

Segmented Wood Coffee Mug

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This is a fun project that is not nearly as difficult or complicated as the following procedures may suggest. The mug on the left is made from staves and follows the method that is most often seen in the literature (see references). It can also be made from a single piece of wood. Unless you are very experienced with staves and hollowing deep vessels, I would not suggest you try this. The mug on the right, however, is much easier to make and can be made with an infinite variety of patterns.

Several references (not all listed below) make this project from a single piece of wood, but it is difficult to find a 4 inch square blank of sufficient length and of an interesting specie. Even if you do, it will be very expensive. The fabrication difficulties with the mug pictured on the left are two-fold. First, the staves must be cut to very precise angles so they form a perfect 360-degree surface with NO gaps. Second, you have to hollow out a relatively narrow diameter to over 5 inches in depth while maintaining a constant wall thickness. Furthermore, since the stainless steel insert is not uniform in diameter, it is a laborious trial-and-error process to get the insert to fit properly. The mug pictured on the right eliminates all of these problems and allows you to use your imagination and creativity to make very unique designs.

The following steps outline my procedure:

- 1. Obtain a mug kit** from Rockler, Woodcraft, or other supplier
- 2. Obtain a 3" x 3" x 8" piece of wood**, preferably one with little remarkable grain. Maple is a good choice. Cut off a half inch piece from one end for the bottom of the mug. The mug is only 5.5 inches but you must account for the thickness of the saw blade.
- 3. Prepare 4 pieces of contrasting wood** or pattern, 8" long, with approximate dimensions 0.75" x 1.0" with the pattern showing on the short side. (See pictures below). The surfaces must be flat and smooth for gluing. If you are careful in the gluing up stages, you can use 0.75" x 0.75" dimensions.

Note on wood selection: Be careful of using some exotic species like cocobolo, which are very oily. They will not take a varnish or urethane finish very well. Mostly, I prefer maple for the large stock and walnut/maple for the pattern, but you may like to experiment with other species. The important thing is to use the right contrasting colors to suit your design.

4. Cut the 3" blank lengthwise and glue two of the prepared patterned pieces as shown in the diagram. Make sure all the surfaces are very flat and smooth. This is important for all glued surfaces and is essential for a good looking segmented joint!!

5. Rotate the 3" blank 90 degrees and repeat (see pictures below)

Note: The more symmetric you do the glue-up, the more symmetric will be the final product. But, if you are off a little bit, it won't be noticeable as long as you keep track of the registration marks (see step 8).

6. Glue the bottom piece as symmetrically as possible followed by waste blocks at each end. The mating surfaces must be flat and smooth. Note: If you make the

waste blocks the same dimension as the segmented blank, it will make it easier and safer to slice (see step 7).

6. Mount this blank on lathe as symmetrically as you can and turn “almost” round. This will be safer when you saw the blank into approx. 0.5” slices because you will have 90 degree flat surfaces to support the blank.. Take care in keeping the blank centered. **Turn a foot in the waste block at the mug bottom end for mounting in a chuck.**

7. Slice the blank into “half-inch” disks. Half inch is not sacred. This dimension is design dependent. Keep track of orientation for all pieces, especially rotation. Also remember to account for the thickness of the blade. 10 half-inch slices will waste about 1.5 inches of the blank.

8. Re-assemble “dry” to a design of your liking and **make registration marks to keep track of the orientation** on each piece.

Now is a good time to finalize on the shape for the mug. See sketches for some possibilities. This will be important if you want to make the mug with a larger diameter near the top, which is what I recommend. If you make the mug flush with the stainless steel insert, you must still make a small lip to account for the thickness of the stainless steel.

9. Glue the bottom and first two or three slices together and **hollow/fit the insert.** Drilling a 2” hole with a Forstner bit may make hollowing easier. There should be a slight gap (at least 0.010”, a loose fit”) between the stainless steel insert and the hollowed blank to account for heat expansion and insulation. The advantage of using the 2” bit and a parting tool for the hollowing is that there are no lateral forces on the blank and you will totally avoid any catches.

Note: Because this is not a “true” segmented technique, the ratio of the pattern to the original blank will change with diameter. This means that if you align the corner of the pattern with the large diameter, then the final turned diameter will have the pattern overlap. Usually this is not a problem if the diameter does not change significantly. It will hardly be noticed. However, this can be eliminated by adding alignment marks to the inside diameter after hollowing (to keep track of where the pattern should be). Then, in step 10 (following), do not leave the last 1/16th inch at original diameter. Align the successive layers manually, and glue with a wood glue. Titebond® III will give you sufficient working time. This can be done with reasonable accuracy. The down side to this is that each successive layer will have to be hollowed one at a time – but it might be worth it.

10. Turn the outside diameter to desired wall thickness (~ 1/8 inch) except for last 1/16th inch, which will be used to quickly match diameters of the next section. (see note above for alternative method)

11. Glue the rest of the pieces, keeping proper alignment for your design, and **hollow/fit/turn** as before. **Continue until full length is achieved** (re-read note in step 9).

12. Note: carefully adjust the last 1/4th inch to fit the stainless steel insert. There will be zero clearance here. The outside diameter should either match the stainless steel insert or be blended in as to your liking (see profile sketches below)

13. Reduce the diameter of the waste block. Then sand and apply the finish without the stainless steel inserted. Applying the finish now will give you a chance to fix or re-sand any deep scratches or blemishes that you missed. Reverse chuck the blank to part off the waste block and finish the bottom.

I like the wipe-on polyurethane but you may choose other finishes as well. I apply two coats of finish, allowing at least one day for each coat to thoroughly dry, then sand lightly. A few more coats will give you a nice durable finish. All this is done on the lathe.

14. Glue/insulate the stainless steel insert. Gorilla glue is good because it expands to fill the gap. I would put a few “dabs” on the insert, rather than covering the whole surface. Clear silicone glue (sealant) is also a good choice. I use the silicone sealant to water-seal the rim to the wood.

I doubt the mug is dishwasher safe, but you can use warm water to wash it out.

Enjoy your mug and use good coffee!

Appendix: So, you might ask why not use four pieces of 1.5” stock plus the pattern inserts, for the mug. Yes, you can do this, but make sure the grain of the stock is “acceptable” and all four pieces are the same dimension. Remember, that the advantage behind this segmented technique is the ease with which you can hollow out the deep form rather than using a solid piece, with the added benefit of making some very unique designs.

Helpful references:

http://www.youtube.com/watch?v=qw_WwgKxXM4

<http://community.woodmagazine.com/t5/Wood-Turning/Turned-Coffee-Mug-With-Stainless-Steel-Liner/td-p/64454>

http://www.homeroasters.org/php/forum/viewthread.php?thread_id=531

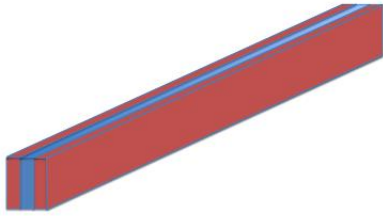
For the following web site, you may have to copy and paste the URL to see the article. Clicking on the hyperlink did not work for me.

<http://www.tahoeturner.com/instructions/pdf/coffeemug.pdf>

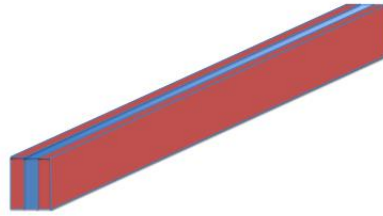
Also, there is an interesting article on the Woodcraft BLOG dealing with insulation issues.



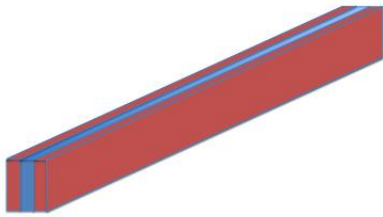
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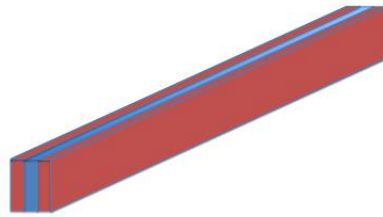
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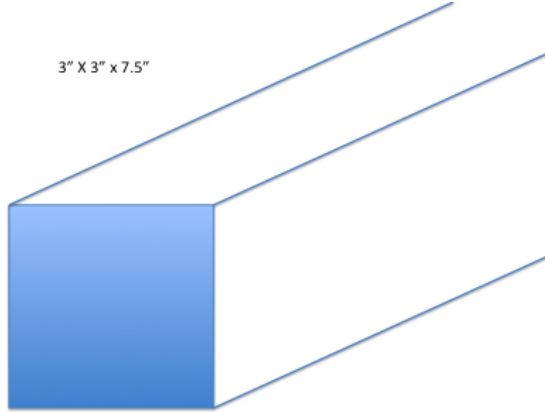


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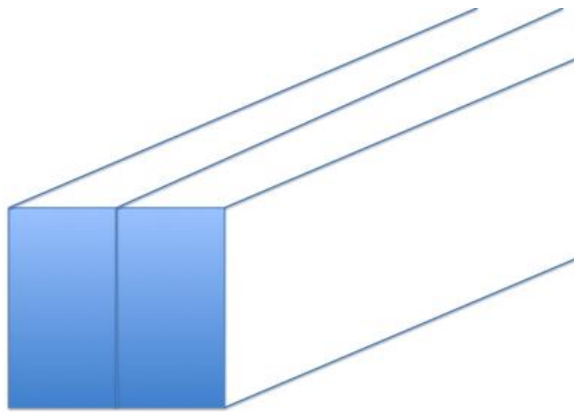


1

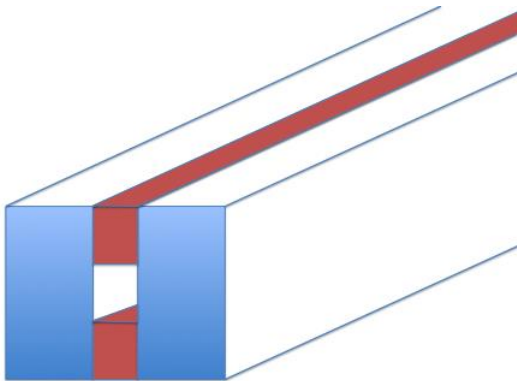
3" X 3" x 7.5"



2

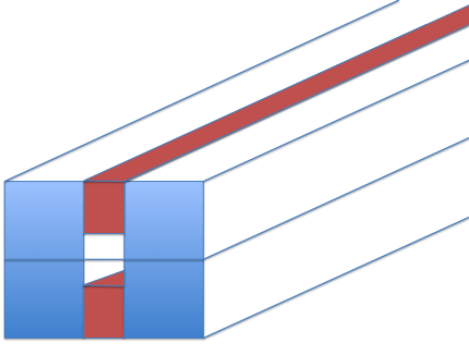


3

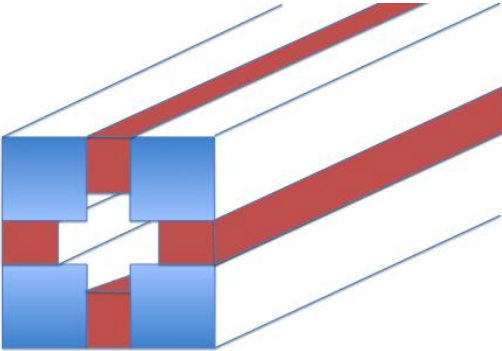


“Insert” (can be multi-layered)

4

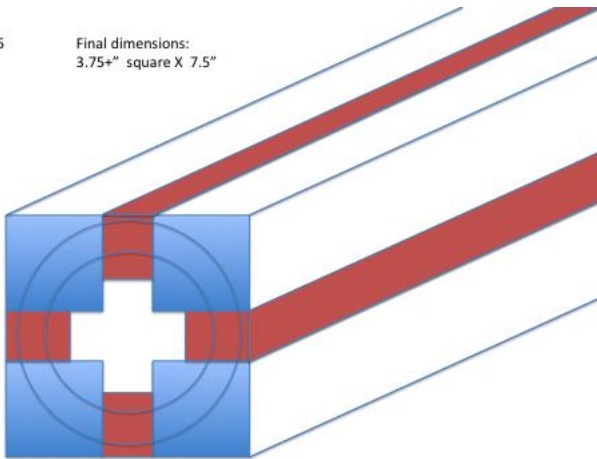


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Final dimensions:
3.75" square X 7.5"



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