

# LASER MATERIAL SETTINGS

## Fusion Series Suggested Material Settings (CO2)

Material	DPI/Freq.	75 watt
<b>Acrylic</b>		
Photo Engraving	300 DPI	90s 40p
Text/Clipart Engraving	300 DPI	90s 60p
Text/Clipart Engraving	600 DPI	90s 55p
Cutting 1/8" (3 mm)	100 f	10s 100p
Cutting 1/4" (6 mm)	100 f	3s 100p
Cutting 3/8" (9.5 mm)	100 f	1s 100p
Cutting 1/2" (13 mm)	100 f	

Cutting Note: Adjusting the standard focus distance so it is closer to the lens by about .080" (2 mm) will produce better edge quality when cutting 1/4" (3mm) acrylic and thicker. Two passes can be used for cutting thicker materials. There are two types of acrylic: cast is better for engraving (it creates a frosted look when engraved) and extruded acrylic produces a much better flame polished edge.

Material	DPI/Freq.	75 watt
<b>Alumamark</b>		
Engraving	300 DPI	90s 20p
Engraving	600 DPI	90s 10p

Material	DPI/Freq.	75 watt
<b>Anodized Aluminum</b>		
Photos/Clipart	400 DPI	90s 35p
Photos/Clipart	600 DPI	90s 30p
Text	600 DPI	90s 40p

We find when engraving anodized aluminum, text appears best at 600 DPI, but photos and clipart can be engraved with great detail down to 400

Material	DPI/Freq.	75 watt
<b>Cork</b>		
Engraving	300 DPI	90s 30p

Material	DPI/Freq.	75 watt
<b>Fleece</b>		
Engraving	150 DPI	90s 15p

When engraving fabric, try changing the graphic to 80% gray and use the Jarvis dithering pattern for the best results. Every fabric you are cutting will need to have adjusted setting - find a small swatch of the fabric you can test first.

Material	DPI/Freq.	75 watt
<b>Glass</b>		
Engraving	300 DPI	35s 100p

When etching glass, try changing the graphic to 80% gray before engraving and using the Jarvis dithering pattern. You can also diffuse heat by covering the have adjusted setting - find a small swatch of the fabric you can test first.

Material	DPI/Freq.	75 watt
<b>Leather</b>		
Photo Engraving	300 DPI	90s 20p
Text/Clipart Engraving	600 DPI	90s 25p
Cutting 1/8" (3 mm)	50 f	30s 100p

Material	DPI/Freq.	75 watt
<b>Tag Board</b>		
Engraving	300 DPI	50s 20p
Cutting	50 f	30s 40p

Material	DPI/Freq.	75 watt
<b>Masking Tape (testing)</b>		
Engraving	300 DPI	100s 10p

Material	DPI/Freq.	75 watt
<b>Marble</b>		
Photo Engraving	300 DPI	90s 35p
Text Engraving	600 DPI	90s 45p

Every marble is very different for settings. Start low and increase the power with a second run if you haven't used that marble before.

Material	DPI/Freq.	75 watt
<b>Painted Brass</b>		
Engraving	300 DPI	90s 25p
Engraving	600 DPI	90s 15p

These settings work well with many plastics, including plastic phones and covers. Even one color plastics can achieve a great look when engraved.

Material	DPI/Freq.	75 watt
<b>Plastic (2 Layer)</b>		
Engraving	300 DPI	90s 40p
Engraving	600 DPI	90s 25p
Cutting 1/16" (1.5 mm)	100 f	10s 40p

Material	DPI/Freq.	75 watt
<b>Rubber Stamps</b>		
Engraving	600 DPI	60s 100p
Cutting	100 f	25s 100p

Material	DPI/Freq.	75 watt
<b>Stainless Steel</b>		
Engraving	600 DPI	45s 100p
Twill		
Cutting	25 f	90s 80p

Material	DPI/Freq.	75 watt
<b>Wood</b>		
Photo Engraving	600 DPI	70s 100p
Clipart/Text Engraving	300 DPI	60s 100p
Clipart/Text Engraving	600 DPI	65s 100p
Deep Engraving	600 DPI	30s 100p
Thin Veneer (Cutting)	10 f	50s 80p
Cutting 1/8" (3 mm)	10 f	20s 100p
Cutting 1/4" (6 mm)	10 f	5s 100p
Cutting 3/8" (9.5 mm)	10 f	1s 100p
Cutting 1/2" (12 mm)	10 f	

When cutting wood, multiple passes may allow cutting of thicker materials. Using Color Mapping you can adjust the focus point between passes down to the center point of the cut for the best results.

Material	DPI/Freq.	75 watt
<b>Mat Board</b>		
Cutting	50 f	30s 40p

Material	DPI/Freq.	75 watt
<b>Cardboard</b>		
Engraving	300 DPI	70s 25p
Cutting 1/8"	50 f	25s 100p

Material	DPI/Freq.	75 watt
<b>MUG - Powder Coated</b>		
Engraving	600 DPI	75s 100p

1200 DPI might help "clean" more

**WOOD:** If you want your engraving to have a darker burn look - you should OFFSET the focus

- > add a .2" offset
- > also consider running at 1200 dpi
- > and break your project into 2 jobs
  - A) Raster/Engraving with .2" offset focus
  - B) Vector cutting that is in focus (no offset)

## Fusion Series Suggested Material Settings (Fiber)

Material	DPI/Freq.	50 watt
<b>Aluminum (Anodized)</b>		
Etching/Marking	600 DPI	Speed: 50 - 60% Power: 100% Frequency: 1% Focus: +.06 to +07

The contrast / brightness of marks achievable on the fiber laser are excellent and can often be much brighter than marks from a CO2 laser Taking the fiber laser out of focus by +.06" - .09" broadens the beam and produces a very bright mark on anodized coating. Lower frequency and higher power settings help offset the change in focal point

Material	DPI/Freq.	50 watt
<b>Aluminum (Bare)</b>		
Etching/Marking	600 DPI	Speed: 40 - 50% Power: 100% Frequency: 50 - 60% Focus: -.01 to +.01

Engraving aluminum will result in various shades of gray, not black. Fine tuning the settings can provide a bit more contrast but the range of applicable marks is very narrow. If the application calls for a black etch, consider using an oxidizer after engraving. Oxidizers are used most commonly if the protective coating covering the area that is not engraved. Deep metal engraving on aluminum passes. Consider deep engraving and using a black epoxy/color fill. Although the marks on aluminum are not black like they are getting 2D, UID barcodes to scan and verify

Material	DPI/Freq.	50 watt
<b>Brass</b>		
Etching/Marking	600 DPI	Speed: 40 - 50% Power: 100% Frequency: 5 - 20% Focus: 0

Material	DPI/Freq.	50 watt
<b>Brass</b>		
Etching/Marking	600 DPI	Speed: 40 - 50% Power: 100% Frequency: 5 - 20% Focus: 0

Material	DPI/Freq.	50 watt
<b>Laserable Plastic</b>		
Etching/Marking	600 DPI	Speed: 60 - 70% Power: 60-70% Frequency: 50% Focus: 0

Material	DPI/Freq.	50 watt
<b>Stainless Steel</b>		
Annealing	600 DPI	Speed: 10 - 15% Power: 100% Frequency: 1% Focus:
Etching/Marking	600 DPI	Speed: 40 - 50% Power: 100% Frequency: 1-5% Focus: -.01 to +.01
Polishing	600 DPI	Speed: 70 - 80% Power: 35 - 40% Frequency: 50 - 60% Focus: 0

Material	DPI/Freq.	50 watt
<b>Titanium</b>		
Annealing	600 DPI	Speed: 11 - 15% Power: 100% Frequency: 1% Focus: -.08 to +.110
Etching/Marking	600 DPI	Speed: 40 - 50% Power: 100% Frequency: 1-5% Focus: -.01 to +.01

Titanium and Ti alloys are highly amenable to marking at this wavelength. Similar to aluminum, a black mark from the etching process is difficult to achieve. Various shades of gray can be made, from very dark gray to light gray. Annealed marks can also be made on titanium materials using the same processing parameter described for stainless steel. Depending on the Ti alloy, marks of various colors can be achieved by changing the frequency values for 1% up to 100%. It is common to see red, blue, green, orange, yellows and purple marks, depending on the frequency selected.

Material	DPI/Freq.	50 watt
<b>Plated Metals</b>		
Etching/Marking	600 - 1200 DPI	Speed: 30-40% Power: 100% Frequency: 1 - 5% Focus: -.09 to -.100"

Metals are often plated to assist with conductivity, to provide a protective coating against rust and elements and for aesthetic purposes. Plating thickness will depend on application and purpose. Most of the plated metals processed through the applications lab are electronic components (to enhance conductivity) and various fittings (protection against environment & rust). The typical plating thickness varies from .001" up to .005". Our recommended settings for general metal engraving works well for ablating through the plating; exposing the base metal. Ablating the plating will also provide high contrast. Using an oxidizer will enhance the look.

Material	DPI/Freq.	50 watt
<b>Powder Coating</b>		
Etching/Marking	600 DPI	Speed: 50 - 60% Power: 100% Frequency: 100% Focus: +.05 to .07"

Two to three passes are suggested (one pass to ablate the powder coating, 2nd or 3rd pass to polish up the metal underneath). A little less power, higher frequency and less focus adjustment will be required for the 2nd or 3rd pass, depending on the base metal. The idea is to ablate then polish. An alternative to running two or more passes is to run one pass and then use a common cleaner such as Simple Green or a citric-based cleaner with short, stiff bristle brush to scrub out the residual material remaining in the mark area. If using this technique, it may be necessary to raise or lower the marking table from around 0.07" to 0.10".

## GENERAL NOTES:

Our recommended settings for polishing of metals are a good starting point where ablating through the plating isn't an option. This is likely the most common plated metal application as exposing the raw metal underneath will break continuity and / or expose the bare metal to rust and other elements. Note that the contrast of polishing of plated metals won't be as consistent or contrasting as a direct ablation. Multiple passes will help and end results will vary based on the metal used for plating, thickness of plating & size of mark. Our recommended settings for annealing will often work for plated metals where the plating has a thicker wall and material used has high levels of carbon or metal oxides.

Power settings: The power settings are linear - 50% power is half as much as 100% power.

Annealing: To achieve an annealed mark, the focal point should be significantly away from zero. The unfocused, broader beam provides the heat to change the surface color without actually penetrating. The focal point can be either closer to or away from zero. Focusing away from the material should be in the range of -.060" to-.090". Focusing closer to the material is generally in the range of +.070" to +.110". Both focusing methods will result in a dark black annealing of the metal. Focusing up typically results in a slight indentation of the metal. Multiple passes can darken the mark even more (no data to confirm whether multiple passes

Speed settings: The speed setting scale of 1% to 100% is not linear - 100% speed will not be twice as fast as 50% speed.

## GENERAL NOTES:

Etching: Like our CO2 counterparts, the slower the speed setting, the deeper the etching. However, many metal applications can be processed at higher speed settings in the range of 50-100%. Again, consider the marking requirements. If the only stipulation is permanency, you'll find the FiberMark can engrave a broad range of metals at higher speeds, regardless of laser wattage. Don't be afraid to turn up the juice!

These are only guidelines: Brightness or darkness of a mark is a matter of personal preference and can be very dependent of the type of material being marked. As such, there is no "correct" setting. Working with the four different fiber settings becomes fairly intuitive in a very short period of time for most users. If you have a material that is not listed, try to compare it to similar materials listed and use those settings as your starting point.

Polishing: Some steel alloys are easier to polish than others. For best results, clean off the surface with alcohol prior to processing. Any leftover grease, oils or residue can affect how well the polished mark turns out. Polishing the metal where the final marks result in a bright white engraving requires finer tuning of settings, more so than the etched or annealed marks. Determine a base speed and frequency setting and adjust the power in small increments/decrements. If you are unable to get a white bright mark, increase the frequency setting and try again by adjusting only the power.

The Fusion has two sets of Speed control for vector cutting applications. Checking the Speed Comp selection box in the print driver will reduce the speed setting you have selected by one half. Speed Comp is most useful for speeds of 1 to 10. Example: Cut a square at 5% speed. Then repeat the job at 5% speed and also select Speed Comp. The second square will take twice as long to cut as the first square. Speed Comp gives you more slower speed setting to work with. Always use Air Assist when cutting.