

Cutting and engraving with your CO² laser and acrylics

Acrylics and plastics are cut by vaporising solid material. The laser energy is absorbed by the material causing it to almost instantly change from a solid to a liquid to a gas. It is important to have a strong suction fan to remove the resulting gas, as it is highly flammable. Your laser machine should never be left unattended - even more so while acrylics are being cut.

Your laser machine includes an air-assist pump which blows air through the lens nozzle, helping to blow the gas and debris away from the cutting area - and to reduce flaming. This air also helps solidify the remaining liquid along the cutting line which will help create a smooth flame-polished finish. However, if this stream of air is too powerful, the cut will have a wavy edge - and the material will drip. If the air-assist is too weak, the material will "self-heal" meaning that although the laser will cut it, it will re-form and the pieces will stay stuck together.

There are two main types of acrylic - cast and extruded. They are manufactured differently, which results in different cutting characteristics.

For most laser applications, cast acrylic is your best bet, but in some cases you may want to use extruded acrylic.

Generally, cast acrylic is formed as a liquid - almost like float glass - and hardens in a tray. Extruded acrylic is not quite as liquid, and it is forced through a die - hardening on a conveyor belt before being cut.

Normally cast acrylic is used for laser engraving gifts, trophies and awards because of its premium optical clarity and because the material turns frosty white when laser engraved. This is also why it is better for edge-lit signs.

Extruded acrylic works best for profile cutting letters, blanks and special shapes where a smooth, polished edge is required.

There is generally a wider range of cast acrylic available - colours and thicknesses - than extruded, but it is more expensive.

When it comes to protective film on the acrylic, there are times when leaving the protective film on can help protect the acrylic from scratches, fingerprints and debris when cutting. However, for engraving you may want to remove the protective film before starting as it is a real pain to try and remove the bits afterwards. The one exception to this is if you want to fill the engraved parts with colour - where leaving the film on until you are done makes for a neater job.

When cutting, you will get better results if you elevate the acrylic above the cutting table. Use some offcuts of acrylic or other material to create a space gap under the acrylic. If the acrylic is flat on the honeycomb, when the laser goes through the acrylic and hits the aluminum honeycomb, it will flash back up at the acrylic. This reflected flashback will burn marks onto the acrylic.



Extruded acrylic is better for flame-polished edges.



Cast acrylic is normally available in a larger range of thicknesses and colours



Cast acrylic is better for making edge-lit signs and decorations.

