



## **Settings for Success: Techniques for most popular engraving materials**

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When it comes to laser engraving, CO2 engravers are capable of handling almost any material, from wood to acrylic, treated aluminum to glass and well beyond. But how do you know what speed and power settings to use for different materials? It's a simple question with a not-so-simple answer.

Speed and power settings depend mainly on two things: the first is the material you're engraving or cutting, and the second is the wattage of the machine you're using. On some materials such as wood, the higher wattage the machine, the faster you can set the speed to get to the same engraving depth as a lower wattage laser. Therefore, the higher the wattage, the more throughput you can achieve from the same system. Materials such as acrylic require little power to engrave so they can be marked almost as quickly with a low wattage laser as they can with a high wattage laser. The thickness of the material you're engraving or cutting will also impact the speed and power settings you select. For example, a three-quarter inch piece of acrylic will take more power to cut than a piece that is only one-quarter inch thick.

This article will give you a general overview on popular engraving materials, along with tips to produce spectacular looking results.

Wood is by far the most laser-friendly material. It can be engraved and cut very easily, and when engraved, lighter colored woods like cherry or maple produce a very nice contrast where the laser burns away the wood.

Every type of wood has its own characteristics. Some are denser than others, with the harder woods requiring more laser power to cut or engrave. The most common hardwoods used with the laser are cherry, walnut, maple and alder. These woods have relatively few veins of grain running through them, while oak has medium to large veins. Because it is much grainier, oak is a less desirable choice for wood engraving, as designs vary greatly in height and have a very non-uniform appearance.

### **Wood engraving techniques:**

- Wood is a great material to laser engrave because it discolors when engraved and the depth of engraving is greater than most materials. The downside is that it takes a lot of power to deeply engrave wood at high speeds.
- Most wood can be engraved using full power no matter whether you are using a 25-watt laser or a 120-watt laser.
- Depending on the wattage of your laser, the best approach is to set the laser power at 100 percent and adjust the speed to obtain the desired depth.
- Wood is a very easy material to work with and you can produce very nice detail with as little as 300 DPI engraving. 600 DPI engraving into wood produces even better results.
- Grayscale clipart images look wonderful when engraved into wood. Since the wood reacts differently to each level of gray, you can produce an amazing amount of contrast.
- Engraving grayscale clipart images also creates a shading effect that is almost three-dimensional in appearance.

- Grayscale photographs can also look wonderful on wood, but these images usually need to be processed through specialty software before they are truly ready to be engraved into wood.
- When engraving wood, understand your results will turn out better if the grain of the material runs parallel with the X-stroke of the carriage.

Next to wood, acrylic is the second most popular material for laser cutting and engraving purposes. Acrylic is easy to both engrave and cut. Additionally, it comes in a wide variety of shapes and sizes, and can be relatively inexpensive.

Acrylic comes in two forms: **Cast** and **Extruded**. Cast acrylic is used for almost all engraving purposes because when it is engraved, it produces a white, frosty look that makes for a clean contrast against the clear material. Extruded acrylic remains clear when engraved and does not produce much of a contrast. Extruded acrylic, on the other hand, is ideal if you are only going to vector cut. The material has a lower melting point, which produces an almost flame-finished edge when cut with the laser.

#### **Acrylic engraving techniques:**

- Most acrylic is reverse engraved on the back side of the item. This produces a “look through effect” from the front of the surface. We recommend removing the top protective cover from the acrylic before engraving. Leave the bottom protective layer on so that it remains in tact to prevent scratching while handling the acrylic.
- Remember to reverse or mirror your artwork prior to starting an engraving project on acrylic. This will be important because you are engraving on the backside of the material.
- Engrave the acrylic at a high speed and low power. A small amount of power is all it takes to mark acrylic and if you set your power level too high, you run the risk of distorting the acrylic when engraving.
- When engraving acrylic, set the focus so the acrylic is slightly further from the lens than normal. Lowering the focus by approximately 1/16 inch (1.6 mm) will soften the engraving so that each individual raster line blends better with the lines above and below producing a smoother, more pleasing look.
- There are a large number of acrylic products that are painted on one side to add color to the clear acrylic piece. You can engrave directly through the paint into the acrylic for a very nice presentation effect. Leave the speed the same as if you are engraving clear acrylic and increase the power about 10% to engrave through the paint. Applying too much power to the paint will melt it and cause distortion.
- Cutting acrylic is usually best achieved with relatively slow speed and higher power. This combination allows the laser beam to melt the edges of the acrylic and produce an almost flame-polished edge.
- Acrylics generally require only a single pass to cut, but thicker acrylics may need two passes. As with engraving, it is sometimes necessary to mask and dampen the acrylic before cutting. Acrylic is very flammable – you should never leave your laser unattended when vector cutting any material.

#### **Glass Engraving Techniques**

When it is etched or engraved, glass produces a very classic and sophisticated look. That’s why it’s a very popular material for laser engravers. When a laser strikes glass, it fractures the surface, but it will not engrave deeply or actually remove material. The fracturing you see on the surface is what produces the highly sought-after frosted look. Unfortunately, if the glass is not protected during the engraving process, the fracturing can cause flaking and unwanted chipping of the engraved area.

The composition and quality of glass varies greatly, which makes it challenging to predict the effect that you will achieve. We always recommend experimenting with a variety of glass types as well as speed and power settings.

**To produce a smooth frosted finish with minimal chipping, use the following techniques to protect the glass while engraving:**

- Using your finger or a paper towel, apply a thin coat of liquid dish soap over the area to be engraved.
- Place the glass into the engraver and laser through the soap while it is still wet.
- The dish soap is often all that is needed to protect the glass.

Alternately, another method is:

- Cut a piece of newspaper or paper towel a little larger than the area to be engraved.
- Completely soak the paper with water then wring out the excess water. You can also place the paper on the glass first and use a mister to soak the paper.
- Apply the paper to the glass and smooth it out so that there are no wrinkles.
- Place the glass into the engraver and laser through the paper while it is still wet.
- Remove the glass, discard the remaining paper, and clean the glass.

Using the techniques above will help ensure your glass engraving projects turn out perfectly every time. From wine glasses to plaques or even full bottles, etching on glass creates a very personalized, very permanent mark that can capture a moment forever.

**Plastic engraving techniques:**

The last material we'll examine is laserable plastic. Engraving plastics has become more mainstream in the past few years as manufacturers have created more laser-friendly materials. Plastic manufacturers have developed a broad range of plastics that have thinner cap sheets, which provide much better engraving and cutting characteristics. These plastics are commonly referred to as Micro Laminates, Micro surfaced, or simply 'laser engravable plastics.' They are generally very easy to engrave with a laser since they all have similar characteristics. Even though lasering plastic has become more convenient in the past few years, it is still important to experiment with different plastic materials and power settings. Different color plastics, even if they are from the same manufacturer, will have unique speed and power settings.

- Always remove the clear protective cover layer before engraving.
- Most laserable plastics can be engraved at high speed with power adjusted accordingly for the wattage of your laser. When experimenting, set your speed to a fast setting and then adjust the power output until you get a nice engraving without any melting.
- With some plastics it is best to engrave using two passes. The first pass cuts through the cap layer and the second pass cleans away the residue that some plastics leave behind.
- Another technique that can be useful is to mask the plastic before engraving with transfer or masking tape. This will prevent a buildup of residue on the plastic surface.
- Try misting the transfer tape with water to reduce heat buildup and melting on sensitive
- If you do not get acceptable initial results with the recommended speed and power settings, start experimenting by first changing only the power setting. If adjusting the power setting does not work, start over and adjust only the speed setting. Once you have acceptable results, record those settings for that particular plastic so that you do not have to repeat the experimentation process.

As you can see, the question of what speed and power settings to use on different materials is not a simple one to answer, as there are many variables to consider. Whether or not you own an Epilog, you likely received speed and power settings from your laser manufacturer. Those provide an excellent starting point for all of your laser materials. However, experimentation with materials and settings is the best way to achieve the perfect look you're going for.