

How To Make A Longworth Chuck

• OCTOBER 17, 2010



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Need an easy way to finish the bottom of your woodturnings? Tired of continually screwing in and unscrewing the screws of your Cole jaws? Hate having to heat the glue gun up again? If so, then you need to make a Longworth chuck!

The Longworth chuck was developed in the late 1980's by Leslie Douglas Longworth of the Hunter Valley Woodturners in Australia. It features a self centering mechanism that easily and quickly adjusts to the size of your turning.

The concept is quite simple – a pair of disks rotate against each other drawing in, or out, eight rubber 'jaws' on a series of opposing arcs. Yep, it's that simple.

Here, let me explain how we made ours and you'll see how easy it is to make one.

We started with two plywood disks sized to the maximum over bed turning capacity of our lathe. We cut these on the bandsaw using a [Bandsaw Circle Cutting Jig](#)

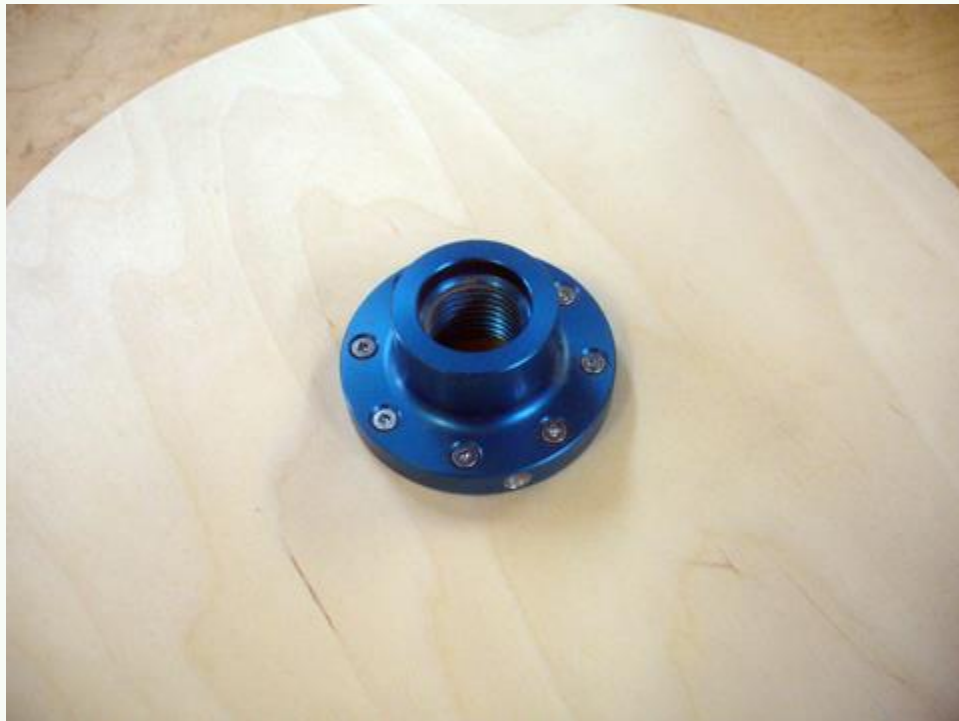


Next, we tacked them together in a couple of places near the edge using some small screws. This is to hold them together for when you route the arcs.



Next, we attached a faceplate to the center of one of the disks using screws that **just went only into this one!** The faceplate will be permanent so you need to get one specifically for the Longworth chuck. Once the faceplate is attached to the disks put it on your lathe and turn the disks perfectly round, removing as little wood as possible to maximize the size of the chuck.

Then bring up the tail stock to mark the true center.

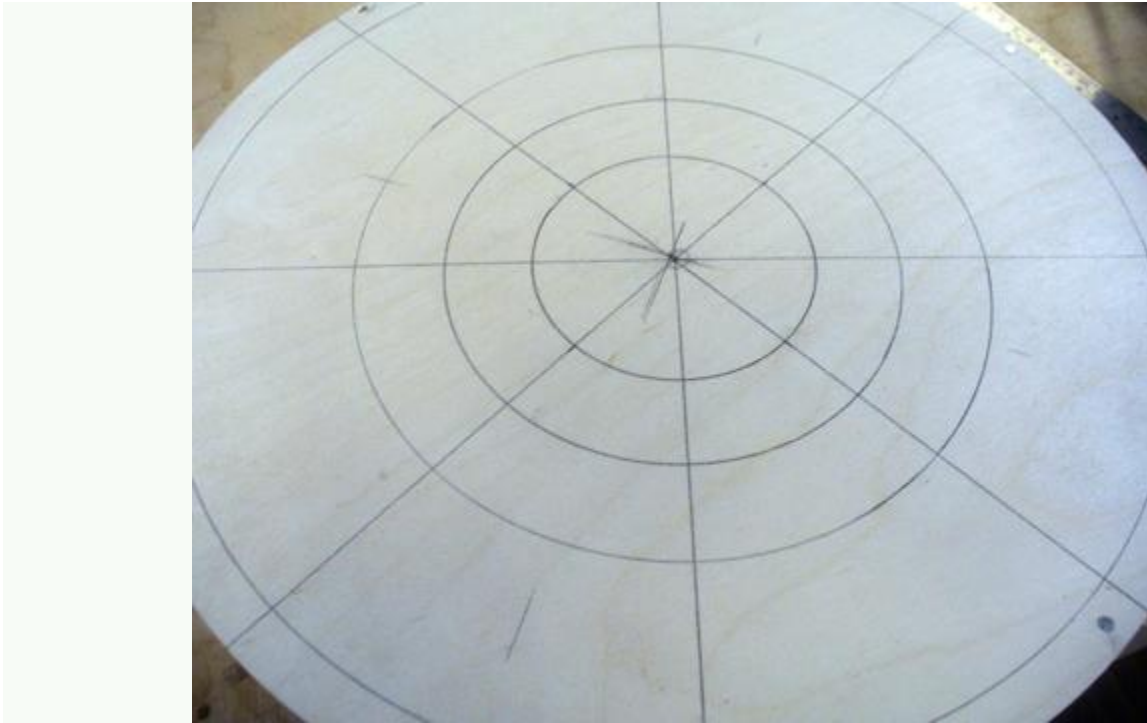


We removed it from the lathe and using a beam compass drew 4 concentric circles. We drew one about 1/2" larger than the faceplate, one about 3/4" from the outside edge, one halfway between those and

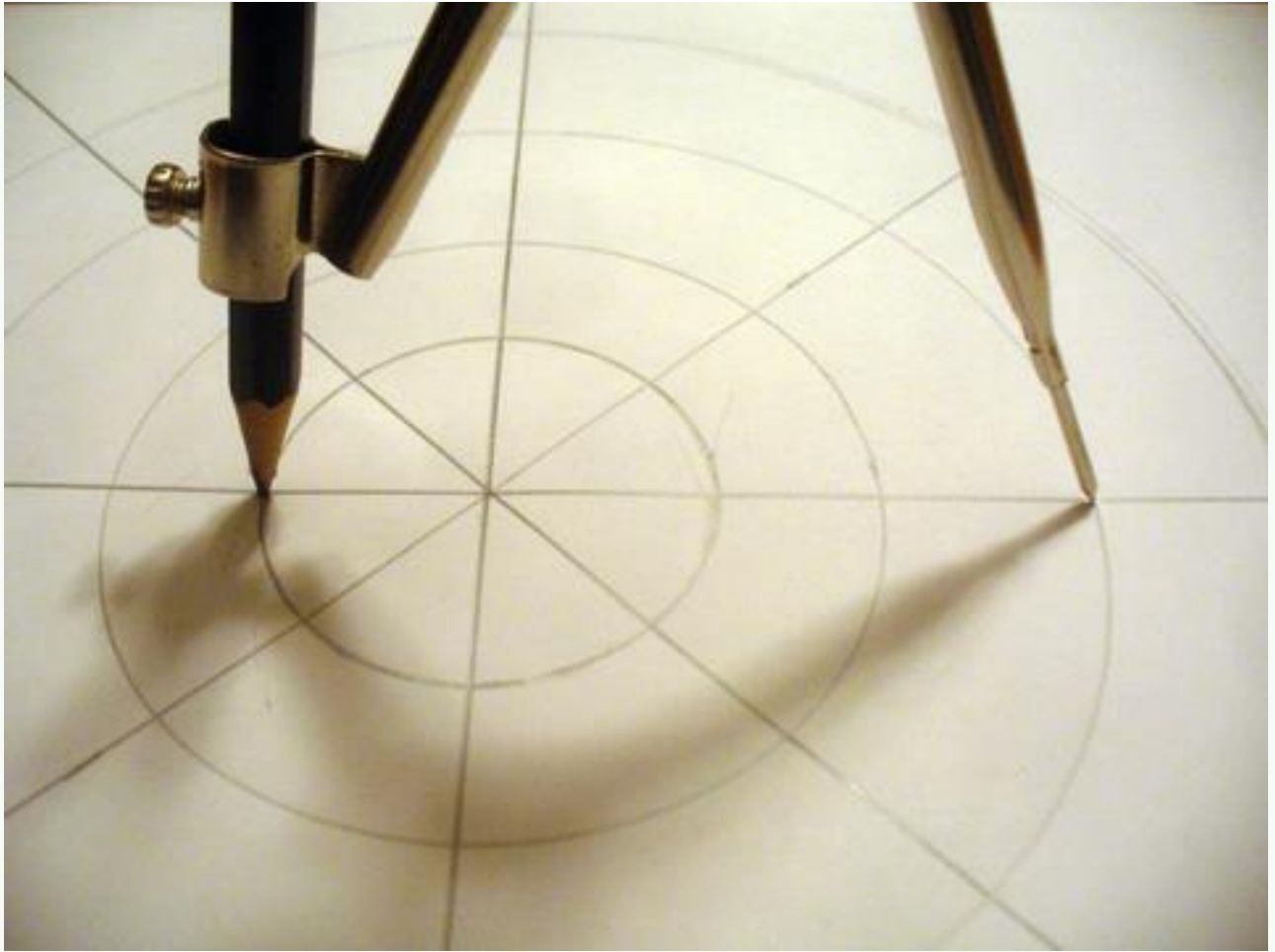
another halfway between the middle one and the innermost one. (note that in the photo the true center of the disks has a small handdrawn circle just so that we wouldn't confuse it with the 'center' we used when making the round disks.)



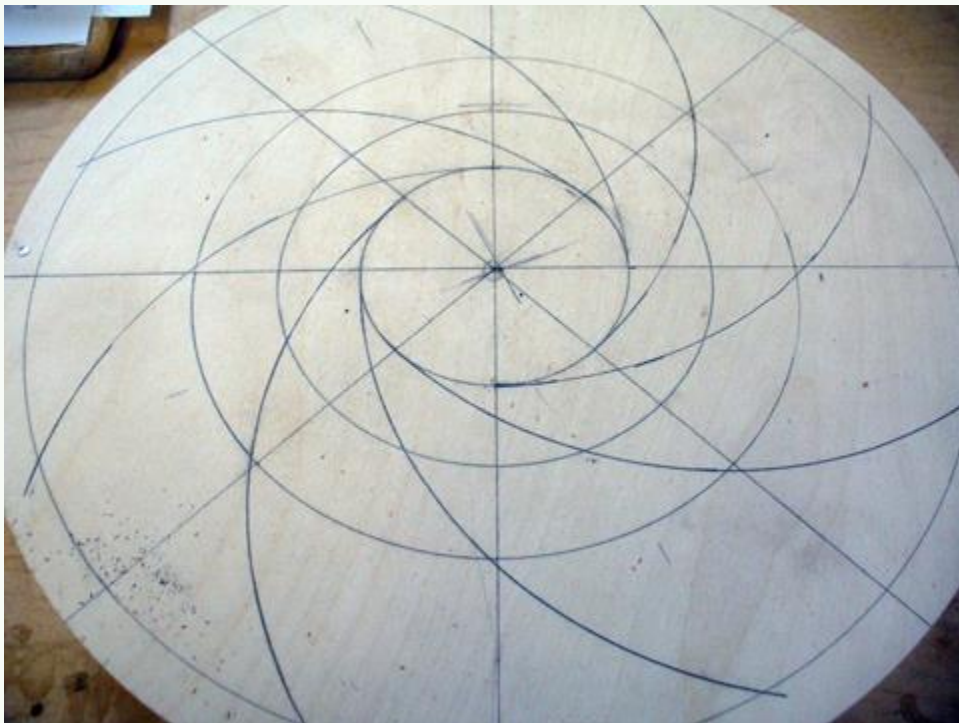
Next, using a ruler we drew a line across the diameter of the disk and then using a protractor we drew a line 90 degrees to this one. Then we drew 2 more lines at 45 degrees to the first one. This made 8 evenly spaced segments:



Then, with the point of a compass on the points where the second circle from the edge and the diameter lines intersect, we drew an arc tangent to the inner circle to a point where they reach the outer circle. This is probably the most confusing part of making a Longworth and is more simply done than read. Hopefully this photo will help:



This step first appeared confusing but once the lines were drawn it looked like this:



Using a plunge router with a 1/4" upcut spiral bit and a trammel base we set the pivot point the same as above when we marked it. Then, taking shallow cuts, we cut out the arcs **making sure that every second arc only went from the outside circle to the third circle in from the outside**. This would ensure that more wood for strength was retained around the faceplate. Marking the starting points ahead of time made knowing which was a long arc and which was a short arc easier.



It looked like this when this part was done:



At this point we put it back on the lathe and with a 1/4" drill bit in a Jacob`s chuck on the tailstock we drilled a hole completely through the center. We also drilled a couple of holes around the very outside edge so that we could use tommy bars to tighten.

Then we took it off the lathe and drilled four 3/4" holes through both disks about 3/4" in from the edge and in between the arcs to be used as finger holes for tightening.

Then we separated the disks and took a piece of sandpaper and rolled it into a small tube and sanded the inside of the arcs a bit.

Then we reversed the front disk on the disk with the faceplate so that the arcs crossed each other and fitted a 1/4" bolt with a nut, a locking nut and washers in the center hole.



For the rubber 'buttons' we used Size #4 rubber stoppers used in wine making. They come with a hole already drilled in them. However, because the hole was a bit too large for the 1/4" bolts we used cylinders made from threaded rod to make them smaller. We cut them a bit shorter than the stoppers to allow them to compress when tightened. These also gave more stability to the stopper. The stopper was also a bit too long so we sawed off about 3/8". To tighten the bolts we used wing-nuts.



Once we had all the hardware added we put it on the lathe and it looked like this:



See, we told you that it was simple. Seriously, it is a lot more simpler than it sounds.

To use it we lay the chuck on a table with the faceplate down and lay my piece on it. Then using the finger holes we bring the buttons in, tightening on the piece. We will also use the tommy bars sometimes to tighten. Sometimes the bolts go askew and need to be jiggled or loosened to allow the disks to freely move against each other. Then we tighten the wing-nuts and follow this up with more

tightening using a wrench when the chuck is mounted on the lathe. We found this process to be a bit cumbersome when we first started using it but it became easier each time we did. With the piece mounted it looks like this:



Because there are 4 arcs that don't come as close to the center as the other 4 there is a limit to how small of a piece you can fit on. The solution is to remove those 4 bolt assemblies and just use it with the 4 buttons on the larger arcs. This isn't a problem since a smaller piece will require less holding power. Another solution is to just make a smaller one with just 4 buttons.

Because of the size and weight of the chuck, and also because we are just using it to finish off a bottom of a piece we usually use it with a speed of between 500 and 600 rpms, though we have had it as high as 750 rpms.

For this project we used a 3/4" thick piece of plywood for the back piece, the one with the faceplate, and 1/2" thick piece for the front because this was the thicknesses that we had on hand. You can also use a combination of 5/8" and 1/4" or even 3/4" or 5/8" for both. The larger that you are making one we expect that the thicker the better.

We also used Baltic birch plywood, again because this is what we had on hand. While Baltic birch ply is better you can use regular plywood or even MDF. If you use MDF we suggest that you bolt the faceplate on the back disk before screwing the disks together since MDF sometimes doesn't hold screws as strong as plywood.

We believe that the Longworth is the cat's meow. There's no more time being wasted on removing jaws, adding the Cole jaws, removing buttons, adding buttons, realizing it's the wrong size and doing this again. Just doing this takes a minimum of 16 steps, and 32 steps if you have to move the buttons! With an afternoon and some readily available and inexpensive parts this is all eliminated.

This particular chuck we made will take a maximum bowl size of 13 1/4". We plan on making a couple of more, a smaller one with 4 buttons so that we don't have to remove the bolts from the larger one and a much larger one to work on my outboard. To further cut the cost of making these we had access to a spindle tap and we made a couple of hardwood faceplates.

Here's a few more websites that offer instructions on how to make the Longworth that you might find helpful:

<http://www.woodworkersinstitute.com/page.asp?p=1417>

<http://www.morewoodturning.net/articles/longworth.php>

http://woodcentral.com/cgi-bin/readarticle.pl?dir=turning&file=articles_485.shtml

<http://www.scrollsaws.com/WoodLathe/woodlatheLongworth.htm>

Also, the April 2010 issue of Woodturning magazine has an excellent tutorial which I followed pretty much verbatim.