Turning Spheres

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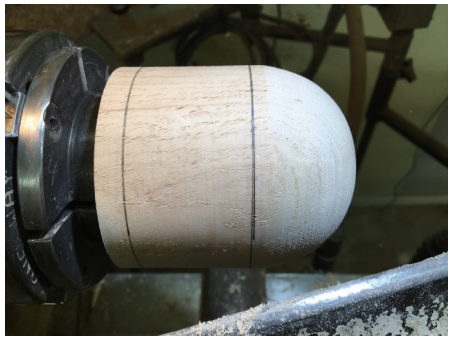
Tools & Supplies

- Roughing gouge
- Spindle or bowl gouge
- Parting tool
- 3/8” Beading and parting tool or straight skew
- Round nose scraper
- Mallet
- Four-jaw chuck
- Live center with removable point (or live center and separate cup center)
- Drive spur
- Masking tape
- Sand paper

Wood—two pieces

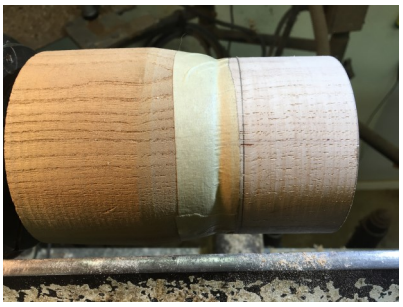
- Sphere
  - Slightly longer than diameter - suggest 3” square, 3.5” long, not smaller than 2” for first one
  - Must be dry or wood that doesn’t move much
  - Harder woods are better
- Jam chuck
  - Slightly larger in diameter than sphere piece (suggest 3.5” square)
  - About same length as sphere piece, but can be shorter
  - Preferably a softer wood than sphere

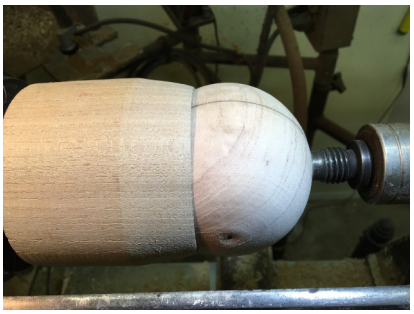


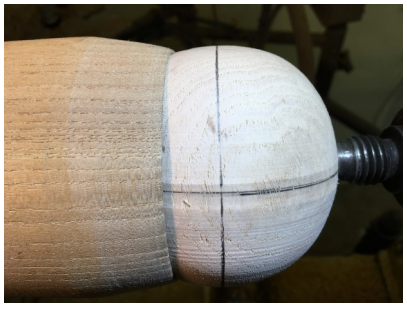
Process

- Turn both pieces of wood to a cylinder and add a tenon on each piece to fit your chuck
- Chuck the sphere blank into your four-jaw chuck, re-true the cylinder if needed. Mark a length on the cylinder equal to the diameter, this is where the sphere is parted off.
- Mark the center line of the sphere —IMPORTANT: center line must remain visible until the very end.
- Round off half of the cylinder into a semi-circle--doesn’t have to be perfect. Use your bowl or spindle gouge for this. The closer you can make this a true semi-circle, the less work there is in later steps and the better it will fit in the jam chuck.
- Mark the center point of the end of the sphere with a pencil mark and part off the piece at your length mark.

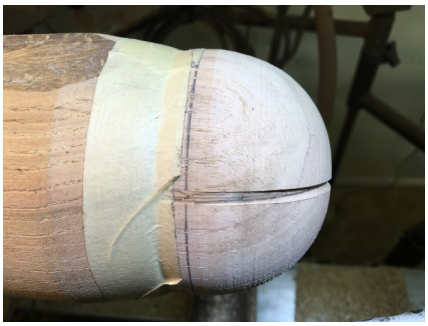
- Chuck the jam-chuck blank into your chuck and re-true cylinder if needed.
- Turn a recess to fit the rounded end of your sphere. Use gouge for initial shape, then finish with round-nose scraper. Make it deeper than half the sphere. Taper the sides – more narrow as you go in, allows you to easily adjust the chuck if you make it too big.
- When you test fit the sphere, try to keep the jam chuck edge ¼" to 3/8" away from center line of sphere. Want a very snug fit. When you have your fit, taper the outside of the jam chuck so the edge wall thickness is about 1/16" - 1/8" thick.
- OPTIONAL: Drill a center hole all the way through the jam chuck. Can easily be done with spindle gouge or use drill bit. This is used as an ejection hole to pop out a sphere that gets stuck in the jam chuck.
- IMPORTANT: You can re-use these jam chucks, but must re-true the inside and outside each time you put it in the four-jaw chuck.
- Insert rounded end of sphere piece into jam chuck Be careful to get it centered--use center line as your guide. Wrap masking tape around edge of chuck and on sphere. The tape holds better if there is less space between chuck edge and the sphere. This is why we tapered the outside of the jam chuck. NOTE: Run the tape away from you (wrap it clockwise) so that is won't come off when the lathe spins.
- IMPORTANT: The tape is NOT the thing holding the sphere in place. It merely reduces the vibration so it won't shake out as easy. You cannot pad the jam chuck with tissue. If your jam fit is not tight enough, re-turn the jam chuck.
- Round off the second end of the sphere into a semi-circle. Take light cuts here as you only have the jam fit holding the piece. You can bring the tailstock up for support, but take the point out of the live center. Finish by marking the center point of the end of the sphere with a pencil mark.
- Next step is to mark the true sphere diameter. Take the sphere out of the jam chuck. If it is stuck, use your knockout bar to poke through your ejection hole. Also can just use a mallet and slightly rap the jawed chuck while applying pressure to the sphere. The vibration caused by the mallet will get the sphere out in almost all cases. IMPORTANT: Do NOT strike the jam chuck! Doing that will knock it off center.
- Rotate the sphere 90 degrees (grain running perpendicular to lathe bed) and fit sphere back into jam chuck. It does not have to fit perfectly. Bring the tailstock up to support it. IMPORTANT: Use a cup center or remove the point from your live center. Draw a line between the end center points.

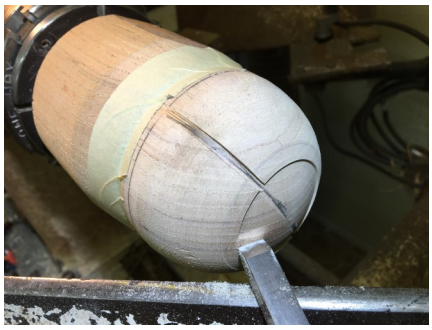


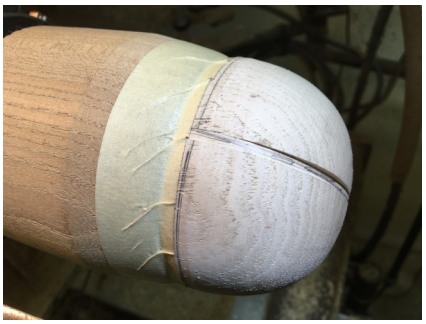




- With a parting tool, cut a groove on the line you just drew. Cut the groove until the groove is a continuous circle around the sphere. This groove will be the end diameter of the sphere. NOTE: If you want a sphere of a very specific size, cut the groove until the depth reached is the diameter you want the sphere to be. Color in the groove with a pencil—IMPORTANT: Don't forget this step!
- Re-chuck the sphere in the jam chuck, in the original direction (grain/groove running parallel with bed) Make sure the piece is centered as best you can. Tape the piece in place with masking tape.
- Use a beading and parting tool to scrape the sphere down to the groove. Use the beading and parting tool (or a straight skew) as a negative rake scraper—sharpen only on one side, the sharpened side should face down on the tool rest. The burr created when sharpening does all the cutting, but only lasts 15-20 seconds. Sharpen often—especially with wood that likes to tear out! Take light cuts. Tool rest height should be set to cut with the cutting edge right at the center.
- Stop the lathe often to check on progress. When the pencil mark disappears you are done with that section. If you have a pencil mark showing on one side, but not the other, keep turning until it is gone on both sides. This will happen if you don't get sphere centered in the chuck. Don't worry, it won't affect the final sphere.
- IMPORTANT: Do not cut anymore where the pencil mark has been removed. If needed mark that area off with a pencil mark so you don't touch it again. Do NOT turn the center line away.
- When pencil mark is gone or nearly gone on the entire half, sand that side. IMPORTANT: Keep the sandpaper moving!
- Remove sphere from chuck and re-chuck with finished side in the jam chuck. Depending on how good your rough semi-circles were, the sphere may fit without modifying the chuck. If have a loose fit, cut the jam chuck back until you get a tight fit. May need to hollow out the jam chuck more.
- Make sure the piece is centered as best you can. Tape the piece in place with masking tape. Use the beading and parting tool to scrape the sphere down to the groove. Your final cuts will be at the center line. Remember that you need to round in both directions at the center line to avoid having a hump right at the center line.
- Sand the second side and remove your sphere. If you find you have a hump at the center line, re-chuck on the just finished end and sand a bit more in that area. You shouldn't be off by much. Just a touch of sandpaper should fix it.







Possible problems

Can't remove sphere from the jam chuck

- Best way is to use a knockout bar to pop out the sphere through the hole you drilled in your jam chuck, if you didn't drill the hole, use a mallet to strike the four -jaw chuck holding the jam chuck while applying pressure to the sphere. Many small quick taps is better than one big whack. You are trying to create vibration to loosen the sphere. If all else fails, carefully cut the jam chuck away

When complete, the sphere has a "high-spot" at or near the center line

- Often happens when the jam chuck is fitted too close to the center line Can also occur when one side sanded more than the other.
- Typically just a little sanding will work. Re-chuck using opposite end of last chucking point. Then sand the high spot. If needed turn the high spot away with the beading and parting tool and then re-sand.

Chucking variation

- It is quite useful to be able to hold the sphere in a four-jaw chuck for the purpose of doing things like drilling holes and hollowing. For this technique, you must have a four jaw chuck with smooth dovetail jaws.
- After roughing the first half of the sphere, cut a very small tenon in the end. It shouldn't be any deeper/longer than 1/8". The use of such a small tenon requires the use of the dovetail jaws. Slightly taper the tenon to match the taper of your dovetail jaws. You can now put the half-roughed sphere in a four-jaw chuck and rough turn the second end. Use light cuts! This is a small tenon and it will not hold up to extreme force.
- You can put another tenon on this second end if you want, but it is not needed if you are just making a sphere. The only time I use a tenon on both ends is if I am drilling a hole in both ends or If I'm making a sphere box.
- Don't forget to mark the center of each end of the sphere.
- When you go to mark the true diameter, you need to make sure you cut through the tenon—your groove must be deep enough so when you do the final shaping down to the groove, the tenon will be removed.
- The shaping to the true diameter using the beading and parting tool is done the same way as before, except the first end can be done using the four-jaw chuck to hold the piece. The second end, however, must be done using the jam chuck as before.
- To see more on the use of this sphere chucking method, see my demo handouts on making a sphere box.