Turning a Sphere

Introduction and Thoughts on Design:

The sphere symbolizes family, wholeness or completeness. What better shape to turn on a lathe. There are many methods and procedures for turning a sphere on a lathe. This handout will walk you through the way I choose to turn my spheres. One can find a tremendous variety of jigs and tools designed to facilitate the turning of spheres on the lathe. I will not discuss these tools in this handout as that is something that you can explore on your own. I have chosen to pass on the method that I learned from Allan and Stuart Batty. It is so simple I sometimes wonder why others break out their vernier calipers and math skills to make what is a fairly simple procedure that much harder. I believe in keeping things as simple as is possible. Choice of wood is the single most important item to consider. It is the wood that will make the sphere grab the observer's interest. A nice piece of scrap burl or an exotic wood would make for an interesting sphere. These are objects that are meant to be held and fondled and not just admired from afar. One test for a good sphere is to roll it on the floor and if it rolls in a semi straight line it can be considered good and true.

Materials:

2" x 2" x 3" Maple, Cherry or other hardwood

3" x 3" x 3" plus or minus Poplar green or dry for making a jam chuck

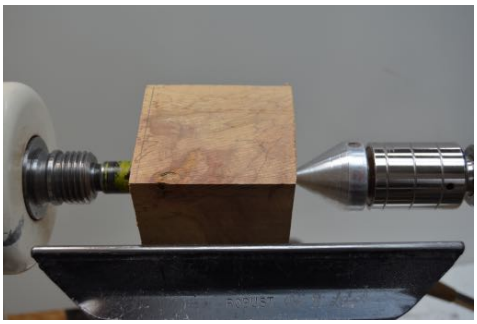
*****_The above dimensions can be changed to suit your needs or the material on hand. Just remember the material for the jam chuck has to be greater in diameter than the blank to be used for turning the sphere._

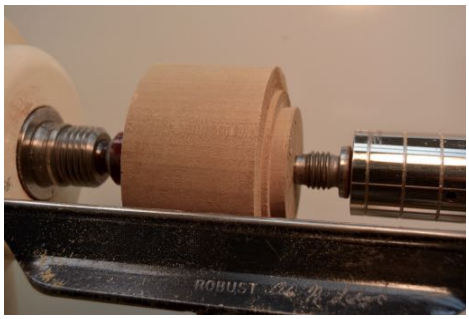
Tools:

1 ¼” Spindle Roughing Gouge ⅜” Spindle Gouge
Thin Parting Tool 1/16”
¼” Parting Tool
Vernier Calipers

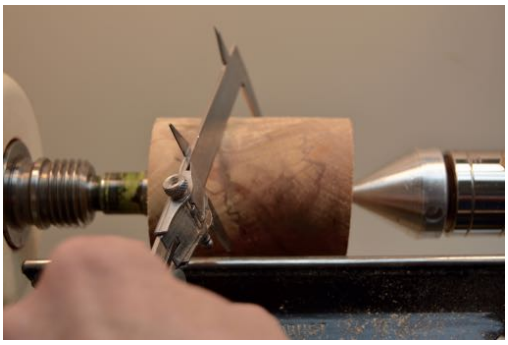
Procedure:

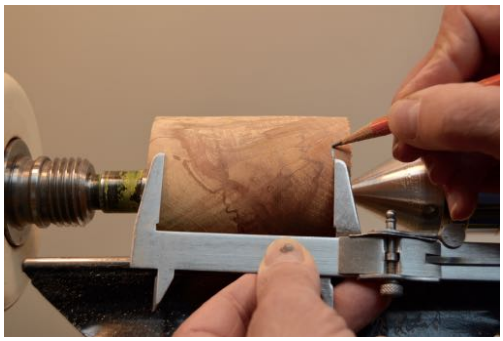
1. Prepare both blanks by turning them between centers into cylinders. Be sure to add a tenon sized to fit your 4 jaw chuck to the larger one that will become the jam chuck.



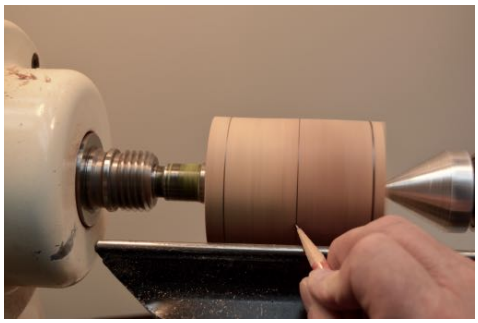


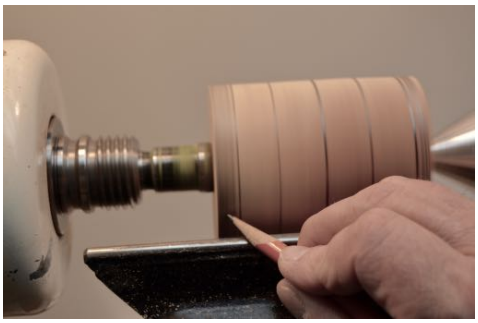
2. Place the blank that is to be the sphere in the chuck and true up the blank.





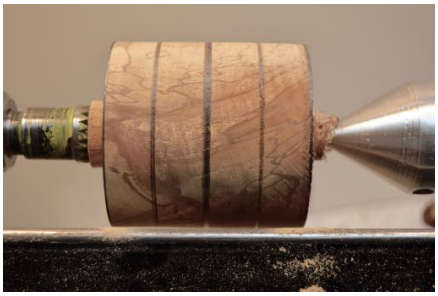
3. Next measure the diameter of the cylinder with a pair of Venier Calipers (if turning a sphere to a specific diameter turn the blank to a diameter slightly larger than the finished diameter to allow for final shaping and sanding) and transfer this measurement to the side of the blank leaving some room for waste on both ends, in order to insure that there is room for the tools to get around to turn the sphere shape without hitting the drive center or the revolving center.

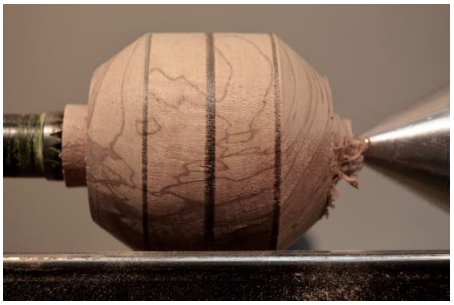




4. Using a sharp pencil mark the centerline between the two marks you just made on the side of the blank. *Do not turn away the centerline as this is your reference point and helps to keep the symmetry of the sphere.*

5. I then like to place marks dividing the previously marked area into four equal parts. I do not actually measure these marks but instead using a pencil place marks dividing the halves in half by eye.





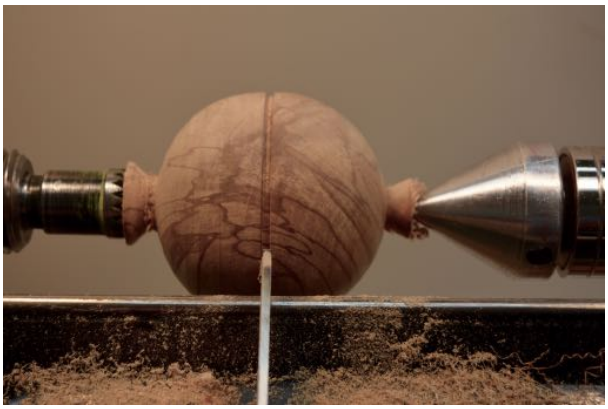
6. Using a parting tool, part down on both ends of the area marked for the sphere to a diameter that is sufficient to hold the blank steady while turning the rough shape of the sphere.

7. Now turn the blank to the shape of a sphere by first turning off the outside corners at approximately 45 degrees to the pencil mark using a ⅜" Spindle Gouge. Essentially, you will be turning the blank to an octagon by trimming the outside quarter marks on both ends, thus making it easier to see the shape of a sphere. These cuts are started the same way one would turn a bead by starting at the outside with light cuts and with each successive cut getting closer to the outside quarter mark and closer to tenons/stubs on both ends.

8. Finish roughing in the sphere shape gradually rounding the outside edges in much the same way as in the procedure that is used when turning a bead. Remember that the flute and the tool handle will go through an arc starting with the flute at 2 or 10 o'clock and rotating to the end of the cut with the flute rotating to end up at 3 or 9 o'clock in the fully closed position

with the handle going around so that the bevel ends up almost perpendicular to the blank. Note that the bevel points in the direction of the cut sliding across the bead or the round shape of the developing sphere, which means that the tool handle has to travel in the same direction ensuring that the bevel points in the direction of the cut, thus creating a round ball shape. Another way to picture the rotation of the bevel and the flute is to start the cut by touching the heel of the bevel to the work with the handle pointing up in the direction of the cut with both the flute and the handle rotating up and around the curve and eventually ending up with the flute in the closed (9 o'clock) position and the handle ending up horizontal and the bevel almost perpendicular to the blank.

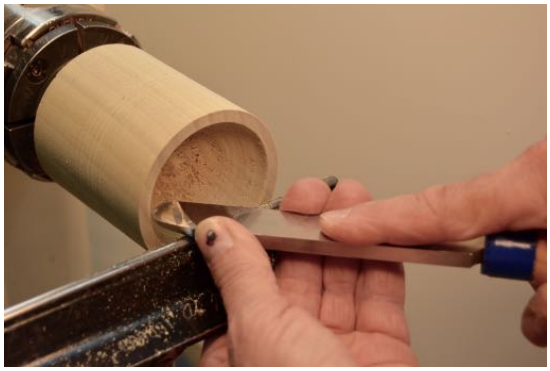
9. *Note: If you are going to make a number of spheres that are the same diameter, you can make a template out of cardboard, thin plastic, scrap of laminate or some similar material. Use a compass to draw a circle then cut it to shape on a band saw. If you cut it carefully the leftover piece can be used as a template for hollowing the inside of a sphere.



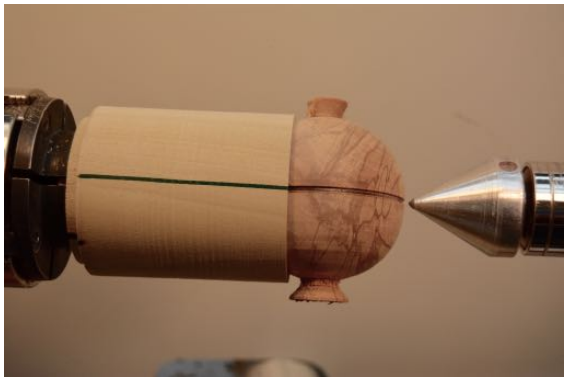
10. Once the sphere has been roughed out use a thin parting tool to make a shallow dado or channel at the center line on the sphere and then using a pencil remark the center line before paring parting it off the lathe. Be sure to leave little nubs on the ends just in case the extra wood is needed for the final shaping of the sphere.

**When making the jam chuck be sure to drill a hole all the way through the center of the blank, just in case the sphere gets stuck in the jam chuck, so that you can gently knock it out.*

11. Mount the block that will become the jam chuck in a 4 jaw chuck and then true it up and face off the end that will be hollowed out to form a jam chuck to fit the sphere blank.
12. Using a ⅜" Spindle Gouge or Round Nose Scraper hollow out a recess to jam the sphere into. If you are using a spindle gouge to hollow the jam chuck you would use the same techniques



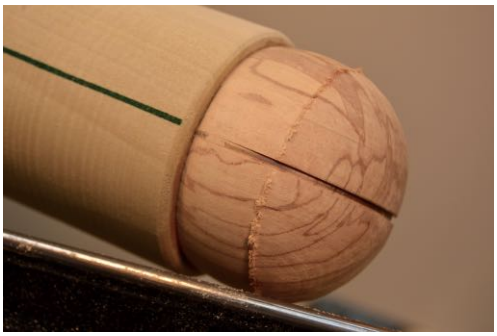
that are used when hollowing a goblet or a box. (See handout on turning boxes or goblets. Also check out the handout on Spindle Turning Techniques.) I finish shaping and sizing the jam chuck using a Round Nose Scraper so that I can sneak up on the fit. The sides/walls of the hollowed out area should be roughly turned at a 1 to 2 degree angle to make it easier to adjust the hollowed out area to tightly jam the sphere blank and hold it tight enough so that the blank can be turned to the finished shape.



13. Next jam the sphere blank in the jam chuck with the nubs facing out and perpendicular to the bed of the lathe. Be sure to adjust the centerline on the globe so that it is parallel to the face of the jam chuck (parallel to the lathe bed). To help me do this more accurately I draw a centerline on the jam chuck and then bring the Revolving Center up to but not touching the sphere, to help with lining up the centerline on the sphere so that the line on the sphere is straight and parallel to the bed of the lathe. If the fit is just a tiny bit loose sometimes moistening the inside of the jam chuck with water will improve its holding power. Also, using greenwood for the jam chuck helps it grip the sphere better.

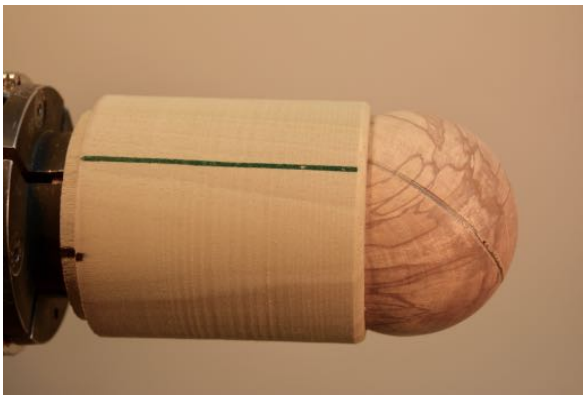
14. When using a jam chuck it is a good idea to take light cuts with your tools. This is not a time to hog out large amounts of wood as the sphere is only being held by friction.

15. Now you can carefully and gently turn off the nubs.



**Note in the photo above left I have used a pencil to mark the area where I still need to remove a bit of material. The photo on the right shows the sphere after it has be reversed to turn the other half down to the pencil line.*

16. Using a ⅜” Spindle Gouge turn the sphere down to the pencil line removing the sides of the notch created by the parting tool. Be sure to leave the pencil line.
17. Remove the sphere and rotate it 180 degrees and turn this end down to the part leaving just the pencil line and removing the sides of the notch left by the parting tool. The recess in the jam chuck may have to be readjusted to fit the shrinking diameter of the evolving sphere.



18. Once the sphere has been turned down to the pencil center line it is ready for sanding. Rotate the sphere 45 degrees and begin sanding with the lowest grit sand paper that causes no harm and removes the turning marks.
19. Continue removing and rotating the sphere another 45 degrees each time and sanding until you achieve the finish that meets your quality standards. I usually sand up to 1500 grit.
20. The sphere is now ready for the finish of your choosing. I like to use an oil finish and then carefully buff it using the Beall Buffing System. Be careful as sometimes the sphere will go air borne during the buffing process. The joy of these spheres is in rolling them in your hand and feeling their smoothness.

* *If turning large spheres instead of using a huge jam chuck, consider using a pair of cup chucks. One can be turned with a tenon/spigot to fit in your 4 jaw chuck and the other can be drilled to fit over the threaded part of your Revolving Center, if you own a Oneway Revolving Center or its equivalent by drilling a 5/8" hole in it to slide over the threaded cup on the Revolving Center. Consider making a cup chuck with a morse taper to fit the morse taper in your head stock, thus eliminating the need to use a 4 jaw chuck. The sphere is then jammed between centers and rotated several times as needed to enable you to turn a large sphere. If you do own a Oneway Revolving Center you can use the large reversible cone that comes with the Revolving Center as a big cup chuck.*