SHOPMADE HOLLOWING TOOLS

Lyle Jamieson

A proper captured hollowing system allows you to turn inside the hollow form with only fingertip control. Note my body position and stance; it should not be hard work.

There is a great deal of satisfaction to be had when designing and making your own lathe tools. Indeed, years ago, we used to make most of our own turning tools. Now, catalogs contain a wealth of excellent tools proven to be safe, versatile, and easy to use. Still, there are those who enjoy making their own tools. For them, I offer some important considerations for safety, as well as taking shop-built tools to the next level.

Are shopmade tools right for you?

Years ago I used any piece of metal I could find for cutting tools, if it was the right size, including planer blades, files, chisels, and Allen wrenches. I got lucky and did not have any injuries, but I was flirting with danger for what I did not know about tool steel. Some knowledge of metallurgy is needed. It is hard enough learning how to turn, and if you add to that learning curve the making of homebuilt tools, a beginning woodturner can unknowingly add significant risk. What about heat treatment, hardening, annealing, losing temper? Just the relatively simple task of tapping threads for set screws requires a specific skillset. What tap to use, what thread size, what drill size to use? Did you know there are drill sizes denoted in letters and numbers that correspond to various needs for tapping *(Photo 1)*? There is a lot to know to make and assemble lathe tools that will function safely. ▸

While tapping threads, the hole size has to be precise to allow the tap to cut cleanly and accurately.

To complicate matters, there are often limitations to a shopmade tool's versatility when cost is the driving force. Some tools work well for small projects, such as Christmas ornaments and lidded boxes, but as scale increases, shopmade tools may not have the required stability. Keep in mind that as the size of the vessel being turned increases, the forces at work are multiplied, and improperly designed tools can pose serious risk to the turner's safety.

Considerations for tool design

Strength

The boring bar needs to be strong and stable enough to do the scale of work you desire; do not sacrifice strength by using tool steel that is too thin. Strength is dependent on the diameter of the boring bar, not its length. The tradeoff is that larger-diameter boring bars need slightly larger vessel openings, yet smaller-diameter boring bars limit the toolrest overhang before vibration kicks in. In addition, a wood handle is a weakness for large turnings.

Stability

Design your tools to have no moving parts or pinch points to ensure stable cutting action inside the vessel. If the cutting tip flexes or moves while cutting, this can cause a catch. With a captured hollowing system set up properly and cutting on or above the centerline, catches will not happen.

Torque arrest

In hollowing situations where you undercut shoulders for bulbous or other hard-to-reach shapes, the cutting action creates enormous twisting forces. To put these forces onto a small, narrow handle will cause the handle to bind up in a gated toolrest or backrest, resulting in bound-up cutting action. And, if the tool has a jerky cutting motion from the torque produced, it is difficult to clean up the resulting tool marks or make a thin-walled vessel. Using a handheld boring bar is not much better; an hour or two of use will cause significant fatigue. Fingertip control and easy movement inside the vessel are the goals, and they can be achieved by designing a broad-platform handle to spread out the torque forces. This is especially important when hollowing large-scale vessels.

Range and reach

A swivel assembly with an infinite range of cutter positions equates to easy cleanup of tool marks. Design your tools accordingly. For instance, using the left side of a high-speed steel (HSS) cutter shaped and sharpened with a broad radius *(Photo 2)*, any required cleanup can be accomplished easily.

Hollowing a variety of shapes could lead to the need for many boring bars with dedicated tips. But it is possible to achieve a range of cutting action with just one boring bar if the cutter has a wide range of positions. The backrest comes into play here, too.

> "I never use chucks, especially for hollow forms."
> —Lyle Jamieson

The boring bar and backrest support must be versatile enough to undercut shoulders and reach into small openings without constant adjustment and fiddling.

Efficiency of the cutter

A large teardrop-shaped cutter removes too much wood in one pass and promotes vibration. Bigger is not necessarily better. Larger cutters tax the holding method, the wood, and the boring bar. I recommend and use a 3⁄16" (5mm) cutting tip. The efficiency of the smaller cutter means you can hollow bigger, taller, faster, and easier, all without vibration.

Laser

It is no longer necessary to work blind in a shaving-filled hollow form. Using a laser when hollowing can accurately measure wall thickness, allow for quicker hollowing, indicate the inside depth, and open up possibilities to make a variety of shapes. However, in use, lasers need to be set often and accurately. To make a laser that is easy to set up, use a small block with a hole the diameter of your support bar. Cut the block in half and bolt it back together to form a simple clamp *(Photo 3)*. On the smooth, round surface of the laser-arm support, the clamp becomes adjustable to infinite positions with one hand. Attach the laser to the block for fast, accurate adjustments.

Safety considerations for hollowing

Wood

Using a log that has the pith in it is inviting cracks. Using punky, unsound logs or wood that is not solid is inviting a blow-up. The most successful hollowing is accomplished with sound, freshly cut wood.

Faceplates

I never use chucks, especially for hollow forms. It is not that the chuck fails, but the jaws are grabbing a sponge-like material and wood fibers compress. This is a limitation and I find I can hollow faster, easier, and bigger with the wood screwed to a faceplate.

When screwing into the endgrain of a hollow form blank, screws are more likely to strip. This is one reason it is important to use a faceplate with many screw holes *(Photo 4)*. If necessary, drill more screw holes in your faceplate. Before mounting the log, turn it between centers and cut a slightly concave surface to mate against the faceplate. Along with the correct screws, this will provide a strong holding method. The best screws to use are No. 12, pan-head, sheetmetal screws, 1¼" (32mm) long. These screws require a No. 3 Phillips drive and last for many vessels.

I am drawn to funky, spalted, bark-included wood with lots of color and character from voids. But it is important to be smart and safe in handling this type of wood. One tip is to drill dowel holes crossgrain into a questionable piece of punky wood. Place the dowels so they intersect the faceplate screws *(Photo 5)*. This has much better holding power than screwing into the endgrain of compromised material, which is easily stripped.

2 A swivel assembly with HSS cutter. Note the grind on the left side of the cutting tip. This grind configuration allows ease of cleaning up tool marks.

3 A simple bracket will clamp the laser to the support bar.

4 Both the large 7" (18cm) faceplate and smaller glue-block faceplates have been upgraded by drilling additional screw holes. Precise placement of the holes is not necessary. A 4" (10cm) faceplate with 12 holes (not pictured here) is sufficient for safely attaching a log for hollowing.

5 When screwing into endgrain, dowels inserted perpendicular to and aligned with the screw holes will greatly increase holding power. Drill deep into the wood so the screws go through the dowels.

Vibration

You might get lucky for a while, but an accident can happen if you grit your teeth and proceed when experiencing vibration. There are four situations that cause vibration: 1) exceeding the limits of your lathe—the size of its spindle and the strength of its bearing assemblies, 2) the method of holding the wood, 3) the wood itself, which can flex and vibrate—keep extra waste wood for support and hollow in stages rather than using a steady rest, and 4) exceeding the limits of the boring bar and hollowing system.

Eliminate the cause of vibration rather than implementing a quick fix that could result in unintended consequences.

Compromise

If you intend to proceed with shop-built tools, consider a hybrid. Buy a few critical components and make some of the parts like the backrest and handle. The bottom line is to do some homework so your system is safe and does not exceed its capabilities (or yours). If the system causes frustration or limits your scale or shapes, cost will be secondary. Do not put yourself in danger. Turning hollow forms is all about having fun. If creating your own tools is fun, do it right and enjoy using them! ■

Lyle Jamieson sells hollowing tools and systems he designed and developed. For more, visit lylejamieson.com.