

PRODUCT REVIEW of the VersaLASER VL-300 & the New High Power Density Focusing Optics Lens

By J. Stephen Spence



A few months back, Universal Laser Systems (ULS) and **EJ** agreed that a product review of their VersaLASER VL-300 with emphasis placed on its breakthrough lens technology "High Power Density Focusing Optics" (HPDFO) would be beneficial to **EJ** readers. This lens allows a 30 watt CO₂ laser to actually mark metal! This is something CO₂ lasers just can't normally do and certainly not the 30 watt variety. This is really exciting technology and I was anxious to try it out for myself. But I'm getting ahead of myself. Let's start at the beginning—a fancy lens is nothing without a good laser to hang it on.

VersaLASERs come in two sizes; the VL-200 which is a 12" x 16" laser and the VL-300 which is the 12" x 24" version. The VL-200 comes in either a 10, 25 or 30 watt version while the VL-300 also offers a wider variety of wattages ranging from 10 to 50 watts, with the most common being 30, 40 or

PRICE STRUCTURE

At the time this was written, these were the recommended U.S. prices for the various sizes of the VersaLASER:

VL-200/10 Watt:	\$7,695
VL-200/25 Watt:	\$9,995
VL-200/30 Watt:	\$10,995
VL-300/10 Watt:	\$9,695
VL-300/25 Watt:	\$11,995
VL-300/30 Watt:	\$12,995
VL-300/40 Watt:	\$14,995
VL-300/50 Watt:	\$16,995
HPDFO Lens:	\$2,650

For information on VersaLaser or any Universal Laser Systems product, please call 800-859-7033 or 480-483-1214 or visit www.ulsinc.com.

50 watts. The more powerful the laser, the more effective and versatile it will be both in normal CO₂ operation and with the HPDFO lens. The HPDFO lens can be used on the VL-300 and all the other ULS models currently in production. Although it can be used on the VL-200, most users will want to have more power than the VL-200 can offer. This is not a negative since typical engraving shops should be looking at the VL-300 anyway since it allows a full sheet of engraving metal or a quarter sheet of engraving plastic to be placed on the table. The smaller version has many applications in gift shops and the like and it, of course, costs less money, but for the sign shop/engraving shop/industrial user, the VL-300 is the laser of choice and will quickly recover any difference in initial cost.

ULS's VersaLASER was unique in its original concept. It was designed with the non-professional in mind. In fact, it was (and is) marketed for a much wider variety of applications than a traditional laser and was designed from the ground up to fit nicely in an office setting as well as on an industrial floor. Its USB connectivity and all computer-controlled operation testifies to the fact that it was intended to be used by secretaries in offices, in schools, by photographers, by salespeople in gift shops and a host of others. And that has proven to offer many new markets for ULS. Perhaps you've seen their ads in some of the non-industry magazines such as *PC Magazine* and *PC World*. One of the latest industries to begin installing lasers is the scrapbook industry.

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As printed in May 2006, Volume 31, No. 11 of The Engravers Journal.



Basic tasks such as engraving and cutting out plastic products was a snap with the VersaLASER's cutting board table set-up.

On the technical side, the VersaLASER is not much different than their other lasers. They are all air-cooled and come with a long list of optional accessories (air assist, rotary fixture, downdraft cutting grid, compressed air). VersaLASER also has an integrated cart/air filtration option that appeals to a wide audience. They run off of either 110 or 220 power and require a good exhaust system. The "flying optics" motion system is controlled by stepper motor technology and is heavy enough to handle just about anything an engraving shop can dish out. Beyond that, however, there are many differences both in basic design and the software to control it. Let's take a closer look at both of these.

Clearly, the VersaLASER looks different from any laser I know of. It's certainly a handsome laser and the only laser that comes in a variety of decorator colors! This is because it was designed to feel at home in an office setting or in a shopping mall kiosk or retail gift shop. When used with the optional computer-controlled charcoal filtration system, the laser doesn't need to be vented to the outside and can actually be rolled around from office to office if need be. Although the combined weight is a couple hundred pounds, the large wheels roll nicely over carpet or solid floors. The only operating requirements are a standard wall outlet and a USB connection.

Beyond its good looks however, is a powerful machine. Designed with the novice in mind, the unit has been kept very simple, but that in no way limits the capabilities of this laser.

The lens assembly is held in with two thumbscrews to accommodate easy cleaning. The enclosed lens cabinet not only helps keep the lens and mirror(s) clean and safe, but also makes it fast, easy and foolproof to change from one lens to another.

Work tables (rotary, downdraft cutting grid or flat) are all interchangeable in a matter of seconds. Best of all, the software always knows which table is installed and makes any necessary adjustments automatically. Of course, there are plenty of well-hidden safety devices to prevent accidental damage to either the machine or the operator.

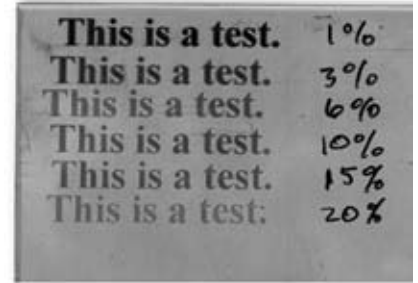
The laser can be focused in two ways. The easiest is through VersaLASER's materials-based print driver. Just enter your material thickness into the VersaLASER settings dialog box and the laser does the rest. It can also be manually focused and has a red diode pointer to make focusing and positioning both fast and simple. This, too, is handled using the special software.

The absolute best way to use any laser regardless of brand or model is to connect it to a properly designed ventilation system which vents the smoke and fumes outdoors. However, sometimes this is not possible, e.g. when using it inside a shopping mall. That's when you need a smoke filtration system.

When ULS's chemical and HEPA filtration system is used, it too is computer-controlled and is turned off and on automatically by the software to limit noise and energy use. This makes it impossible for operators to run the laser without the ventilation system operating properly. No filtration, no laser and no way for the typi-



Stemware and a wide variety of other cylindrical shaped objects can be easily marked using the cylindrical attachment.



This piece of 400 grade stainless steel was marked with the same text at different speeds, using 100% power and 500 ppi.

cal user to bypass this safety feature.

I tested the laser using this system and found it more than adequate for everything I did. Although it didn't remove all odors when cutting wood or acrylic, it certainly handled all the smoke and particulate, making the room where it was located quite acceptable to work in no matter what was being cut or engraved. For operations in malls or other areas where an external exhaust is not practical or where the laser needs to be portable, the filtration system is the best solution. Although its built-in blower adds to the noise of the laser, the sound level is still low enough to allow talking on the phone when you sit next to it. In short, it's a laser I would be proud to have in my shop anytime. It's reasonably fast (45 ips), powerful, easy to use and very versatile.

If one opts to use conventional venting, a special stand can be purchased to place the laser on or it can sit on a desk or table (remember, the system weighs about 100 pounds so be sure to use a sturdy table). Specs call for an exhaust system capable of 150 CFM which can be installed for a few hundred dollars. As with all lasers, proper ventilation and exhaust are imperative.

Now for the special lens: The patented "High Power Density Focusing Optic" lens assembly. We will just refer to it as HPDFO for simplicity, but the name describes how it accomplishes marking on metal—something typical CO₂ lasers can't do.

As power comes from the laser tube, it can be measured to be 30, 40 or 50 watts, depending on the model laser being tested. A CO₂ laser light beam from a typical laser is

then focused down to a tiny spot (usually about .003" diameter). If the light beam could be focused into an even smaller dot, say down to about .00125", it would produce considerably more heat (power) within that small area.

The problem is that physics severely limits the manufacturer's ability to do that. What HPDFO does is solve this problem by directing the laser beam through a series of special mirrors (optics) in such a way as to condense the spot size down to about .00125". Sounds easy doesn't it? It isn't.

The nature (physics) of a CO₂ laser beam resists being condensed down below .003". That's why most CO₂ lasers use .003" as a standard spot size.

Up to now, to go any smaller would be both very expensive and technologically challenging. Yet, that's exactly what HPDFO does. HPDFO is not a single lens, nor an amplifier or magnifier. Rather, it's an assembly of mirrors and lenses that takes the laser beam and refocuses it into a smaller beam of light. The light beam is reflected by a combination of mirrors and refracted by the lenses and the beam is then compressed and intensified into a smaller, more dense beam spot. Where normally more mirrors and lenses reduce the laser beam's effective power, the special optic lens is designed so it intensifies the light beam by condensing the available laser power into a smaller spot. The smaller the spot, the higher the power density. And concentrated power is what you need to mark metals. Because this is done with a very special patented optics, the cost is about \$2,650.

One concern expressed about



The lens on the right is the conventional lens and mirror assembly and the one on the left is the HPDFO lens.



This example was done using the HPDFO lens (no chemicals). The speed was 1% at 100% power and 1000 ppi. It took 40 minutes to complete this test.

HPDFO has to be its fragility. After all, common sense dictates that the tiniest variation in a single mirror will drastically change the results. Yet, upon handling the lens assembly, I can say that using reasonable care, it's unlikely one would ever damage it. It's well built and virtually impossible to install incorrectly. Obvious care would include keeping the lens assembly in a clean, safe place and caring for it much like you would any high quality photographic lens. Clean it by using only photographic quality cleaners and lens cleaning sheets to keep it in top condition for many years of service.

My testing of HPDFO over several months resulted in these conclusions: HPDFO loves stainless steel. I ran a variety of grades of stainless and found that it could be marked both at a relatively high or low speed. The lower the speed, the darker the image, but even at the fairly high speed of 20% (that's fast compared to working with chemical etchers), the resulting mark was quite readable. Slowing the machine down even more resulted in darker and darker marks with the darkest being at 1% speed.

Although that sounds very slow, marking stainless brings such high profit margins, who cares. In reality, the jobs I did for my customers using HPDFO on stainless were marked at 15% speed and although they weren't quite as dark as they would have been using a chemical blackening compound, such as CerMark, the engraving was significantly sharper. This allowed for far smaller font sizes to be used as well as intricate logos and even photographs!

I tested a wide variety of other metals as well, but stainless was the

winner—hands down. Some metals such as gold would not mark at all. Engraver's brass and aluminum would mark, but I was hard pressed to see results that would justify the investment for those materials.

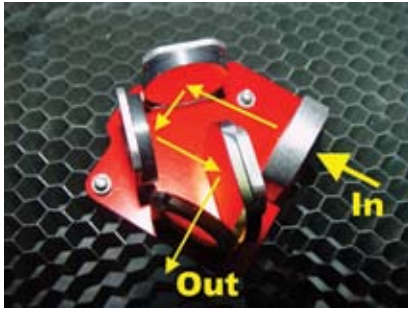
HPDFO loves to cut acrylic or most any plastic for that matter. Because of the smaller dot size and the amplified power density produced by HPDFO, I could cut much thicker acrylic than with a conventional lens and do a better job of it to boot. Not only could I cut thicker acrylics, I could cut thinner ones much faster than with the conventional lens assembly.

HPDFO loves to cut wood. This should come as no surprise since it does so well cutting acrylic, but there's a twist. At the suggestion of a friend, I tried doing some inlay work using HPDFO and it did great. The pieces fit together so tightly they actually had to be pushed together. A small jigsaw puzzle I made from wood fit together as tightly as a cardboard puzzle you would buy in a store.

I was also impressed with photographs. Engraving photographs with a laser is one part skill, one part laser and one part luck. Programs like PhotoGrav make the process much easier and remove much of the stress, but still, a lasered photograph is only a facsimile of the actual photo. Printed photographs use what is called "half-tones" to accomplish the effects of gray tones. This is something a laser can't duplicate very well. Actual photographs use "gradients" to develop contrast. This also cannot be accomplished with a laser. In short, the facsimiles created by a laser leave out much of the detail of a photograph



The VL-300 has only the most basic of controls on the cabinet because the system is primarily controlled through the software.



Follow the light path as it goes through the HPDFO lens, with each reflection, the light beam is intensified by further focusing the beam into a smaller and smaller dot size.

(our brain actually fills in much of the missing information without our being aware of it). Having the capability of the smaller dot size means more information can be included in the image without it becoming “muddy.”

HPDFO can also produce much finer detail in line work and text. Want to do something really small? Well, here you go. My test demonstrated the ability to create raster engraved text down to about three points and vector text down to one point. Of course I had to use a magnifying glass just to read it, but it was certainly legible.

HPDFO may prove extremely valuable for marking 2D matrix codes for the new UID (Unique IDentification) initiative for the Department of Defense (DoD). I generated 2D matrix codes on black anodized aluminum down to .125" that were consequently read and properly interpreted. To the human eye, the code looked more like a white square with a few very tiny black specks in it, but the reader had no problem seeing it just fine. (Just a note: verification equipment was not available during this test so the end result may or may not have been verifiable—a DoD requirement).

So far as I could see, the downsides of owning HPDFO were two. First, the unrealistic expectations. This is always the tricky part. People (me included), too often look at a laser thinking they understand what it can and cannot do. When the laser doesn't measure up to their expectations, they are disappointed “in the laser” although sometimes it's their own conceptions that were at fault.

ULS has been very careful in the

claims it has made about this new lens assembly. It isn't magic. It doesn't turn a low cost CO₂ laser into a \$100,000 YAG laser. It does however, “crossover” to give users the capability to engrave jobs they could not do before. Most anything on uncoated stainless steel—without chemicals—is suddenly a great new capability. Everything from industrial engraving to simple dog tags are now simple and economical to mark. This makes the laser more suitable for “on the spot” cutting such as in a scrapbook shop or highly specialized cutting such as in wood shops that do inlay work.

Second, I have to wonder how many people who invest in HPDFO will really take advantage of its capabilities. Here's what I mean. Experienced engravers focus their lasers in a split second. They run up the table until they feel the focusing tool move and hit the “Run” button. Although this is more than acceptable for conventional CO₂ lenses, HPDFO requires careful focusing attention to insure the desired effect. Those really difficult-to-mark products will mark faster and considerably darker when the intensity of the laser dot is at its maximum.

Every tiny bit of variation in focus causes the dot size to grow, and the more it grows, the less effective the lens will be. Remember, we're talking about the difference between a .003" and a .00125" dot. The best way to focus HPDFO is to use a micrometer to measure the thickness of whatever is being marked and then allow the software to do the focusing for you, but if that isn't possible, just take your time and get the focus as close as you



Connecting the VL-300 involved only one USB connection. The filtration system needed a USB jumper cable from the laser to the filtration system and the software did the rest.



This engraving of the Titanic blueprints illustrates the very fine detail possible with the HPDFO lens. This drawing (top) is 2.5" long and has over 3,000 vector lines. The bottom version has been reduced to only 1" and is amazingly distinct.

can. Having this breakthrough lens and getting the best possible results from it are not the same thing. Taking an extra couple of seconds can really make a big difference.

Synopsis of Accessories

Downdraft Cutting Grid: This optional plug-in table did an excellent job with air being pulled from both above and below the grid. As with all grids, it did leave some tiny marks on the underside of some items. Although it performed well, it did not have rulers on it, something I would correct if it were mine to keep. (Cost \$240 for the VL-200/\$340 for the VL-300).

Rotary (cylindrical) Attachment: Cylindrical engraving using the optional plug-in rotary fixture was made especially easy with the software making most of the decisions. Most any glassware, vases, etc., can be engraved quickly and easily. Watch out for mugs and cups with large handles however. (Cost \$850 for the VL-200/\$900 for the VL-300)

Red Diode Pointer: This is a standard feature and is especially helpful when using the software to focus on round or odd shaped items such as pens.

Air Assist Cone: This is a must for engraving wood and for almost any cutting job. Although this accessory was not sent for testing, I use it with my own ULS machine. Air assist is little more than a small compressor that pumps a tiny stream of air down onto the area being engraved. This downward stream of air tends to blow down any flame-ups that might

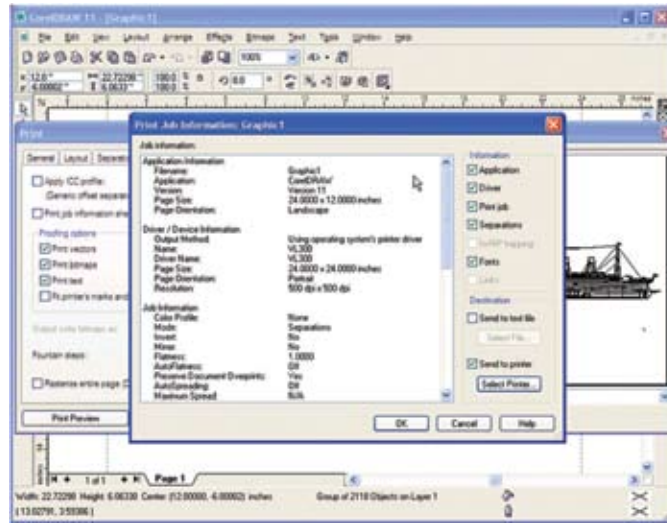
occur when working with flammable products as well as help keep the lens cool and clean by blowing any residue away from the lens assembly. The “plumbing” needed for air assist comes standard, but the compressor is an option. Many people opt to use a compressor from a local hobby shop for this application. (\$140)

Back Sweep: This is something new to me and I regret it was not sent for testing. This optional feature allows air to be focused down on the engraving or across the engraving area to knock down flame-ups or better direct smoke into the exhaust portal. Even without testing it myself, it is a feature I would insist on. Unlike air assist, this feature allows air to be directed wherever you want it to go. Similar systems are offered by other laser manufacturers—a feature I like very much. (\$225)

Software

There are two versions of ULS drivers available for the VersaLASER. The user needs one of these to operate the laser. One, referred to as the VersaLASER Control Panel is intended for the general user and has been made extremely user friendly. For those already familiar with ULS drivers, there’s also an “Advanced” version of software that’s virtually identical to the driver used with other ULS lasers. Both of these drivers work with a variety of “front end” graphics programs such as CorelDRAW or Adobe Illustrator, etc.

Having used ULS drivers for nearly 15 years now, I had to reeducate myself to the VersaLASER materials-



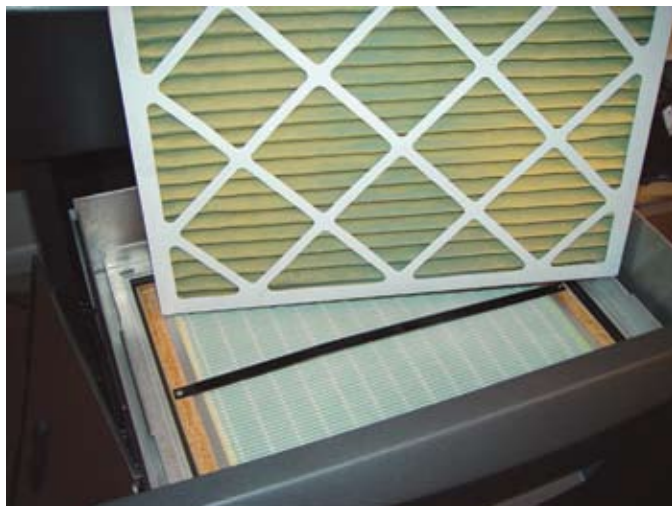
When using the standard VersaLASER software, job information is stored with each job and can be called up or printed out as needed.

based print driver. Once acclimated, however, I did find it very easy to use. VersaLASER's materials-based print driver was written in-house by Universal's software engineers. They reported they had two major design goals: it had to be very easy to use and it had to deliver consistently good results. According to the ULS engineers, the best way to get consistent results in any laser system is to optimize power delivery. This is easy for ULS since they don't rely on a third party to manufacture their CO₂ laser tubes. Because Universal manufactures their own CO₂ lasers, they can tune them for cutting and engraving applications. This freed Universal to develop a materials-based print driver from the ground up that could best optimize laser performance. For general engraving jobs, I can't imag-

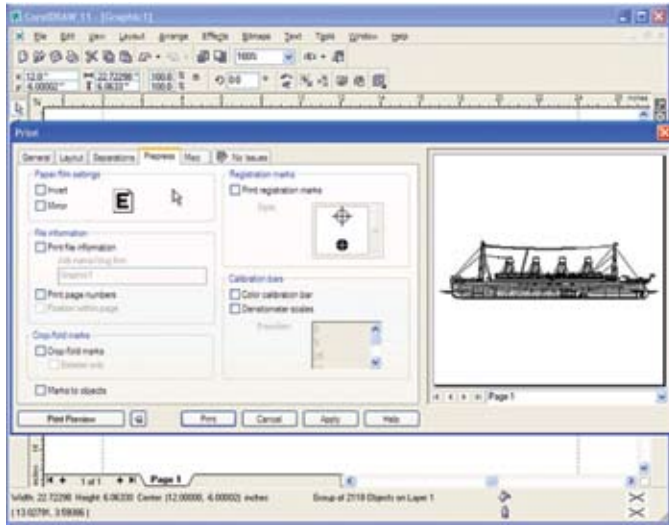
ine why anyone would want to use the advanced software when all they have to do is click their mouse a few times—even if they don't have a clue on earth what the settings mean. All the “standard” materials are already listed within the materials-based driver. Just select the material or product (pen, key chain, etc.) to be engraved and the driver automatically sets the focus, power, speed and ppi. The user can insert alternate settings for items not included in the original products list. ULS wanted a software package that was super simple and required the operator to have only a minimal amount of knowledge about lasers and the materials they mark. That's what they got.

As time passes, I'm sure many additional items will be added to the list making it even easier and more flexible to use. I also expect we'll see more of this type of driver showing up with other “industrial-strength” lasers in the future, provided the materials being engraved are listed in the software, it almost eliminates the learning curve of operating a laser. When coupled with the stand-alone filtration system, the software not only turns on the laser but also the filtration system—then it turns it off again when the engraving is finished. The only thing that could be easier is if someone else did the work.

For more complicated engravings, most Windows based graphics or CAD program can be used for design work. I ran CorelDRAW 11 with the VersaLASER software and



The combination filtering system includes a 1" filter as a second, much thicker filter and has a long life expectancy.



When using the standard VersaLASER software, a click on the “Prepress” tab will give options such as mirroring or inverting the image.

CorelDRAW 12 with the “Advanced” software, but those familiar with other programs such as Illustrator, PhotoShop or CAD programs, can just as easily use those. Even many word processing programs will work. I ran Word for Windows for some engraving and although I feel much more at home with Corel, the software worked just fine.

Because the laser works with USB (only), it’s easy to connect to any current computer and may be “hot swapped.” The software was designed to be used with Windows XP (Home or Professional). My testing was done with the Professional version.

I should note that the stand-alone filtration system was designed for use solely with the VersaLASER materials-based driver and was not designed for use with the Advanced version. Although unfortunate, the reason for this limitation is to insure users don’t cut or engrave materials the filtration system was not designed to handle. When the VersaLASER software is used in conjunction with the filtration system, you can be assured the filtration system has been tested and approved for those products listed in the driver. For safety reasons, those requiring the Advanced software driver should plan on exhausting their system to the outside.


My experience has taught me that nothing less than a 25 watt system should be considered when purchasing a laser system unless there’s a

very specific application that requires less power. 25 watts provides a good starter platform that will do most anything you might need for the Recognition and Identification industry. The more power, the more work you’ll be able to do and the faster you’ll be able to do it. So adding power is almost always a wise investment. If you want to use the new High Power Density Focusing Optics lens, the more power the better. For my money, I’d prefer the added power and available speed of a 50 watt laser when using HPDF.

They say confession is good for the soul so here goes. When I first agreed to test the VersaLASER, I really thought I was going to see a lightweight contender in a plastic box. I didn’t doubt that it would work okay, but I didn’t expect too much either. What I found was a very well built ULS laser. It is a little different from other ULS lasers I’ve owned in that it is controlled primarily from the computer, rather than the control

panel. The software that controls the setup was different—more automated and easier for the novice to learn and use—but all in all, it was one tough, sweet running laser. Perhaps not as large as some of the industrial models, the VL-300 is the same size I use in my shop and the size I generally recommend to others. It was fast, quieter than most and very easy to use. In short, it was far more laser than I expected and I was pleasantly pleased at every turn.

Would I put one in my shop? You bet! Not only as a second machine or back up machine, but I wouldn’t hesitate to bring it in as a production machine. Not only is the price right, so is the performance. In fact, the only things I found that I thought were limitations were: The depth of the laser cabinet prevents large steins and cups to be marked when using the rotary fixture and I didn’t like the fact there weren’t rulers on the cutting grid, although this is easy enough to remedy.

Because of the way this laser has been marketed (as a computer peripheral), some of us have not given this laser its due, including yours truly. Although more at home in an awards and engraving shop than on the floor of United Airlines, perhaps, this laser will do everything my own older lasers will do and frankly, will do some of it even better. In other words, don’t sell this laser short just because you can order different color side panels. This is a workhorse and more than suitable for most award shops and even many sign shops (sign shops may require a larger platform). And by the way, it doesn’t come in a plastic box, it is built in a tough, steel cabinet just like all of the other ULS lasers. The colored sides are just for decoration. 

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As printed in May 2006, Volume 31, No. 11 of The Engravers Journal.