A Segmented Ball Christmas Ornament
(the simple way)

November 10, 2015       By Gary Miller

Materials:

1. 4 pieces of 1” X 1” X 12” Maple (or other light coloured wood).
2. 4 pieces of ¼” X 1” X 12” Walnut (or other dark coloured wood).
   Note: rip the pieces of wood to the exact dimensions, ensure that your saw cuts at right angles.
3. A cylinder of hard wood about 1.5” diameter and 12” long (pieces will be used for waste blocks on the lathe)
4. 1 piece of ½” MDF about 3” X 12” for clamping jig #1
5. 1 piece of ½” MDF about 5” X 12” “ “ “ “
6. 2 pieces of ½” MDF about 1 1/2 “ wide and 12” long (for clamping)
7. 2 pieces of ½” MDF 2.5” X 12” for the cutting platform
8. 1 piece of ¾” pine about 3” X 12” for clamping jig #2
9. 1 Piece of ¾” pine about 1 1/2” X 12” “ “ “
10.1 piece of ¾” pine about 2 1/4” X 12” “ “ “
11. Wood glue such as Titebond II.

Tools:

1. Hand clamps
2. Shop Vac
3. Table saw
4. Mitre saw (if possible)
5. Lathe
6. Spindle roughing gouge, 3/8” spindle gouge, ¼” spindle gouge, 1/8” parting tool, 1/16” parting tool
Procedure:

A. **Segmented cylinder blank**

1. Rip materials #1 and #2 pieces of wood to dimensions (fig 1)

2. Make clamping jig #1 from materials #4 & #5. It’s simply two pieces of MDF nailed and glued together to form a right angle. Glue and clamp a ¼” X 1” X 12” strip of dark material to each 1” X 1” X 12” piece of light wood making sure that the grain orientation is the same on each glue-up (fig2). Use lots of glue on BOTH adjoining pieces of wood. Using wax paper will ensure that the squeeze-out glue won’t bond to the clamping jig. Make 3 more.

3. After the glue-ups are fully cured set your table saw at an angle that will intersect the outer edge and the opposite inner edge of the dark strip (a little trial and error here). Rip the bevel on each of the glue-ups (fig 3) (take great care for your safety)

4. Set the table saw to 90 degrees again. Place the face of the “wedge” on one of the glue-ups downward against the table with the wide edge touching the rip fence). Rip each of the glue-ups accordingly (again, with care for your safety). You have created a new 90 degree corner at the thin edge of the “wedge” on each piece (fig 4).

5. Glue up the blank:
   - Place wax paper on the gluing jig
   - Place one of the glue-ups on the jig with the dark “wedge” facing out and sloping down. Rotate the next glue-up so the tip of the “wedge” touches the tip of the previously placed “wedge” then glue them together (glue applied to BOTH of the adjoining faces). Glue the next two glue-ups to the first two, rotating each strip to ensure that the tips of the “wedges” all touch (again, glue applied to BOTH adjoining faces). Rap the wax paper around the bundle and place the MDF clamping strips on the top and front of the bundle (fig 5). Take care with the clamping to keep the blank square and flush on all sides.
B. **Preparing the blank**

1. When cured, turn the blank to a 2” cylinder.
2. Square off one end of the cylinder on a mitre saw (or use a mitre gauge on a table saw). Note: because you are cutting end grain and there will be no sanding, a very sharp, fine cutting blade is best used for this and the following cuts to ensure good clean, flat gluing surfaces.
3. Mark the full length of the cylinder with two lines, wide apart at one end tapering to a point at the other end. Make one of the lines heavier than the other (fig 6).

C. **Cutting the wafers**

1. Make a simple cutting platform out of ½” MDF (materials #7) and screw it to the mitre fence so that its edge is very close to the cutting path of the saw blade (fig 7). Lightly clamp another piece of MDF (or scrap) 1 1/2” away from the edge of the cutting platform (for a register location). Place a fine pencil mark on the cylinder ¼” from the end. Align the saw blade to where it will cut off the ¼” wafer.
2. Insert a 1” spacer between the edge of the cylinder and the registration piece. Bring the registration piece up tight to the spacer and clamp it in place.
3. Remove the spacer.
4. Clamp the vacuum nozzle to the registration piece and turn on the vac.
5. Cut off the first wafer. It will immediately be sucked up against the nozzle, clear of the saw blade. Remove the wafer and place it face down on a table. Repeat instruction #3 through #5 until you have 8 wafers, stacking them in order (watch the converging lines).
D. Gluing up the ornament blank
1. Make 2 simple gluing jigs out of ¾” pine materials #8, #9 & #10 (fig 8). Mount one of the jigs in a wood vise (for convenience, if you have one).
2. Separate the stack of wafers into 2 piles. Take the first wafer on pile #1 and draw a 1 ½” circle on centre with a compass. On the opposite side of wafer #1 apply a generous layer of glue. Take wafer #2 and apply a generous layer of glue. Place #2 wafer on top of wafer #1 (glue to glue) aligning the converging lines to ensure correct orientation and apply hand pressure to force out the excess glue (lightly wipe off the excess). Continue as above with the remaining 2 wafers (it’s easy to keep them in order and right side up because of the converging lines). Before clamping, re-align the wafers to alternate the dark segments. Glue a ¾” piece of 1 ½” waste block (materials #3) onto the first wafer centered in the circle that you drew earlier. Place the stack onto the gluing jig, waste block up, force the wafers against the “V” of the clamping jig. Make sure that the dark segments stay alternately aligned. Clamp with care to ensure proper alignment (fig 9). The second pile of wafers are glued and clamped in exactly the same way with one minor exception, the circle should be drawn on the BACK of the LAST wafer and the waste block glued there. Together, the two stacks will form a single ornament blank with waste blocks at each end but before gluing them together it allows you to hollow each side.

E. Hollowing the ornament
1. Mount stack #1 in a chuck with the waste block facing OUT. Turn the waste block concentric and make a chuck-mounting tenon. Reverse mount the stack in the chuck. Lightly turn the stack concentric with a spindle roughing gouge. Drill a pilot hole to ¾” depth. Using a 3/8” spindle gouge, hollow from the centre out until it conforms with the hollowing template (fig 10). Repeat the procedure with stack #2. Return to the gluing jig and glue the two stacks together being careful to maintain the alternate pattern of the dark segments. At this point, the blank will have a waste block on each end (fig 9b).
F. Shaping the sphere

1. After the glue has cured, mount the ornament blank in the lathe chuck (either waste block) and bring up the tail stock. Part off the outer waste block. Measure the diameter of the cylinder with calipers. If necessary trim the length of the cylinder to the same measurement (a little off each end). Using a drill chuck in your tailstock, drill a ¼” hole into the outer end right through to the hollowed out area.

2. Move the tailstock up to stabilize the blank (use a small cone on your live centre).

3. With a pencil, mark a line on the cylinder ½” from each end. Mark another line ½” in from the perimeter on each end face (you will have to cut away a bit of the waste block at this location). Mark another line at centre on the cylinder. Using a 3/8” spindle gouge turn a 45 degree chamfer between the two lines at each end. This creates a rough, symmetrical semi-spherical shape. Gradually trim a little off each hard corner until the ball fits the outer template (fig10).

NOTE: the cylinder is end grain for its full length. You must turn from near the centre line toward each end. As you turn closer and closer to each end of the cylinder, the length of the fibres at each joint are getting shorter and shorter thus they are more susceptible to tear out. A light touch is necessary and a very sharp gouge. On the waste block end, you won’t be able to turn all the way to the centre. As you turn into the waste block, aim at the centre point but leave at least 3/8” of the waste block attached to facilitate sanding/finishing.

4. When you’re happy with the fit to the outer template, sand the exterior of the ball from coarse to fine (120 to 400 grit) being careful to eliminate any small areas of tear-out at the joints but maintaining the ball shape. Before you part it off, you will want to apply a finish. I use “Ultrashine cut-n-polish” to refine the surface before I do any final finishing.
G. Applying the finish
1. Of course you can apply whatever finish you prefer but my favourite finish for this type of project follows:
   - With the ball turning at about 25 rpm lightly spray lacquer sanding sealer over the entire surface. Let it dry (about 10 minutes) then apply another coat. Repeat at least one more time. Note: Put a cloth over your lathe ways to protect them from the lacquer.
   - Let it dry for at least an hour then, using something like 320 grit Abranet, sand it off until there are no shiny spots. If there are obvious unsealed spots apply one or two more coats of sanding sealer and sand again.
   - Rub it down with “0000” steel wool then apply a coat of Renaissance Wax. Immediately buff to a semi-gloss sheen. You might want to apply a second coat if you would like a higher gloss. Then part it off (you’ll have to do a little hand sanding and finishing where it was parted off).

H. The hanger knob
1. I use a ¾” X ¾” pen blank of African Blackwood (or Ebony or any other hard, dark wood) about 5” or 6” long. Mount it in a chuck and bring up the tailstock. Turn about 1 ½” to 3/8” diameter. Turn a ¼” tenon to glue into the ball. Contour the next ¾” any way you like using a ¼” spindle gouge. Sand it to 400 and again, use “Ultrashine cut-n-polish” to polish it. No further finish should be required. Part it off and glue it into the ball. I drill a 1/32” hole through the hanger knob and run a length of flax thread through it to form a loop for hanging. Put a drop of thin CA glue on the knot to keep it from unfurling. That’s it! You’re done!

(Note make a bunch more)
Fig. 10

2" Sphere Template
(Outside)
(Inside)