

GCC LaserPro 30-Watt Mercury Laser Engraver



By J. Stephen Spence

ONE OF THE BENEFITS of writing test reviews is that I get to play with lots of neat toys. The downside is that after playing with them, one tends to get a bad case of "the wants". It's something like having chronic new car fever.

I am very sorry to report that such is the case with the LaserPro Mercury. The Mercury is a 30-watt, 18x25" laser with all the features of its competitor's top of the line machines.

LaserPro is built by GCC (Great Computer Company) of Taiwan, making it the first laser to be imported from that part of the world. Although most laser engravers are American made, this is changing. To be totally honest, the fact the machine was made overseas is without question the biggest negative I can call up about the device. Like many Americans, I like it when such large ticket items are made in the good ol' USA. I was pleased to discover, however, that although the machine was assembled overseas, many of the most critical components were actually made in the US. Not only was the laser tube itself American made by Synrad™, the largest volume manufacturer of CO2 laser tubes in the world, motors and some of the electronics are also American-made.

THE CABINET

The mostly welded steel box is well designed and built. Unlike most lasers, this design places the laser tube under the engraving table and to the back of the machine. This saves considerable space (probably 8 to 10") and allows the machine to have that much smaller a footprint. The exhaust outlet is located under the cabinet rather than on the back saving additional space and actually allowing the unit to sit flat against the wall.

The cabinet is well painted and extremely strong. It is mounted on wheels that allow the 250-pound machine to be moved easily, even on thick carpeting.

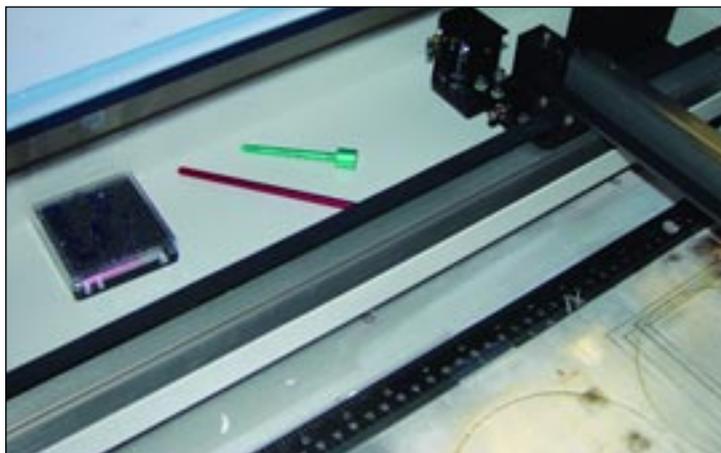
The control panel is located on the front of the machine, making it easy to access, but the power switch is located near the back along with the power cord and computer connections. This positioning makes it nearly impossible to turn the machine off accidentally in the middle of a job.

The device has a very large Plexiglas top door that allows, when open, a clear view of the entire engraving table. The lid opens completely, giving good access to the engraving table, and although I had heard it was easily broken, I found it to be light, durable and well designed.

Inside the cabinet, there is plenty of room for storing those pesky little things like focus tools, magnets, weights, and safety glasses. To the left of the engraving area, in a nice large space I am sure



There is a nice area on the left, inside portion of the laser that is great for storing such things as focusing tools, weights, etc.





Removing eight screws from the back cover in order to use the pass-through capability is a reminder that this can be dangerous. Precautions should be taken when operating a laser with doors or panels removed.



Input connections, fuses and the power switch are easy to access but out of the way. I wish there were switchable outlets for the air compressor and exhaust blower.

was not intended for this use, a host of tools can be kept in easy reach. To the front of the machine is plenty of room to mount a couple of different types of lighting instruments to give additional light inside the table area if desired. Although not necessary when used in a well-lighted shop, a little extra light is always helpful.

It arrived in its own house. I'm not kidding. When the 500+ pound crate arrived, it was as big as a house and almost as heavy. Still, it was designed to travel and it had—all the way from Taiwan! Fortunately, the trucking company had a hydraulic lift and skid dolly, which made the crate fairly easy to move, and because someone had given it all some thought, the box actually went through the standard-sized doorway that enters my shop. About half the weight was contained in the plywood crate making the laser itself check in at about 250 pounds. Something to consider if one plans to move it to the second floor as I did.

With a little help (actually, it was a lot of help), four of us managed to get the laser into its temporary home on the second floor. Unlike some lasers that come in two parts (body plus a stand), this laser comes in a single unit. The model I tested was an 18x25", 30-watt variety called The Mercury.

ENGRAVING WITH THE MERCURY

If you are already a laser engraver, working with the Mercury takes a little getting used to. There are features that are different than the other lasers I have used. The most obvious is that the engraving head or lens assembly can be moved by hand at any time the machine is not actually engraving a job. Touching the lens assembly in other lasers once the system has energized is always a no no but with the Mercury, it is quite permissible.

Why anyone would want to do that in the first place eluded me for some time but as I used the machine, I began to discover the shortcuts this feature allows. These might include:

- Need to focus on some specific spot? Most lasers require you to use a slow moving button configuration to move the head to the right spot. This can take what seems like hours (it actually takes 15-30 seconds). With the Mercury, just reach out, grab the lens assembly and drag it to the desired spot. This takes about three seconds.
- Need to focus on a very specific spot? Just drag the lens assembly to the desired spot and push a button. Auto focus does the rest. Lasers that use those clunky plastic focus tools require the area to be focused on to be about 1" in diameter. The Mercury requires only about 1/8". Although this may not be an everyday advantage, I did find it useful on several occasions when engraving



The electronics are simple and easy to access. Chances are, access will never be necessary but should it be necessary, even the motherboard can be changed easily in just a few minutes.

round objects or truly strange-shaped objects.

- Ever need to know if the lens assembly was going to hit the edge of some product with hills and valleys? Most machines require the head to be moved by using those buttons, and although this serves the purpose, being able to manually move the lens assembly with your hand allows for a very gentle testing of any areas that might be questionable.
- Ever need to engrave inside something that had lips or edges too tall for the laser to pass over? Not to say engraving such an item isn't possible with other lasers, it is. However, it can become really complicated. The Mercury, because of the movable head, allows for relative positioning. A feature discussed later but one that makes the machine very flexible when those really strange-shaped products are encountered.

Engraving an actual job with the Mercury isn't much different than with other lasers—usually. Push the Go button and the laser goes, does its thing, and stops.

In analysis, however, a number of things should be considered. Among them are:

- Accuracy of curves and straight lines.
- Accuracy and cleanness of text.
- How accurately the machine can duplicate a job over a previous job.
- Speed of the engraving.
- How the mechanics track. Do they get dirty easily which effects engraving quality? How

easily are they cleaned? How smoothly do they run?

- How does the machine handle bitmaps?
- How easy is it to set up a job in the laser to insure accurate placement of product first time, every time?
- How quickly do the optics get dirty and how easy is it to clean them?

Since most of these questions can be answered in a few words, let's take them one at a time:

- **Accuracy of curves and straight lines.** Straight lines did fine. Both horizontal and vertical lines were straight and solid. Even after fairly heavy use for a month without any service, straight lines remained solid. Definitely an A+.

- **Accuracy and cleanness of text.** Arcs and circles didn't fare as well as straight lines but they did fairly well. Most lasers fall down with this test. Combining all the software, firmware and hardware combinations to get a truly perfect circle is extremely complicated and any dirt on the mechanics only irritates the problem further. With mechanics in a perfectly clean condition, there were occasional bobbles in the engraving of circles. After mechanics were given the opportunity to collect dust and dirt from normal usage, there was little or no degeneration in the purity of the circles, which tells me the mechanics are strong enough to overcome a little dirt but they are not perfect. Still, not bad—definitely better

than my other laser, but of course, it has three years of heavy use on it. All in all, I would give it a solid B+.

- **How accurately the machine can duplicate a job over a previous job.** Ever run a job only to find a spot that didn't engrave properly? One feature that is very important is the ability to take a job out of a laser and then put it back in for a second pass. A laser that doesn't track itself perfectly is anything but an asset. The laser tracked perfectly every time and gets an A+.
- **Speed of the engraving.** The discussion of speed when related to 25-30 watt lasers is a foolish one since the ability to move the engraving head across the table is only the first of several factors that answer the question, "How fast does it engrave?" The issue of speed is more a part of a salesperson's pitch than it is meaningful criteria for judging a modern laser. Yes, the Mercury is fast, super fast—up to 42 inches per second—but without discussing every type of product, the number is meaningless. I give it an A+ for speed but I would probably give that to all lasers currently being sold. True speed in today's lasers has to include as much verbiage about wattage and the material being engraved as it does speed. Due to limited space, let's save the speed discussion for another time and just say this laser is fast and leave it at that.



The control panel is simple and easy to use. The readout provides plenty of information about the job being engraved and the buffer allows for up to 99 jobs to be stored at a time.



Special LaserShield glasses are a MUST when operating a laser when using the pass-through feature. These special glasses are provided with the laser.

- **How the mechanics track. Do they get dirty easily which effects engraving quality? How easily are they cleaned? How smoothly do they run?** I really like the mechanics in this machine. They are simple, strong and dependable. Although they can and will get dirty (as all lasers do), they are very easy to clean. Adjustments are at a minimum, belts are strong and durable and I see no reason why these mechanics can't be expected to give excellent service. Of course, only time really tells this story and since my test was only for a few months and not a year or more, and because they do not produce an absolute perfect circle (no laser I have ever seen does), I will give the mechanics a well deserved A.

- **How does the machine handle bitmaps?** For the first couple of months, I experienced considerable trouble with bitmaps, but after acquiring a new copy of the driver, this cleared up and for the remainder of the test period all sizes of bitmaps were attempted, up to about 10 megs in size, and only one failed to engrave properly. To the machine's defense, however, my other laser also failed at the same job. Perhaps it was because of the multiple Powerclipped images, the unusually large size of the job, insufficient memory or some bizarre computer conflict but whatever the reason, one job containing a large bitmap did fail to engrave. In the final analysis and after installing the second driver, I give it an A for bitmaps.

- **How easy is it to set up a job in the laser to insure accurate placement of product first time, every time?** Here is something that bothered me a bit. Setting home is accomplished by going into the backdoor of the operating software on the laser itself and making the appropriate changes. This is easy once you know how and is more effective than some other machines that require the moving of the rules but the manual wasn't any help so unless the user knows to ask, it remains a mystery. In repeatability, the laser gets an A+ but the manual, discussed later, needs a lot of work

- **How quickly do the optics get dirty and how easy is it to clean them?** Dirty optics result in serious problems. Keeping them clean is very important. Dirty lens and mirrors cause a variety of problems, the least of which is the inability to get the laser to burn or cut as deeply as it should. All lasers have exposed mirrors that pick up dirt and a lens that is all but unprotected from smoke, dirt and trash. The Mercury designers did an outstanding job designing the mirror mounts and lens carrier used in this machine. Although they may have borrowed

some of their design from American laser manufacturers, they have combined the elements into a system that is very easy and fast to clean and service. For reasons I did not understand, the manufacturer provided two identical lenses with the machine. Both were 2" focal length which is an okay general purpose length and is fine for almost every job but why the extra. I later found out one should have been a different focal length which made a lot more sense. The system accommodates 1.5", 2", 2.5" and 4" focal length lenses. This means zero to most users but those who have some really unique application should be conscious of this fact. Lenses are easy to install and change, easy to clean and throughout my tests, remained clean, even when working with some nasty materials. Lenses and lens assembly get an A+ in my book.

Likewise, a high mark goes to the mirrors, which were easy to remove and clean and did not seem to attract an unusual amount of dust or dirt. Except for the one that rides on the top of the lens assembly, they are mounted far enough away from the engraving area they tend to remain clean. Because of the design of the laser (laser tube mounted under the machine rather than on the back), there are a total of four mirrors used in the system. This is one more than some lasers use, and since the addition of mirrors can mean a reduction in power and effectiveness, especially when comparing the temperature of the laser at the extreme lower right as compared to the extreme upper left of the engraving table. I found this not to be a problem, however, in that the quality of the engraving remained very consistent across the entire engraving surface. Furthermore, I felt the design advantage of having a smaller footprint clearly outweighed the disadvantage of adding an additional mirror.

USING THE DRIVER

Every laser has a driver that makes it work. No machine is ever better than its driver. Dependability, repeatability, bitmap creation and much more are all handled by the driver. Every printer has a print driver, and a laser driver is absolutely the same thing although it may be considerably more complicated and flexible. A driver is a driver.

Many shoppers stand in tradeshows and wow over the antics of the various lasers on display, watching them zip back and forth working their magic but what they don't

realize is the real magic isn't in the metal box, it is in the computer. Every laser must be judged by its driver. If the driver won't do it, neither will the laser. If the driver has a bug in it (and they all do), so does the laser.

The driver for the Mercury is a good one. It is easy to use, clear cut in its design and stable (most of the time). The bad news is, the copy that came with the laser was defective and it took awhile to find it out. Once that fact was identified and a new driver installed (same version), the bugs seemed to go away and I had no further problems. It did occasionally crash along with CorelDraw 9 or 10 but then that might not have had anything to do with the driver since Corel likes to crash from time to time just for the fun of it.

The good news is the driver allows great flexibility and control over what the laser is doing. The bad news is it was written by a non-American and therefore is done using the metric system, not ASE (inches and feet). Although not a big deal, it is an inconvenience that could be easily fixed either by offering two versions of the driver or by allowing the user to select Inches one time and set it as the default for the driver. The choice is there but the driver doesn't remember the selection unless expressly told to do so. Since this is really not detailed in the manual, the installer should take care of this at the time of installation but it could be better handled if it came to the user ready to go. To expound on this Americanization issue, the rulers on the engraving table are also metric and should be changed to ASE since the machine is being marketed to Americans. This too is a very simple fix. Of course, the user can make an overlay easily enough but for \$17,995, it seems like a small thing to ask that the rulers be correct for the country it is sold in.

More important is the driver's ability to handle relative positioning. Want to engrave beginning at a certain point? Just check relative position, move the lens assembly to where you want it and push the button. It works well and once you get used to it, becomes a commonly used feature.

Control of power and speed is simple and clear cut. Sliders are provided that can be moved easily from zero to 100 percent for each of the sixteen colors that can be individually set within a drawing. The bad news is the driver doesn't automatically hold these settings for the next job. The setting can be saved for instant recall or a set of settings can be saved as a default but the driver must be told to do so. Remembering settings or saving

them with a job so the sliders don't have to be set each time a quickie job is sent to the printer would be nice. Also, for someone who uses another brand machine, the sliders are reverse of what I am used to and I was constantly setting the power and speed opposite of what I really wanted them to be. Not an issue for new users but an irritation for those who run multiple brands of machines in the same shop. Finally, it would be very nice to have the ability to type in the power or speed setting desired as opposed to having to use the sliders each time. This provides quick, easy input of precise settings.

More good news. I loved the rubber stamp feature. Just a few clicks and the job is ready to engrave. The relative position and ability to easily control the amount of dead space around the actual stamp is great. Also the ability to quickly control the amount of rake or angle left on the sides of letters is really nice (the default didn't suit me at all but changing it was a snap). The worst news, however, also concerns the rubber stamp feature. That has to do with its untimely ability to crash the program. This was corrected when I was given another copy of the driver and although the versions should have been identical, the new copy of the driver did seem to eliminate this problem. What I found with the original copy of the driver was that if page two was called up in a sequence the driver obviously doesn't like, it crashes the driver and CorelDraw®. If the job hadn't been saved, you get to start over—not a good thing since one doesn't usually save rubber stamp layouts unless they are for a company that calls for repeat orders. The good news is the problem was fixed by loading the new copy of the driver.

The good news is that all these can be classified as minor nuisances that might be changed with a future release but in no way limited the use of the laser. Of great concern in today's computer market is the availability of a driver for Windows 2000 and XP which has been released but not included in this test (this test was done exclusively with Windows 98).

CONNECTING THE EXHAUST SYSTEM

When I first saw the Mercury unpacked, I had some concerns about the way the exhaust system was designed. Unlike most lasers that exhaust the smoke and odors out the back of the machine, the Mercury channels the exhaust to the bottom of the machine where a 4" dryer type vent hose or PVC pipe connects to an exhaust system or

charcoal filtration system. Neither of these items are included in the price of the laser. An exhaust system must be adequate to handle the job and although some laser salespeople recommend a small inline exhaust blower designed for clothes dryers, these machines demand some much larger. Exhaust blowers like those provided by W. W. Granger are much more the order of the day (about \$300 and require both electrical and mechanical assembly that not everyone can do themselves).

What I found was that the bottom draft design performed very well and because it vented out the bottom of the machine, it eliminated a bulky vent tube that usually forces lasers to be placed six inches or more from a wall. This laser can be backed up directly against a wall, giving it a smaller footprint. I think the reason I was so suspicious of this design was because I had read several comments made by salespeople for other brands of lasers talking about the inefficiency of this design compared to what their machines offer. In truth, I looked at this very closely, and I could find no difference between the bottom draft and the back draft designs. Both worked fine and in fact, (although I can't prove it), I think the bottom draft might have worked a little better. Regardless, I found the exhaust design to perform very well with quick evacuation of any smoke generated by the laser. Even when I reduced my exhaust to 50 percent of its capacity, the design performed just fine.

SPECIAL FEATURES

There are three special features on the Mercury that are often considered optional extras on other machines.

RED LIGHT

One is the red light. This is a harmless red laser beam that shows exactly where something is going to engrave. It can be used to double check oneself before turning the laser loose on that \$200 piece of custom glass. It can also be used to check the outline of a product such as an engraving plate to be sure it is positioned correctly or when cutting a job out of a scrap piece of material. It is an easy way to make sure the entire job is actually going to fit. It's not something one can't live without but since it comes at no extra charge, it is a very nice feature to have.

One thing that should be noted is that the red beam does not show up on some materials. Because of its nature, the red light is sometimes completely absorbed by some materials such as black brass or almost anything that is red.

AUTO-FOCUS

Auto-focus is the second feature that comes included with the laser. Although there are times when I prefer a manual focusing capability, manual focus is becoming a rare duck to find and in the case of the GCC, it isn't a great sacrifice, especially since the GCC actually does focus correctly on almost every product—first time, every time.

The advantage of manual focus is when you want to roll something out of focus slightly. I do this often when engraving rounded or curved products. With the GCC, I found it easy to adjust the amount the lens was out of focus using the mathematical readout on the display. Once accustomed to it, it is actually far more precise than anyone could ever focus the machine manually. Sometimes, it was actually too precise!

Several methods of focusing automatically have been attempted. The first used an infrared beam on each side of the table that shot across the table, looking for the top surface of the product being engraved. The problem was twofold. One, it was locked down to one precise spot on the table. If the job called for engraving a product on another part of the table, it wouldn't work. It also failed to work well on clear glass and acrylic and items that were thinner than the rule guides mounted on the top and left of the engraving table. The height problem was eventually solved by cutting a slot in the guide strips, allowing the light beam to pass directly over the engraving table. This allowed for even the thinnest materials but still offered problems with glass and acrylic.

The GCC uses a different approach altogether. Instead of using an infrared light beam to find the thickness, the GCC uses a pressure-type switch mounted to the lens assembly. Because the lens assembly can be moved manually to any position on the table, even products with uneven surfaces can be easily registered accurately. For those really tricky products (I never did find one I couldn't get good focus on automatically), there is a simple drop-in tool that allows manual focusing or allows the engraver to double-check what the auto-focus is doing.

My only complaint with the auto-focus is that it may be too accurate. When engraving soft materials like plastic or even soft woods, the laser is focused so precisely that it can produce a ridged bottom on the engraved product. To eliminate this, I just knocked the laser out of focus ever so slightly so as to broaden the light beam and thus distribute

the energy over a slightly larger area. This resulted in nice, smooth bottoms on every product I tested. An out of focus setting can be programmed into the laser as a default if one so desires.

One of the true advantages of the excellent focusing capability is how it increases the machine's ability to cut thick materials. In cutting, it is important to be able to focus as much light energy as possible into the tiniest area. When comparing the machine's cutting ability with the beam focused automatically and manually, the laser was capable of cutting much thicker materials when auto focused, even when I tried my very best to manually focus the light beam as precisely as I possibly could.

AIR ASSIST

The third feature that is almost always an extra on entry level is air assist. Without question, this is the feature I appreciated the most. Familiar with the feature for years, I have never actually had a laser with air assist and after this trial, I will never have another without it.

Air assist is nothing more than a very small, flexible tube that is attached to the lens assembly and run through the mechanics and to the outside of the laser where it can blow a constant stream of air onto the area being engraved. This keeps the area around the actual engraving spot cooler and thereby reduces melting or flare up.

Most helpful when engraving wood or rubber stamps, the feature also helps when engraving glass (reduces fracture) and plastic (reduces melting); it is also very helpful when cutting with the laser. Because cutting requires maximum energy, it often results in charring, flame up and melting. For example: Cutting wood is easy with a laser. A 25-30 watt laser should easily cut 1/4" wood or more but often won't because the heat causes so much charring on the edges. The item, once cut out, resembles a charcoal brochette more than a product. With air assist, the job is an easy one which results in little if any charring, allowing not only 1/4" material to be cut but even thicker materials up to 3/8" in a single pass. This is not to say there won't be any black char on the cut edges, as that is not true, but it is greatly reduced.

The same is true with acrylic. Tests allowed cutting of 1/2" cast acrylic with this 30-watt laser. That is very good. The air assist kept the acrylic cool enough it did not distort when being cut—what would have been a serious problem without air assist. In fact, by using several passes, I was able to cut completely

through a piece of 3/4" cast acrylic, leaving a perfectly usable end result. This is a feat that salespeople may make sound easy but I assure you, in real life, it isn't.

The Mercury laser comes equipped with the plumbing for air assist but does not include the air pump. That little toy can go for as much as \$1,200 extra but truth be known, any small air compressor will do the trick. I used a \$100 compressor from Sears but even a hobby compressor costing about \$75 that makes a lot less noise than the one I used will be adequate for all but the more demanding users. Any compressor capable of producing about 10 psi and a rubber hose from the local auto parts store is all that is needed to set this most valuable asset into operation.

One design feature on this machine I have not seen on all is the fact the air assist nozzle is directly under the lens. This means the air is blown directly down over the area that needs it so it tends to blow any flame up straight down, not off to one side. This seems more effective and although the nozzle does reduce the clearance of the lens assembly over the area being engraved, the nozzle can be easily removed when not needed.

I do wish the designers had included a switched power outlet as part of the design of the Mercury with a switch on the control panel for Air Assist. Being able to control both air assist and the exhaust blower from the control panel would be a very handy-dandy feature.

PASS-THROUGH ENGRAVING

One feature this laser offers that is truly unique is pass-through engraving. This feature allows the user to engrave objects much larger than the cabinet could otherwise accommodate. This is done by allowing the user to defeat the safety switches on the front door and also remove a back panel (eight screws) giving a passageway through the engraver.

Although nice to have, this feature requires some understanding by the user and a warning to the irresponsible. Most lasers in our industry are Class One lasers. This means they are completely self-contained and safe. The laser beam cannot escape the metal/Plexiglas cabinet (CO2 lasers do not pass through Plexiglas). A Class Four laser uses an open architecture that does allow the laser beam to escape into the immediate environment and, therefore, can be extremely dangerous. These lasers are usually contained in sealed rooms where win-

dows are absent and doors are auto closing and self-sealing. These lasers are often far more powerful than the ones we use in the awards industry but not always and require workers to wear special red tinted glasses and even special aprons for protection from stray or reflected laser beams that might burn clothes or skin and are more than capable of destroying one's eyesight.

For this reason, the Mercury comes with special glasses and a warning to be very careful when using the laser with doors open.

In reality, the danger of being struck by a stray or reflected laser beam is remote but it is possible and if struck in the eyes, the damage could mean blindness for life.

Here is how such an accident could happen: When the light beam is fired at an object, its energy is absorbed by the material. Wood, leather, plastic, etc. usually will absorb all the energy leaving nothing to be reflected out into the environment. Metal, glass or other hard materials, however, may not absorb all the light's energy. The remaining energy is then reflected back into the cabinet where it would usually just bounce around until exhausted. Should the angle be just right and a door be open, however, the energy could be reflected into the room around the laser. It would then be absorbed by whatever it hits: furniture, walls or people. If it strikes a wall, it could start a fire (I've done it) but the chances are small at best. If it hits a person, it can cause a serious burn. If it strikes the eyes, it may well cause blindness.

All this is to say, if you use this option, use it responsibly. Wear laser safety glasses (provided with the laser) and restrict non-essential personnel from the area. When I do this, I cover the open doors on the laser with black plastic. This will not stop the laser from escaping but will leave an indication of when it does. Remember, laser beams are invisible. The red beam you see in some lasers is just that: a red beam. It is not the laser!

OTHER POINTS OF INTEREST

- Resolution is always a topic of interest. Although most people never use anything but 500 or 600 dpi, like most lasers, this one is capable of 200, 250, 300, 500, 600 and 1,000 dpi. The dpi is easily adjustable through the driver as is the PPI (Pulses Per Inch).
- The machine comes with a 16 meg buffer, which is enough for most users. It is expandable to 64 megs using standard SIMM modules.

- Up to 100 jobs can be sent to and held in the machine's memory (provided there is enough memory installed).
- A variety of models are available in varying wattage and sizes—even a 48" x 33" machine is available.
- Several lenses are available for the Mercury. I tested the 2" lens but there is also a 1.5", 3" and 4" available. The laser usually ships with two 2" lenses. I don't understand the need for an extra lens but I guess it's a nice thing to have—just in case.
- The newest toy being offered for this machine is a new software add-on that allows 3D engraving. I have seen the result, and it is pretty neat. I'm not sure of its real value in the marketplace but if that's what you need....
- Warranty is always important, and the GCC comes with a three-year warranty. As with all lasers, these warranties have some small type in them so be sure you understand what is and is not covered during that time.
- Other options available for this laser include a honeycomb cutting table (\$550), a dual head assembly that allows two identical objects to be engraved at the same time (\$1495) and a rotary attachment for engraving stemware, beer glasses, etc. (\$950). Although I did not test the rotary attachment, I did play with a 4" lens. This extra long lens allows the user to work on beer steins with large handles that are a restriction to many lasers because the lens assembly can't get over the rotating handle. With a 4" lens, only exceptionally large handles would be a problem. Since most things with handles are steins or cups made from glass or ceramics, the fact that the super-fine focusing possible with standard lenses must be sacrificed when using a 4" lens is of little consequence.

THE MANUAL

By far the weakest area of this laser was not the software nor the hardware but the manual that comes with the machine. Written by people whose first language is obviously not English, the end result is about what one would expect—confusing. Discussions with company leadership stressed the importance of Americanization of the machines sold in the US. A driver

set-up for SAE measurements; guide bars calibrated in inches, not millimeters; and a manual that gets rid of all the white space and packs itself with helpful step-by-step information about how to setup and use the machine—after the installer has left the premises! Granted, some of the American-made machine manuals aren't much better. What we need is a manual that can quickly get a new user up to speed and making money, even without a technician to install and setup the machine. The GCC manual falls far short of this.

CONCLUSION

To be honest, I was somewhat nervous about testing this machine since I had heard some reports about earlier models that concerned me. Not the least of which was difficulty in getting replacement parts in the US. I found there have been some problems but current leadership has taken an aggressive role in not letting history repeat itself by arming company representatives with a

complete set of replacement parts (motors, control boards, mother boards, etc.) so quick change-outs could be possible. In addition, a full inventory of parts are now kept in the California warehouse for immediate shipment.

Of course, the great weakness of doing a test like this one is the limited length of time the instrument is actually under test. Three months shows how a machine works when it is new. It does little to show how it performs when it is old, beaten and abused. The most important indicators here are the reports of people who have had the machine for some time and the philosophy of the leadership of the company. A company that does not put heavy emphasis on customer service and support will be a headache from the start. A company that values its customers will do whatever is necessary to always make things right. From all indications I have, GCC has become such a company and although it may not always be perfect, I have seen considerable

effort and determination to make perfect their goal. During the testing period, I have gotten to meet and get to know several of the regional representatives as well as management and these too have impressed me with their knowledge and desire to put the customer first. My recommendation is to shop wisely, ask lots of questions and above all, build a personal relationship with your representative. Get to know him (or her) on a first-name basis and communicate with them often. This person is your lifeline to a happy experience with any laser. Don't be left out there alone. Let that rep be your teacher, mentor and when necessary, your liaison with the manufacturer. I have been using lasers since 1991 and my representative is not only a friend, he is an important factor in my success.

American manufacturers: Be advised, the Taiwanese have landed and they brought a really nice piece of equipment with them.

A&E

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