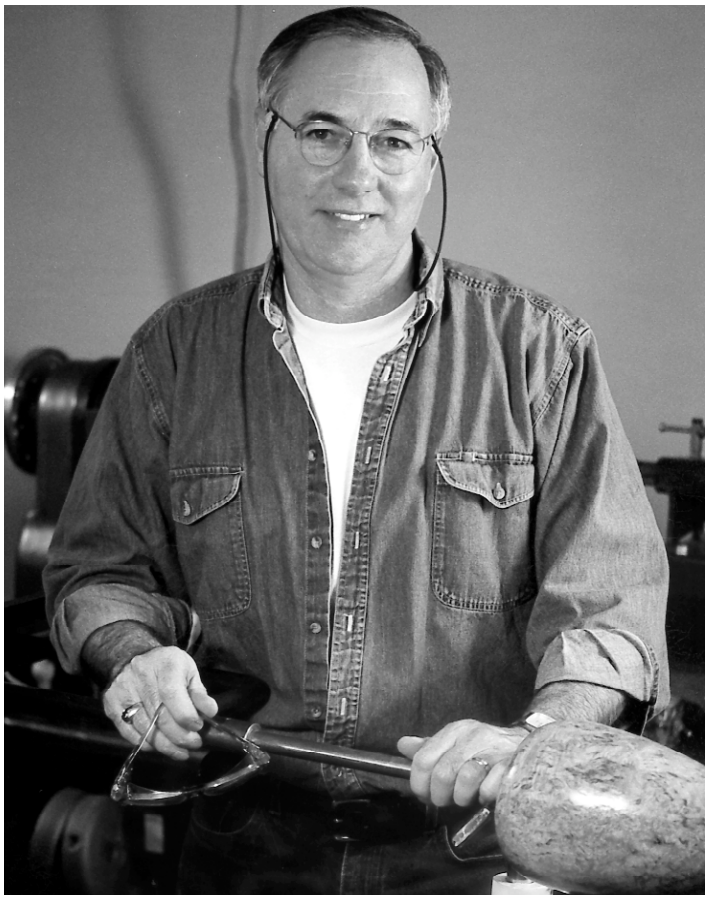
RED HOT LASER MEASURING

Accurate, fast and fun, but how do we use it?

LYLE JAMIESON

LASERS, LASERS, LASERS, everyone is talking about lasers! Lasers, really nothing more than a device for generating an intense, highly focused beam of light, can effectively measure wall thicknesses of hollow forms. Lasers have many more uses and provide exciting technical short cuts to understanding problems such as measuring the bottom of bowls while using coring systems, or showing the shape and depth of the inside bottom contour of any turned form, even through the waste block area.

The laser is the latest advancement in turning techniques to sweep across the country. It is the best new aid to the turning world since the stabilized boring bar systems came into wide usage. There are many methods of measuring the wall thickness of hollow forms, many have been around for quite some time. I didn't get too excited about the old measuring systems because they had limitations and I didn't want to work within any set of parameters that would limit my creativity.



Lathe artist and teacher Lyle Jamieson thinks laser measuring systems are the best turning idea since boring bars. One of his sculptures is on Page 33. Photos and drawings by the author.

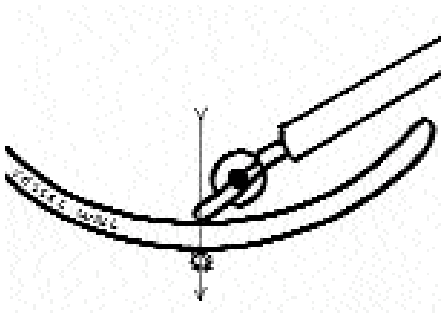


Fig. 1: Distance between the cutter inside the vessel and the laser outside equals the thickness of the wall.

My laser system can be used to measure anything, any place, any wood, any thickness desired, tiny Christmas ornaments or huge vessels. It doesn't impede the tool movement to get into those hard to reach places you have been dreaming of creating.

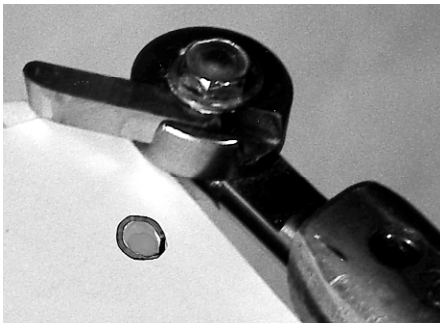
In the beginning

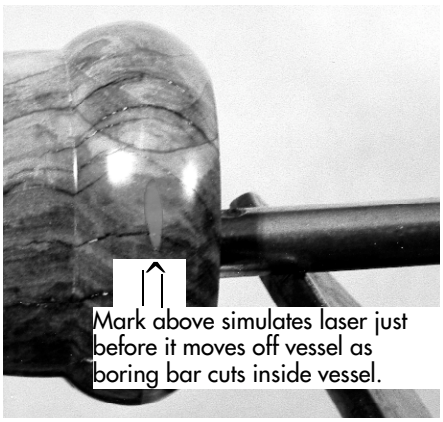
As far as I know, it all started when Dave Thompson of Seattle, WA, published an article in December 1999 describing his idea for suspending a laser light above his boring bar to see where the cutting tip was. See the original article at the following web site: www.fholder.com/Woodturning/article7.htm. After reading the article, I called Dave and told him how excited I was about using and teaching with the laser. He told me to have fun and encouraged me to let the whole world see how much fun it is to use. Thank you, Dave!

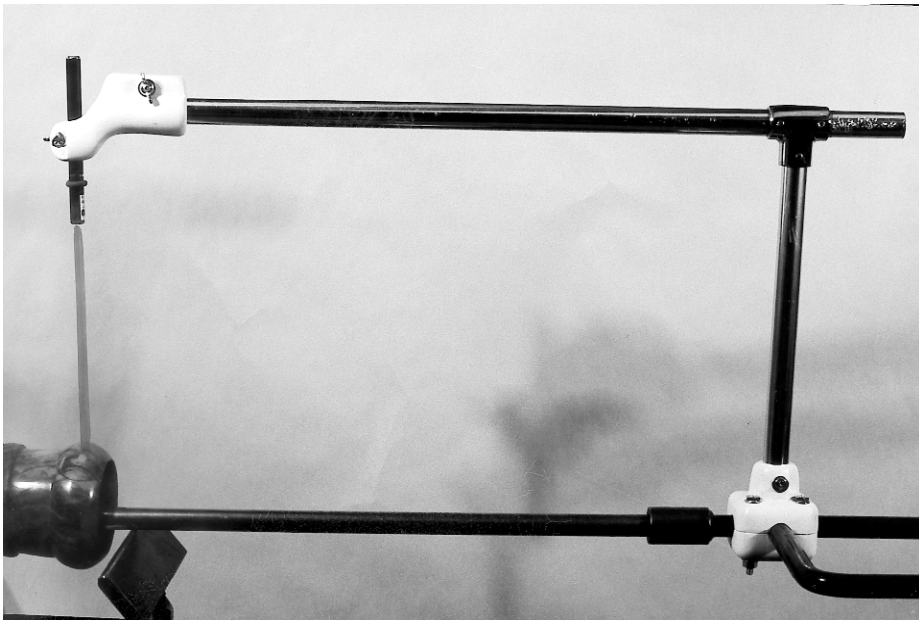
I realize how many turners are making their own systems. My students have been thrilled with the laser's simplicity. So I will outline the techniques I have found that work.

In the companion article on the fourth page of this article I discuss the fundamental ideas behind all wall thickness measuring no matter what caliper or measuring methods you choose.

The whole idea of the laser is really simple. You set the laser light so that the beam of light passes by the cutting tip at the distance you want your wall thickness. The distance between the light and the cutter is your wall thickness, as shown in Figure 1, below left. While the light shines on top of the hollow form, the cutting tip is hogging away wood inside the vessel. When the laser shines around on the side of the vessel, slow down and watch your cutting pace. As the light no longer shines on the turning, it skips off the edge of the form and shines on the floor — You stop cutting! The set distance between the light and the cutter is now the de-







The author's laser system, above. As the tool moves, the laser moves in the same way. The beam is set to desired wall thickness, as shown at top left. When the desired thickness is achieved, beam slips off vessel, as shown at lower left.

sired wall thickness. Go back lightly now and smooth away any tool marks without reducing wall thickness any further.

For best results you need a stable platform like the Sudol, Jamieson or McNaughton system, or one of the shop-built variations, such as the one by Steve Sinner and Dale Hupp in the Fall 2001 *American Woodturner*. The two tool rest platform for boring bars is preferable but not essential. It should be possible to set up a laser on a hand held boring bar, although I have not seen the laser used that way.

Setting up the laser

To set up the laser light, position the laser above the cutting tip so that the light will shine down vertically near the boring bar cutting tip, as shown in the photos, above, top left. Lock down all supporting hardware so that all you have to move for an adjustment is the bracket holding the laser. Now all future adjustments can be made easily be moving or swiveling the laser holding bracket at the end of the tubing that supports it.

Preparing for measurements

To prepare for measuring with the laser system the first step is to set the boring bar at the angle you need to get through the little entry hole and put the cutting tip in a position to cut. Note the angle of the boring bar assembly. Pull the boring bar out of the vessel and support the boring bar on the front and back stabilizing tool rests at that same angle that is needed to cut. If you set the laser at one boring bar position and go into the vessel and cut with the boring bar swung around at a different angle you will get a false measurement. With the boring bar supported on both tool rests you can now position the laser to measure perpendicularly, or at 90º, through the wall. I use the back of one of my business cards as a set up aid. I use the lines on the card as an aid to show me where to adjust the laser light. The line drawn near the edge on the business card is my wall thickness and the arrow line indicates the direction that would measure perpendicular through the wall. The star is the laser position, as shown in Figure 2 on the next page. Now place the card along the outside of the hollow form where you will need to hollow and at the angle needed to measure perpendicularly. Move the card from the work, keeping it at the same angle, and place it next to the cutting tip. Move the laser holding bracket to shine the laser light dot on the star on the card. The cutting tip is inside the vessel, the distance between the two is the desired wall thickness. You are ready to hollow.

Watch the perpendicular

As with any of the other measuring methods the measurement must be close to perpendicular to the side of the vessel. The position of the laser in relation to the cutting edge must be kept perpendicular. The laser needs to be moved periodically depending on the shape of the vessel.

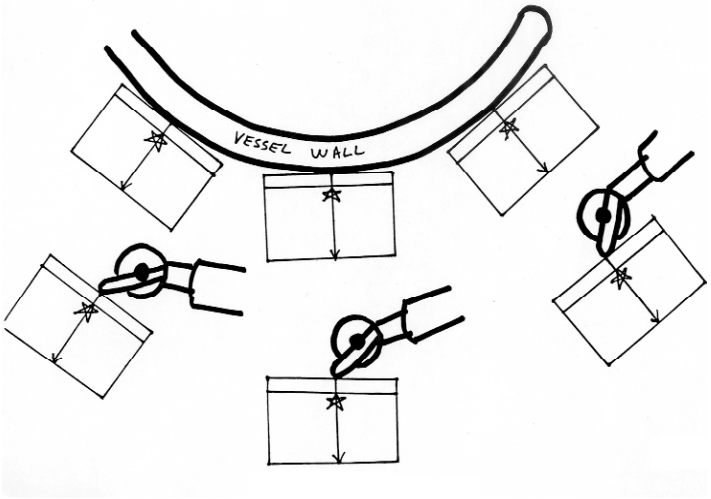


Fig. 2: Lines on a business card help line up the laser to measure perpendicularly to the vessel wall.

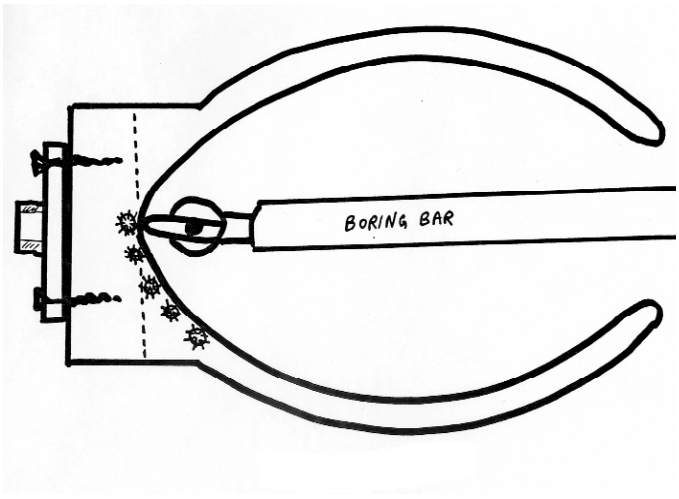
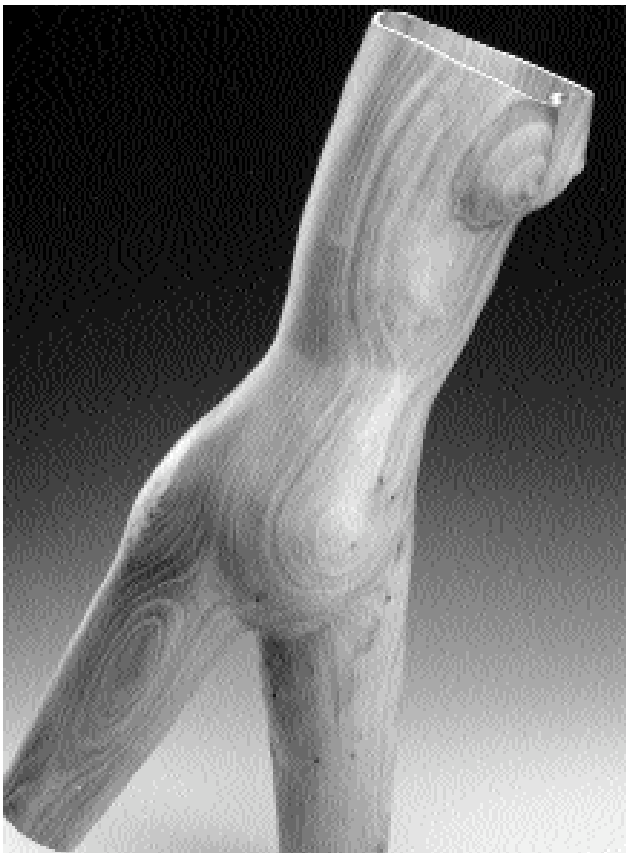


Fig. 3 : Dotted line indicates depth of vessel. Spots indicate laser light as it sweeps across the bottom inside contour.

(See Figure 2 for an example of the positions I would put the laser to measure accurately.) The setting of the laser with the business card helper only takes a few seconds with one hand on the laser holding bracket and one on the business card. Now measuring is easier, faster, a lot faster, and accurate, plus a lot more fun. Maybe it's not fair for those using the laser, since they can do hollow forms in half the time. Does that mean they make twice as much money and have twice as much fun?



Jamieson's *Go For the Gold*; Chinese elm, 27X18X10.

Let's explore even more exciting uses for the laser. There is the inside bottom of the vessel to deal with, which is hidden in the waste wood of the face plate or chuck. You can reset the laser to do bottoms so the gap between the laser and the cutting tip is zero, as shown in Figure 3, above right. Now with the cutting tip down in the middle of the bottom of the vessel you can see exactly where the inside depth is. Draw a line on the waste block at the edge of the laser. That's the bottom!! No more attempting to measure the inside depth and extrapolate it somehow to the outside. Is that cool or what! No more cutting a hole in the bottom when you finish the foot of the form. Hang on! It gets even better!! With the laser still set with zero gap you can watch the light as you cut the bottom contour inside the waste block area. As you make a cut inside the vessel the light will flow from the previously measured center of the bottom to the previously measured side wall thickness where the waste block ends. (See spots in Figure 3, above right)

Watching the light move on top of the waste wood allows you to make any shape bottom you want to create. Flat bottoms, cone shape bottoms, or just a nice rounded bottom are all a piece of cake. Take care not to cut in the previously measured wall because the laser will be at the tip and not set to measure the wall again.

Laser systems available from Cutting Edge (800-790-7980), Packard (800-683-8876), Craft Supplies USA (800-551-8876) or in Canada from Jacques Coulombe (877-866-5799).

A More Traditional Approach For Measuring Wall Thickness

Recently it was my honor to demonstrate at the Central Florida Symposium. The event was a great success thanks to Ken Jackman and the support of the Florida clubs in that area. I was showing my new laser measuring system and demonstrating tips and techniques for successfully using it. I took the opportunity to poll the participants to see if my theory on measuring wall thicknesses was accurate. What I found, by my very unscientific poll, supported my theories that: (1) not everyone uses calipers or other measuring aids besides the finger method, and (2) a majority of turners have used some kind of measuring device in the past and still blown through the side of a vessel or bottom of a bowl.

The assumptions I have drawn from my poll are: first, I assume most turners have tool control and know where they are cutting and second, I assume many turners blow up pieces because of measuring errors.

So I believe many turners have tried to measure wall thicknesses, and failing, have SETTLED for the finger method which leads to uneven wall thicknesses and heavy, thick bottoms. Fear lets the wood remain in control. Fear of blowing up a piece dictates how you turn. I prefer the fun and satisfaction of being in control. Fear is stifling to creativity and is certainly not fun. How do we rid ourselves of fear and get in control? It's easy to say but not so easy to do.

In a hollow form or deep sided bowl the standard calipers won't reach the bottom contours. I have used the bent wire method taught by David Ellsworth with great success. The bent wire method has become the foundation for all the other calipers I use. To use the wire you simply set the gap at the end of the wire at a constant measurement. Let's use a $1/2$-in. gap for this example. If my desired wall thickness is $1/4$-in. and we place the wire ends perpendicular to the wall we are measuring we have a gap or air space of $1/4$-in.. $1/4$-in. wood plus $1/4$-in. air gap equals $1/2$-in. wire gap. The hard part is to keep the measuring at right angles or 90º to the surface at the point where the measurement occurs. If you measure at an angle through the wall thickness at more or less than 90º you will get a false reading. (see figure A) I use this "watch the air space" method on all the different kinds of calipers I use, such as standard, figure 8, or Stewart calipers. Using the double ended calipers you tighten down the adjustment screw and set the calipers at the thickest portion of the vessel. Then move the caliper back and forth along the wall surface and watch the gap of air on the outside of the vessel. Very small variances can be detected and this is important when thin wall thicknesses are the goal.

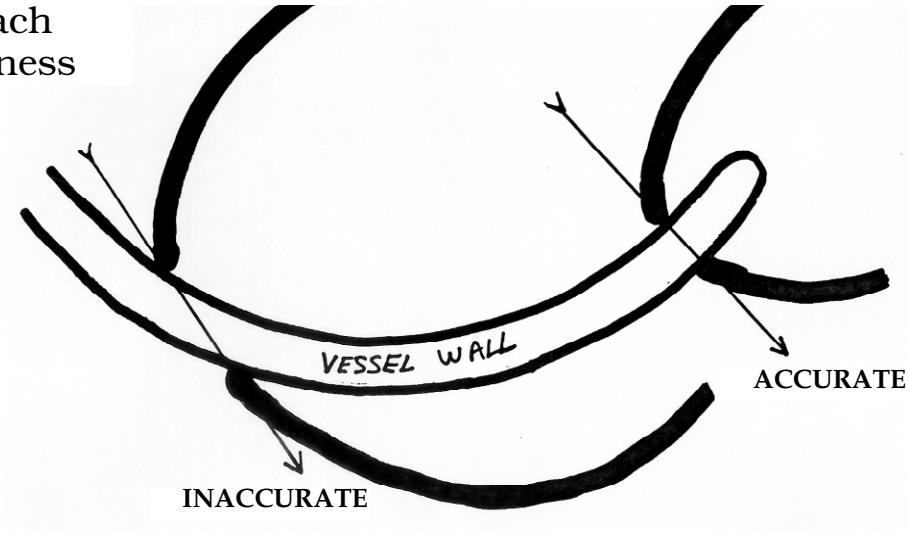


Fig. A:The author says the hard part is to measure at right angles to the surface. Calipers on the right, above, will measure accurately; those on the left won't.

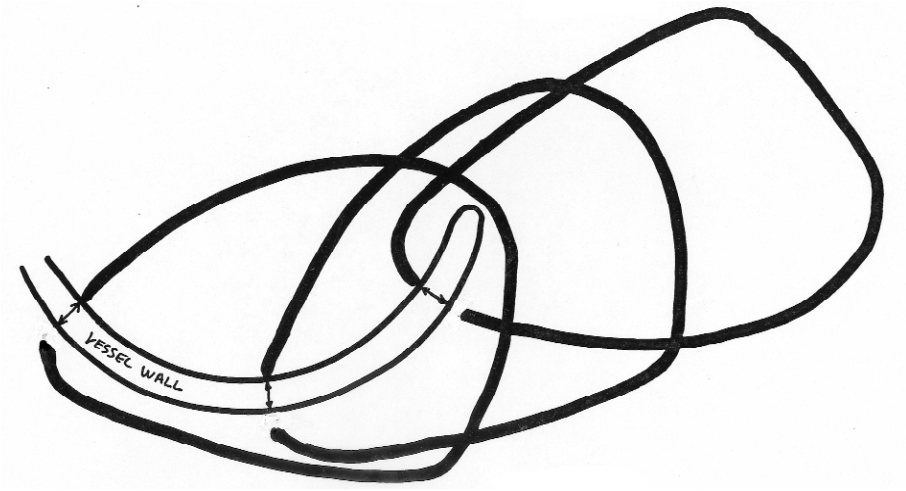


Fig. B: Bend the wire to whatever shape is needed, as shown in the three examples above, while still keeping the angle of measurement at 90°.

The success in measuring accurately is dependent on measuring straight through or perpendicular to the wall. (See figure B for an example of wire measuring.) Notice the wire has been flipped over and swept in an arc in order to measure 90º to the wall. The nice thing about the wire is that you can bend it in any shape needed to measure where you need to measure. But how do we measure the waste block area?

See this exciting breakthrough in the laser article.

Lyle Jamieson is a sculptor and teacher in Traverse City, MI.