Laser cutting is a mysterious and fascinating feat of science that may seem impossible to explain. How can a single beam of light cut through some of the thickest and toughest metals? While there are several different methods of laser cutting, the basic process can be simplified enough for anyone to comprehend.

This guide will help you understand what laser cutting is and how the manufacturing industry utilizes it to cut and shape sheet metal and other materials into the products we use daily.

**How does laser cutting work?**

It might come as a surprise that the word “laser” is actually an acronym for “Light Amplification by Stimulated Emission of Radiation”. The laser is a beam of intense light with a single wavelength or color and a diameter that is less than 1 inch. The heat created by this light will melt or vaporize materials—both metal and non-metal. Laser cutting is a non-contact, minimal waste-producing form of fabrication.

The key to laser cutting is knowing what kind of material you are working with, and therefore, what kind of power, wavelength, and focal spot size are necessary to cut through it safely and effectively. One of the benefits of laser cutting machines is that you have control over the process.

**Components**

The **laser resonator**is where the beam is generated. The laser beam is focused on a piece of material with the help of mirrors called **beam benders**. These mirrors bounce the laser back and forth within the **Laser Focusing Head**. You are able to control the **lens,**which finishes off the focusing process with precision and accuracy. It shoots the beam through the **nozzle**and out onto the workpiece. Material is melted, and a cut is made.

The smaller the spot the beam is focused on, the higher the intensity of the laser. The process is supported with what is called *assist*or *cutting gas*. These compressed gases are pushed through the nozzle to aid the work of the laser and remove excess material within the slit or cut made—otherwise known as the *kerf*. This ensures a clean cut every time.

It is important to know the reactive and non-reactive properties of the material you are working with so you know what kind of cutting gas can be used. The most common gases used are oxygen or nitrogen.

**Beam movement**

There are two types of beam movement:

* **Pulsed beam:**The laser is produced in short bursts to cut intricate shapes or to make holes within thicker materials.
* **Continuous beam:**The laser is run continuously and on a high power.

**Types of machines**

*Moving materia*laser cutting machines stay stationary while the workpiece moves, *flying optics*laser cutting machines have a moving laser and a stationary workpiece, and *hybrid*laser cutting machines can function both ways.

There are also lasers that are made from different materials: either gas, liquid, or solid state. For example, one of the most common laser cutting machines has an electrically stimulated CO2 laser. This cuts through non-metal materials. Fiber cutting machines have solid-state lasers formed from pump diodes and glass fibers. They can cut through metals as well as non-metals. Crystal cutting machines use crystals; however, they involve a more expensive upkeep than the other machines.

**Who uses the laser cutting method?**

A variety of industries will use the laser cutting method to create quality products. This includes but is not limited to woodworking, aerospace, automotive, electronics, and medical.

**Advantages**

There are many advantages to using the laser cutting process:

As mentioned previously, it is a non-contact method, so there is a lower risk of damage to any workpieces. The compact and focused nature of laser cutting means narrow kerfs with very small amounts of waste are produced. No extra cleanup is necessary!

The results are always accurate, highly specialized, and controllable. A CNC laser cutting machine can be programmed in many different ways depending on the project and the materials used ( like steel, glass, plastic, wood, etc.) You can decide and change things such as focus and intensity of the laser. Additionally, the process is very cost effective because it does not require expensive replacement parts—especially CO2 machines.

**Disadvantages**

[Laser cutting](https://mainstaymfg.com/capabilities/laser-cutting/) is not always the best solution for every project.

Reflective metals are difficult to work with because the lasers tend to bounce off the metal instead of being absorbed by it. This is not the only material that could be dangerous if used: some non-metals like plastic may result in harmful gas emissions.

Finally, although the process is usually worth the cost of the equipment, it does require an ample amount of energy to work it all.