

Best practise guide

All CO₂ lasers contain a mix of gasses in the appropriate proportions, contained in a sealed tube. When this gas is excited, an intense beam of light is produced.

Over the course of operation this internal gas will break down, resulting in loss of efficiency; this is a normal occurrence of laser technology, resulting in reduced power density, and increased difficulty cutting through materials.

In order to get the most from your cutting system, there are certain steps which can be taken in order to ensure longevity of your laser tube, which are detailed below;

Never set power levels at or near upper output range

When attempting to cut thick materials in a single pass, slowing the speed of cut will *always* improve results as opposed to increasing output power. Raising output power will only yield small increments in cut speed, reducing overall efficiency and increasing wear on the laser.

Only use the amount of power you need

Most thin-sheet materials (acrylic, plywood, veneer etc) can be cut efficiently using 30% power or less! Attempting to put too much energy into certain materials will reduce cut quality, and can damage your cut parts. Using air assist will also increase efficiency and speed of cut.

Know your power and speed settings

Due to the vast amount of materials compatible with laser cutting, it is impossible for Synergy to provide exact speed and power settings for every material, thus we encourage our users to experiment with what works best.

It is best practise to use the minimum amount of power necessary in order to process every job, as a general rule-of-thumb; materials of 1.0mm thickness or less can be processed with 10-15%

power, medium thickness items, up to 4mm, with 30-35%, and thick materials 6mm+ with up-to 50%.

As an example our 40W intermediate machines regularly cut 3.0mm acrylic at 8-10mm/sec at 30% power.

Multiple-pass cutting

Difficult materials may have to be cut using multiple passes (*whereby the materials is left in position, and the job repeated*) this may be necessary with thick sheet incandescent materials such as plywood and MDF which are more difficult to cut.

Cutting Examples

Below is a selection of images demonstrating cut quality in relation to speed and power, and highlights the potential issues of incorrect speed/power settings.

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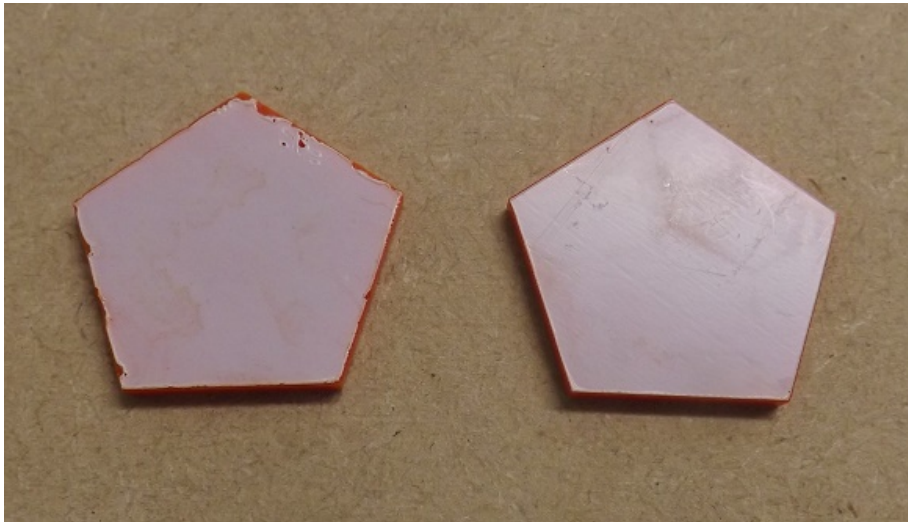


Image above shows correct power setting (on right) and incorrect (left). Notice how edges of protective film on the left-hand image have been vaporised, demonstrating that too much energy has been forced into the material. This is caused by; a) speed set too low, or b) power too high.

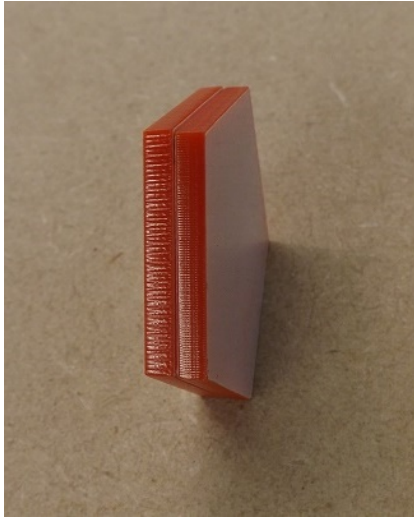


Image opposite demonstrates cut quality on 3.0mm cast acrylic.

The part on the left has been cut with the speed setting slightly too high and resulted in thick striations (textured lines on cut edge).

While this would be an acceptable finish for hidden edges, the part on the right-hand side has been cut using a 10% reduction in speed, which results in a more consistent (and finer) cut texture.

Many materials have variations in thickness and density across the area of the sheet, and from batch-to-batch. This may occasionally cause cutting errors, especially when parts are nested across large areas. Synergy recommends multiple items be split into a more manageable area if the above becomes problematic.

Please note that it is important for processing of any warranty claims that the above guidelines be followed – laser cartridges that show signs of high-wear or excessive power setting may invalidate your cartridge warranty.