TECH TIPS

FIBERGRAVE™ GUIDELINES

Overview:

FiberGrave is a new and innovative product that opens the door to many new applications for laser-marked plastics. One of the most significant features of FiberGrave is the ability to produce a contrasting mark with a fiber or YAG laser instead of engraving the material to expose underlying contrasting color on the product. In addition, the ability to cut out custom shapes utilizing a standard CO_2 laser, router or engraver makes FiberGrave a versatile solution for specialty tags, labels, and more.

Usage:
- ID Tags
- Name plates
- Identifiers
- Traceability
- Utility markers

- Livestock tagging
- Control Panels
- Bar code scanning
- QR code scanning
- Data matrix scanning
- Signage and photo images

Recommended settings (starting points):

Gantry* lasers
FiberGrave white 0.020" & 0.040"

Laser Source	Power	Speed	Frequency	Focal Length	Focus
30w Fiber- Gantry*	80%	50%	75	3"	In-focus

FiberGrave black 0.020" & 0.040"

Laser Source	Power	Speed	Frequency	Focal Length	Focus
30w Fiber-Gantry*	60%	90%	25	3"	In-focus

Galvo** lasers
FiberGrave white 0.020" & 0.040"

Laser Source	Power	Speed	Frequency	Overlap	Focal Length	Focus	Direction	Angle
50w Fiber-Galvo**	50%	5,000 mm/s	200 KHz	0.030"	160 mm	In-focus	Bi-direction	0°

*Gantry lasers- lasers configured like an "XY plotter", laser head moves above the material when engraving or cutting.

**Galvo lasers- laser head is stationary, utilizes moving mirror technology; moves mirrors quickly and precisely at different angles within a specific engraving/cutting area.

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How to fabricate FiberGrave:

Laser marking (Fiber/YAG):

1. Remove the masking from the surface of the FiberGrave sheet.
2. Place the FiberGrave sheet onto the laser bed.
3. Adjust the focus of the laser so that it is in-focus to the surface of the FiberGrave sheet.
   a. *If the laser is dual laser source, be sure to adjust using the fiber/YAG laser source parameters and/or use the fiber/YAG focus tool included with your laser.*
4. Set laser speed, power, and frequency settings in your laser setting options.
5. Send the marking job to the laser.

Laser vector cutting (CO2):

1. Place the FiberGrave sheet onto the laser bed with masking still intact.
   a. *For best results, Rowmark recommends leaving the protective masking on the surface of the FiberGrave sheet when vector cutting.*
2. Adjust the focus of the laser so that it is in-focus to the surface of the FiberGrave sheet.
   b. *If the laser is dual laser source, be sure to adjust using the CO_2 laser source parameters and/or use the CO_2 focus tool included with your laser.*
3. Set laser speed, power, and frequency settings in your laser setting options.
4. Send the cut job to the laser.

Fabrication Notes:

- Variable tones can be created by varying the fiber/YAG power, speed, and frequency settings of the laser.
- A focus offset of approx. +1mm focal distance can be applied to create an additional variation of tones.
  - *FiberGrave requires a high concentration of laser radiation to produce a high-contrast mark. To prevent excessive laser beam diffusion, do not exceed +2mm additional laser focus offset.*
- Higher power and/or lower speed and frequency settings **will not** always create a darker mark on the white sheet, or brighter mark on the black sheet.
  - *Rowmark recommends running a laser power grid to show the range of tones that your laser make/model will produce on FiberGrave sheet.*
    - *Laser power grids consist of a matrix of lasered marks ranging from 0-100% power, speed and frequency combinations, creating a quick-reference example of the range of tones that can be achieved on FiberGrave.*
    - *For your convenience, utilize the power grid artwork files provided by Rowmark. (.CDR or .PDF formats, other formats available upon request)*
- Laser settings that are too intense may cause excessive foaming or melting of the material surface as well as cause the sheet to warp.
  - *The laser power grid will help determine the optimum settings for your application as well as settings that minimize or prevent warp.*
- Using a fiber laser to vector cut FiberGrave is <u>not</u> recommended.

How to use a laser power grid:

Using a laser power grid is the quickest and most effective way to find the best combination of laser settings for fabricating a new or unknown material for the first time.

<u>Overview</u>:

A laser power grid will show every power/speed combination starting from a very low percentage of power/speed (such as 10%) and moving to the maximum power/speed combination (100%) on a laser engraver.

Laser power grid (.cdr or .pdf)
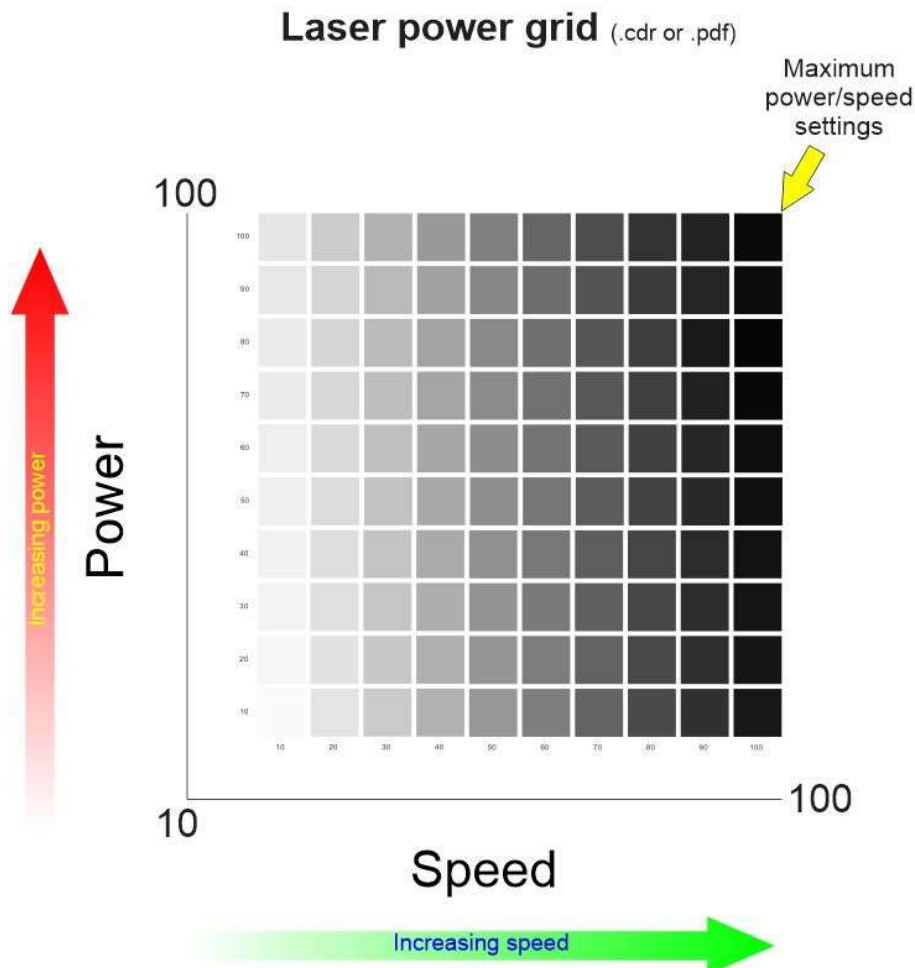
Some laser engravers may have the capability to run a power grid as a feature built into the software or driver. For lasers that do not have this capability, a power grid may have to be set up manually.

Laser power grid setup:

Many lasers have the ability to assign marking/cutting parameters to individual colors within the artwork, usually referred to as color mapping. For using the color mapping function of your laser, refer to the laser's instruction manual. Follow these steps to set up the laser power grid artwork using color mapping.

1. Save the laser grid file to your computer.
2. Open the laser grid file in your layout software (CorelDraw, Adobe Illustrator, etc.).
   a. Use only page 1 to send to the laser for engraving.
3. If necessary, resize the laser grid artwork to fit the sample material used for the test.
4. Open the settings of the laser or laser driver. Set up the color mapping settings for the test (refer to the laser's manual for color mapping setup).
   a. Page 2 specifies the RGB values for each grid square. Enter the RGB values and corresponding speed/power settings of each grid square into the color mapping settings of your laser.
   b. Examples:
      i. R: 250, G: 250, B: 250= 10% power, 10% speed.
      ii. R: 120, G: 120, B: 120= 40% power, 60% speed.
      iii. R: 61, G: 61, B: 61= 80% power, 80% speed.
      iv. R: 5, G: 5, B: 5= 100% power, 100% speed.
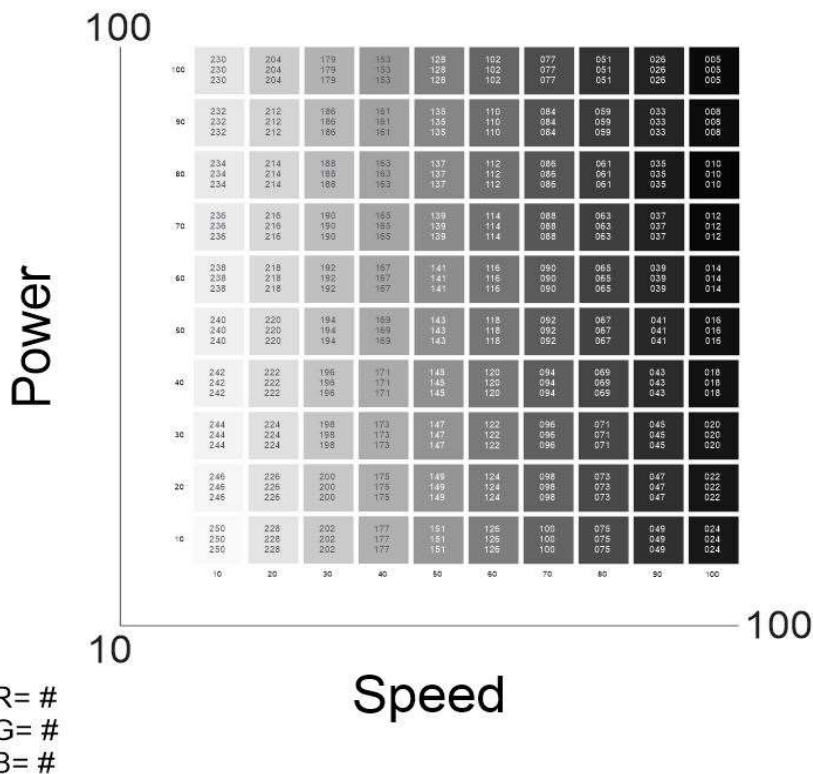
5. When setting frequency, it is recommended to set the frequency to 50% or half of the available frequency spectrum. Use the same frequency setting for all squares in a single power grid.
6. When color-mapping settings are complete, send to the laser to engrave.
7. To find the broadest range of color/contrast results, run three total power grids; each with low, middle, and high frequencies:
    a. First grid- lower frequency, example: 10% Q (frequency)
    b. Second grid- middle frequency, example: 50% Q
    c. Third grid- high frequency, example: 90% Q
8. Observe all laser marked power grids to find the desired laser setting combination.
    a. Retain the laser grid tests for future reference.

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