

# 5 DIFFERENCES BETWEEN CO2 LASER CUTTING MACHINES AND FIBRE LASER CUTTING MACHINES

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Fiber laser cutting machines are also one of the most commonly used laser cutting machines. Unlike CO2 laser machines with their gas laser tube and light transmission, fiber laser cutting machines use a fiber laser and a cable to transmit the laser beam. The wavelength of the fibre laser beam is only 1/10th of that produced by a CO2 laser. so compared to a CO2 laser cutting machine, a fibre laser cutting machine has better consistency and reliability and can process finer patterns. the main differences between a CO2 laser cutting machine and a fibre laser cutting machine lie in the following areas.

### 1. Laser

CO2 laser engraving machines use a CO2 laser tube to produce the laser beam. The CO2 laser beam is reflected and focused by a reflective and focusing lens onto the laser cutting head. The laser beam is generated by a fiber laser cutting machine using multiple diode pumps. The laser beam is then transmitted to the laser cutting head via a flexible fibre optic cable.

### 2. Materials processed

CO2 lasers have a beam wavelength of 10.64µm, which is more easily absorbed by non-metallic materials. However, a fibre laser has a beam wavelength of 1.064µm, which is 10 times shorter. Due to this smaller focal length, the intensity of a fibre laser cutter is almost 100 times higher than that of a CO2 laser cutter with the same power output. This makes fibre laser cutting machines ideal for cutting metal materials.

CO2 laser engraving machines can cut and engrave metallic materials with low efficiency. So CO2 laser machines are mainly used for cutting and engraving non-metallic materials. For example, wood, acrylic, paper, leather, fabric, etc.

The fibre laser cutting machine, also known as metal laser cutting machine, is mainly for metal materials. For example, stainless steel, carbon steel, galvanised steel, copper, aluminium, etc.

### 3. Production costs

CO<sub>2</sub> acrylic laser cutting machine in the work will consume a lot of gas. However, its photoelectric conversion rate is only 8% to 10%. Fiber laser cutting machine in the process of other consumption is less, photoelectric conversion rate of up to 25%-30%. Therefore, the fiber laser cutting machine is more energy efficient than the CO<sub>2</sub> laser cutting machine.

#### 4. Maintenance costs

The CO<sub>2</sub> laser tube has a complex structure and the optics are fragile and expensive. Replacing these consumables costs a lot of money. Therefore, the maintenance cost of CO<sub>2</sub> laser cutting machine is very high.

Fiber laser cutting is basically maintenance-free and has few wearing parts. It can withstand harsh working environments and is highly resistant to dust, shock, impact, humidity and temperature. As a result, the maintenance cost of fibre laser cutting machines is low.

#### 5. Cutting efficiency

CO<sub>2</sub> laser engraving machine processing beam divergence is large, not suitable for large size processing. Although the cutting slit is relatively small, it is slow when processing thick boards.

Fiber laser cutting machines are characterised by high laser beam density, high intensity, high brightness and high conversion rate. For thin plate processing, the cutting speed of a fibre laser cutting machine is 2-3 times higher than that of a CO<sub>2</sub> laser cutting machine of the same power.