



→ Acrylic Processing Guide: How to Achieve Flame Polished Edges

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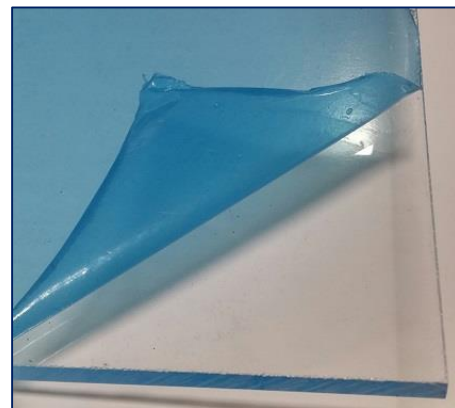


Material Preparation



Prior to processing the acrylic, should I leave the film on or off? What about paper backing?

A large part of achieving a flame-polished edge is dependent upon the quality and type of acrylic being cut. It's important to have the correct materials before attempting a flame-polished edge. In general, you should leave the film on the acrylic to protect the material during cutting. But if you are engraving or using small or thin parts, you should take the film off to reduce the risk of flare ups. When processing acrylics with paper backing, at a minimum, always remove the paper from the top side. It may be necessary to remove the paper from both sides due to the fact that the paper contains paraffin, which causes flaming and reduces the cutting edge quality.



Laser Power, Frequency and Speed Settings



Where should I set my power settings for best results when laser cutting acrylic?

As a general rule, more power yields better results. A good rule of thumb for achieving a polished cut and good production speed is 10 watts per 0.04 inches (1mm). Sixty watts can process 0.5 inches (12mm), however it will be slower and the quality will not be as nice. Your method may also depend on your preferences. For example:

- 400 watt for 0.125 inches (3mm) = fastest speeds
- 400 watt for 1.0 inches (25mm) = best quality





→ Laser Power, Frequency and Speed Settings

→ How should I determine what frequency settings to use?



It depends on the material you are using. You should start high on cast acrylic (10 to 20 khz); and start lower on extruded (2 to 5 khz). Decreasing the frequency means there will be less pulses, which results in less energy in the material. This causes:

- Less flaming
- Less boiling (too much heat in the material)
- Slower cutting speed

→ What speed settings should I use?

To achieve a flame polished cut, you should set your speed to less than 0.4 in/sec. We suggest (600mm/min). For best results on a separation cut, use maximum power and maintain maximum frequency.

→ Lens and Focus

→ How should I determine which lens to use for best results in flame polished edges?

For materials with a thickness of 0.75" (20mm) or less, use the 2.5" lens. For materials above 0.75" (20mm), it is optimal to use a 5" lens with 200 or 400 watt laser system.





Lens and Focus



What are the general rules on focus?

Here are some best practices on focus:

- Defocusing results in better beam usage
- Do not defocus when material is less than 0.25" (6mm)
- Above 0.25" (6mm) defocus 1/3 into the material
- EX: Cutting 0.5" Z-Offset should be -0.17"
- Defocus if the cut edge is not straight or wavy lines appear at bottom of cut edge



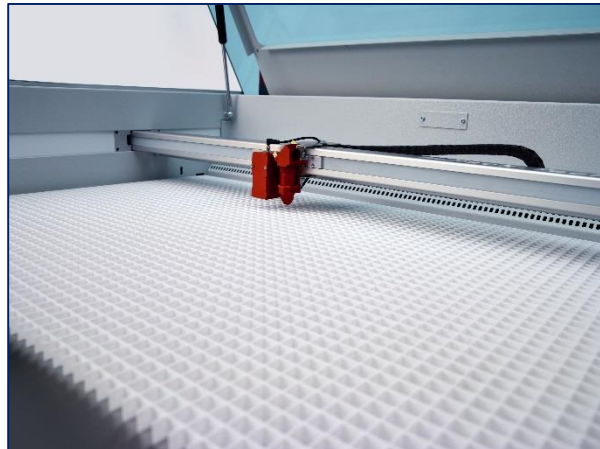
Table Configuration



How should I determine what table configuration to use?

It depends on the size and thickness of the materials you are processing. For parts larger than 4" (100mm) or thicknesses above 0.25" (6mm), a cutting table with acrylic lamellas will generally produce the best results. If you are processing parts smaller than 4" (100mm) or with thicknesses below 0.25" (6mm), you should use an acrylic grid on vacuum table or a hard anodized cutting grid.

If you have a downdraft cutting table, you should always make sure to cover any exposed working area to improve suction beneath the acrylic. This is a key factor for better results. It helps to avoid air leaks and makes the exhaust more efficient.





Exhaust and Gas



How does exhaust contribute to high-quality flame polished edges?



Exhaust plays a huge role in achieving flame polished edges. It is important to have downdraft suction beneath the acrylic to evacuate the gases so they do not become “trapped” in the cut kerf. Without adequate exhaust, a quality cut is not possible. Negative pressure is more important than air flow. The exhaust serves two purposes:

- Avoids flaming
 - A good acrylic cut is hot and produces gases
 - Gases are highly flammable
 - Exhaust transports gases away and thus avoids the possibility of igniting the gases
- Controls frosting of liquid acrylic
 - Airflow through cut kerf lets acrylic melt from top to bottom
 - This gives flame polished cut
 - Otherwise you will receive wavy horizontal lines



What are best practices for transporting gasses away through the exhaust?

You should use compressed air or standard air assist and a large diameter nozzle. The pressure should be maximum 1.5 PSI (0.1 bar).





Post Processing



What is the best way to join acrylic pieces together?

Joining acrylic pieces can be challenging because laser processing applies heat to the material, and the heat stresses the material. To avoid micro cracks when you are joining, you should temper your material for a few hours at 80 degrees Celsius. Then follow joining guidelines set by your acrylic manufacturer.



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For applications assistance or to learn more about Trotec lasers, contact our experts at 844-333-3757.



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