

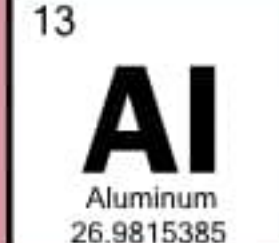
# Can Laser Cutters Cut Aluminum?

## Understanding Aluminum

Aluminum is a lightweight, conductive, and corrosion-resistant material widely used in aerospace, automotive, and electronics industries.

Its soft and plastic molecular structure allows for clean laser cuts with minimal burrs.

Different aluminum alloys (6061, 5052, 5083, 7075) can be efficiently processed to meet specific needs.



**Aerospace**



**Automotive**



**Electronics industries**

## Factors Influencing Laser Cutting of Aluminum

### Laser power



1000W



2000W



3000W



8000W



12000W



15000W



20000W

### Laser power

Higher power enables thicker cuts and faster speeds, but may increase heat-affected zones.

### Laser type

Fiber and Nd:YAG lasers are more suitable than CO2 lasers due to better absorption.

### Aluminum type and thickness

Pure aluminum is more difficult to cut than alloys; thicker sheets require higher power and gas pressure

### Surface condition

Roughness, oxide layers, and coatings affect laser beam absorption and cut quality

### Process parameters

Optimizing speed, gas pressure, focus point, and nozzle height is crucial for efficiency and quality

### Assistant gas

High-purity nitrogen protects cuts and removes melt; proper pressure is key

### Equipment properties

Laser stability, beam quality, and cooling system impact cutting performance

### Operator experience

Familiarity with equipment, parameter adjustment, and aluminum characteristics affects results



**Assistant gas**

## Laser Types and Thickness Limitations

Fiber lasers (1.064  $\mu\text{m}$  wavelength) are ideal for cutting intricate aluminum structures quickly

Nd:YAG offer high power and can cut metals and non-metals

CO2 lasers (10.6  $\mu\text{m}$  wavelength) are suitable for cutting thicker aluminum sheets (up to 16 mm with 6000 W power)

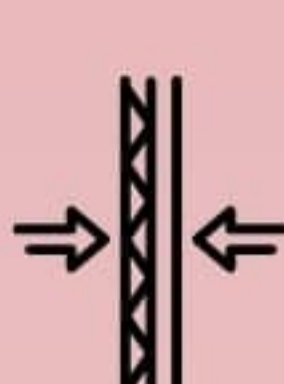
Maximum thickness for laser cutting aluminum is typically 10-20 mm; thicker sheets may require other methods



**Nd:YAG lasers**



**CO2 lasers**



**Maximum 10-20 mm**

## Advantages of Laser Cutting Aluminum



**0.02 mm**



**< 0.2 mm**

High precision and accuracy (positioning up to 0.02 mm, slit width < 0.2 mm) for complex shapes and sizes.

Clean edges, minimal material waste, and high utilization rate compared to mechanical cutting

Versatility in creating intricate designs with flexible laser head movement and programming control



## Limitations and Considerations



Heat-affected zones can cause distortion, especially in thicker sheets; proper power and speed control is necessary

Surface quality issues (streaks, roughness, slag adhesion) may occur, requiring optimization and post-processing



**> 10 mm**

Thickness constraints exist, with reduced efficiency and quality for sheets over 10 mm; pure aluminum is more challenging to cut

Applications span aerospace, automotive, electronics, signage, and construction industries



**Cutting Patterns**

Creative design possibilities for functional components and artistic works with various surface treatment options

Environmental benefits include reduced emissions, energy consumption, and chemical etching costs compared to traditional methods