

## Directions for Turning Mugs with a Stainless Steel Liner



You have a couple different options when turning mugs. You can turn them from a solid piece of wood, a circular stave design, a staved cone or segmented turning. Each one will get you to the basic shape and each one will create a greater or lesser level of difficulty with flat stock. I recommend starting out with either a solid block of wood or doing a circular stave. Both of these methods for building your turning stock are relatively quick and allow you to get right to turning the project.

Most of this project is spindle turning, but there is some elementary hollowing.

### Actual Mug Dimensions

Diameter at lid – 3 5/16"

Diameter at base – 2 3/16"

Length – 5 3/4"

### Tools Needed

Termite or hollowing tool  
(Recommended)

Faceplate or Chuck

Face shield

Gouge or scraper

Roughing Gouge

Dial Calipers

Jacobs chuck & 2 1/8" forstner bit.

Lathe - 6" swing

Skew

### Wood Block Dimensions

#### Solid Wood

(1) 3.75" x 3.75" x 8" L. If you can round your blank without losing too much diameter, you can drop down to 3.5" diameter.

#### Circular Stave

(8) Staves cut 1 7/16" wide x 7/8" thick x 8" long.

Each stave should have a 22.5° angle on each side. This can be cut using a table saw or dimension each stave on the table saw and use a router table to apply the 22.5° chamfer. Please use a push stick or block and caution.

### Stave Glue Up

Each stave when ready for glue up is 1 7/16" wide. This is the bare minimum. For this glue up to work, the staves all need to match up inline cleanly. Meaning that the inside corner of each stave needs to match up with the next stave's inside corner. If they don't then the final blank will be crooked and you will encounter all kinds of difficulties caused by the blank being out of round. You can either glue the staves in sets of two, working to a half and then gluing the half together or you can glue up half a blank at a time.

To glue up half a blank at a time cut 3 additional strips from plywood with the 22.5° angle on it. Attach the first strip to a board. Slide the first stave in against the strip; glue the stave to the next one. Do the same for the rest of the half and use the other strip of plywood to support the last stave. Remember to match up the inside corners of each stave at the front and the back of stave.



The strips keep the half blank from spreading. By applying pressure from above (a bag of sand in my case) the blanks are compressed together until the glue sets. Remember to use plastic wrap or aluminum foil to keep the sand bag separate from the block.

When the half blank's glue has dried, take them out and match the two half blanks together. Check the joints for a smooth fit. If you have inconsistencies you can run it through the jointer about 1-2 passes. Anything more and you'll need to put a filler strip in there (1/8" flat strip). Once the joints are smooth, glue them together and clamp.

### Turning the Project

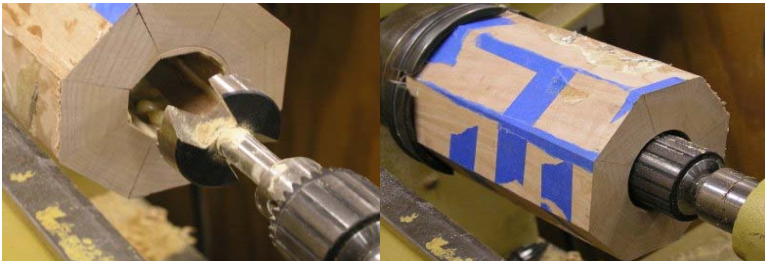
Start by mounting the block in a chuck or via faceplate. If using a faceplate, ensure that you have approximately 7.5 inches of length after the depth of the screws. The blank should be square at both ends to ease the process of lining up a straight blank. If the block isn't round you can spin it between centers to make it round and part off the ends on each side to "square it up".

With it squared up, mount in either a chuck or using a faceplate. If using a faceplate, please make sure the screws are long enough to handle the block and that they aren't drywall screws. This project is an end grain turning, so screws won't have as great a holding strength as it would cross grained, so it is also important to use all the available holes in the faceplate and screws with sufficient length.



Round the blank using a roughing gouge or skew, utilize a scrap of wood to apply pressure using the tailstock if you have a hollow center due to using a circular stave or staved cone blank. Leave as much diameter as possible while maintaining a round surface.

Drill a hole in the middle of the blank using a 2 1/8" forstner bit. The hole should be at least 7" deep. The extra depth gives you the ability to shorten the blank if the opening up top becomes too wide or you have problems with tear out at the liner's lip.





Here I've switched to a face plate while drilling out the center from a solid block. If you're working from a solid block, you may need to use a smaller forstner bit first and then re-drill using the 2 1/8" bit. You don't need to use the largest forstner unless you want to. You could also hog the excess out from a smaller bit size. The 2 1/8" forstner is the closest diameter to the bottom of the cup which will make it easier to enlarge the hole accurately.

Measure the inside width of the mug's mouth with a dial caliper and transfer a mark onto the end of the blank.



Use a ring tool, "termite", bowl gouge, large scraper or hollowing tool to further open the drilled hole. A 2 1/8" bit is slightly smaller than the bottom of the stainless steel liner. As a result, you will only be doing a small amount of hollowing at the 5 5/8" depth and beyond. Most of the widening will be in the first 2 inches at the top. If you have a steady rest, you may want to use it, however light cuts shouldn't require the use of the steady rest.

The ring or termite tool is a very fast cutter. It will hollow out very quickly. 2 to 4 passes from the bottom should take care of everything but the upper portion. As you hollow, occasionally move the tool rest out of the way, clear out the shavings and check the fit of the mug liner. It should fit snugly, but not need to be forced. If it will fit, but seems to require force to get it in there, check to make sure you are deep enough and if that's okay, then apply a little sand paper to the inside. You can also mark the outside of the liner with crayon, grease pencil or chalk and then re-insert it to see where your narrow spot is located.



The top of the blank actually fits inside the lip of the liner. (Do not force the liner or you'll have trouble pulling it out). Utilize your dial calipers or push the liner back in and mark the outside of the liner's lip. Use a parting tool or gouge, to trim down the diameter until the liner is just shy of fitting properly into the blank. Because the liner is now going further into the blank you may need to enlarge the internal dimensions further down the blank a little. Notice that it's still rough inside the mug. This isn't a problem because the liner will hide it. The inside doesn't have to be perfectly smooth.



Sand the piece that the liner's lip is going to go over and get everything fitting correctly. It should have some play to allow you to pull the liner back off. Turn the remainder of the blank down to size. Now its time to decide whether you want a straight tumbler or to taper it down towards the base of the mug, adjust as desired.



Sand the piece and part off the mug. The mug should be parted 6 inches or more down from the rim of the mug.

This will leave you with a hollow wooden tube. A plug can

be turned to fit into the hollow at the bottom or you can fill it with epoxy. Epoxy should not exceed 1/2 inch. The plug can be turned from flat stock using double stick tape and a waste block. Measure the inside diameter of the hollow bottom and reduce the plug to fit. Depending on whether any hollowing was done where the mug was parted off, you can slide the liner onto a jam chuck or use your chuck jaws to spread out from inside the mug's opening to hold it in place to clean up the inner diameter of the bottom. You can bring the tailstock up in support and using a scraper or gouge, lightly clean up the edge. Fit the plug and glue into place. Re-chuck as above and turn any excess off the bottom using light cuts once dry. You can then finish as desired. Epoxy or glue under the lip of the liner. Finish can be applied on the lathe or off. You can re-chuck the mug if you need to power sand again or the finish needs to turn while drying.



## Finishes

In my family coffee spills are a normal occurrence, don't know why but I suspect it's genetic, so a finish that resists moisture is required. In recognition of the heavy use you are likely to see with this mug, a CA, Epoxy (Mirror Coat), or poly finish is highly recommended. No matter which finish you use, I would not recommend placing the mug in the dishwasher.



## Troubleshooting

*I parted the mug off too short.* – Use double stick tape on a waste block to turn a flat piece of stock round. Create a new foot for the bottom of the mug. Glue it on to the bottom and re-chuck the mug from the liner's mouth expanding the chuck jaws outward. Bring up the tailstock in support and clean up the foot and its transition to the mug.

*The half stave blanks are too narrow.* – Cut two strips of wood where the strip's width equals the stave's thickness. Make sure the strips are smooth. Use the strips to thicken the mug back to the correct dimensions. Glue the two blanks and the strips up.

*I mounted the stave blank and it has an eccentric wobble.* – This one is tough. The eccentric wobble will cause the most problems around the lip. You may very well lose this blank. Try and just barely round it, then drill like normal. See if the liner will fit with sufficient wood around the lip. If you're okay, continue, but you will have to be as accurate as you can. If you can get the blank hollowed accurately (you may want to use a scraper taking light cuts instead of the termite) you should be ok.

The pictures taken here were from a maple based stave block cut 1 5/8" wide x 1 1/8" thick, as you can clearly see, there was way too much blank to turn away. For this reason, the dimensions for the circular stave have been reduced. The solid block is from a Eucalyptus branch.

If you have any questions or would like to provide feedback on this document, please email us at [sales@smoothturning.com](mailto:sales@smoothturning.com). Thank you and safe turning. Copyright 2006 © Smooth Turning