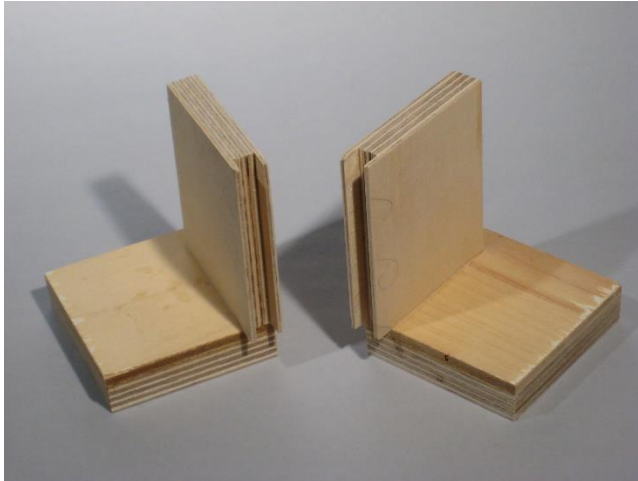


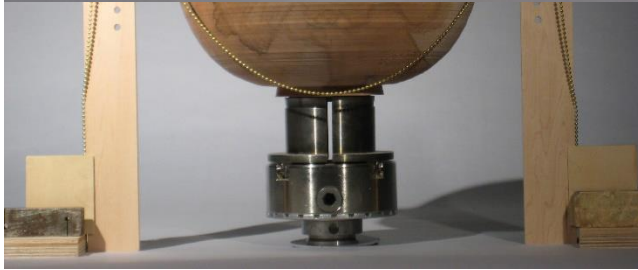
CATENARY CURVE BOWLS

Steve Wilson

For the large outer bowls of a log half, I prefer the fuller form, but for the medium sized bowls inside the log, the catenary curve is an interesting alternative. The



catenary curve is, of course, the curve formed by a chain suspended by two points of the same height. Imagine the curve formed by the cable of a suspension bridge. This curve is difficult to achieve in bowl form because templates are hard to make accurately and are very dependent on the diameter and height of the bowl.



- 102-3206 Photo 1

- By using a fixture to suspend the chain and moving the bowl with chuck from lathe to fixture

and back, the errors in the bowls curve can be nibbled away, leaving the bowl curve following the chain curve closely.

This fixture was made for bowls 14" diameter or less, but the bowl depth can be adapted by blocking the fixture to the height needed. At least three feet of 1/8" diameter light pull chain will be needed.

- 3207 Photo 2



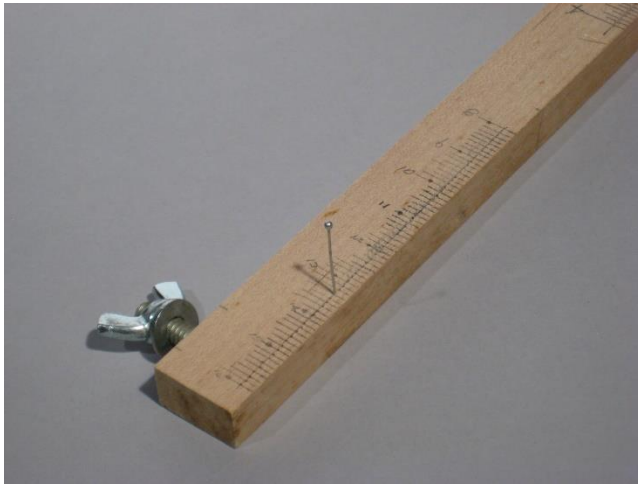
- Each support / base starts with a piece of plywood 2-1/2" square by 12mm or 1/2" thick. Each base has a 3" square piece of 12mm plywood glued vertically on top. This 3" square has a 1/4" by 1/4" saw slot up the vertical edge that is a loose fit with the vertical piece. The pieces are glued up to make a right-hand and a left-hand base so that the slot overhangs the base.

- 3208 Photo 3

- For the chain suspension verticals, start with 1/4" stock 1-1/2" wide and 12" long. 1/2" from one edge, drill six or seven holes through. I chose 5/8" between centers, but to keep the distances identical, stack the two verticals for drilling.

- 3209 Photo 4

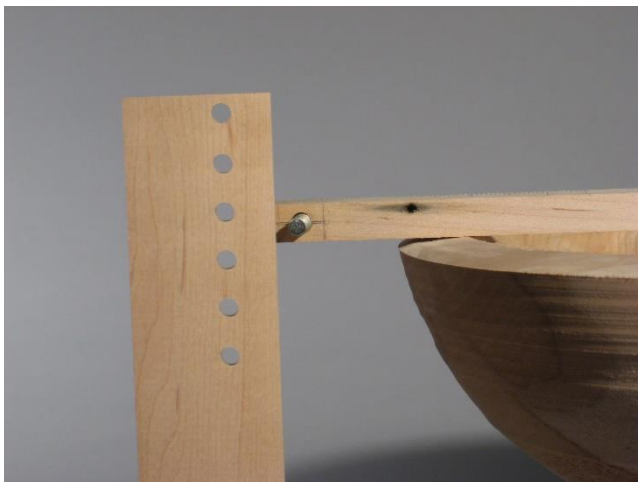
- For the horizontal bar, make up a piece of stock $1/2'' \times 7/8'' \times 18''$ long. On the top surface, mark 9" and draw a perpendicular. From the front edge, draw a parallel line $1/8''$ back, this allows the chain to drape neatly. Starting from the centerline, measure and mark every $1/16''$ from 4" to 8" on each side of center. Use an awl to start each hole, then drill a $1/32''$ hole by $5/16''$ deep at each mark. These holes allow for a straight pin to slide in with no binding. Each sixteenth counts as an eighth of an inch in diameter, so mark the first lines (4-inch lines) 8 then count eight lines and mark 9, 10, etc.



- 3210 Photo 5

- To attach the bar to the verticals, drill two $1/4''$ holes on the back of the bar, $1/2''$ deep. Center the holes on the thickness of the bar and $1/2''$ from each end. Into each of these, epoxy a piece of $1/4''$ threaded rod $1-1/4''$ long. When the glue is set, use a $1/4''$ flat washer and a wing nut

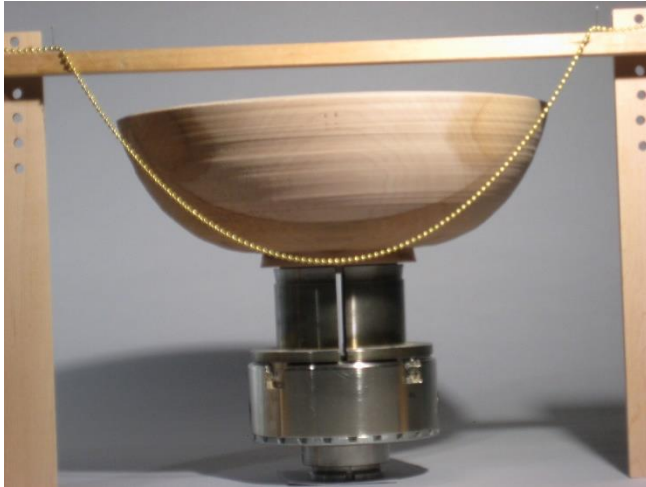
on each to attach the bar to each vertical.



- 3211 Photo 6

- In use, start with the bowl blank in the chuck to decide which hole pair to use to allow the bar to clear the top of the bowl. Assemble

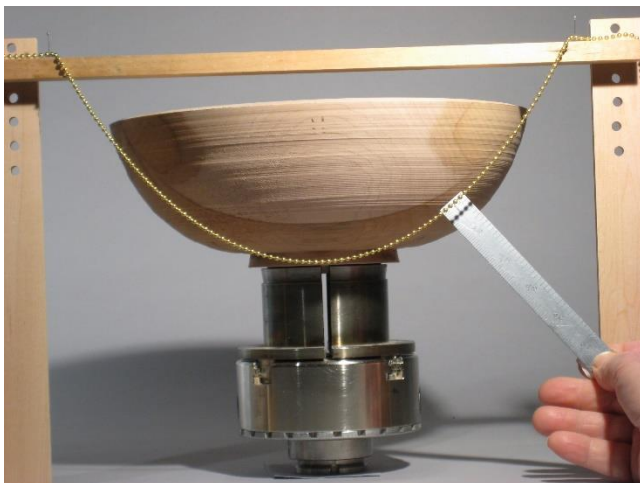
the fixture. Put some weight on each base to stabilize it.



- 3212 Photo 7

- Drape the chain over two straight pins equal distant from the centerline. The idea is to define the curve within the blank, then chip away what doesn't fit. The chain has thickness, so consider only the inside line of the curved chain. Set the inside curve of the chain just at the

top corner of the bowl on each side. Set the inside of the chain curve to fall $1/8''$ above the foot of the bowl when viewed from a single point 4 feet away from the chain, exactly at the foot of the bowl. Use this point each time the bowl is viewed.



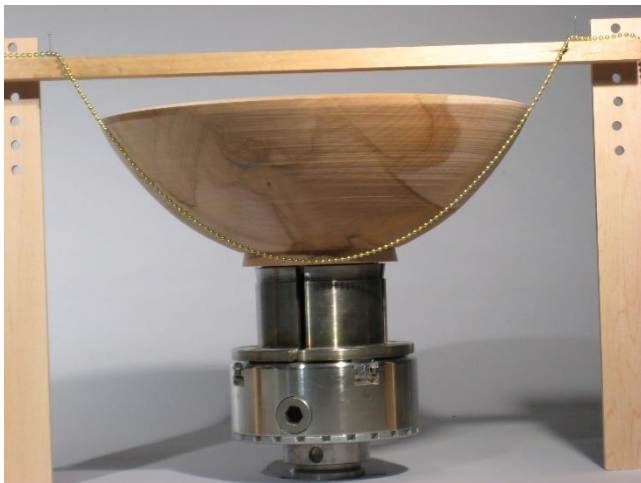
- 3213 Photo 8

- Measure the amount that will need to be turned from the bowl. Make sure there is at least $3/8''$ more than this in bowl thickness. In this

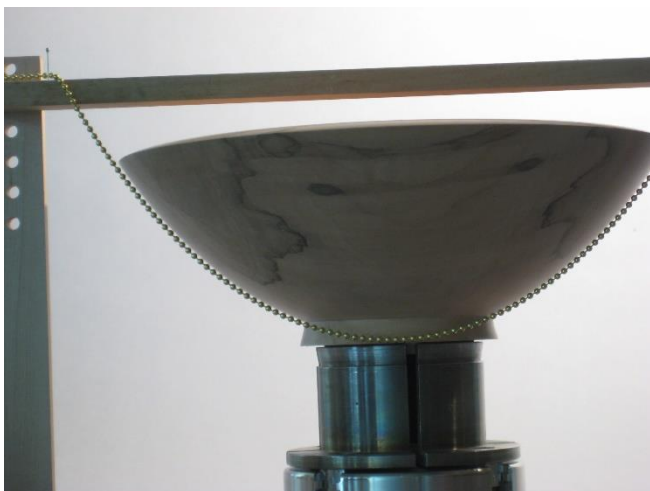
case, the bowl blank is 1" thick at this point.



- 3215 Photo 9
 - Leave the fixture set up, of course, and bring the bowl with chuck back to check progress.



- 3214 Photo 10
 - Some progress, but more work to do.



- 3218 Photo 11
 - After several trips to the chain, the form above the foot is complete and sanded.

Make a complementary curve inside the bowl. To establish the inside bowl depth, I'm allowing 1/4" for the bowl thickness at the bottom, plus 1/8" for the center of the bottom to be above the foot. So, if the whole height of the bowl is 4" then the inside depth is 3-5/8".



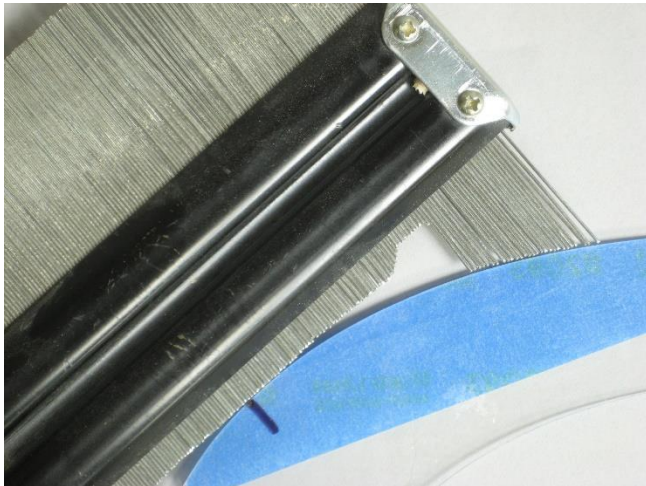
- 3219 Photo 12
 - Reverse the bowl on a jam chuck to finish the foot.



- 3220 Photo 13
 - First establish the 1/8" set-back.



- 3222 Photo 14
 - Now that the setback is done, true up the foot and begin shaping the inside of the foot to follow the chain curve.

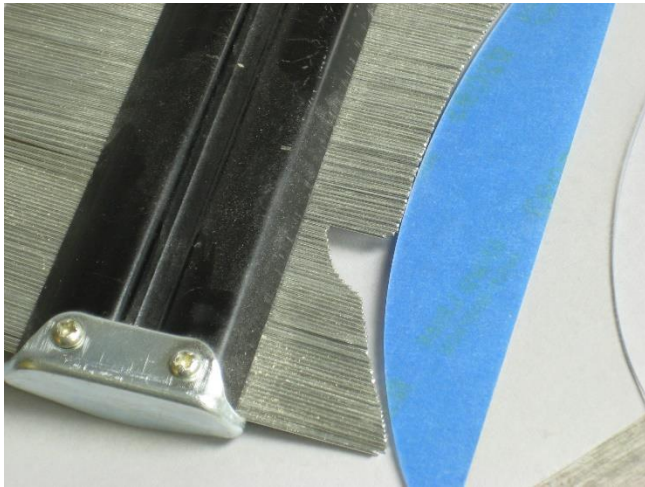


- 3223 Photo 15
 - Using a contour gauge and a number 48 French curve, see what needs to be removed to follow the chain curve.

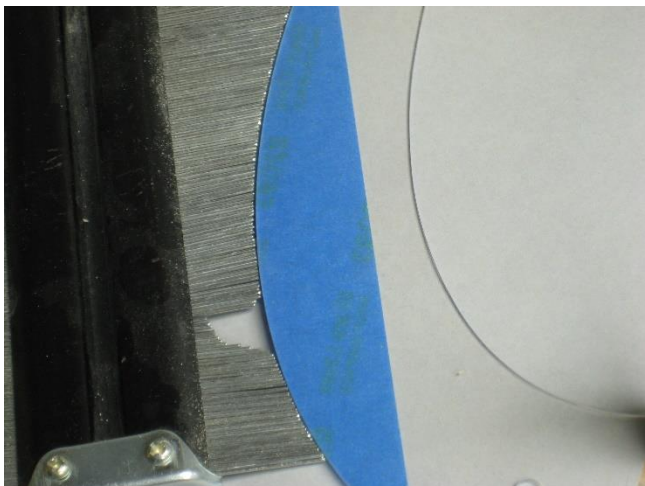
- 3224 Photo 16
 - Use the contour gauge to span the center and to start



near the foot and make the largest curve.



- 3225 Photo 17
 - Use both indicators to find the best compromise in following the chain curve through to the center of the bottom.



- 3226 Photo 18

- Here is a close representation of the chain curve. Finish sanding the bottom.



- 3227 Photo 19
 - The foot is complete.



- 3228 Photo 20
 - Carve off the excess, then sand to a continuous curve.



- 3229 Photo 21
 - The chain curve follows through the foot to the center of the bottom.



- 3230 Photo 22
 - The complete form.

BIO

Steve Wilson has been turning since the mid-seventies, showing since 2010 and teaching and demonstrating since 2008.

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