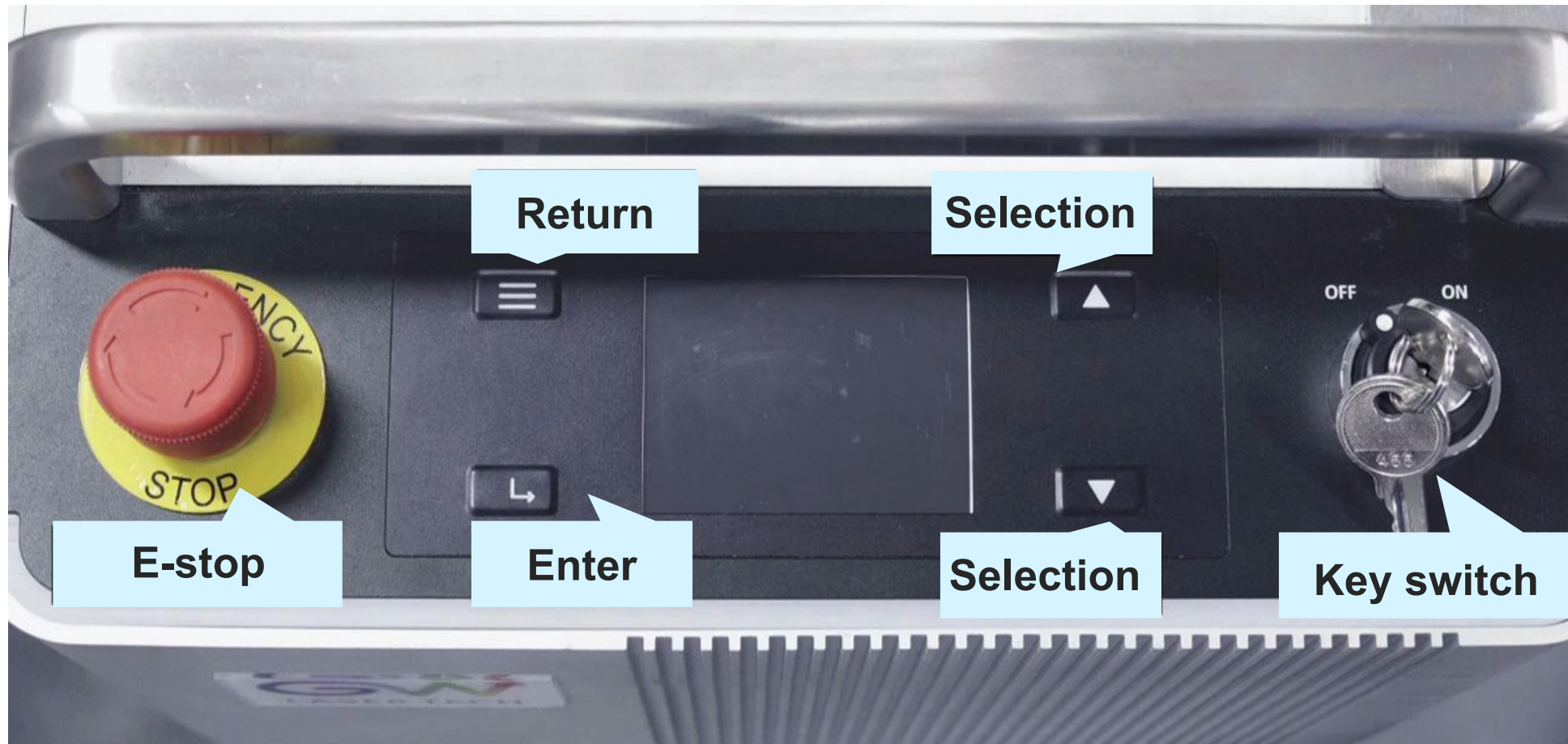


Kitchen ware



04 Air cooled handheld laser welder operation





- Release E-stop, Turn Key ON
- Wait until LED become green.



- Touch selection button to control page, then push enter button to select.
- Select U(user)/S(system) parameters, then push enter button to get in.



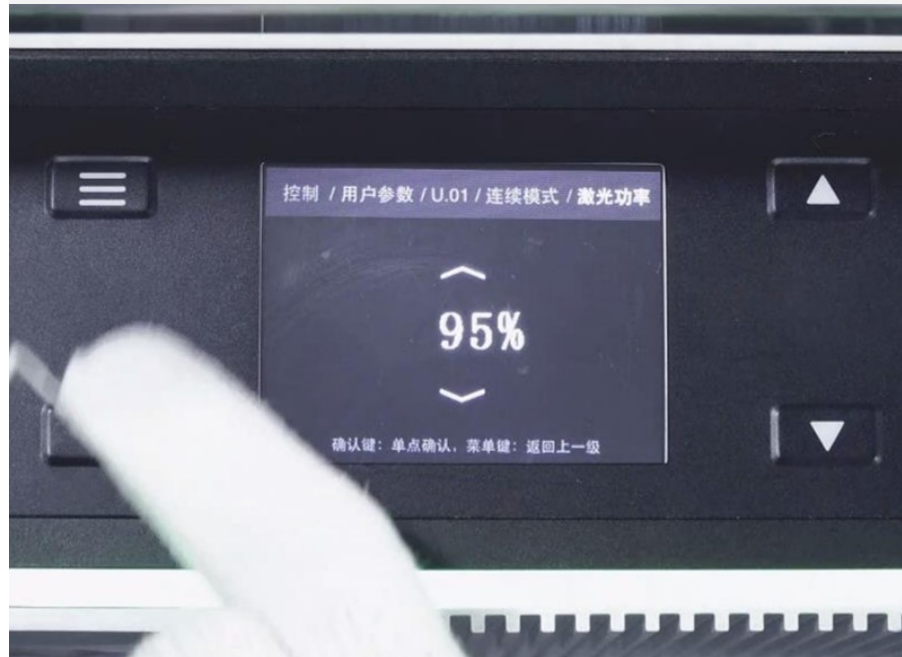
- Select Program , then enter
- Press 3secs enter parameter page



- Select mode, then Enter
- Press 3secs enter parameter page

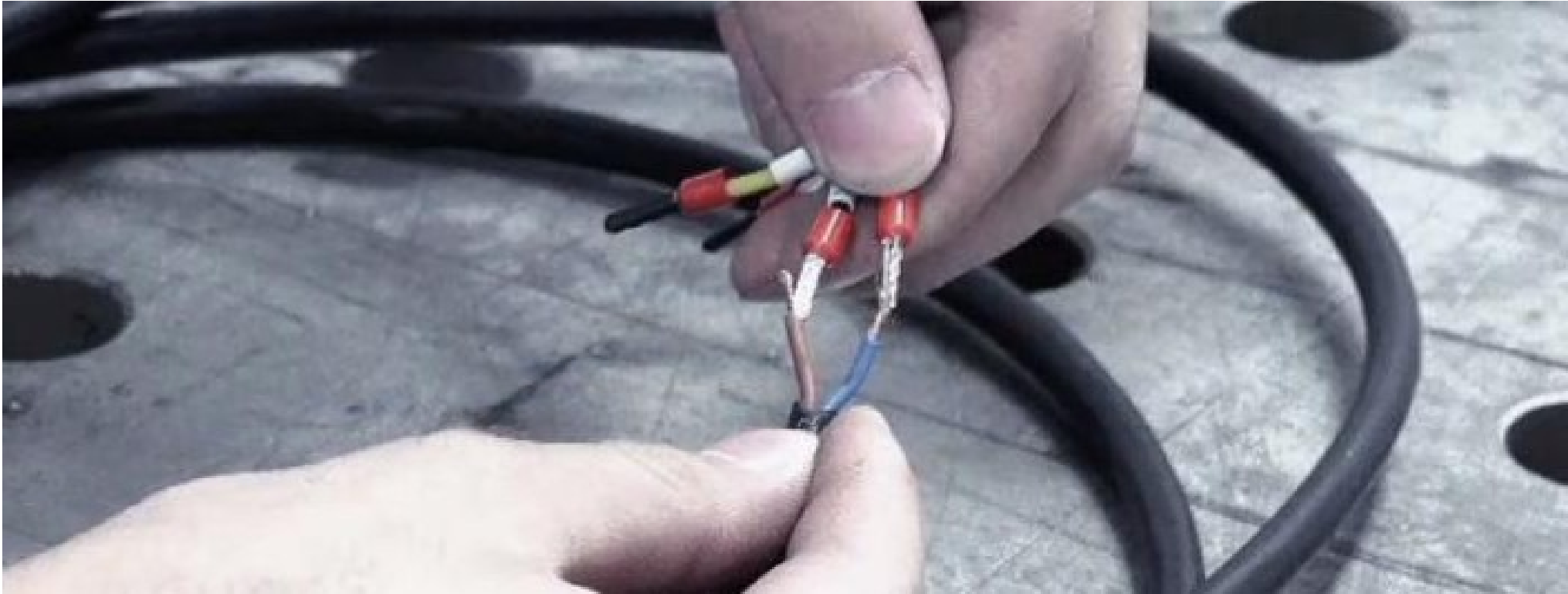


- Adjust value, press enter, then return
- Adjust other values same as above

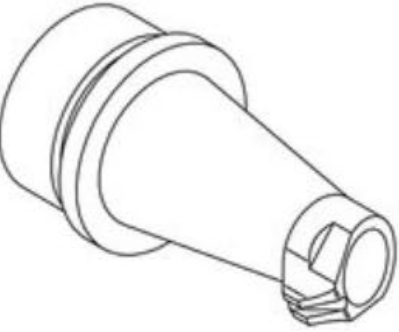
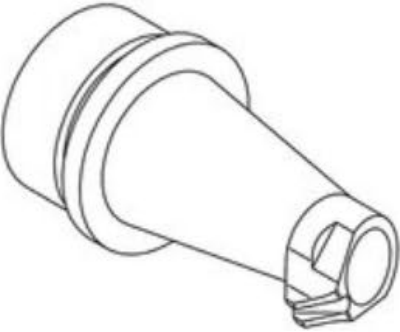
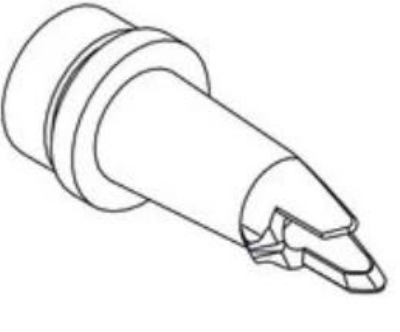
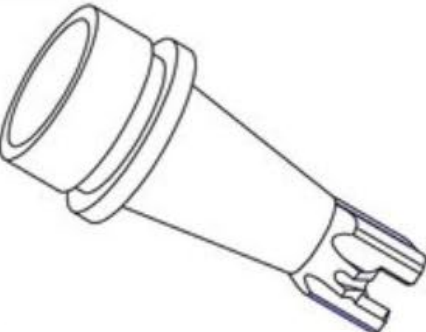
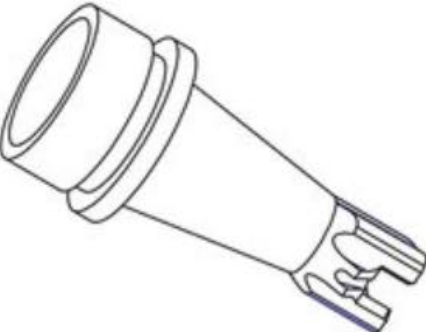
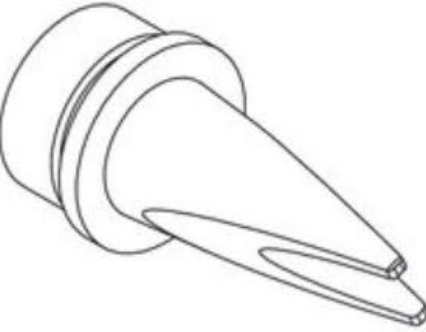




- Back to main page
- Main page shows current value
- No return main page , values not be saved





- SS1 and SS2 wires from Laser welder connected to wire feeder SS1 and SS2
- Welder only provides feeding signal, Wire feeder should have parameter adjustable function.

 <p>No.: AS-12 Note: Wire 0.8/1.0/1.2mm</p>	 <p>No.: BS-16 Note: Wire 1.6mm</p>	 <p>No.: CS-12 Note: Wire 0.8/1.0/1.2mm</p>	 <p>No.: ES-12 Note: Wire 0.8/1.0/1.2mm</p>
 <p>No.: FS-16 Note: Wire 1.6mm</p>	 <p>No.: C Note: No wire</p>	 <p>Cut nozzle : C Note: Single layer 1.5mm</p>	 <p>Focal adjustable tube</p>

Material	Thickness																								
	0.5 mm					1 mm					2 mm					3 mm					4 mm				
	C	M	P	W	T	C	M	P	W	T	C	M	P	W	T	C	M	P	W	T	C	M	P	W	T
SS	S.38	S.07			S.52	S.00	S.01			S.55	S.02	S.03		S.28	S.54	S.04	S.05		S.29	S.53	S.06				S.30
MS	S.39	S.15			S.48	S.08	S.09			S.51	S.10	S.11		S.31	S.50	S.12	S.13		S.32	S.49	S.14				S.33
Al	S.40		S.21		S.45	S.16		S.17		S.47	S.18		S.19	S.34	S.46	S.20			S.35						
Cu	S.41		S.27		S.42	S.22		S.23		S.44	S.24		S.25	S.36	S.43	S.26			S.37						

C: CW / M: PWM / P: Pulse / W: Wire feeding / T: Spot weld

Safety clamp

No wobble

Gas pressure low

E017

System locked

S028

Ambient temperature too low, Turned off and wait about 5mins then turn on

E023

Contact GW after sales service

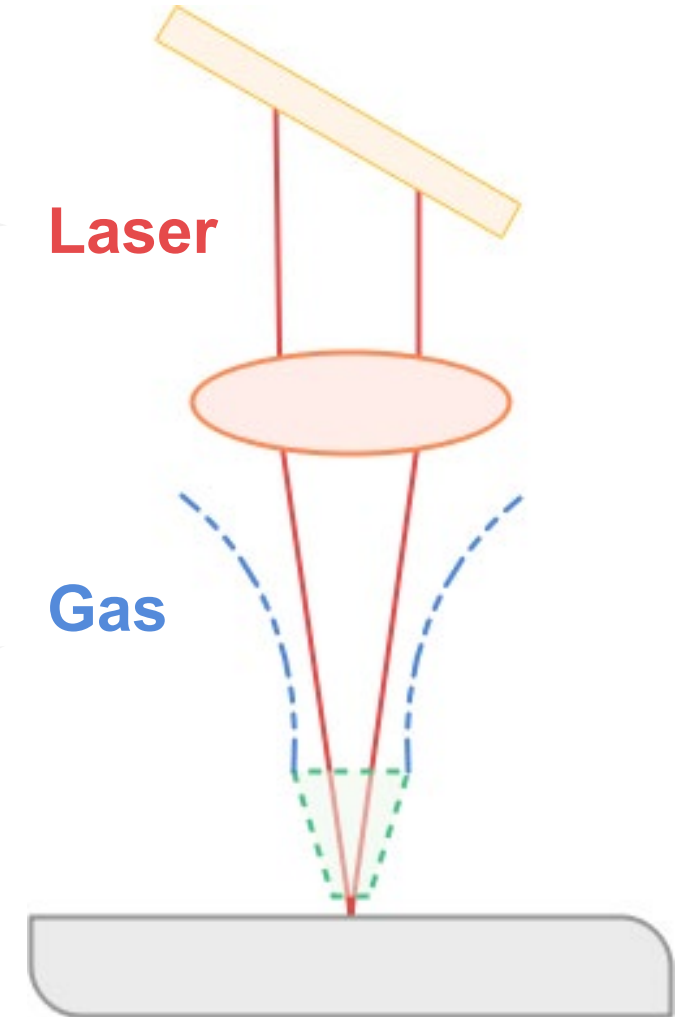
Others

05

Hand-held laser welding application

- **Fiber core:** The smaller of core dia. the higher power density
- **Laser power:** The higher power ,the higher energy
- **Pulse frequency:** the lower frequency, the lower energy
- **Pulse duty:** Low duty ,low energy output

- **Type:**
- **Inert gas :** Nitrogen /Argon/CO2
- **Gas Pressure/Flow rate:**
Too small will affect welding quality
too high will blow away
- **Angle of blow direction:**
Gas covered the welding seam to protect the quality



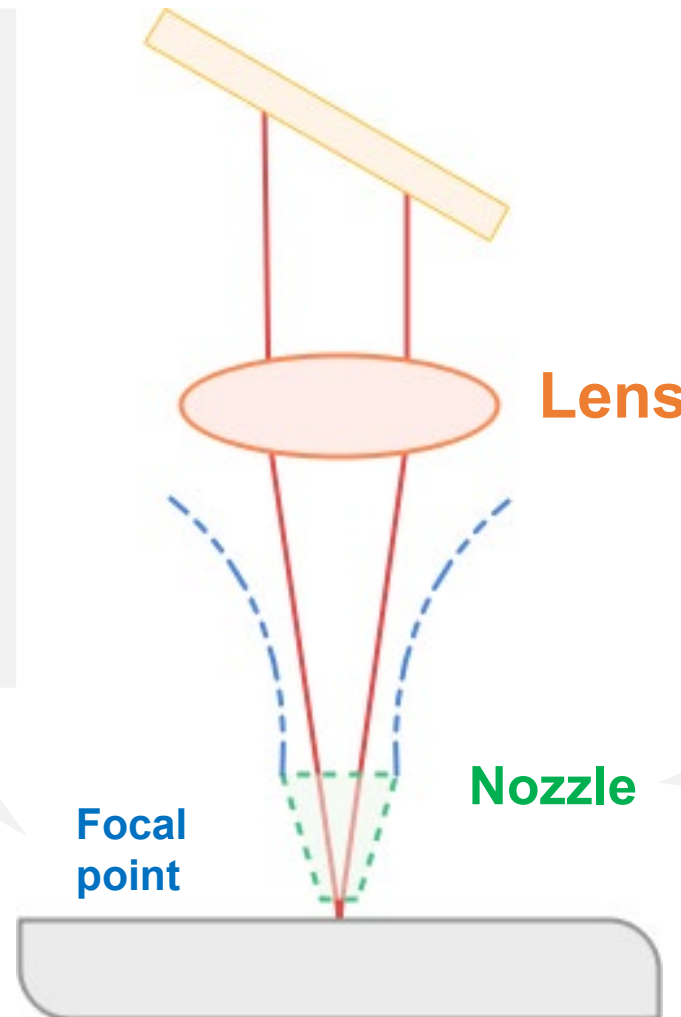
- **Focal position:**

Focal point is the highest energy

The further from focal point, the weaker of energy

- **Beam size:**

The smaller, the higher of energy density



- **Light transmission:**

Affects the power and heat

- **Focal length:**

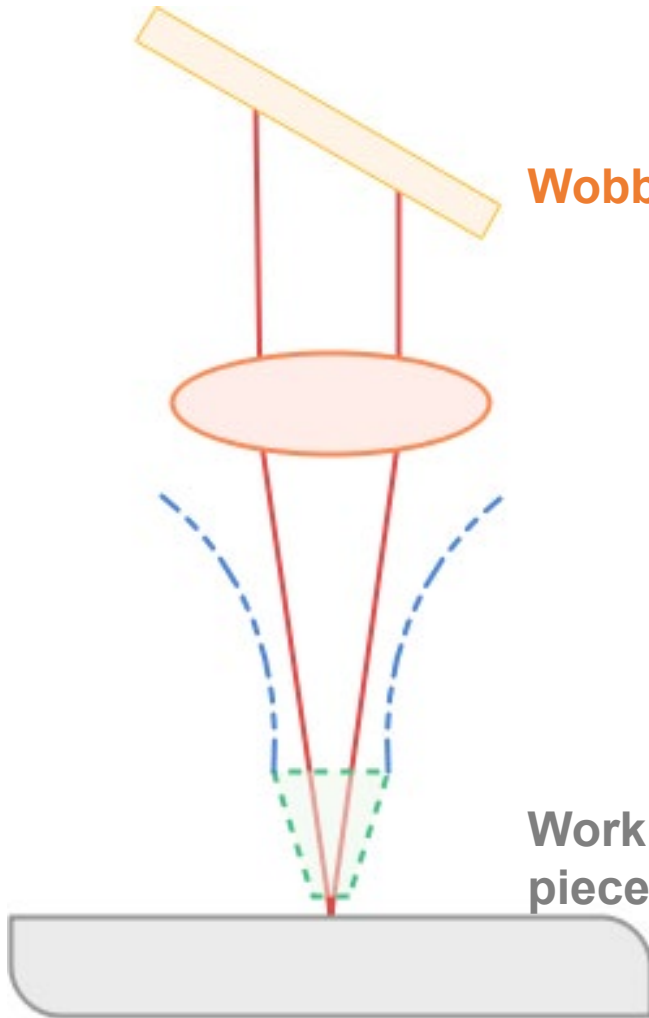
Affects the beam size and Focal point position

- **Construction:**

Affects gas flow and direction

Affects the welding function

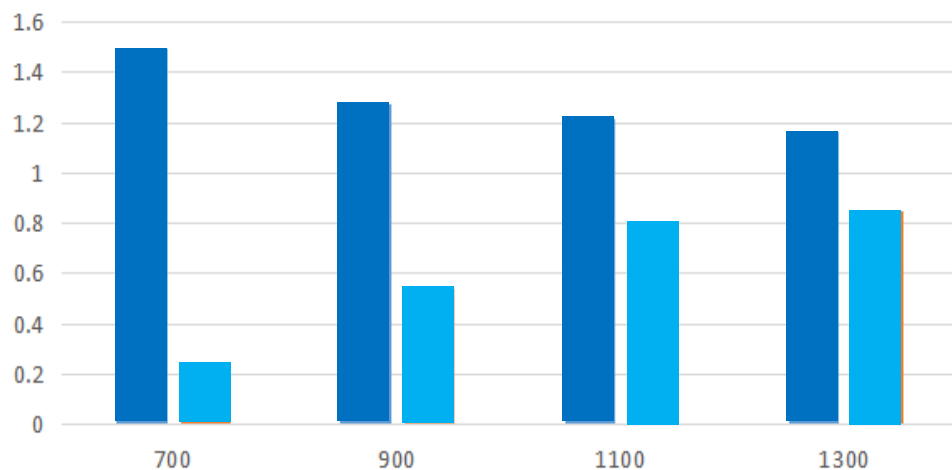
Affects the wire feeding



- **Wobble Frequency:** The higher ,the wobbling faster ,the weaker of energy density
- **Wobble Width:** The wider the longer beam wobbling ,the weaker of energy density

- **Material:** Good quality for steel; AL/Cu needs more power
- **Thickness:** Thinner sheet easy to deformation ,Thicker sheet needs lower speed.
- **Seam:** Seam too width, need thicker wire feeding.

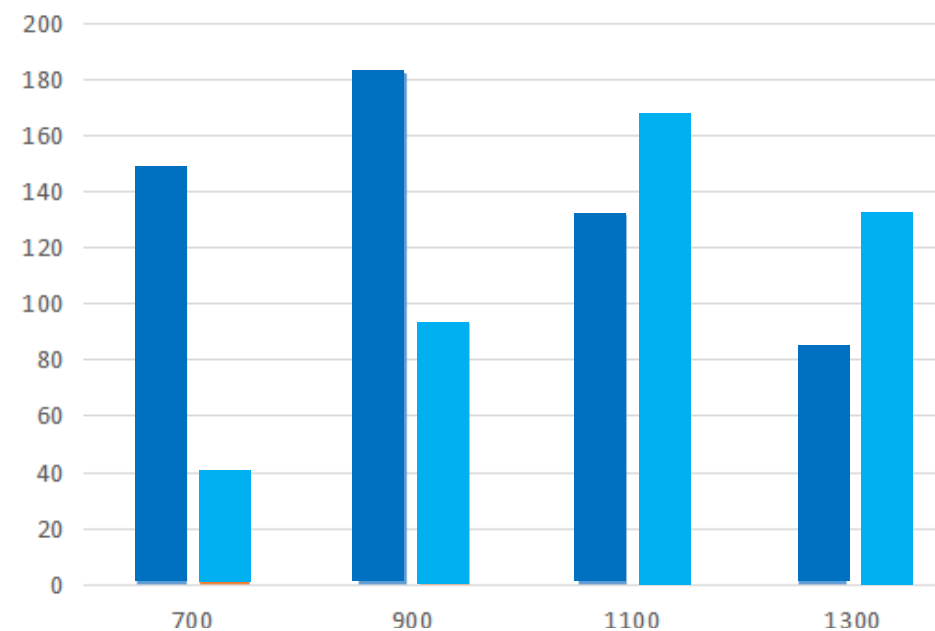
20 μ m welding deeper than 50 μ m



■ 20 μ m ■ 50 μ m

Welding Aluminum prefer for 20 μ m

Power energy too high ,resulting in unstable molten pool ,deterioration of mechanical properties of welds



■ 20 μ m ■ 50 μ m

01. Use of different wires according to material (solid core)

Stainless steel → Stainless steel wire

Mild steel/
Galvanized steel → Steel wire

Aluminum → Aluminum wire
(4or5 series)

02.

N2/Argon

N2 → Welding steels

Argon → Welding Aluminum

Gas pressure

Pressure meter: 0.1-0.2 MPa

Flow meter: 15-30 L/min

Focal point:

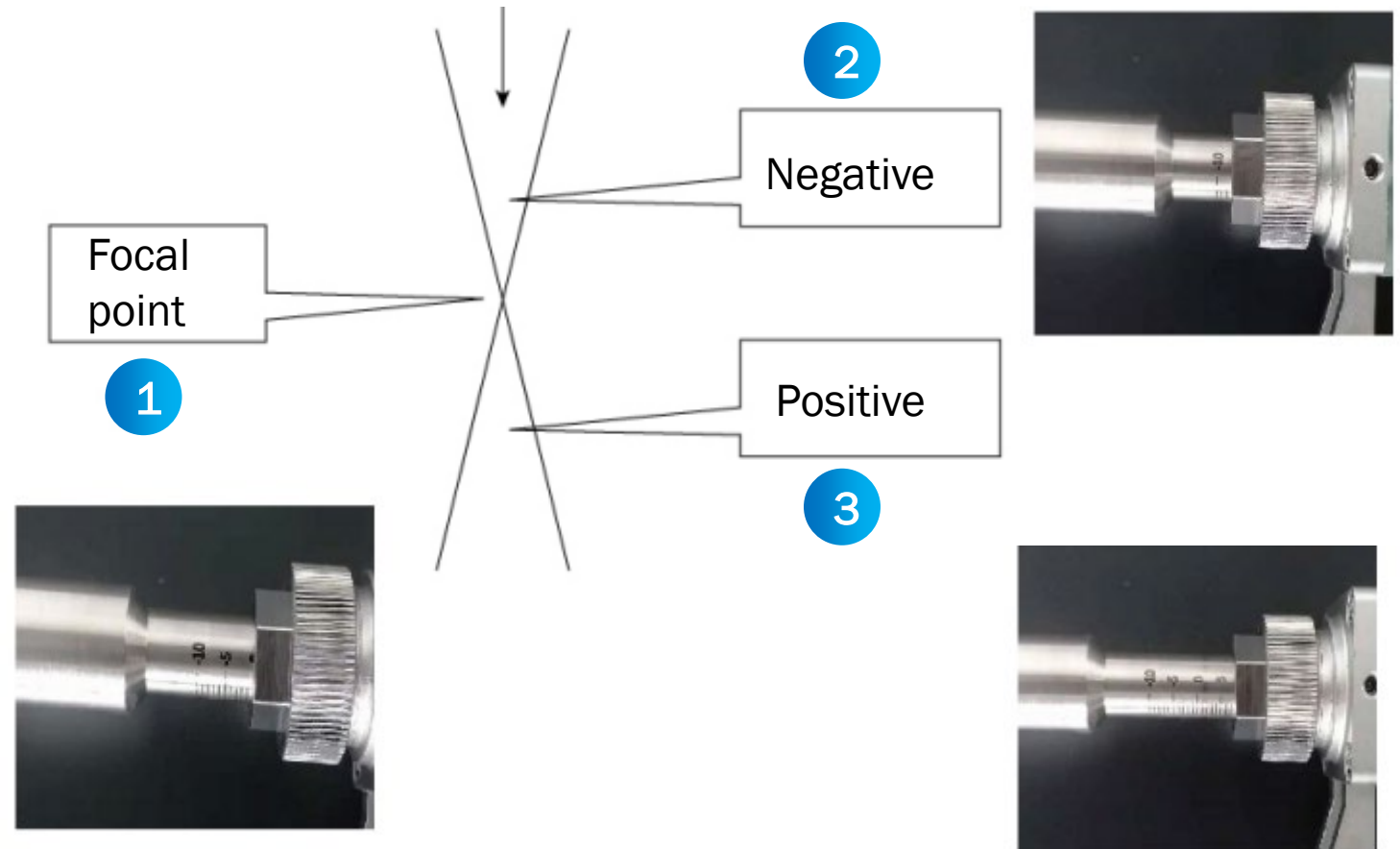
Highest energy,
Used when need high energy

Negative focus:

The further of focus ,
the weaker of energy
For deep welding ,thickness

Positive focus:

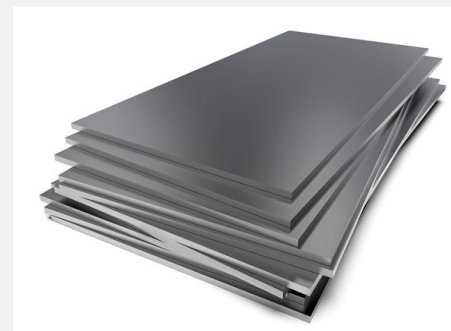
The further of focus
the weaker of energy
For heat conduction welding
surface welding



01

Steel

- More thickness need more power, lower speed
- More thickness, thicker wire , lower speed
- Increasing power, welding seam from white to black
- Higher speed ,higher wobble frequency
- Thinner wire, then lower speed.
- Wire size less than metal sheet thickness



02

Aluminum

- Reference the steel parameters
- Power increased 20~30%



Defects	Possible reasons
Lack welding	Power too low; Speed too slow; Focal point is not good
Big deformation	Speed too slow; Power too high
Big spatter	Power too high; Wobble frequency too high; Gas pressure too high
Start/end over welded	Rise/Down time too short
Weld seam black	Power too high; Gas too low
Weld seam sawtooth	Wobble Hz too low; Welding speed too fast
Weld seam sink	Wire feeding too slow; welding speed too fast
Wire sticks on the workpiece	Too slow at the welding end



THANK YOU

Laser as a tool!



GW LASER TECH

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