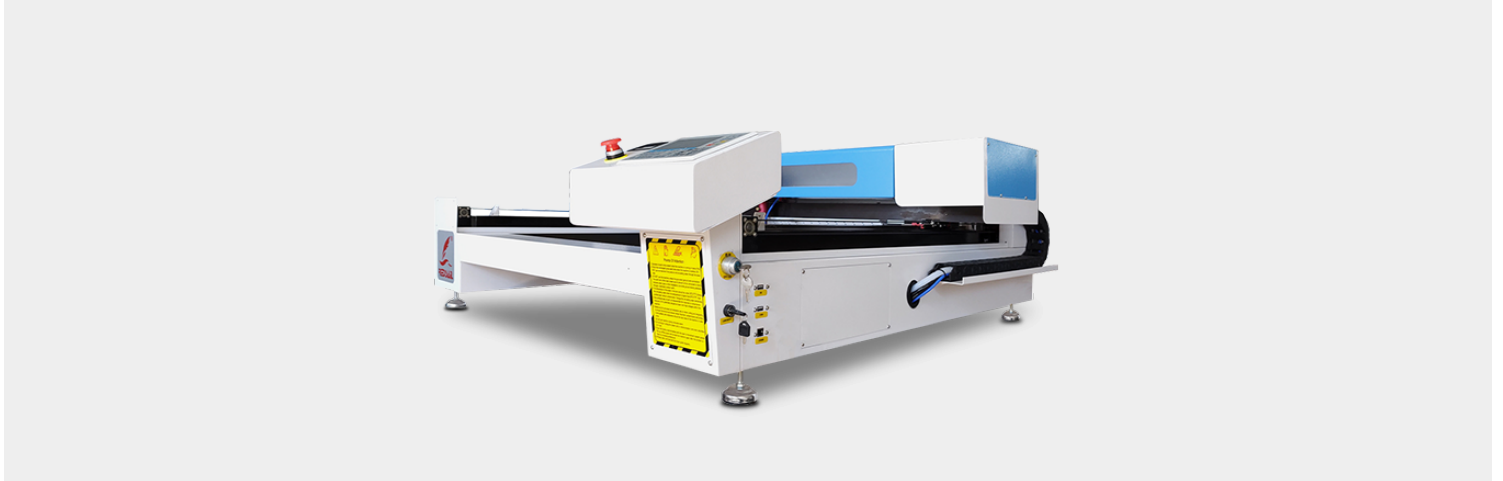


# COMPARISON AND PERFORMANCE CHARACTERISTICS OF FOUR LASER CUTTING MACHINES

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Fiber laser cutting machine, the principle of fiber laser cutting is through the transmission of optical fiber, the flexibility of laser has been significantly improved, and there are few failure points, fast speed and convenient maintenance. It performs amazingly when cutting thin plates of about 3mm, and has great advantages. However, due to the influence of the solid-state laser wavelength, its quality performance when cutting thicker plates is unsatisfactory. Generally speaking, the laser wavelength of the fiber laser cutting machine is 1.06um, which is not easily absorbed by metals and cannot cut non-metallic materials. The photoelectric conversion rate of fiber laser is more than 25%, and the advantages of fiber laser are quite obvious in terms of electricity consumption and supporting cooling system.

YAG solid laser cutting machine, the output power of YAG solid laser cutting machine is generally below 1000W, which has good stability and obvious price advantage. The output energy based on YAG solid-state laser is small, and it is generally used for cutting, drilling and welding of thin metal plates. His green laser beam can be used in pulsed or continuous wavelength, the wavelength is short, suitable for precision machining, especially in pulsed hole processing, but also for cutting, welding and punching. The wavelength of YAG solid-state laser is easily absorbed by metals. It is a pulse laser with instantaneous power and can cut non-ferrous metal materials such as copper and aluminum. The wavelength of YAG solid laser cutting machine is 1.06um, which is not easily absorbed by non-metallic materials.

#### Comparison and performance characteristics of four laser cutting machines

Carbon dioxide laser cutting machine, CO<sub>2</sub> laser cutting machine can stably cut carbon steel within 20mm, stainless steel within 10mm and aluminum alloy within 8mm. The wavelength of carbon dioxide laser is 10.6um, but it is easily absorbed by non-metals.

Although the light conversion rate of carbon dioxide lasers is only about 10%, non-metallic materials such as wood, acrylic, PP, and plexiglass. The carbon dioxide laser is equipped with oxygen injection, compressed air or inert gas N<sub>2</sub> nozzle at the beam exit to improve the cutting speed and the flatness of the cutting edge. In order to improve the stability and service life of the power supply, the carbon dioxide gas laser should solve the discharge stability problem of the high-power laser. To target thick plates, the cost of use is higher than other plates.

Ultraviolet laser cutting machine, ultraviolet (UV) laser cutting machine has a wavelength of 355nm, and adopts third-order intracavity frequency doubling technology. Compared with infrared laser, 355 ultraviolet light has a very small focused spot, which can greatly reduce the mechanical properties

of materials. It is the preferred choice for fine processing, mainly used for ultra-fine marking, engraving and micro-cutting, especially suitable for marking food and pharmaceutical packaging materials, and drilling micro-holes on circuit boards. , marking/scribing of glass materials, and complex micro-cutting of silicon wafers.