There are lots of products that can be engraved. Among the wood items are guns, bats, and knife handles. Almost anything made of wood can be laser engraved. Don't forget to sell engraving on leather, plastic and coated metal products as well.

Here is a wide variety of products—all engraved with a laser. The possibilities are endless.

PHOTOS COURTESY OF UNIVERSAL LASER SYSTEMS

Laser Engraving WOOD

PART ONE

By J. Stephen Spence

One of the most highly sought after laser products is wood. The natural beauty of fine wood combined with the depth and richness of quality engraving can make for a spectacular keepsake.

Because wood is natural, no two pieces are alike and each type of wood, and even similar woods, can seem very different when engraving them with a laser. Some woods are soft and easy to engrave while others maintain attributes that actually seem to defy the laser.

In the space remaining, I will try to present as much information as possible. Although there are a great many wood products suitable for engraving such as pens, paperweights, cups, plates, name badges and a host of others, we will focus on plaques since these offer the widest range of challenges.

Any and all the techniques applied to wood plaques can also be applied to other wood items with equal success. At times, instructions may seem overly simplistic but when working with wood, even the smallest details can make the difference between a quality job and a block of firewood. When engraving wood, it is truly the little things that count.

There is a paradox in our industry concerning lasers. Almost everyone who buys a laser has visions of engraving beautiful wood plaques, and lots of them. Yet, the vast majority of lasers sold are only 25 or 30 watts. The irony is that to make money engraving wood plaques, we should really be running 100-watt machines. Obviously, the reason for this is the pricey nature of lasers.

With the very cheapest 100-watt system going for well over $40,000 and a 25-watt machine selling for under $20,000, most engravers have little choice as to what they can buy. The decision is purely financial. Still, one should be well advised that if speed, quality and profit are the end goals of offering laser engraved plaques, a 100-watt system is the key.

Having said all that, let's talk about what most of us can afford. Although larger systems including 40-, 50- and 60-watt versions are becoming more common, the vast majority of users have 25-watt lasers and little hope of upgrading to anything with more power.

To be sure, beautiful, deeply engraved wood plaques can be created with even the smallest laser but it takes more time, a great deal more skill and an unrelenting attention to detail. Many of the tricks and shortcuts discussed here may be ignored when using more powerful systems, but even for them, the great advantage is speed and the ability to produce more product per hour and does not necessarily have much to do with the quality of the finished product.

CO_2 lasers (the type generally used for engraving wood) come in a wide variety of power ratings: 10, 15, 20, 25, 30, 35, 40, 45, 50 and so on up to 100 watts. Somewhere along the way, usually about 50 watts, something changes in the laser. Small lasers, like the common 25- and 30-watt models, are all air-cooled. Fans, mounted over and under the laser tube, struggle to keep the tube cool. In larger machines, there is so much heat to be displaced that fans are not enough, and a water chilling system must be included in the cost of the system. This adds to the bottom line and is one reason the larger systems are more expensive.

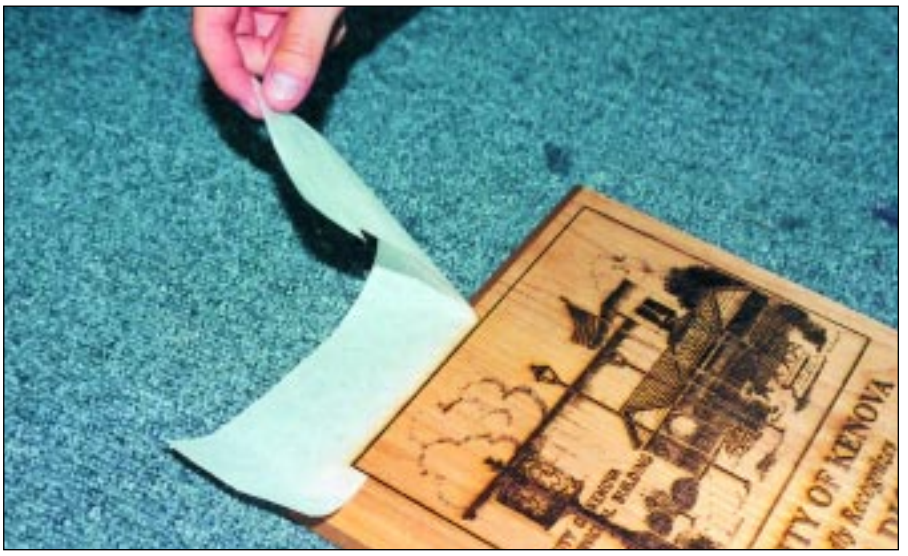
In recent years, larger and larger tubes (currently up to 50 watts) have been developed that can be air-cooled but the idea of an air-cooled, 100-watt system is still well out of reach. Water-cooling systems or *chillers* actually refrigerate a volume of water and constantly circulate it around the laser tube. Without such a system, the tube would destroy itself in a matter of minutes.

The objective of engraving wood with a laser is to find that magical point at which the laser actually vaporizes the

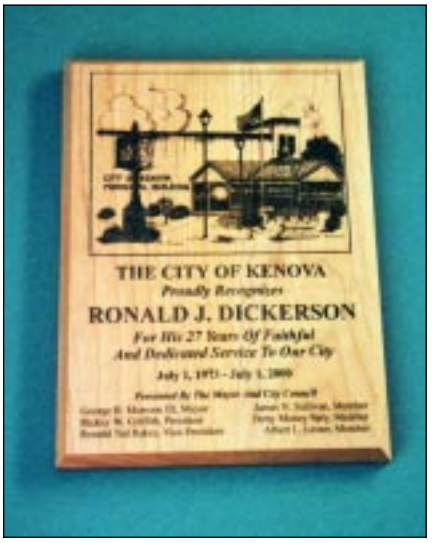
This 4′ x 4′ state seal was laser engraved in solid cherry using a Class 4 laser.

Preparing the wood for engraving is often just as important as the engraving itself. Here, a wood plaque is being waxed using a good paste floor wax.

Sometimes, wax alone isn't enough to protect the wood. Here, some paper transfer tape is being added to the top of a plaque to protect it from damage while a very heavy engraved area is being cut.



Here, the protective tape is removed to reveal an engraved area with no damage to the surrounding wood.



Alder is a light-colored wood that engraves about the same color as walnut. The high contrast makes it an excellent wood for laser engraving.

wood particles. This is evidenced when the bottom of an engraving remains the same color as the natural wood itself. A blackened or charred color illustrates a laser that was running too hot or an attempt to burn too deep, too fast. An engraving that is not deep enough may indicate engraving at too low a power rating and, therefore, a waste of time causing the need for multiple passes.

One way to capitalize on the beauty of wood with low-power lasers is to use soft, light-colored woods that naturally engrave dark. One product, often called Rosebud, is actually a wood from the American Northwest called alder. This wood looks like maple but engraves about the color of walnut.

There are other woods commonly used with a laser. The most common of these include walnut, oak, cherry and maple. Exotic woods can offer a host of challenges and might include rosewood, hickory, ebony and a host of others. Although some very common woods such as pine and fir are easy to engrave, they are not commonly used.

Some of the problems with woods lie in the fact the wood was once alive. This not only introduces the fact that every piece is different, it also allows for knots, grain, mismatched glue joints and a couple of invisible pitfalls such as water content, an unforeseen tar or sap content and of course finish. Each of these can have a dramatic effect on the way a piece of wood

engraves, how much smoke is produced and how that smoke can or cannot be removed once the plaque is engraved.

Because of these factors, both seen and unseen, it is not only important how the piece of wood is engraved, it is just as important how a piece of wood is prepared for engraving and how it is cared for afterward.

Because every laser is different, it is impossible to discuss settings, speeds and the time required to do a specific job. Older lasers will require very different settings from their newer, faster cousins. Although most small lasers will require about the same amount of time to engrave a wood plaque, the settings will vary wildly from one model to another. Here is the reason:

There are three variables in a laser engraver. Power, speed and PPI or *pulses per inch* are the three controlling characteristics of each laser, and changing any one of these can dramatically effect the other two. Here is a quick overview of what they mean:

POWER. This is the simplest attribute to a laser. Lasers are identified by the maximum amount of power they can produce. For instance, a 30-watt laser is capable of producing at least 30 watts of pure power when new. Some machines will be hotter than others, but the differences between hot and cool tubes will be minimal at best. More attention should be paid to maintaining clean mirrors and lenses than worrying about a few watts of power.

One of the best and most commonly used blackening agents for wood engraving is liquid shoe polish. Just dab it on, smear it around a little and wipe it off.

SPEED. There is a lot of fanfare about speed in today's marketing. When engraving wood with low-power lasers, it is enough to say that the maximum speed a laser can produce is of little value. The reason is that most wood jobs require a very slow engraving speed to obtain adequate depth. This depth is usually obtained by running the laser at maximum power and slowing the speed to obtain the maximum depth without burning or charring the wood. The fact a machine has the capability of running like the wind may be money in the pocket of someone engraving acrylic but is no help when engraving wood plaques. An easy rule of thumb is that when the speed is cut in half, the result is equal to doubling the power and visa versa.

PPI. The number of times a laser actually fires also plays a major role in determining the depth of the cut, the amount of smoke generated and most importantly, something called *flare up*. This is when the wood becomes so hot, it actually catches on fire. Not an uncommon experience, this usually marks the death of a wood product in that it does more damage than can be corrected with a can of Pledge. Although I usually engrave my wood at 500 PPI, most experts recommend 250 or 300. This reduces the depth of the cut but also greatly reduces the chance of flare up since the burn spots are spaced further apart, and, therefore, the surface of the wood remains cooler. The resolution of most soft wood products is not affected by reducing the PPI to as low as 250 PPI.

PREPARING THE WOOD

Every piece of wood is different. Some require much more attention than others. A wood pen, for instance, might be engraved with no preparation at all, since the engraving will be small, fast and fairly shallow. But what about that 12″ x 14″ plaque filled with heavy solids and loads of text?

Someday, I may take a lesson from others in our industry and capitalize on the need to have a good wax for laser engraving. Rather than develop a new, highly specialized product, I will take some old-fashioned Johnson's Floor Paste Wax and repackage it with a fancy name and slogan like *perfect engravings every time*. It won't be true but then neither are a lot of advertising slogans.

The truth is, a good even coat of paste floor wax on a wood plaque will work wonders in protecting it from the smoke and tar that result from laser engraving on wood. I like to apply the wax shortly before engraving. I don't bother removing or buffing the wax before engraving, but I do try to be sure there aren't any ridges in the wax after applying. Having a smooth, even coat of wax is important.

After engraving, you can add color before removing any of the wax or smoke. Once satisfied with the product, use a solvent to remove the wax. With the wax comes all the smoke and tar.

Like many laser engravers, I like to darken my engraving with liquid shoe polish. This leaves a much darker color in the engraved areas and especially when using walnut, greatly increases contrast. The shoe polish will, of course, also slightly darken the wood surrounding the engraved areas so it is important that it be removed as quickly as possible. If a good coat of wax has been applied, the shoe polish is much easier to remove and has little or no effect on the surface of the wood.

Removing the wax can be tricky. Because there is a finished surface under the wax, care must be taken to use a solvent that will remove the wax (at least most of it) and not adversely effect the original finish of the plaque. Since I like to do my clean up with alcohol, I take care to order plaques I know are finished with a coating that is not easily affected by alcohol.

LASER QUALITY VS. REGULAR QUALITY PLAQUE BOARDS

Anyone who buys walnut plaque boards knows that for an additional five to 15 percent, you can buy laser-quality wood. Is it worth it? Is there really a difference? The answer to the second question is yes. There is a difference—several differences—and everyone should know what they are.

All walnut plaques are built using the same method. Narrow strips of wood are cut and then glued together to form a board. This is not done to utilize scrap wood (although that isn't a bad idea). Remember, wood was once alive and because of that, wood will not remain constant over time. Plaques will absorb moisture, expand and contract, twist, buckle and change color. Because of the ability of wood to twist and bow, a plaque larger than a 6″ x 8″ will not remain flat if