

## Reverse "3D" Engraving

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### Description

Some of the most attractive signs are those which are reverse engraved in acrylic and color filled. The effect is a rich looking sign with colorful, sub-surface graphics that have more dimension than surface engraved products.



One common method of reverse engraving in acrylic is to use a cutter with a wide included angle (90°) which produces a broad, "V" shaped groove. Due to the angle of the side of the cut, light entering the edges of the sign reflects off the surface of the cut, instead of passing through it, and causes the letters to stand out.

One of the problems with this method is that due to the shape of the cutter, the width of the cut increases significantly with increased depth. As a result, the bases of the letters can run together when engraving to any significant depth.

To eliminate this problem and further enhance the effect of reverse engraved acrylic, Antares introduced the "3-D cutter." This cutter is sharpened to a narrow included angle, which allows for engraving at considerable depth without significantly broadening the stroke. After the letters are filled, the resulting effect is that the lettering appears to have been "cast" into the acrylic plate.

### Technique

The 3-D effect becomes more pronounced as both the material thickness and the engraving depth are increased. The best effects come from engraving to a depth of 1/2 to 3/4 of the material thickness. As a guide, 1/8" material should be engraved at a depth from .060" to .090" and 1/4" material to a minimum depth of .125".

When you consider that most engraving is done to a depth of .010" or .015" in soft materials like flexible engraving stock, engraving deeply in a hard material such as acrylic requires more time. Engraving to a depth of .125", for example, would require four to five passes of about .030" depth per pass.

One problem inherent to acrylic engraving is melting of the material due to the heat generated by the cutter. If the heat is excessive, the chips that are not ejected by the cutter will "weld" themselves to the walls of the cut and to the cutter itself. When the latter condition occurs, the cutting action is severely reduced and the melting problem is magnified.

To help minimize the problem, the initial roughing cuts should be made at a reduced spindle speed (cutter speed) and a reduced feed rate (engraving speed). The slower cutter speed prevents heat build-up and the slower feed rate allows the chips to be cleared from the cut. It is strongly recommended that the final pass be a "clean-up pass" cut .002" to .003" deep. This pass, done at the same engraving speed but a higher cutter speed, will clean out any chips left in the cut and produce a smoother finish which enhances the appearance of the paint fill.

Using a cutting fluid virtually eliminates the melting problems and speed up the engraving process. A water-soluble fluid keeps the heat below the melting point of the acrylic, provides lubrication of the cutter, and can be washed off with soap and water.

If the sign is to have a background color, the plate can be spray painted on one side before engraving. After the paint has dried sufficiently, the plate is engraved through the painted surface and then filled with a contrasting color. If you are not required to match a specific color, you can eliminate the hassle of surface painting by using a reverse engravable material such as Rowmark Slickers.

The Slickers are a multi-layered acrylic material with a clear face and a colored back. The engraving is done through the colored layer and then filled with an acrylic-based paint. Since the colored layer is very durable, the material can be engraved using a nose cone without the worry of scratching through the surface as is possible on painted surfaces. The Slickers are available in a wide range of colors and in thicknesses of 1/16", 1/8", and 1/4".

