Three of the projects shown together.

Laser Engraving Acrylic

By J. Stephen Spence

Writer's note: When I first began engraving with a laser in the early 90's, I would have done almost anything to have a place I could go to learn the basics skills for engraving the various products I wanted to produce. At best, when I asked others in the business, they either snowed me or told me, "there isn't anything to it". I have long felt there was a need for someone to provide some very basic, step-by-step instructions on how things are done. Since no one more qualified than I seems interested in writing such a column, I will give it my best. To be sure, the ideas expressed are usually not my own but a culmination of training and conversations that extend over the past seven years with everyone from laser manufacturers to beginners. My hope is that the novice will find them to be very helpful while even the expert might pick up a trick or two. It is also my hope that those who are more experienced than I will share their knowledge with me so I can pass it on to others.

ACRYLIC IS ONE OF THE EASIER materials to work with using a laser engraver. Even a low wattage laser can produce spectacular results.

There are only a couple of things one needs to know before undertaking that first engraving task on acrylic. Since the acrylic sold to the engraving industry is usually made specifically for laser engraving, there is little concern about buying the right material.

There are actually two types of acrylic one might encounter in our industry. Cast acrylic is the one sold for and used for awards. It engraves very easily and affords incredible detail. Extruded acrylic, on the other hand, is usually only encountered in sheet form or in very cheap novelty products.

Ironically, extruded acrylic cuts on the laser better than cast but does not engrave well. It tends to engrave clear rather than frost when engraved with a laser, and usually becomes more of an embarrassment than something of pride. Because it is very difficult to identify which type is which until after it is hit with laser, the shop owner who accepts products from customers for laser engraving without knowing for sure what type material it is actually made with is headed for trouble.
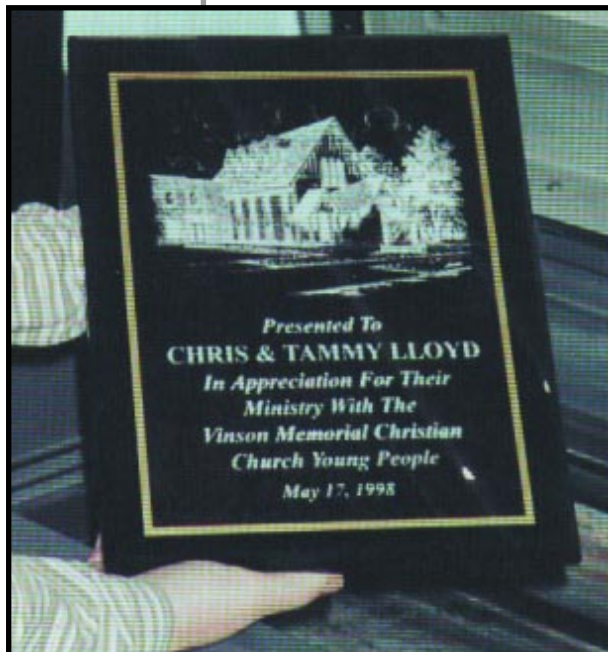
Acrylic is available in a wide variety of sizes, shapes and colors. In this article, we concern ourselves only with clear acrylic but the techniques work just as well with any transparent or translucent acrylic. Black acrylic or acrylic with a painted or screened back engraves much the same as those illustrated below.

The biggest difference with screened acrylic is that you can't take advantage of my safety engraving technique and with black acrylic, you must engrave from the front just as you would black metal. You may also find you will need to engrave black or screened acrylic a good bit hotter than clear acrylic.

The first rule when preparing to engrave any acrylic product is the KIS rule—Keep it simple. Because acrylic is innately elegant, it isn't necessary to use an abundance of flourishes, elaborate ornaments or overly large text. In fact, most engravers will agree that less is more and try to avoid large, bold text and logos in lieu of smaller, more classic designs.
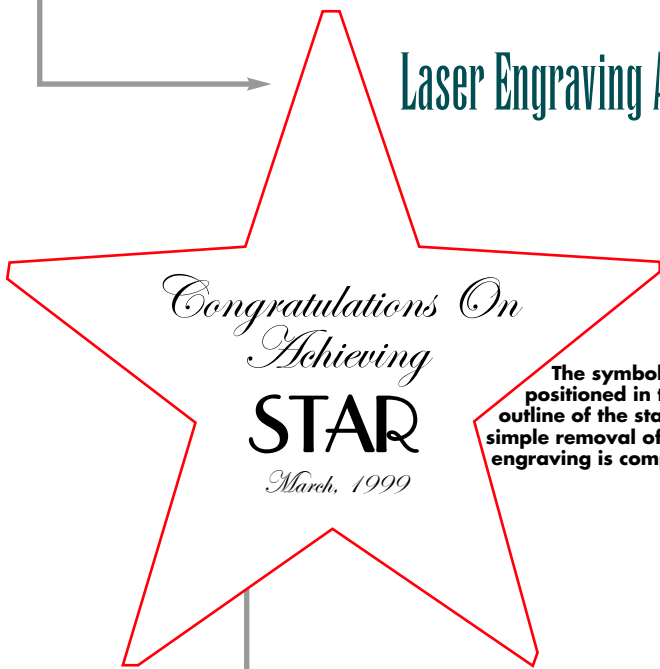

(above) The back (engraved) side of an 8" x 10" acrylic plaque with marble screened image. Everything is engraved in reverse so it will read right when viewed from the front. Plaques can be paint filled, backed with vinyl or other colored materials.
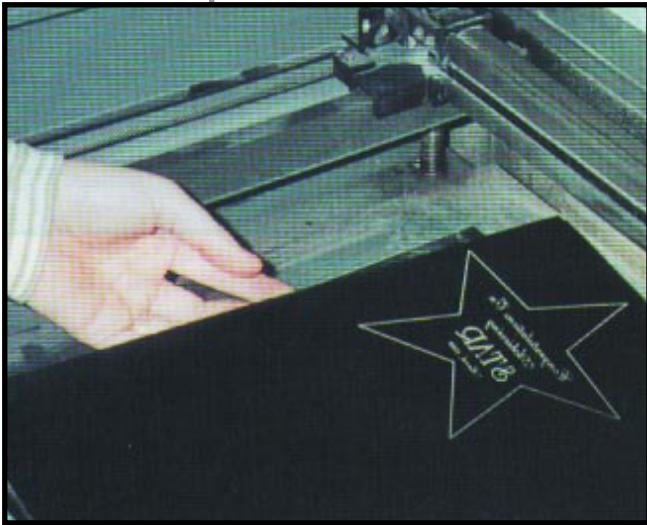
(at left) The same plaque as above viewed from the front. The plaque has been paint filled with white acrylic paint.

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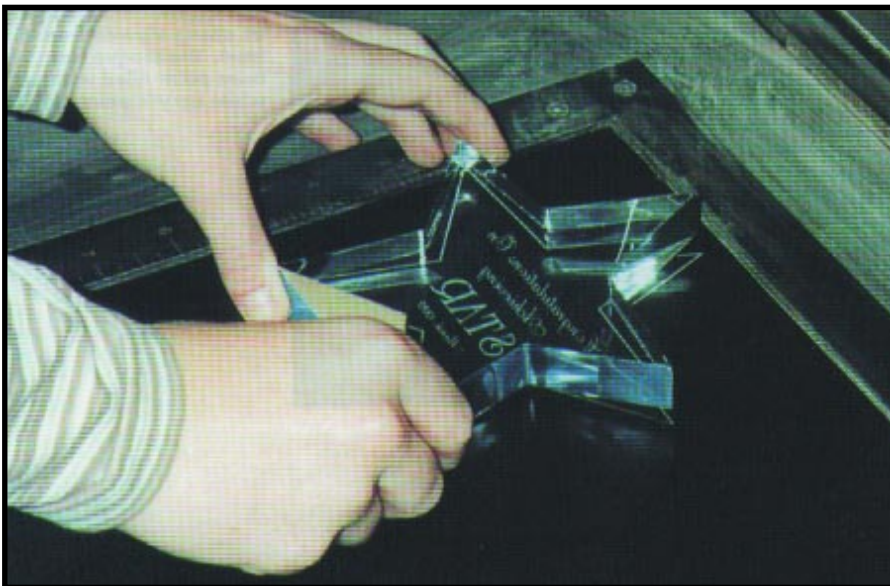
Congratulations On
Achieving
STAR
March, 1999

The symbol of a star with the text positioned in the center. Note that the outline of the star is in red. This allows for simple removal of the star after the safety engraving is completed.

(at left) The safety engraving of the star.

(below) The star being positioned over the safety engraving. Although the outline of the star on the safety engraving may not line up exactly with the actual acrylic star, it allows for easy centering.

In our dialogue, we will engrave three pieces of acrylic. The first is very basic. A star with a couple of lines of text—simple and elegant. The second will include a highly detailed piece of clip art that normally would be too detailed to really be appreciated in such a small size. When specially treated with a blackening dye and a touch of magic, the design will jump out for a completely new look in acrylic engraving. The third will be a larger selection that needs more than just simple engraving. On this piece, we will add a foil overlay and actually engrave on both sides of the acrylic.

PIECE ONE—THE STAR

For this type of engraving, we will create our design in CorelDraw as with any engraving. Since we are using only text for this design, I have selected a fairly fancy text style called University Roman. Its classic lines add to the elegance of the shape.

Since the acrylic already has a distinctive shape, I want to be careful not to clutter the design with frills that would take away from the simplicity of the shape. For this particular piece, I have chosen to engrave the name on a small strip of FlexiBrass to be attached to the base of the star rather than to include it in the body of the design.

This is purely a personal preference but the touch of gold adds to the final appearance of the item. Better yet, since this is a piece that may be engraved every month, it makes future engravings go easier. It also means that, should a misspelling occur, it is simple, fast and cheap to correct the mistake.

Step One: I begin my design by selecting a star from the symbols menu of CorelDraw. Although these stars may not match exactly to the actual acrylic star to be engraved, it will provide the general design parameters. Fine tuning this to become the exact star can be done in a couple of ways but generally is not necessary.

Once the star is stretched to the same size as the piece to be engraved and placed in the upper left-hand corner of the engraving field, the text can be positioned and centered. Finally, in this stage, the image is reversed by using the Mirror Image tool from the Transformations drop down menu. Once everything is in position, select the star outline, change it to red, and set the line width so it will engrave the star shape as a vector (solid line) image.

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Acrylic is generally engraved from the back as a mirror image. This gives additional depth and elegance to the award, making it appear more like real glass.

Step Two: The next step is what I call my safety engraving. This is nothing more than a security blanket for laser engravers. It takes a little extra time but it will save countless mistakes and often prevents me from mis-engraving a really expensive piece of acrylic.
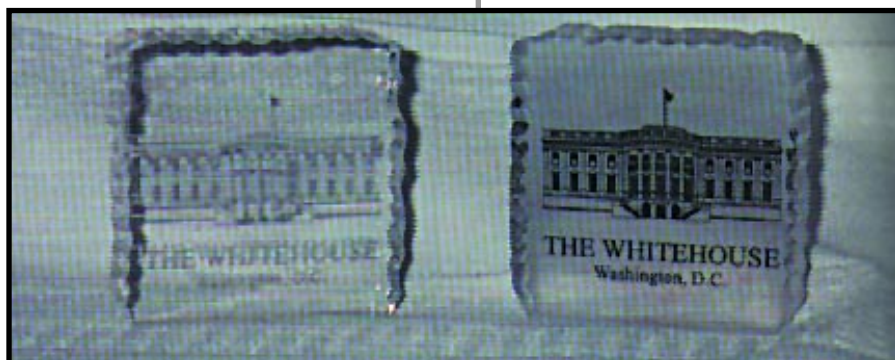
You can use a variety of materials to perform the safety engraving. The back of a sheet of anodized aluminum probably works best but a piece of cardboard or even a sheet of copy paper will do just fine. This involves sending the job to the engraver with settings just hot enough to engrave the final image, including the star shape on the aluminum, cardboard or copy paper. This process should take only a few seconds.

Step Three: Now that we have the image, including the shape of the star engraved in the upper left corner of the engraving area, we can proof the job one more time. Most importantly, we can now lay the item to be engraved directly over the safety engraving and by looking through the acrylic, we can align the piece so we can see exactly what the finished piece will look like. The star outline helps to position the piece exactly to center in all directions. If everything looks right, proceed to the next step.

Step Four: With the acrylic in place, refocus the laser to the proper height (remember, this should be done manually since auto-focus may not see the surface of the clear acrylic correctly). Before sending the job to the laser with the correct settings for acrylic, be sure to delete the star shape or if drawn in red, instruct the laser to skip it.

Do not over-engrave acrylic. A low power setting and high speed setting usually work best. The test for a good engraving setting is when there is no residue or haze on the back of the acrylic after engraving. Residue is a direct result of excessive heat and requires careful cleaning.

This takes time and requires polishing the acrylic with a special cleaner. If not done correctly, this can damage the acrylic. Worst of all, the added depth achieved by engraving with excessive heat is of no value. Remember, before sending the job to the laser, either delete the star outline altogether or if drawn in red, instruct the laser to skip red.

(above) Two acrylic paperweights with an extremely detailed image engraved on the back. Note that the detail on the one on the left is very difficult to see while the detail on the one on the right actually jumps out at you.

(at right) The application of the orbital sander. Notice the can of black dye and the application needle. This process requires 220 grit sandpaper. After dye is applied to the entire image area, just sand until the background is even and all the dye has been removed. It takes about 20 seconds.

Step Five: Before moving the engraved acrylic after engraving, take time to look it over carefully. Did everything engrave properly? Is the setting too cool? If so, there is always the opportunity to repeat the job but only before moving the piece. On unusual shapes like a star or circle, it is almost impossible to run multiple passes once the item has been touched.

Final Step: Add the base, an engraving plate, if desired, and you have turned a $10 block of plastic into a beautiful engraved award worth $40 or more, and you did it all in under five minutes!

ITEM TWO—USING BLACK DYE TO BRING OUT DETAIL

This time, we will do the exact same type of engraving but with one exception. Because we are going to be engraving an image that has tremendous detail and will engrave it on a very small piece of acrylic, we need a way to bring out the detail engraved by the laser.

After engraving the back of the acrylic, a special black dye is applied with a Q-Tip or hypodermic needle. The dye is specially produced by Acrylic Idea Factory and sold specifically for this purpose (it is also used for gluing black acrylic). Great care must be taken with the dye not to get it on anything other than the back of the acrylic. This stuff will ruin anything it touches.

After applying the dye, allow it to dry for a few minutes before sanding it with an orbital electric sander and 220 grit paper. This sounds crazy but it really does work. Continue sanding until all the excess black dye has been removed and the entire back of the piece appears frosted. Take care to sand the acrylic evenly and a little bit at a time. Sanding too deeply will destroy the detail of the artwork.

This process works especially well with highly detailed artwork and photographs. It is fast, simple and pretty much fool-proof. If you are going to buy an orbital sander for this purpose, select a fairly large one that uses 110-Volt house current. Rechargeable units don't usually do as well.

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This is what the layout will look like on the computer screen. Note the logo is read right while everything else is reversed.

Placing a sheet of aluminum in the engraver. This will be used for making a safety engraving.

The safety engraving after it has been made.

The acrylic award after the reverse side has been engraved. It will now be turned over and prepared for the foil applique.

The self-adhesive foil being applied to the acrylic.

The excess of the gold foil being removed after being lasered. Remove slowly and carefully to avoid damage to the finished logo.

All engraving has been completed. The only thing remaining is clean up and attaching the base.

ITEM THREE—ADDING FOIL APPLIQUES

With this item, we will perform the same techniques used in our first sample. Because of the rectangular shape of the object, it is a bit simpler to create a layout. The difference with this piece is that we will engrave it on both sides. The back will house the actual engraved text while the front will sport a gold foil logo. This is a way of not only adding color to acrylic, but perceived value as well. The added step takes only a few minutes and is very simple.

Step One: First, we create the entire layout in the computer. For now, consider the logo to be part of the reverse engraved image. The only difference is when the text is reversed, the logo will not be. Also, the logo will be drawn so it is a vector outline of the logo. After all the text is positioned and the job is carefully centered, the text will be grouped together and reversed. The logo will be left as it is.

Step Two: Take time to do a safety engraving of the entire project. After the project is engraved on a sheet of aluminum or paper, you can easily see what the finished job will look like.

Step Three: Re-send the job to the laser in two parts. Part one should be the reverse engraved text with a low power/high speed setting just as you would any other piece of acrylic. Once the back is engraved satisfactorily, proceed to the next step.

Step Four: Now, it is time to do the front engraving. Turn the acrylic over and place it carefully over your safety engraving, making sure the logo of your safety engraving falls exactly where it should on your final piece. Now, take a small piece of laser foil, vinyl or Spectrum Lites and place it lightly over the area that will become the logo. Don't worry too much about burnishing it down; just be sure the applique isn't going to move.

Step Five: Next, send the second part of your job to the laser. This time, you will send only the red portion of your engraving job, telling the computer to skip the black portion. Set the speeds of the engraver to a vector setting suitable to cut vinyl lettering. Engrave the job. If you aren't absolutely sure the laser cut completely through the applique, run it again before touching the piece.

Step Six: Remove the piece from the laser and carefully peel off the excess foil or vinyl from around the logo. After placing a clean sheet of tissue paper over the face of the acrylic (to prevent scratches from your fingers), rub the logo applique until all the air bubbles are out and the foil is tightly adhered to the face of the acrylic.

There are several sources for the various laser foils, which come in a variety of colors. These are very thin, self-adhesive sheets and work very well. Sign vinyl also works and broadens the number of colors, but my favorite material for this application is Spectrum Lites. Available in a brushed gold or silver, it can not only be cut as an applique, you can also engrave it at the same time, creating another dimension for information.

Your piece is finished and the price just went up for all the extra time (ten minutes) you spent applying a foil logo to your customer's award. Best of all, you have created a really unique award that is sure to be treasured for many years to come.

Acrylic is simple and fun to do. There are many variations you can apply to acrylic using these three basic techniques and a laser. Because the laser never actually touches the acrylic, it is easy to engrave without clamping, scratching or marring the award. Unusual shapes can be engraved by either scanning an outline of the actual piece, or digitizing it and creating your layout inside the shape. Using a safety engraving takes all the guesswork out of the actual engraving process and allows you to make minor adjustments in placement that will probably be required.

Acrylic is not only simple and fun, it brings an excellent return on your investment. The corporate market loves acrylic because of its elegance and the high degree of detail that can be accomplished. If you have a laser and you are not engraving acrylic, you are missing out on a great market and a lot of fun.

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