

Turning a Femisphere

by Drew Shelton
dcshelton@gmail.com



Femispheres make interesting desktop toys and stocking stuffers and can almost always be counted on for a “How did you...?” Geometrically, a femisphere has one side, two edges, and four vertices. It will roll on its edges in a straight line, but will wobble back and forth as it does. From a turning standpoint, it’s a spindle project turned entirely between centers. It’s basically a top with a twist.

The wood should be clear and dry with no voids. Start with either a single square billet sliced in two along the grain or 2 separate pieces. The pieces should be at least an inch longer than their combined thickness to allow for waste wood at the centers. Joint the faces. Since the blank must be mounted between centers directly on the seam, cut relief notches in both ends of both pieces to make room for the center points. This will reduce the likelihood of the pressure from the points prying the blank apart and will also make sure the points are on the seam. Join the two pieces with double-stick tape and clamp them for a minute or so.



Two pieces with notches cut on the ends.

I recommend using double-stick tape instead of a paper joint or a few drops of CA for several reasons:

- It's easy to guarantee adhesion along the entire surface without it being difficult to get apart. This is important since you'll be cutting away much of the joined surfaces.
- After turning, it must be separated, rotated, and glued together. Double-stick tape leaves the least amount of residue to remove to get a clean joint for the final gluing.
- If a glue joint fails while turning, it tends to fail all at once, flying off the lathe. A double-stick tape joint will usually peel apart gradually and can often be stopped before the pieces become projectiles.



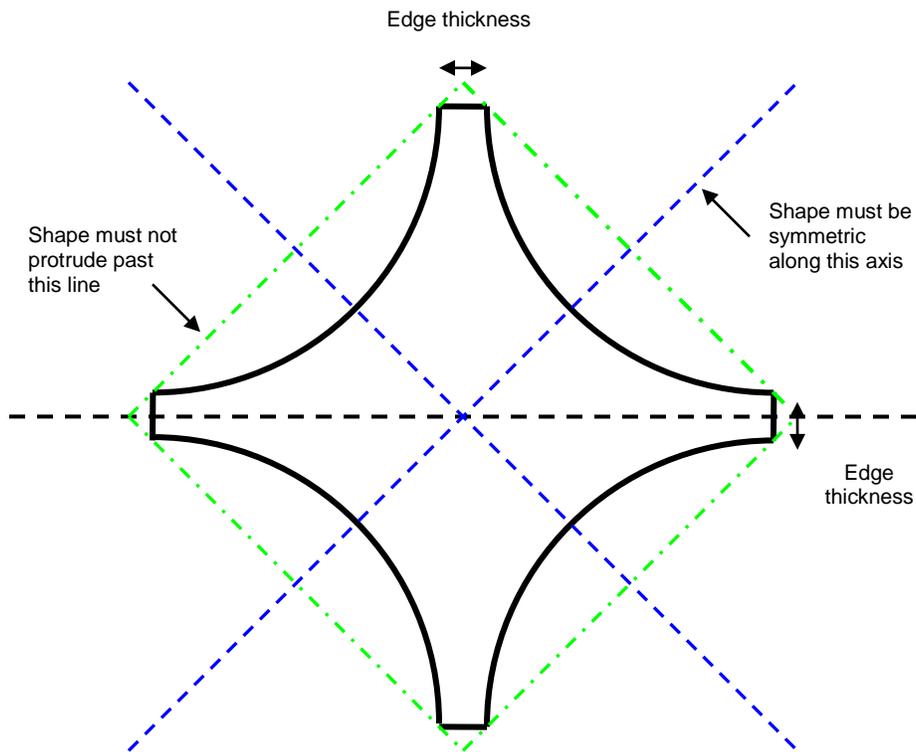
The blank is ready to go.

Turn the blank into a cylinder. True up both ends just enough to make consistent edges to measure from. Find the center and draw a vertical line all the way around. Choose an arbitrary thickness for the edges (I use 6mm) and draw lines on either side of the center to match this thickness (3mm on either side of the center). Measure the diameter of the blank, divide by 2 to get the radius, and then subtract half of your chosen edge thickness. Use this value as a radius to create a $\frac{1}{4}$ circle template from a piece of cardboard. Use of the template will guarantee that the width and height will be the same and guarantee the same thickness on the left and right ends as the vertical edge.



Center line and edge thickness lines drawn. Template is based on the diameter of the cylinder at the center line.

Symmetry is the key to successfully turning a femisphere (see diagram below).



I always use $\frac{1}{4}$ circles for the curves, but any shape can be used as long as it's symmetric along the blue diagonal axes and does not protrude past the green lines. The same shape must be cut on both sides.

Turn the curve on the right side first and check it against your template regularly. Once you're satisfied that the curve matches the template, repeat the process on the left side. The vertical center will be left with square edges. If you want rounded edges (which I always do), then now is the time to do it. Sand it just enough to remove any tool marks since hand sanding will be necessary once the final assembly is glued together.



The right side is completed.

Using the template as a guide, part the right tip down very thin just past the endpoint. Do the same on the left side. Use a saw or knife to remove the ends. Resist the urge to simply twist off the ends, which can tear fibers within the tip of the femisphere (why do I know this?).



Ready to cut off the ends.

Use a knife to gently pry the two halves apart. Peel off the tape, rotate one half 90°, and glue it together.



Twisted and glued.

I use a small belt sander to remove most of the waste at the tips and a small drum sanding attachment in a Jacob's chuck to sand the tips flush. In spite of your best efforts at symmetry, the edges probably won't match perfectly and will also need the drum sander to make them flush. Be sure to use a drum with a smaller radius than the femisphere. Sand the rest to finish grit by hand. Then apply the finish of your choice.



Ready to roll!

Put it on a table and give it a nudge!