

Gauging wall thickness with a laser

By DON DERRY

The one thing I would like to stress before we get started is that the procedure for setting the laser dot is not as critical or as complicated as the description would make it sound. To gain a perspective on what I mean by this statement imagine trying to teach someone how to use a bowl gouge by only giving written directions. I am sure you will agree it is much easier to show someone a technique than it is to explain it.

It is important to understand that gauging wall thickness with a laser is a very forgiving procedure with wall thicknesses of 3/16" or more and with some experience is very manageable even with walls that are less than 1/8". In this paper I will attempt to explain a methodical procedure that will get you started on the road to mastering thin wall hollowing. Most turners figure out very quickly the why and how of setting and using a laser so I encourage you to jump right in and try it.

First I would like to put forth a couple of concepts that set the stage for the actual procedure. It is important to realize that the cutting process of hollowing a vessel takes place on only one half of the hollow form. Therefore the boring bar cutting tip moves thru an arc of 180 degrees to complete the hollowing from the opening of the vessel to its bottom. This "half circle" corresponds to the shape of the outside of the vessel. Coincidentally it is also the shape ground on cutting tip of the small tool bit scrapers that many hollowing systems use.

At any given time, the actual area of the tool bit where the chips are being made, will change as you work down the inside wall to the bottom of the vessel. This is because we are working in the 180 degree arc I mentioned earlier. The laser dot will need to move around the tool tip relative to where you are cutting on the arc that makes up the shape of the vessel.

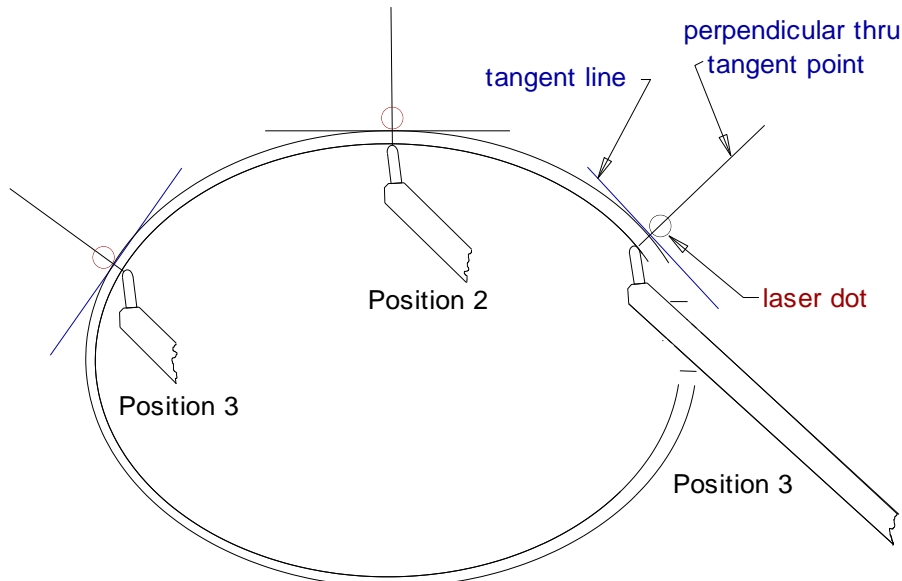
{Illustration 1} shows an oval hollow form shape with a series of boring bars imposed in three different areas of the form. Note that the when the bar is working near the opening, the cutting is taking place on the right side of the tool bit (position1). When the bar is working near the center of the form the cutting is taking place strait off of the tip.(Position2). As you move to hollowing toward the bottom of the vessel notice that the cutting is now taking place on the left side of the tool bit. (Position 3) At any given time the laser dot will need to correspond on the outside of the vessel where the cutting is taking place. The distance that the dot is set away from the cutter tip is going to be the wall thickness.

A more technical definition of how these concepts work together with a laser goes like this;

The laser dot is positioned so it is perpendicular, through the vessel wall, to the tangent point where the cutting is taking place. The laser dot is set along this perpendicular line offset from the tool bit with a gap. This gap, between the cutter and the inside edge of the dot will be the final thickness the wall of the vessel.

This may sound confusing if you have not worked with it before but please remember it is nowhere near as complicated or as critical as it sounds.

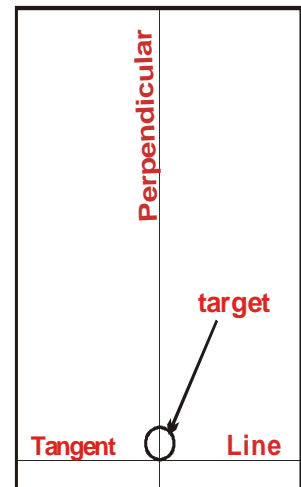
Illustration 1



There is one more basic concept to understand before we continue learning the process. While hollowing to a final wall thickness, you will work down the inside of the form incrementally. This is to say, we will cut to the desired wall thickness in short 2 inch stages starting just inside the opening. Why 2 inches? There is no other reason other than it just happens to be the short side dimension of a standard business card. When the first 2" increment is finalized to its finished wall thickness the laser will then be set for the next stage which is adjacent to it. This next increment will be reduced to final wall thickness and so on until we reach the bottom.

Here is a simple procedure to determine where the dot will need to be set for each increment of the hollow form you will be working on. First you will need to make a simple visual aid. Take a business card and draw two lines on the back of it. The first will split the card in half length wise. The second will be drawn parallel to the short edge of the card. This distance between the card edge and the line you draw will be the wall thickness of the hollow form. Any measurement you choose down to 1/6" can be accomplished but I recommend 3/16" to 1/4" to start with. The setting of the dot is far less critical at this chosen wall thickness

Standard Business Card



Roughing out

1. Drill an access hole.

Pick an appropriate drill bit and open the center of the form. Make the hole short of where you think the bottom of the vessel will be. At this point there is no need to guess where the bottom is going to be because you can always bring the drill in later and make the hole deeper.

2. Hog out the inside.

I usually rough out a cavity in the vessel to a wall thickness of 1/2" by guessing. The laser can be a good aid for this roughing stage. If you put the laser partially on the tip of the tool bit you will have a real time indicator of where the bit is while you are cutting. **Remember this is a rough setting.** It is only used for bulking out most of the waste from the inside and is not accurate for final wall thickness. **With this setting it is important not to let the dot get near to the outside edge of the form.** With some practice you can easily estimate how close you may go to the edge to cut a 1/2' wall.

Cut to final wall thickness

1. Set the presentation angle of the boring bar.

Place the cutter inside the opening so the tool bit is touching the wall so it splits the first 2" working increment in half. This should be about 1" from the hole. Since the laser is on the tool tip you can use it to show where the half way point is. The tool's boring bar will be canted, at an angle, in the opening in order to get the tip to reach the area it will need to cut. Now pull the bar out of the form but keep it oriented in the torque gate as if it were still inside the vessel. This presentation angle is important because it can change the orientation of the cutting tip. (you may temporarily tighten the bar down the gate so it will stay put when you need to turn the adjuster screws.

2. Transpose the tangent point.

In order to accurately reduce the first increment to its final wall thickness we will need the business card we modified earlier. Place the tangent point of the card on the outside of the vessel at the same half way point of the first increment. This will correspond to where the tool tip was when we set the presentation angle of the bar. Now move the card over to the edge of the tool tip as if it were attached to a pantograph. Do your best to preserve the orientation of the card in space while you move it. By bringing the card over to the tool tip the corresponding tangent point will be established on the same relative part of the tool bits edge where the cutting will be taking place. See {**Illustration 2**}

3. Set the dot.

Adjust the laser dot so it moves from its place on the tool tip to the center of the target circle on the card. The laser dot is now set with a 3/16" wall gap along a 90 degree perpendicular to the tangent of the point on the tool bit where the cutting will be taking place. You can set the card aside and begin hollowing.

4. Hollow the first increment.

Replace the tool back inside the vessel at the presentation angle you established earlier so the tool bit will reach the increment you will be working on. Move the tool back and forth within the 2 inch area of the first increment. Remember don't cut passed the 2 inch boundary of the increment. This first setting is only accurate for the first working increment.

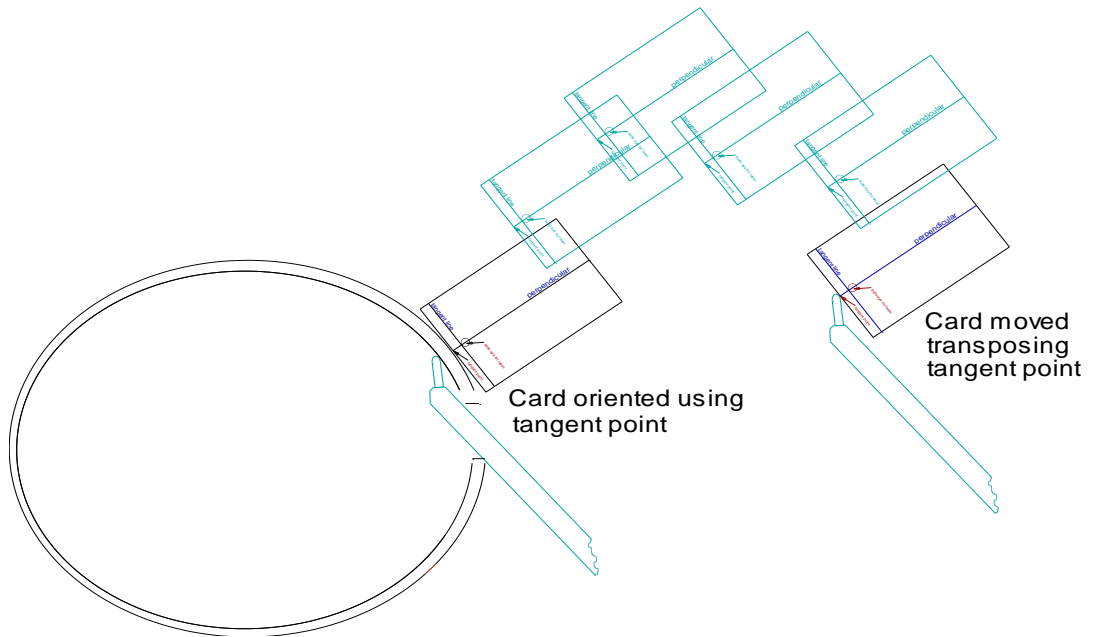
As you remove material you will watch the laser dot grow in length as it moves down the outside of the vessel. When the laser dot completely disappears from the side of the vessel, along the entire 2" increment, the wall will be the exact thickness you set when you first established it by drawing it along the short edge of the business card.

5. Repeat, repeat then repeat again.

Now all you need to do is establish the adjacent incremental section down the inside of the vessel, define its average tangent point transpose it to the tool bit readjust the laser and cut that stage to its final wall thickness. Keep repeating this procedure until you get to the bottom.

Again, I encourage you to wrap your hands around a set of hollowing tools and get started. This will make it much easier to wrap your head around the concepts and the process of setting laser to guide you to success in thin wall hollowing.

Illustration 2



Don can be reached at:
www.donaldderry.com
donald@donaldderry.com

