Deep Hollowing System

Designed and Built by Doyle McConnell

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This article is a description of the development of a shop made system for hollowing deep wooden vessels on a lathe. The developer made two systems for much less than the cost of one commercial product. The article is published here so that interested club members will see how it is made and have the opportunity to make one for their own use. Interested members can contact Doyle McConnell to discuss details of the design.

The lathe which, initially conceived to turn spindles for furniture parts such as legs and finials, soon found other uses such as bowls and tabletops. Since then, the lathe has become a major tool in woodshops, and in the past few decades has become an important tool for wood artists.

Manufacturers have made chucks, jigs, fixtures, specialized tools, etc. commercially available to the turner. In most cases, these devices are originally the result of a turner creating a solution to a need. Often, the designer enlists manufacturers to produce their invention. Other times, on seeing a market for a device, manufacturers pick up the design and commercialize it themselves. The individual woodturner is better off for this process, but these commercial products are costly and many amateur turners will not purchase them.

One can easily argue that most jigs, tools, and fixtures for the lathe are the result of an individual reacting to a need rather than an engineer in a laboratory coming up with an idea and a tool to address it. This should, and obviously does, encourage other woodturners to be inventive themselves.

Once someone has invented and shown a device to other turners, it becomes a challenge for others to improve. Such is the case for the subject of this article.In the spring of 2002, Doyle and Juel McConnell attended a symposium at Provo, Utah. One of the products shown there was a deep hollowing system for creating closed form vessels on a wood lathe. The inventor designed the system to perform the deep hollowing function without the attendant wear and tear on the turner’s arm and shoulder. The presenter invited the class to look at his web site for the instructions on how to make one of their own. Checking the catalogs, Doyle found several versions of the design. To put it mildly, they were costly. However, they did not look too difficult to recreate, so after clearing his shop backlog of the required projects, he began to look at making the tool. Fortunately, he had a welding machine on loan in his shop for another job, and while he was so equipped, he enlisted the help of the local metal working shop to cut the steel tubing to size, and then he welded it into the final form himself.

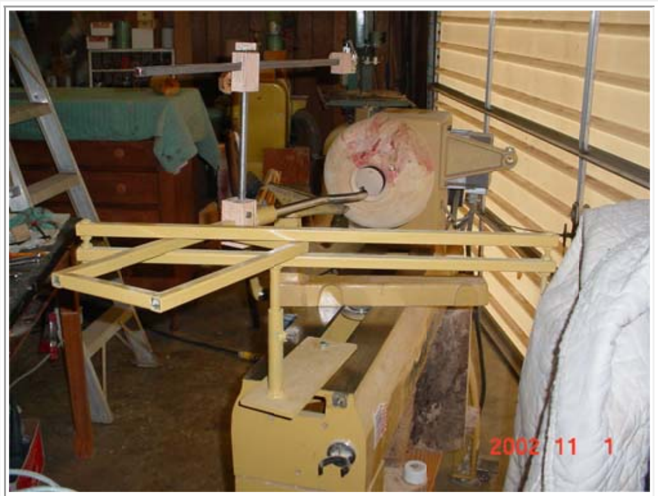
During its maiden run, Doyle realized that the angle of the cutting tool was not optimal. His original angle was about 15 degrees negative. He determined that a five to 7-degree negative angle would be better and modified the holding tool to hold the cutting tool at that angle. The result was that the tool worked fine, and in a short time, he had created a closed vessel with a very small entry hole and without his shoulder being traumatized.

Another part of the system seen in Provo was a small laser, aligned on a fixture attached to the hollowing system handle. The laser pointed a thin beam of light down at the turning so that the distance between the edge of the cutting tool and the outside of the vessel could be determined without stopping to measure with calipers. The inventor designed the system so that when the laser dot dropped off the outside edge of the vessel, the thickness of the wall at that point was equal to the preset distance between the laser spot and the tool edge. The commercial cost of these fixtures is again very high.

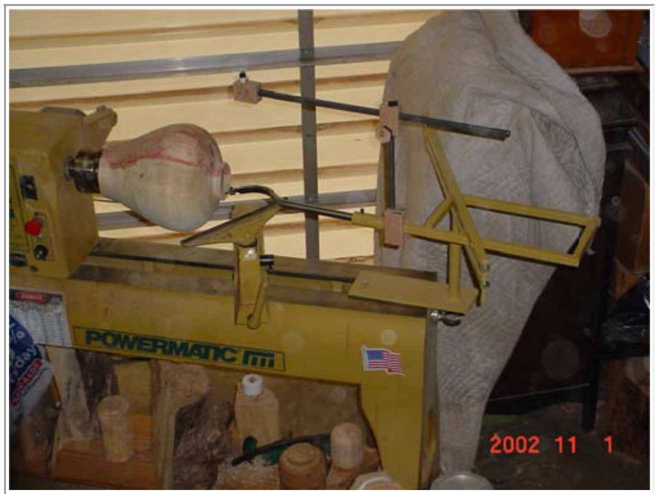
One can acquire a low cost laser pointer from an office supply store, but it produces a large spot. Doyle solved this problem by providing and aperture plate to narrow the beam width and set out to develop a mechanism of steel and wooden parts to hold the laser at the proper angle and distance.

The low cost laser pointer, not originally intended for this purpose, had a pushbutton switch. Doyle solved this by making a cam-operated plunger which holds the button closed when turned clockwise and lets it open when counter clockwise. The laser "caliper" works well. Time will tell how it holds up under use and how long the batteries will last, but the low cost of the device means that it will not be much of a problem to replace if need be. As well, the batteries are commonly available.

The Deep Hollowing tool is really a system which includes a stabilizing bar, a tool handle, and a laser caliper attachment. Any 3/4" cutting tool will work in the system.   A setscrew secures the cutting tool to the handle. The cost of two of these tool systems was well less than $100. Compared to the catalog costs of over $200 for each tool, the shop made system seems like a real bargain. A detailed plan for the system will depend on which lathe the system will be used. The ones seen in the following pictures are for a Powermatic 3520. Your lathe and tools may require different dimensions, but the basic ideas are the same.



This view is of the deep hollowing system installed on a Powermatic 3520 lathe. The handle (protruding through the bar structure) is moved left and right to steer the boring bar cutter to the cut point within the vessel. The parallel bars keep the handle from twisting so that very little stress is transmitted to the turners hand and shoulder. The parallel bar structure is adjustable up and down so that, together with the tool rest, the cutting tool is located at the appropriate vertical level and angle.

	View of handle assembly with laser attachment mounted. The laser is in the block to the far right above the point of the cutting tool. All standard 3/4" cutting tools will mount in the handle assembly. The laser assembly is adjustable in three axes to let the turner place its spot exactly where it is needed to be relative to the cutting tool edge.
	Note that the laser assembly acts as a caliper in that it is preset to the desired distance from the edge of the cutting tool so that when the laser dot drops off the side of the vessel, the thickness of the wall at that point is the preset value. This picture shows that tool just at the entrance of the vessel, so that, using a scale, the turner can preset the desired thickness. Once the tool is inserted into the vessel the laser dot will show on the vessel's surface. As the thickness of the wall decreases with the cut, the dot will approach the side of the turning and ultimately begin to get oblong and disappear off the edge completely as the cut is continued.

This system works very well, is affordable, and (now that Doyle has done the groundwork) not too difficult to make. I'm looking forward to many hours of enjoyment with mine.