Adding Color to Laser Engraving

Our trade of laser processing continues to develop as new materials and processes become available to create unique and professional results with our laser systems. The concept of laser engraving has become associated with the precision and clarity for engraving on a wide variety of materials and substrates.

Consumers immediately think a product that is laser engraved has a higher value due to the wonder and excitement of how a laser can create such detail and fine elements of a photo of a loved one or the simple text emblazoned on an ordinary gift. We are forever pushing to create more impact with laser engraved products to an increasingly more educated customer base using the latest engraving technology and our own creative talents.

Creating that extra pizzazz in our engraving jobs does not need to be complex or difficult. What it takes is the time and knowledge to work with new materials and perfect the new processes in your own shop. Pushing the envelope of creativity and professionalism will not only set your products apart from a competitor, they will create more value for your customers keeping your profit margins high and establishing you as an expert in your field. I invite you to continue on with me as we discuss several processes for decorative laser engraving and think about how you can incorporate them in your business.

Color Filling

The process of color filling has been often elusive over the years. New materials have become available that make the process more reliable on a wide variety of substrates. The basic idea is to laser engrave a base material to create a recessed area. The recessed area is then filled with a liquid color and the top surface wiped clean to remove any extra color to create a professional addition to any engraved product. Sounds simple right? Well, like anything that sounds easy there are bound to be difficulties that lie ahead. The variables in the color filling process are in both the base material being engraved and the color material being added. Excellent results can be achieved by learning with base materials are compatible with different color fill materials to create a finished product that is affordable with minimal effort. Take the time to understand both the base material being engraved and the color material being added to reduce production frustration.

Substrate Variables

Understanding what materials you are working with is the first place to start and will determine what kind of color filling procedures are available. Typically the laser engraving / color filling process can
be accomplished on wood, acrylic, plastic and stone materials. Each material will have different techniques and materials used to get the job done right.

Wood is a common base material for laser engraving because it is generally soft and the laser can vaporize it quickly. Wood types vary radically but are based on a couple of simple principles. Wood is generally comprised of fiber held together with resins. When laser engraving on wood, the fiber and most of the resin are vaporized by the focused heat energy and turn to smoke. The result is a recessed area with a small amount of the wood's natural resin left. The residual resin gives laser engraved wood that dark color to the recessed area. The density of the wood is based on the amount of resins and varies greatly from species to species. The result is that heavier, denser woods engrave darker. Walnut and Cherry are two examples of dense woods.

On the other hand, lighter woods like Oak are difficult to achieve much contrast because the resin content is lower. Less dense woods also have the added variable of a more open grain structure. Remember wood is made from fiber and as we engrave into these fibers the end grain of the fibers become exposed. When thin liquid color is added to the engraved area of wood the effect can be disappointing due to the wood's natural tendency to wick the color into the exposed end grain. The result of this bleeding of color into the wood is thin streaks that destroy the crispness and clarity of the laser engraving. Definitely a laser no.

Acrylic is also a commonly laser engraved substrate. Adding color to acrylic means first understanding what kind of acrylic you are using. Two types of acrylic are commonly available for engraving. Cast acrylic is easily identifiable by the fact that it will laser engrave a frosty white color. All awards and plaques are made from cast acrylic sheet stock. The white colored engraving from your laser will mean that if you intend to color fill the engraved area, you should engrave on the front surface of the acrylic. Color filling the back side of the engraved piece will yield muted colors due to the natural white engraving of the cast acrylic. Extruded acrylic laser engraves virtually clear and is available in large sheets from a plastic supply company. Extruded acrylic can be color filled from the back side successfully using the correct color filling liquid. Acrylic being a type of plastic is sensitive to many solvents that are present in paints. Therefore, rule number one when color filling acrylic is to use an acrylic based color. The results of using a solvent based paint can be disastrous and include cracking and crazing around the engraved area where the solvents have interacted with acrylic.

Color filling on engraving plastics should be handled in a similar method as acrylic. Engraving plastic sheets are made up of a high percentage of acrylic and therefore using an acrylic based color is mandatory.

Color filling on marble and stone can create some dynamic results but like all natural materials have some technique required for best results. Stone has a very porous nature and can susceptible to the wicking of thin color additives. Since each stone is different in density and structure you may develop several methods to add color.
Color Additives

The term color fill is very general and not overly descriptive to the type of color additives to be used in the process. The basis of this article is to give a better understanding of the process and materials so you can develop your own techniques or refine the ones you are currently using. We have already learned that some substrates like acrylic and engraving, have limited types of color materials that can be added. Acrylic based color additives come in many forms and are available in a brush on liquid or spray.

Color fill materials for wood have evolved from the shoe polish used years ago to a variety of colors that can add some real pizzazz to your engraving. Specialized color fill materials are now available for all wood types and designed not to bleed into the wood grain. These custom blended materials contain dense polymers and rich color content which add a professional touch to laser engraved wood products.

Adding color to stone has also become easier with special inks that brush on to the engraved stone and soak in to the top layer of the porous material. Gold, silver and bronze can be added to marble and other stone products by brushing on the stone color fill product.

Adding the Color

Lets start by creating some interesting engraving to a photo by adding a color to the laser engraved text. When working with wood, keep in mind the depth of the laser engraving makes a difference on how the final product will look. Although the density of the wood varies, try to achieve an engraving depth of .035 to .040 inches (35 to 40 thousands). You may not have a gauge to measure such a thickness so use the wire of a large paper clip as a guide. Engraving too deep in the wood will make it difficult for the color fill material to flow into the recessed area. Engraving that is too shallow will not hold the color fill liquid in the engraving and will be wiped off unintentionally during the clean up process. After engraving into the wood, use a damp towel to remove the wood resin residue on the top surface of the photo frame. Careful not to get excessive moisture into the engraved area. If the engraved area was soaked during the cleanup allow 15 minutes for it to dry before proceeding. The added moisture in the wood will help to wick the color into the wood grain for that undesired bleeding of color into the grain. Finally, apply the color liquid to the engraved area and work it into the nooks and crannies with a small paint brush or artists palette. Wood color fill liquids are very thick and may require some coaxing into small, detailed areas. The acrylic polymer starts to dry quickly so move on to the final step of wiping off the excess color fill liquid using a damp towel. Usually the top surface of the wood comes clean on the first pass of the damp towel. Any residual color on the top surface can we wiped off when it has dried and it is best to wait 15-20 minutes before doing so. Up to this point, we have been assuming the wood product we are working on is finished with a clear coat on the top. What if we are working with uncoated wood? The process is virtually identical except for the first step which includes applying a paper mask to the top of the wood prior to laser engraving. After laser engraving into the wood, apply a quick dry spray paint of brush on the liquid color fill material. Clean up is a snap and can be accomplished by simply removing the paper mask to reveal the finished product.
Working with acrylic and plastic follows many of the same procedures as color filling wood items. Again, be sure your laser engraving depth is appropriate and not too deep or too shallow. Adding color to awards or plaques engraved on the front surface works just like the process for wood by carefully brushing the color into the engraved area. Remove the excess color with a soft cloth that is dampened with water. Apply light pressure during the cleanup phase to avoid scratching the top surface of the acrylic.

The masking process used with uncoated wood can also be applied to engraving plastic when a third color may be need on a badge or sign. First apply the paper mask and make sure it is firmly against the plastic sheet with no air bubbles. Engrave through the mask into the plastic and use an acrylic based spray paint to add the color. After the paint is dry, peel away the mask and use a damp cloth to remove any excess paint that may have gone underneath the mask.

Hopefully your are starting to see a pattern for the color filling process starting to develop and it will be very much the same one we use for stone and marble. Polished stone is ideal for adding color as the surface is smooth and not receptive to the color fill ink liquid. However, when laser engraved the top surface is microscopically chipped away by the focused heat energy of the laser and reveals the porous stone underneath. Brushing on the Stone Color Fill liquid over the laser engraved area will allow it to soak into the stone surface. Using a clean, dry cloth remove the excess Stone Color Fill liquid from the top surface before it dries. Small areas of the Color Fill liquid may have dried and will need to be removed using mineral spirits.

**Color Adds Value**

The process of adding color to laser has become increasing simple with the availability of specially formulated products. Customers like the special look of gold, silver and rich colors on their gifts products and will pay for the added brilliance. Sometimes just adding black to an engraved product can help the detail the laser produces to stand out like never before. Set aside time during your work week to develop your own methods using proven materials and make several samples for your showroom. Your customers will notice the difference in the color filled products and that added value will help keep your laser engraving business successful.