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# Best Portable Handheld Laser Welder & Welding Machine On The Market

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## Best Handheld Laser Welder

- **Laser Type** :CW Laser (Continuous Wave Laser)
- **Laser Source Power** : 1000W/1500W/2000W
- **The laser wave length** : 1070nm±5nm
- **Welding thickness** : 0.5-5mm
- **Working voltage** : 1 PHASE, 220V 50/60Hz
- **Cooling Method** : Water Cooling
- **Price Range**: **\$5500.00 to \$9500.00**



- **Application :** It is widely used in the complicated and irregular welding processes of cabinets and kitchens, stair lifts, shelves, ovens, stainless steel doors and windows guardrails, distribution boxes, stainless steel furniture, metal sheet metal and other industries.

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Laser welding is a non-contact process that allows metal parts to be assembled mainly by means of a laser beam.

This type of welding is suitable for applications that require high speeds and for thin welding with low thermal distortion.

The speed of this process, as well as the ability to control the quality of welding during the operation and its high level of automation, make laser welding a widely used method in many industrial sectors such as the medical industry, electronics, tool making and the automotive sector.

## What Is Laser Welding Machine?

Laser welding machine is an eco-friendly power welding tool with handheld laser welding gun, CNC controller, or single-arm robot to join pieces of metals or thermoplastics. Laser beam provides a concentrated heat source, which is used for spot welding, butt joint, lap joint, lap edge, lap, T butt, seam welding, narrow welds, deep welds, and kissing weld with high welding rates. The process is frequently used in high volume applications with automation, which is based on keyhole or penetration mode welding.

Laser welding is a versatile, low cost way of achieving high quality spot welds for different materials and thicknesses. A laser welding machine is also known as laser beam welding machine, laser welder, laser beam welder, laser welder machine, laser

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welding equipment, laser beam welding gun, laser beam welding tool, seam welding machine, laser bonding machine, laser brazing machine, laser joining machine, laser soldering machine.



## Categorization of Laser Welders

There are multiple modes of laser welding that we can categorize the machines into. Therefore, we can categorize laser welding technology in various ways. Let's start defining the laser welding machines by the different categories:

### Categorization is based on the type of laser

- **Pulsed Laser**

The pulsed laser mechanism is ideal for metals that are light in nature and have low thickness. Thus, the pulsed laser makes intermittent exposure on the metallic body. Keeping it safe from burning or melting.

Furthermore, this type of laser welding is ideal for welding sheets of metal, razors, jewelry, and even medical prosthetics like screws.

- **The continuous laser**

The continuous laser is ideal for welding on parts that have a high thickness and are strong. Moreover, this welding technology is good for refractory surface metals too.

This type of welding is costlier than the pulsed type welding but in the long run, saves a lot of money and labor for you.

### Categorization based on the source of laser

Currently, there are three main types of sources of laser for laser welding machines that use one of these laser sources i.e. Fiber laser, CO2 laser, and Nd: YAG laser. Each of these laser sources has their own benefits and are suitable for the different types of

welding materials.

## • **Fiber Laser Welding Machine**

The fiber laser welding machine is ideal for working on metallic parts. Furthermore, it offers great reliability and efficiency. According to estimates, the accuracy of the laser welding machine using fiber laser is close to 25%.

## • **CO2 Laser Welders**

The CO2 laser welders can provide a great continuous welding beam that creates efficient and durable welds. It can easily penetrate metals and non-metallic bodies.

## • **Nd: YAG Laser welders**

The Nd: YAG lasers are less energy efficient as compare to the fiber laser welding machines. However, there are certain applications like greater laser control that you cannot achieve with other types of laser sources.

Summing up, you will get laser welders of all types, technologies, and sources. You will have to decide which type of laser welder will suit your business the best.

Before discussing the selection of the best laser welders, let's have a look at the main applications of laser welding machines in the industry.



## How does Laser Welding Machines work?

### Laser Welding Technology

The laser welding technology works based on the principle of heat generation by the laser source. Sources of laser in the method also vary and different sources of lasers are suitable for different types of materials and their physical and chemical properties

Thus, when the beam of high laser energy is focused on a spot of the metal sheet it creates the metal sheet to melt at the spot. The depth of the hole is managed by the various methods of welding and varies accordingly.

This process takes place at the seam of the two metals or materials to be welded together. However, there are multiple methods of laser welding that depend on the type, thickness, and quality of materials to be weld.

## Laser Welding Methods

There are multiple methods of laser welding that are largely in use in various industries. Let's discuss some of these laser welding techniques for you to get a better idea of the process of laser welding.

- **Conduction Mode Welding**

Conduction welding is a method that provides you with a wide weld that is shallow. There is a further categorization of this method of welding as follows:

- **Direct heating method**

The direct heating method uses thermal conduction from the source of heat. Subsequently, this results in the melting of the base material and ultimately making the weld with the other material.

- **Energy transmission method**

In comparison, the energy transmission method is slightly different and makes use of an intermediate material that conducts the heat from the source to the weld. Usually, it is the absorbent ink that acts as the intermediary material for the transfer of energy.

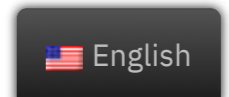
Similarly, butt joints are also possible by directing the heat energy at an angle of the joint.

- **Conduction/Penetration Mechanism**

This mechanism works on medium energy and creates a deeper hole than the conduction method but is shallower than the penetration method.

- **Penetration or Keyhole Welding Mechanism**

The other way to weld by using a laser is by using the keyhole method. This method focuses the beam of the laser onto the material and creates deep penetration of heat. Thus, a hole is created on the spot by this method.



This hole is later filled with metal vapor that forms a bonding material with the other metal. Therefore, the resulting weld makes a great depth to width ratio and creates tight welds that are durable.





## Applications of Laser Welders

Laser welding finds large applications in various types of industries. These industries range from the manufacturing industry to the medical industry to the jewelry manufacturing industry.

Here are a few of the industries that have major applications of laser welding technology.

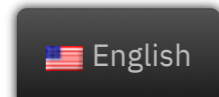
Robotic welding of parts could never have become a reality if it was not due to the laser welding techniques. The laser beam is aligned on the seam of the parts to be welded. These units are then passed through the laser welding by a conveyor belt.

Thus, the speed at which the process happens enables the rapid production of welded products. This technology has applications in an uncountable number of industries. Almost every manufacturing industry that makes use of metallic parts has a use for this kind of welding. Therefore, the application of laser welding is found at large in all types of metallic and non-metallic manufacturing industries that make use of welding of parts.

- **Jewelry Industry**

Another important application of laser welding is found in the jewelry industry. When you have to make intricate and delicate parts of jewelry from two different materials that are to be weld together, then the best option for welding them together is the laser welding technology.

- **Auto-motive Industry**



According to twi-global, almost 15% of all the manufacturing processes in the industry involve laser application in one way or another. CO2-type welding has a large application in the automotive industry. The major application of welding is found in the manufacturing of gears, transmission parts, power trains.

Most of these products also require circular and annular welds. Thus, the circular welds are also well managed by laser welding. Furthermore, Nd: YAG has a high application in the welding of body parts and the structure of automobiles.

Laser welding has found large successes in the automotive industry primarily due to the speed of operation, accuracy, efficiency, and lower cost in the long run. You can find out more about the application of laser welding in the automotive industry here.

- **Medical Industry**

If you start listing down the individual industries that make use of laser welding then you will run out of time and writing space and time but you will not run out of the industries that make use of laser welding. Similarly, the medical industry has a large application of laser welding methods.

The most number of applications of the laser welding technique in the medical industry is the welding of dissimilar metal welding. Medical aids are usually made up of different types of electronic parts that are further fitted with multiple semi-conductors.

The main challenge in the scenario arises when the different metals and materials, possessing different chemical and physical properties are to be weld together. But the fiber laser welders do the job successfully.

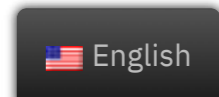
A few of the hard metals and materials like stainless steel, 440C or 430, and Titanium alloys are also widely in use in the medical industry. These materials are to be weld together with a foolproof system that ensures the health of the patient.

Other devices like pacemakers, AEDs, drug pumps also make use of laser welding technologies.

## **Advantages of Laser Welding Techniques**

Laser welding technology has multiple benefits over conventional types of welding technologies. Here are a few of the advantages that you get by using laser welding machines.

- The integration of laser welding is easier with automation and Computer Aided Systems. This not only gives you greater control over the entire process but also the operation becomes more accurate and efficient.
- Tools are not affected during the welding process.
- The focus of the laser beam is very accurate. Thus, the final weld is of high quality and durable for a long time to come.



- The speed of the welding process is much higher than that of conventional welding techniques. This makes the laser welding technology suitable for batch productions.
- Laser welding is applicable to products that require a high level of accuracy, like in the manufacturing of medical industry products.
- The input energy is lower than that used in other types of welding techniques.
- No secondary finishing of the product is necessary after welding. Thus, saving the welding time and manpower.
- Contactless method. This means that there are no contacting parts and thus the quality of the final product and the life of the machines will be better.



## Pulsed or continuous laser?

**laser welding machine** can be equipped with one of the following two types of lasers: a **pulsed laser** or a **continuous laser**. The choice of one over the other depends on the **thickness of the material** you want to weld.

- **The pulsed laser:**
  - It is suitable for metals that are light and thin.
  - It prevents them from being deformed or melted.
  - This type of pulsed laser is mainly used to weld sheet metal, razor blades, gold jewelry chain links and titanium pacemakers.
- **The continuous laser:**
  - It is recommended for welding thick parts.
  - It is particularly effective on refractory metals.
  - It can pose problems if it is used on metal or a part that is too thin. In these cases the laser could damage, deform or melt the part.
  - It is more expensive than a pulsed laser, but it also reduces operating costs.

## How to choose the laser beam source?

There are three types of sources: **fiber laser**, **CO2 laser** and **Nd:YAG laser**. The choice of source depends on the type of laser you have chosen (pulsed or continuous).

- **The fiber laser:**
  - This technology is based on sharp and thin beams that allow continuous and penetrative work to be carried out.
  - Like the CO2 laser, the fiber laser can penetrate thick sheets with great speed and efficiency.
  - It is easier to integrate into a machine than other lasers both in terms of use and maintenance.
  - This laser offers an average efficiency of 25%.
- **The CO2 laser:**
  - This technology uses a gas mixture of carbon dioxide, helium and nitrogen that is electrically-excited and optimized for continuous operation.
  - Like the fiber laser, the CO2 laser can penetrate thick sheets with great speed and efficiency.
  - It is more effective at penetrating thick steel parts than the fiber laser so it is more widely used.
  - It is more flexible and can penetrate thicker and lighter materials than the fiber laser.
  - This laser offers an average efficiency of 7% for 8,000 W.
- **The Nd:YAG laser:**
  - It allows effective control of the power, duration and shape of the laser pulses.
  - It is optimized for pulsed mode.
  - But it emits pulses of very different wavelengths that do not all reach their target and then dissipate in the form of heat.
  - This type of laser is less energy efficient (3 to 4% efficiency) than CO2 lasers (7 to 10%) and fiber lasers (25 to 30%).

## Handheld Laser Welding Machine with Fiber Laser Beam



Handheld laser welding machine is a type of portable fiber laser beam welding machine which couples the high energy fiber laser beams into the optical fiber, after long-distance transmission, then transformed into parallel lights through collimating mirror to be focused on the work piece to implement the welding. The fiber laser welder is more flexible to implement flexible transmission.

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non-contact welding for those difficult to weld site. The manual laser beam welding can realize the spectrum separation on time and energy, it can do multi-beam welding at the same time, it provides the conditions for high precise welding compared with the traditional MIG & TIG welding, electric welding, and arc welding.

## Advantages of Handheld Laser Welding Machine with Fiber Laser Beam

- Handheld welding head is equipped with 1000 watt fiber laser power, flexible, enabling outdoor welding.
- Fast welding speed, 2-10 times faster than traditional welding.
- The welding seam smooth and beautiful, large depth, small taper, don't need polish, save time.
- No deformation or welding scar, firm welding of the workpiece.
- Laser welding has less consumables, low energy consumption and long service life.
- Safety, easy operation and more environmentally friendly.

## Handheld Fiber Laser Welding Machine Features

1. High laser energy density, small thermal effect area, not easy deformation, less or no subsequent processing.
2. Top brand gold cavity, high temperature resistance, corrosion resistance, the service life is 8 to10 years, the xenon lamp service life is more than 800 million times.
3. Easy spot welding, stack welding, splicing and continuous welding.
4. Variety of detection and protection measures using, greatly avoid the faults caused by a variety of external factors or human misuse, to protect the equipment with long-term stable operation.
5. Non-contact processing, stress free, noiseless, no pollution to the environment, which belongs to the green processing.
6. Good welding quality, smooth and beautiful appearance.
7. The communication function monitors all data of the laser.
8. The small fiber laser welding machine adopts a specific fiber to achieve the welding of tiny solder bumps.

9. High quality fiber laser beam, high conversion efficiency and therefore high welding speed, high aspect ratio, high strength.
10. Excellent spectral system minimizes energy loss to ensure that the laser energy of each fiber is almost the same.
11. The portable laser welder adopts optical fiber transmission, can realize remote welding, conveniently to equip with automatic welding workbench, manipulator, assembly line and other equipment together to work. More uniform light spot and more beautiful solder joints after the light transmission.
12. A variety of input and output signals are very easy to achieve the machine's automated production and assembly line production.
13. Solder joints non-pollution, weld strength and toughness at least equivalent to or stronger than the base metal.
14. The manual fiber laser welder supports time spectroscopy and energy splitting or a combination of these two spectroscopic modes (customizable). Multi-channel fiber output, up to 4 fiber at the same time, significant cost savings, improve welding efficiency and reduce equipment space.
15. Touch screen input, friendly human-computer interaction makes setup and operation easier. The operating system is easy to learn and easy to operate.

## What is Handheld Laser Welding Gun?

Handheld laser welding gun is a portable welder combined with laser generator, welding system, cooling system, and automatic wire feeder to achieve stitch welding, nail welding, butt welding, lap welding, lap welding, tailoring edge welding, crimp welding, T-welding, and more types of metal joints. The hand-held laser welding gun is flexible and convenient, which can realize long-distance welding and outdoor welding. The operating mode of the hand-held welding gun enables the part to be welded in any position and at any angle. It is suitable for spot welding of various complex welded joints.

The hand-held laser welding gun is composed of a gun body, a cooling chamber and a protective gas chamber. It is not only simple and compact in structure, easy to operate and carry anywhere, but also can be easily connected to the cooling medium source and the protective gas source, so that the welding gun can be effectively cooled, and the welding area can also be effectively used. A protective gas atmosphere is formed, which makes the weld quality reliable.





## How Much Does A Handheld Laser Welding Machine Cost?

The average cost of a handheld laser welding machine is around \$7,980 depending on the fiber laser powers based on the data from Google, Amazon, and SINBADLAB. A cheap portable laser welder with 1000W fiber laser source is priced from \$5,500 for beginners with hobbyists in home use. An affordable 1500W handheld fiber laser welding machine cost start at \$7,800 for small business with low cost. The top rated portable fiber laser welder machine with 2000W handheld laser welding gun will cost \$11,500 for commercial use in industrial manufacturing. The best budget 3-in-1 laser welding, cleaning, cutting machine prices range from \$5,500 up to \$8,500.

## Laser Welding vs MMA Welding vs MIG Welding vs TIG Welding

Shielded metal arc welding (SMAW), also known as manual metal arc welding (MMAW or MMA), shielded metal arc welding (SMAW): large spatter, low utilization rate of filler metal, frequent removal of welding slag, replacement of welding rods, extremely slow speed, low production efficiency, and a strong dependence on the welder's operating skills and experience.

Metal inert gas welding, also known as MIG welding: large welding wire consumption, large heat input, welding thin plates are easily deformed and burned through, welding of medium and thick plates needs to be grooved, and the welding seam is serious and requires subsequent polishing.

Manual tungsten inert gas welding, also known as manual TIG welding: The welding seam has shallow penetration and large melting width. It can only weld thin plates and has a large amount of deformation. Large currents will also cause the tungsten electrode to melt and evaporate. Manual wire filling is difficult and inefficient.

Hand-held laser welding: simple operation, deep penetration, fast speed, smooth and beautiful welding seam, small deformation reduce the follow-up grinding process, and can weld beautiful products without a master.

Traditional manual arc welding requires experienced welders and a lot of training and research. The control device of GW air-cooled handheld laser welding machine is intuitive and concise. The machine is preset with commonly used welding parameters, and users can customize and save what they need. Processing parameters, ordinary personnel can easily get started after a few hours of simple training, and they can work without a certificate.

The welding speed of traditional manual arc welding usually does not exceed 1cm/s, while the welding speed of hand-held laser welding can reach 2-10cm/s, and its efficiency is 2-10 times that of traditional manual arc welding, and at least 2 can be saved a year Labor cost. In addition, manual arc welding usually requires polishing after welding, and there is almost no need for polishing and cleaning after laser welding, which can save part of the labor cost.

Handheld laser welder can weld common steels (such as carbon steel, stainless steel, galvanized steel), aluminum alloys, and brass. The weld seam is beautiful, no deformation, no deformation of the weldment, no need for subsequent processing. If the laser welding machine is used to weld steel, the penetration depth can reach 4mm, and if it is welding aluminum alloy or brass, the penetration depth can reach 3mm.

## Frequently Asked Questions of Laser Welding

### How do you weld using a laser?

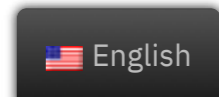
With the laser welding procedure, the energy reaches the workpiece only via thermal (heat) conduction. The welding depth required for this procedure is usually less than 2 mm.

The laser gleam thaws the materials you're connecting along the joint. Then, the melts flow into one another and the solidified melt binds the materials lastingly.

### Is laser welding potent?

In laser welding, you'll get more precise weld seams, and the finish is exceptional. The welds are also strong. Therefore, this manufacturing procedure is great for fine components. You can also use it in areas with restricted access.

### Can aluminum be laser weld?



Laser welding is commonly used to connect aluminum and its amalgams.

## Can you use filler in laser welding?

You can carry out laser welding with filler material. It can be done with wire or powder. Nonetheless, most of the industrial laser welding applications utilize wire.

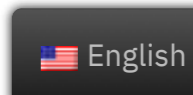
## Where is laser gleam welding mostly commonly used?

Laser welding provides a concentrated heat source and forms a potent seam at high velocity. Its procedures and applications are mostly used in the automobile industry. This is where lasers increase productivity at a low cost if you're laser welding automobile components like a door, roof, or filter assemblies together.

## Why do we use lasers for welding?

The highly focused heat source produced by a laser can form a keyhole. As a result, laser welding creates weld metals in small volumes. It conveys only a restricted amount of heat into the encompassing material, and subsequently, the samples contort less as compared to those welded using numerous procedures.

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
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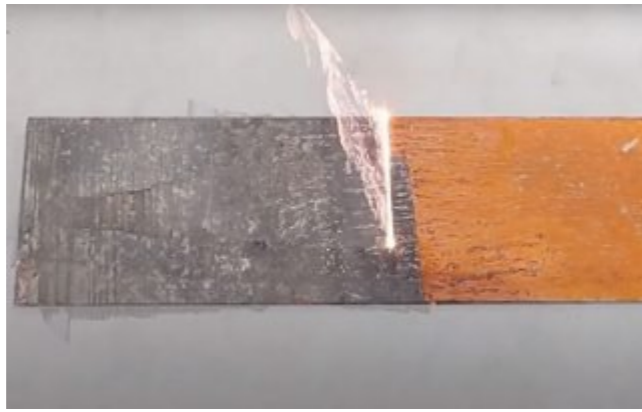


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