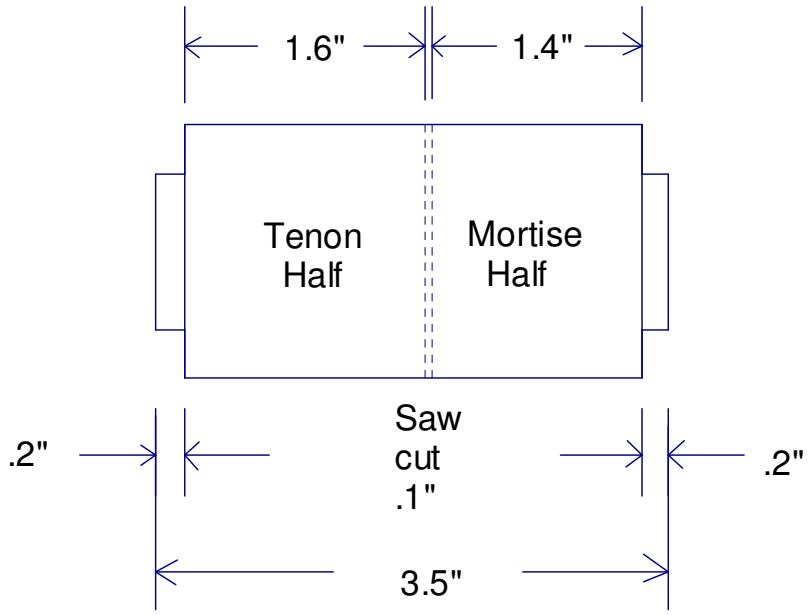
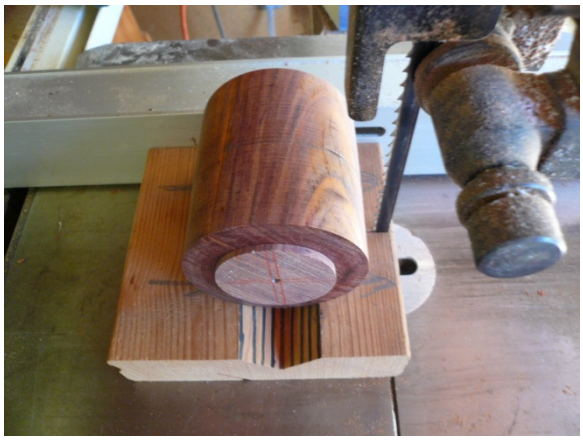
Making a Spherical Box

Jim O'Connor

I start with a 3 inch square block 3.5 inches long. The box I am describing here will end up with about a 2.375 inch inside diameter and about a 2.675 inch outside diameter.

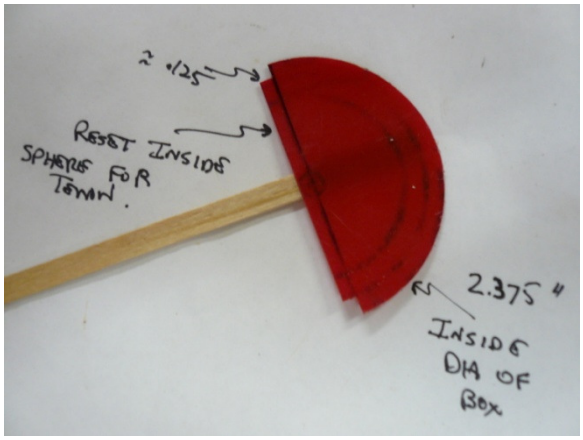
I turn a cylinder with a 0.2 inch tenon on each end and then mark the remaining cylinder with a line. The line divides the cylinder into two unequal length to allow for the tenon on one half of the block.



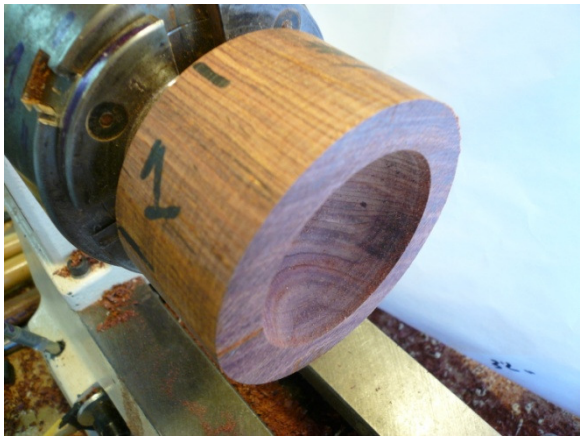


I think the best way to cut the cylinder into halves is by using the band saw with a “V” block to support the cylinder. Don’t try it without the “V” block because the band saw will cause the cylinder to rotate and pull it into the blade along with your hand. I have a groove in the block to line up the line on my cylinder and I use the guide to make a straight thin cut.

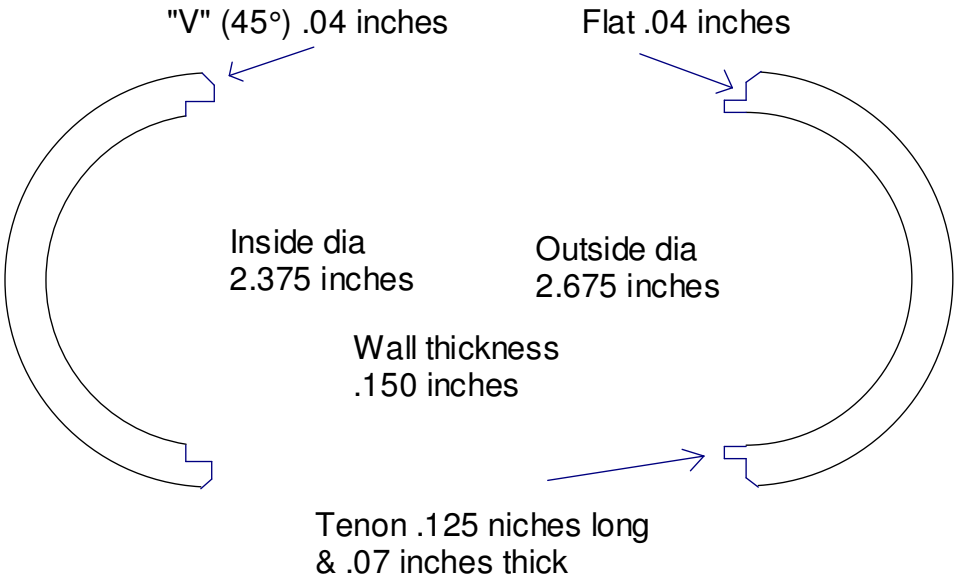
I usually rough out the inside of both halves and let it dry (move) for a couple of months to make sure the wood is dry.



A sturdy but flexible template is needed to get a decent spherical shape on the inside of both halves. I mount a piece of a divider for a of ring binder with double back tape to a disk on the lathe and cut out a circle to the dimension of the inside diameter of the box. Make sure you mark the center and draw a line through it as shown. I like to leave a strip along the diameter of the card to help measure the amount of reset for the tenon half.

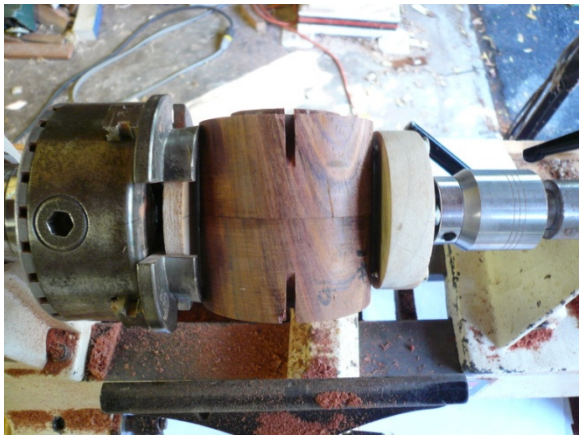


Mount the larger half (tenon half) on the lathe and complete the inside. I like to do this half first so that the thickness of the tenon will be the size I want it to be. If you start with the smaller half (mortise half) first, you cannot control the tenon thickness as well and it may end up too thin.



As you scrape out the inside keep checking the shape of your sphere with the template. I use a 1 inch round nose scraper. The inside sphere of the tenon half must be recessed the thickness of the tenon otherwise the wall thickness of your finished sphere will not be consistent. Cut the tenon to the length of the reset. A beading tool is perfect for this.

Sand and completely finish the inside. Do not sand the tenon. I use walnut oil on the inside as my finish. Go through the same process on the other half of the box except do not recess the sphere. Sand the inside and then cut the mortise to fit the tenon. I want a tight fit at this time because of the way I cut the outside sphere. Also the fit loosens up some times and may end up too loose. You can always take some off, but you can't put it on.

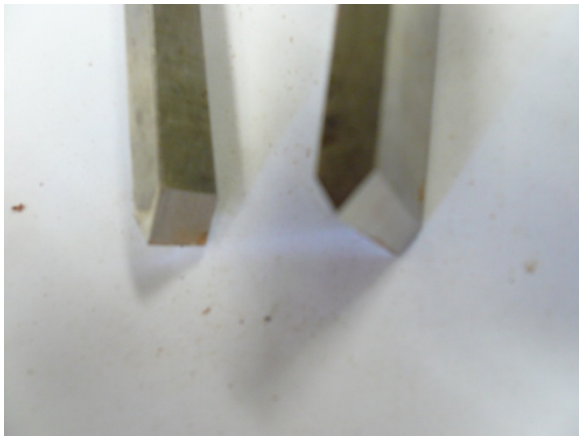


In order to get a perfect sphere on the outside concentric with the inside sphere I came up with a jig to hold the cylinder together. I used the jig to cut a circle on the outside with a parting tool. This is why I wanted a tight fitting box, but it will still fly apart unless you make the following jigs (next picture). Most important, the lathe must be turning at the slowest speed possible and still be able to cut the ring.

I cut a disk to mount in the jaws of my chuck. There is also a line through the center of the disk to line up with the center of the two halves of the cylinder. Notice that the disk is recessed and the jaws are opened wide. The jaws act as a "V" block to hold the

cylinder and the corners of the jaws will help to keep the box from coming apart. This insures concentric inside and outside spheres. On the tail stock I have a disk mounted to a revolving center with 4 screws slightly protruding through the disk. They help align the cylinder and the screws dig into the cylinder to hold it together when cutting the outside ring.

Once the groove is cut you can do each half separately. Make a mortise jam chuck to fit the tenon half of the box and a tenon jam chuck to fit the mortise half of the box. You can cut most of the excess wood away with a gouge and using the tail stock for support. Be sure to pencil in the groove so that it is easier to see when the outside is almost finished. After I cut away as much wood with the gouge as I feel comfortable, I then switch to a negative rake scraper (beading tool or a skew ground into one).



You have much more control with the negative rake scraper and it will give a good finish. Don't worry if the groove is gone on one side of the half sphere and not the other. This happens because of slight inaccuracies in the jigs used to cut the circle. As long as the tenon and mortise are being used with the jam chuck, the thickness on both halves will be the same. Scrape until the pencil line is completely gone.

After the outside is finished, I cut a half the "V" groove on each half of the box where they join. This

makes for a nice mating of the halves and if the grain does not match because of the band saw cut that removes material, it is not as noticeable. Each half was done separately, but if scraped down carefully to remove the pencil line, they will be the same size. I also use walnut oil on the outside.

The fit should be too tight and will need to be corrected. I usually wait a week or more to let the wood relax. I make another jam chuck to take small amounts off the tenon. The jam chuck fits inside the half sphere and it has a stop for the tenon to center itself on. The fit should be snug. The tail stock with a soft rubber pad is used to hold it in place. Take very slight amounts off the tenon and keep checking the fit. Don't go too far or the fit will be too loose and the box will be ruined.

I then finish the sphere by buffing and putting carnauba wax on the outside only. I don't like waxing the inside of the box because if wax gets on the mortise – tenon the joint doesn't seem to fit properly.