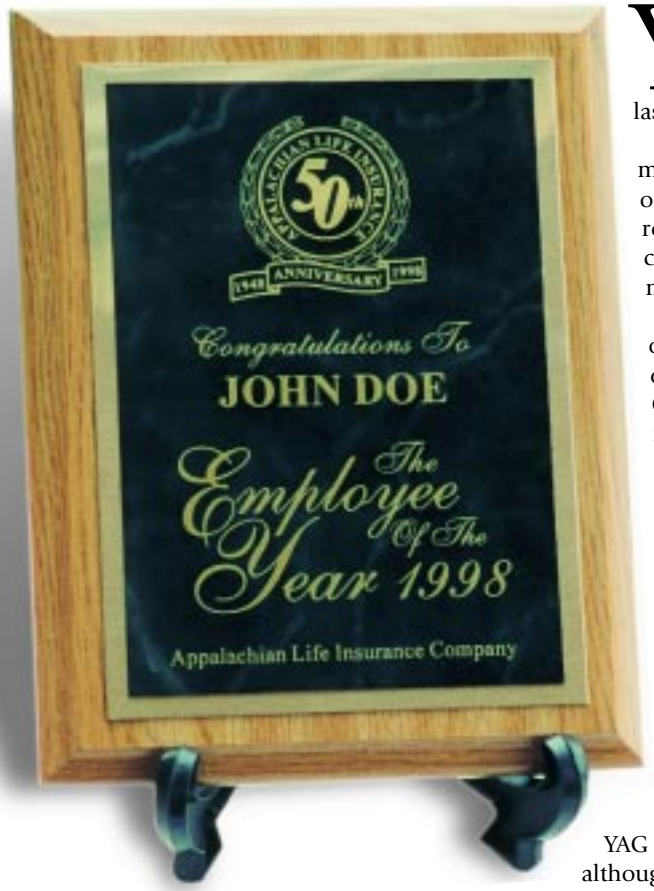
Metal *and the* CO_2 Laser



Art and text created in CorelDraw, lasered onto Green Mist brass plated steel and mounted onto an imitation oak board. The most important thing to remember when lasering metal is not to burn the images too hot.

By J. Stephen Spence

You can't engrave metal with a CO2 laser. As true as that is, metal is perhaps the most common material used with a laser engraver. So what's the deal?

Although the type of CO2 lasers most commonly used in our industry will have no effect on metal as such, it can produce spectacular results when the metal has some kind of coating on it. The laser doesn't engrave the metal; it just removes or modifies the coating.

There are some CO2 lasers that will not only engrave metal but cut it as well. I know of one that can cut metals up to 1/2" thick. Of course, it is 250 watts and costs in the neighborhood of $750,000—maybe a little rich for making plaques.

In our industry, most CO2 lasers are between 25 and 100 watts and cost between $18,000 and $65,000. Although not normally recommended, there are also some lasers with power ratings as low as 10 watts. These are usually used for very specific applications and dance around the $13,000 to $15,000 price range.

There is another type of laser used in our industry you should know about. The YAG laser does many things a CO2 laser cannot. But before you decide to invest in a YAG in the place of a CO2, you should know that although a YAG will do a much better job on some metals, including cutting metals, glass and some other very hard materials, it does not do as well with coated metals, acrylics, leather, wood and many other natural materials.

A word about price. Although it is almost always the first bit of information we process when considering such a purpose, it really is not as important as we sometimes make it out to be. The question should be, "How much money can you make with it?" not "How much does it cost?" Anyone considering such a purchase should research carefully what kind of market is available and what the realistic potential is for recouping the initial investment.

Back to the issue of engraving metal. There are several types of metal that can be engraved or marked with a laser. It is important to understand how each works in order to get the most from a laser investment.

BRASS

There are basically two types of coated brass available. One is marketed as laserable, while the other isn't. The most significant

A lasered image on aluminum. The mist that is always such a problem when lasering aluminum was removed with lacquer thinner. The engraved areas are perfectly bright silver.

A photograph laser engraved onto anodized aluminum. The original photo was a 3" x 5" color snapshot converted for engraving using PhotoGrav. The finished image is 10" x 14" and is mounted on a homemade plaque.

difference between the two is that the laserable brass is highly polished prior to the coating being applied. The advantage of this is that once lasered, the image will be a very bright, highly polished gold, while the regular or non-laserable brass results in a much duller appearance.

The procedure for engraving is the same for both. The second difference is price. Highly polished solid brass may push $20 a sheet while regular coated brass may sell for as little as $5 or $6.

BRASS PLATED STEEL

Because of the high cost of polished, laserable brass, brass plated steel was developed. This is possible because the laser does not invade or attack the metal itself. Therefore, even a very thin layer of polished brass over a steel sheet yields the same result as a much more expensive sheet of polished solid brass.

The cost for brass plated steel is usually around the $5 mark, and even though it may not work well on a mechanical engraver, it is almost impossible to tell the difference between the two. The most common coating used on this material is black, but other colors are possible such as the new marble finishes, which are currently very popular.

ALUMINIUM

Aluminum differs from brass in that most aluminum is fairly highly polished prior to being coated. Since it is far less expensive than brass, a plated version isn't cost effective. To obtain a really highly polished finish when engraved, there are some laserable aluminum colors available. The biggest problem with lasering aluminum is the haze that is often left over the engraved areas.

Running a second or third pass with the laser can help eliminate the haze but more often than not, it just can't be removed with the laser. It can be removed, however. After engraving, just apply a few drops of lacquer thinner and wipe with a paper towel. The result is a perfectly clean image.

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GOLD AND SILVER METAL

Here's the rub. Because gold and silver metals, including brass, aluminum, nickel plated brass, steel and chrome have no contrasting coating, they are not affected by the normal CO2 laser. The one exception is a material called anodized aluminum. This material affords a satin gold finish that will be changed when struck by a laser. Unfortunately, once engraved, it is very difficult to read.

ANODIZED ALUMINIUM

One metal the laser really likes is anodized aluminum. This material may look much like other coated aluminum sheets except the finish is dull. Available in red, green, blue, gold, silver, flat black and gloss black, the laser actually doesn't remove the coating like on other metal products. Instead, it bleaches the anodized finish. The result is a white, almost dull silver image.

The advantages of this material are multi-faceted. Because the coating is not removed, only altered, the actual aluminum material is not exposed to the elements. This makes the material excellent for both interior and exterior applications. Anodized aluminum is a little more expensive than normal aluminum and runs around the $5 to $6 mark.

ENGRAVING METAL

For all extent and purposes, all metal is engraved basically the same way when used with a laser. Excellent detail and stunning results can be easily achieved with even a very low power laser since metals are typically engraved at very high speeds with fairly low power.

My biggest concern when lasering metal is not to over engrave the material. In order to obtain the detail possible with a laser, it is very important that the right amount of power be used. The objective is to apply just enough power to cause the coating to be vaporized. Excessive power will cause the beam to splatter when it cuts through the coating causing the engraved image to appear smeared or bloated. When just the right amount of heat is applied, even very thin lines will appear sharp and crisp with no drop outs or faded areas.

BETTER THAN THE LOTTERY

I just don't understand it. We can send people into space, put men on the moon and build super computers, but we can't make a gold or silver metal with a coating that can be lasered off so cleanly that the exposed metal can be blackened much like we do with computer and mechanical engravers. The company that develops such a material will make a fortune. It will be better than winning the lottery.

Metal is easy to laser. It is very consistent, and although different types of metal may require different settings, they all engrave the same. Brass and aluminum require the least heat (30 percent on my laser) while anodized requires a good bit more (60 percent on my laser).

Last but not least, would you like to be able to laser stainless steel and end up with a permanent black image? You can. Actually, you aren't going to affect the metal at all. Remember, CO2 lasers have no affect on uncoated metals. So what is going on? A company in Pennsylvania has developed a chemical that can be applied to uncoated stainless steel (and some other uncoated metals).

When engraved with a laser, the areas struck with the laser beam create a tooth with the stainless steel that makes it actually become part of the metal. This opens a variety of options including control panels, mechanical equipment tags, pet tags and any number of other products.

Whatever your needs, be it aluminum, brass or stainless, the options are vast and growing. Take some time and experiment a little. You may be surprised how easy it is. Best of all, you will be pleased with both the price that quality lasered metal will fetch and how excited your customer will be with the results.

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Certec should be applied with a small airbrush but in the absence of compressed air, it can be brushed on with a small brush for dog tags and other small items or a foam brush for larger items. A smooth even coat is necessary for good result.

Placing the coated dog tag into the laser for engraving.

Removing the dog tag after engraving. Note the burned appearance of the engraving. This is normal. Engraving should be done at a very high temperature and slow speed. The settings used to make rubber stamps would be a good starting place.

After engraving, the remaining chemical can be removed easily with water and a paper towel.

The artist may have shifted from working metal with hand tools to mastering the mouse in a graphics program, but some skill is still required, so, from my point of view, the craftsmanship elements in engraving are still alive.

The finished tag. The black image is actually etched into the stainless steel and is permanent.