

## Fiber laser guide

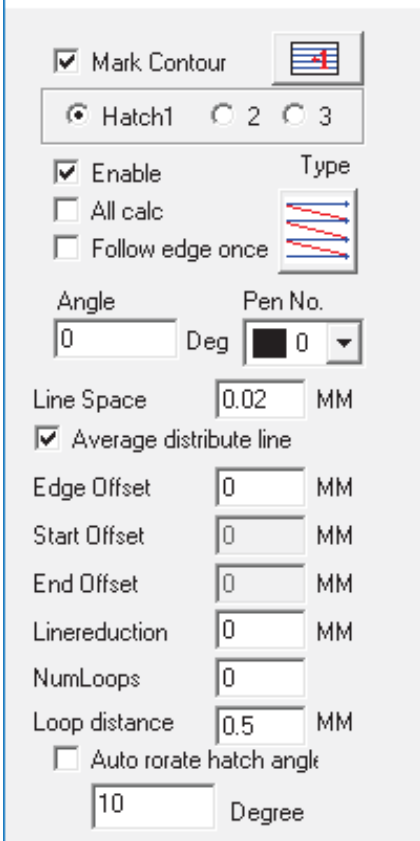
This document provides generalized laser parameters for a variety of marking styles on various materials. Fiber laser marking has several parameters or settings that are programmable, which can affect the results you achieve on a specific material or substrate.

There are 5 primary parameters that will affect the marking result:

- Loop Count (number of repeat passes)
- Speed (mm/sec) (the speed at which the beam travels across the surface during lasering)
- Power % (percentage of total available power)
- Frequency (KHz) (number of laser pulses delivered per second - In general, lower frequencies produce less heat but are more aggressive while higher frequencies produce more heat but are less aggressive.)
- Hatching or Fill (how objects are made solid, as opposed to only an outline. Users can control density, angle and type of fill pattern. The fill is important to achieve the proper type of mark.)

NOTE : The settings shown on the next pages are provided as a general guideline and serve mainly as a starting point. Individual materials and preference will determine the final combination of settings for each application. Some user experimentation and testing will be required. Contact Perfect Laser for assistance on fine tuning your laser settings or marking difficult or unusual materials and substrates.

## Hatch



## Burning / General Marking

Materials: Steel, Stainless Steel, Aluminum, Brass, Titanium.  
Created by aggressively burning the surface of the material. Depending on the substrate, the mark will vary in colour from medium brown to black or black/grey. The surface of the material will feel rough to the touch.

## Annealing / Black Surface Marking

Materials: Steel, Stainless Steel, Titanium.  
Created by applying a large amount of heat to the surface of the material while minimizing the aggressiveness of the mark. The result is a solid black mark with a smooth surface finish. This type of marking is commonly used in medical applications.

## Ablating / Material Removal

Materials: Anodized, Black Oxide, Painted or Coated Materials.  
Created by removing the surface coated layer of a material, such as burning the anodized layer off of aluminum. This usually results in a bright or white colored mark when contrasted with the coating. The mark is relatively smooth with minimum surface penetration.





## Frosting / White Surface Marking

Materials: Carbide, Aluminum, Stainless Steel, Chrome Plated, Nickel Plated, Galvanized.

Created by frosting the surface of the material at high speed. This usually results in a bright or white coloured marking. The marks may have a slight texture to the touch, but the surface or coating penetration is minimal or none.

## Deep Engraving / Material Removal

Materials: Steel, Stainless Steel, Aluminum, Rubber, Various Other Substrates.

Created by removing material to create a mark with depth. The resulting mark has an embossed look. The mark depth can vary from minimum to extreme depending on the time, frequency and power used for the process. Removing multiple shallow layers to get the desired depth is preferred.

## Foaming / Colour Change (Plastics)


Materials: Various Plastics.

Created by a controlled burn on the surface of plastic. This usually results in a white, tan or dark colored mark depending on the plastic. The mark is relatively smooth with minimized surface penetration. Controlling the heat is very important to prevent distortion of the plastic.


## Approximate Settings (30 Watt Fiber)

### Material : Stainless Steel, Steel, Titanium

#### Mark Type : Burn

Hatch Angle	Mark Contour	Hatch	Line Space	Passes	Speed	Power	Frequency
90	No		0.01	1	100	90	20


#### Mark Type : Anneal

Hatch Angle	Mark Contour	Hatch	Line Space	Passes	Speed	Power	Frequency
180	No		0.03	1	100	90	25

#### Mark Type : Frosting

Hatch Angle	Mark Contour	Hatch	Line Space	Passes	Speed	Power	Frequency
90	No		0.05	1	1500	50	65

#### Mark Type : Deep Engrave

Hatch Angle	Mark Contour	Hatch	Line Space	Passes	Speed	Power	Frequency
90	No		0.005	5	200	90	30




Material : Brass

Mark Type : White


Hatch Angle	Mark Contour	Hatch	Line Space	Passes	Speed	Power	Frequency
90	No		0.03	4	1500	90	60

Mark Type : Deep Engrave

Hatch Angle	Mark Contour	Hatch	Line Space	Passes	Speed	Power	Frequency
90	No		0.01	5	200	100	35


Material : Anodized Aluminum / Painted / Black Oxide

Mark Type : White

Hatch Angle	Mark Contour	Hatch	Line Space	Passes	Speed	Power	Frequency
90	No		0.03	1	2000	100	55

Material : Plain Aluminum


Mark Type : Frost

Hatch Angle	Mark Contour	Hatch	Line Space	Passes	Speed	Power	Frequency
90	No		0.03	2	2000	100	45

Mark Type : Deep Engrave


Hatch Angle	Mark Contour	Hatch	Line Space	Passes	Speed	Power	Frequency
90	No		0.01	5	1500	100	35

Mark Type : Burn

Hatch Angle	Mark Contour	Hatch	Line Space	Passes	Speed	Power	Frequency
90	No		0.01	1	50	100	20

Material : Plastics

ABS

Hatch Angle	Mark Contour	Hatch	Line Space	Passes	Speed	Power	Frequency
90	No		0.05	1	1500	20	45

Nylon

Hatch Angle	Mark Contour	Hatch	Line Space	Passes	Speed	Power	Frequency
90	No		0.03	1	2000	70	35


CPVC

Hatch Angle	Mark Contour	Hatch	Line Space	Passes	Speed	Power	Frequency
90	No		0.03	1	3000	20	65

LDPE

Hatch Angle	Mark Contour	Hatch	Line Space	Passes	Speed	Power	Frequency
90	No		0.03	1	1000	100	20

Acrylic

Hatch Angle	Mark Contour	Hatch	Line Space	Passes	Speed	Power	Frequency
90	No		0.03	3	500	100	65

