

# The Triangle Box

## Supplies & tools

Bob Wolfe



Bowl and/or spindle gouges  
Round nose scraper 1/2" or 3/8" for box hollowing  
Bedan and Parting tool 3/8" or 1/2"  
4" or 6" tool rest  
Vernier calipers for scribing (General Brand, the cheap ones)  
Center finder  
Ruler  
Compass  
Awl  
Sharp pencil  
Sharpie markers (black, blue, red, green) optional  
Small scroll chuck with smooth jaws ~ 50mm  
Drive Center  
Tailstock live center – preferably a small diameter cup  
Painters tape 1" – 1½" wide  
Sandpaper 120, 150, 180, 220, 340, 400 grit  
Favorite finish – Triple E, Carnauba wax, latex clear coat, etc.  
Face Shield  
Dry blank 4" x 4" x 1½" or 5" x 5" x 1½" (other sizes will work)

# The Triangle Box

## Step by Step

Bob Wolfe

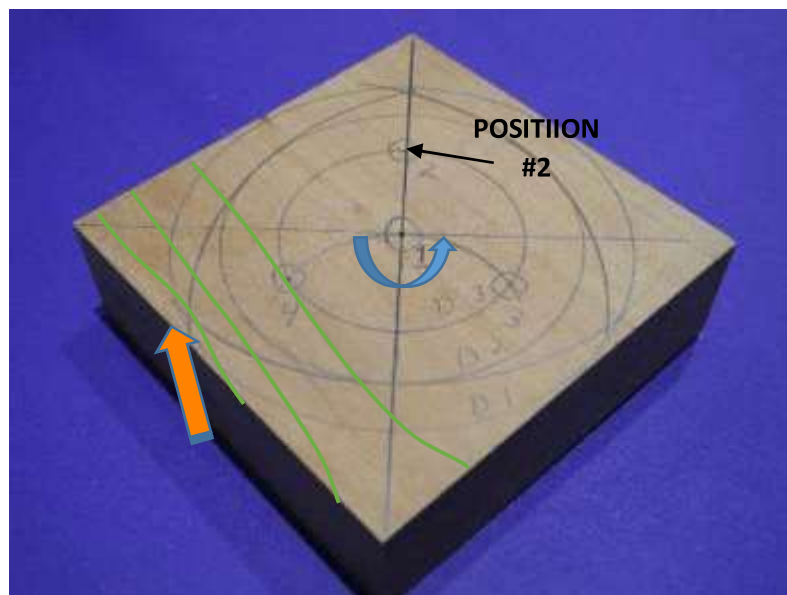
This design starts with a dry blank 4" x 4" x 1 1/2"

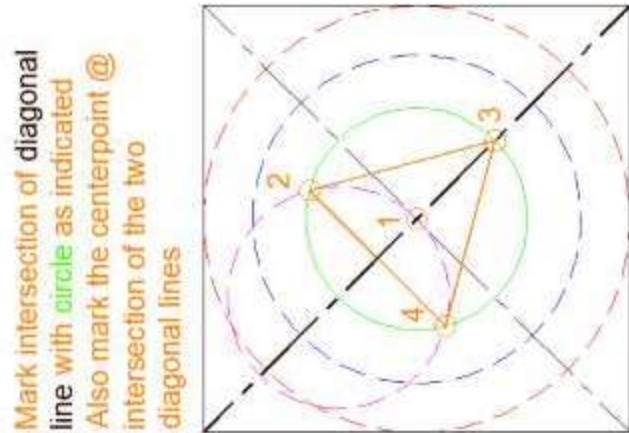
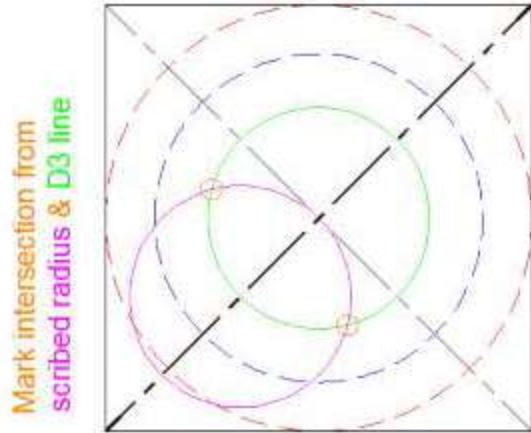
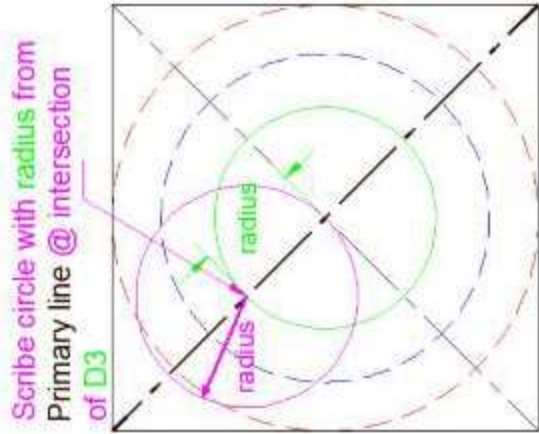
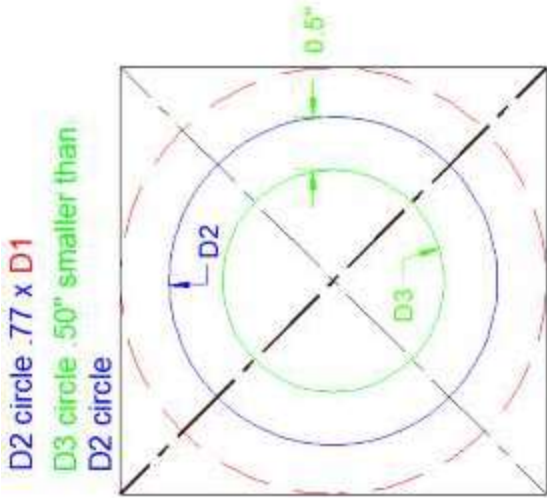
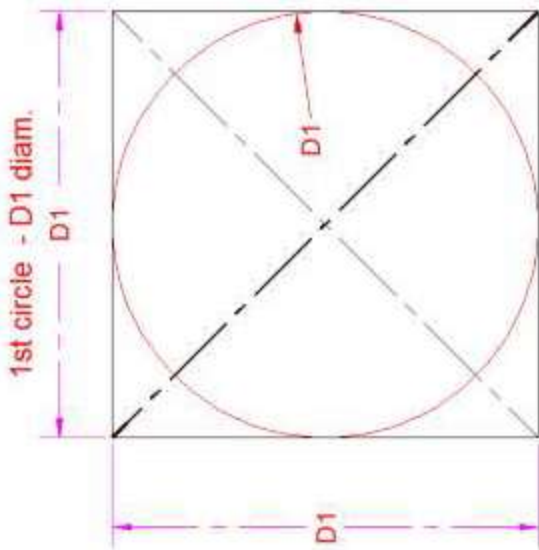
1. Layout top and bottom of box – refer to “**Layout Instructions**”
2. Mount blank between centers, **POSITION #1** turn down to just over **(Major) diameter**.
3. Turn multi-axis triangle using the 3 offset **POSITIONS #2, #3, & #4** cut to **(secondary) diameter D2**.  
**Note:** choose the **POSITIONS #2** as the cut with the most severe back grain to minimize tear out
4. Remount from **POSITION #1** to true bottom outer portion of box (slight concave is acceptable)
5. Sand the edges of triangular box completely
6. Cut recess in bottom of box to accept a 50mm jaws. Note: do not cut too close to edge of box  
~ 3/16" thickness is adequate
7. Begin to shape bottom of box leaving live tailstock in place. (you will come back and finish cut bottom)
8. Remove the box from between centers and mount in scroll chuck and mount on lathe
9. Rough shape the top of the box (shear cut or supported bevel cut)
10. Cut the inside lip for the lid using a sharp tool (skew, parting tool or bedan)
11. Adjust tool to cut about 1/16" smaller diameter to form the inside edge of the interior of the box
12. Hollow, sand & finish inside of the box
13. Remove scroll chuck from lathe with box still mounted.
14. Using a second scroll chuck or air chuck, mount the lid piece in the lathe by placing the top side of the lid to the chuck and centering the lid using the live center to previously laid out center of the lid.
15. Measure the ID of the lip of the box using the Vernier calipers and lock the setting.
16. Transfer the caliper measurement to the bottom of the lid. Make sure the transferred measurement is just oversized of the box ID.
17. Cut down the lid material to within 1/16" of finished diameter.
18. Using a parting tool or bedan, slowly cut the lid OD to slight interference fit to the box. This will take several trial and error cuttings and checking. Note: if you take too much material the lid will not fit properly and if the fit is too tight, you could have a permanently closed box. If you do cut too much material, trim the first cut and try again or use a contrasting piece of wood to make a new lid.
19. Once the lid fits properly, slight tug will “pop” the lid from the box, you are done fitting.
20. Remount the box onto the lathe and insert the lid in the proper grain orientation. Use the live tailstock to hold the lid in place.
21. Now you are ready to begin final shaping of the top of the box with the lid.
22. Slowly remove material from the lid to as close to the live center as you can within 1/32-1/64" of the top of the box.
23. Carefully using a supported bevel cut, begin reshaping the box in a continuous cut towards the live center. You can shear cut the final shape as needed. Sharp tool and light cuts will prevent fiber tear-out at the interface between the box and lid.
24. Retract the live center and determine if the lid is in the box tight enough to finish cut the outside of the lid. IF not tight enough, remove the lid and slightly wet the OD and reinsert into box to proceed. Also painters tape over the finished portion of the lid will hold in place to make final cuts.
25. NOTE: a finial can be added by drilling a 1/4" hole in the lid to match the tenon on the finial.
26. Sand and finish to top and lid together.
27. The lid interior can be finished by remounting in an air chuck to hold in place.
28. Remove the box from the scroll chuck. Mount and center in air chuck to finish the bottom of the box. A small smooth jaw pin chuck can be used to finish the bottom, but be careful not to over tighten as this will damage the lid to box fit.

# The Triangle Box Layout Instructions

Bob Wolfe

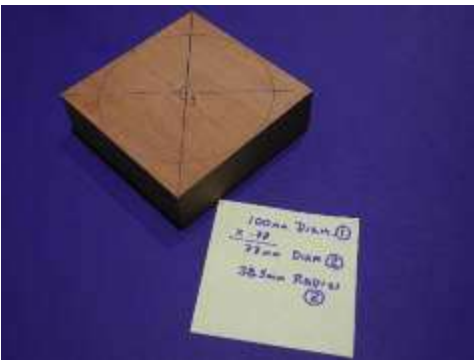
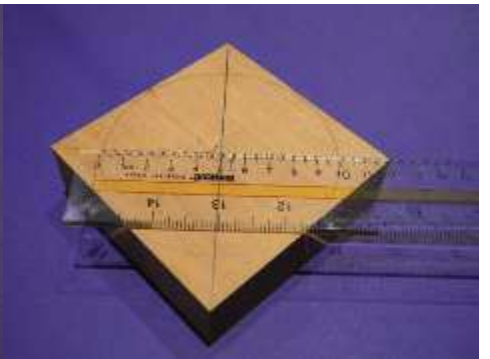
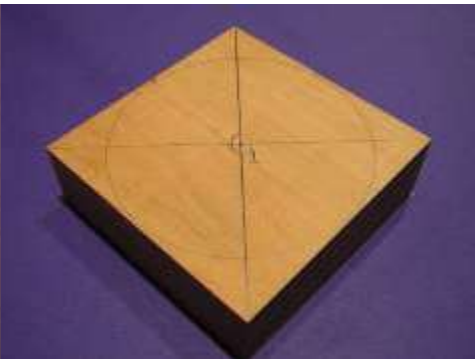
1. Cut block into an accurate square (4" to 5") square and 1½-2" thick.  
REFER TO ATTACHED DRAWING:
2. With a Center finder tool or ruler, draw opposing diagonals from corner to corner, (accuracy counts).
3. With a compass, scribe a circle to the maximum included size. This diameter is **D1**. Note, this will be the bottom of the box.
4. With a ruler, measure the diameter of circle diameter **D1**. I use metric millimeters. Take that number and multiply by 0.77, the resultant diameter is **D2**. (Divide this diameter by 2 to set the compass to the radius of **D2**).
5. With the compass, scribe a circle using the center point of the block, this is diameter **D2**.
6. With the compass set for the radius for **D2**, reduce the radius by 0.5". This will be used to scribe **D3**.
7. Scribe a circle using the center point of the block, this is diameter **D3**.
8. Using the compass set for **D3**, insert the point at the intersection of one of the diagonals with the intersect of circle **D3**. Once you choose a diagonal, this is the (Major axis), Scribe a **semi-circle arc** that crosses **D3** on either side of the **Major axis**.
9. **Mark the intersects** of circle **D3** and the **semi-circular arc** drawn in previous step.
10. Also **mark the intersect** of the **Major axis** to **D3** opposite side of the **semi-circular arc**.  
NOTE: The **three intersects** will be the locations for each of the offset turnings.
11. If you are going to use the same block for the top, scribe a line on one edge of the block 3/8" – 1/2" from the opposite edge of the block you just marked.
12. With a band saw cut a slice from the TOP of the block. Set aside for later.
13. Take the thicker portion of the block and scribe your two diagonals on the fresh cut "top" of the box. Accuracy still matters.
14. With a center punch, put a divot at the intersect of the two diagonal lines.
15. With a marker, highlight the diagonal line that is parallel and on the opposite side of the **Major axis**.
16. With the compass, scribe a circle on the top using the center point of the block, this is diameter **D3** from the top of the block.
17. With the center punch, mark the intersects of the **D3** and **Major axis** (matching the intersect of **D3** & **Major axis** on the opposite side of the block).
18. Take the compass and scribe a **semi-circle arc** using the other intercept as a center point. The intersect of the **semi-circle arc** and **D3** will be marked. The other two center points should match-up with the marked centers on the opposite side.
19. Take box blank and mark the center point on bottom of block POSITION #1.
20. Look at grain pattern to determine the first offset turning POSITION #2. The block will be turning clockwise from the tool side, so you are looking for the grain at the end of the offset cut. If you will be cutting against the grain, that it the POSITION #2 center-point since this is the position where you could have the most tear-out. (See Photo below)

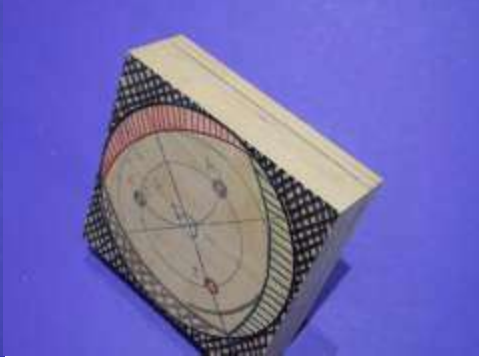
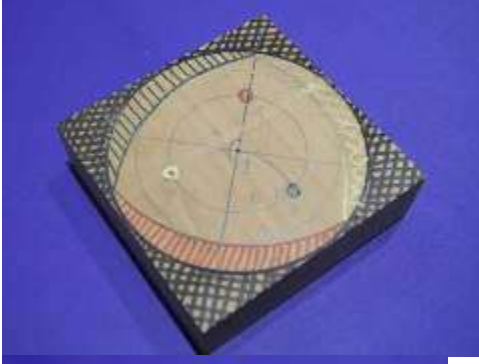
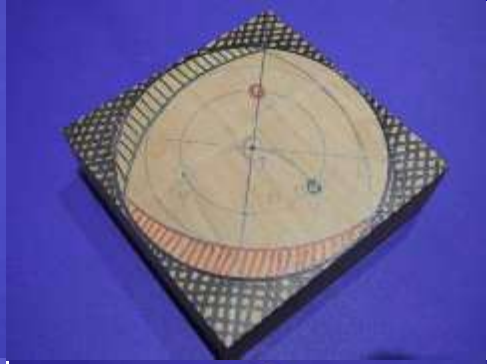
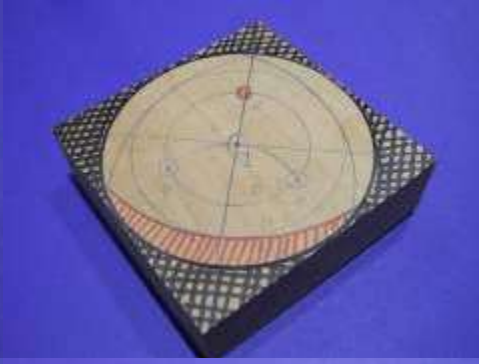
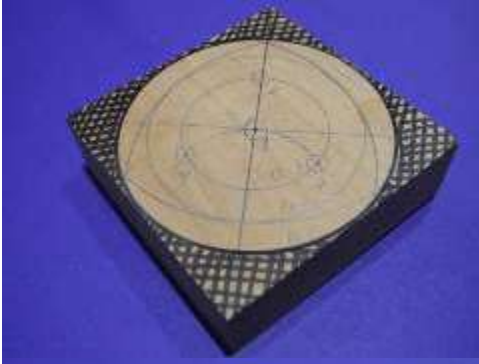




Repeat marking on opposite side of block. Make sure to use the same diagonal line to scribe and mark points so offset points align with each other.









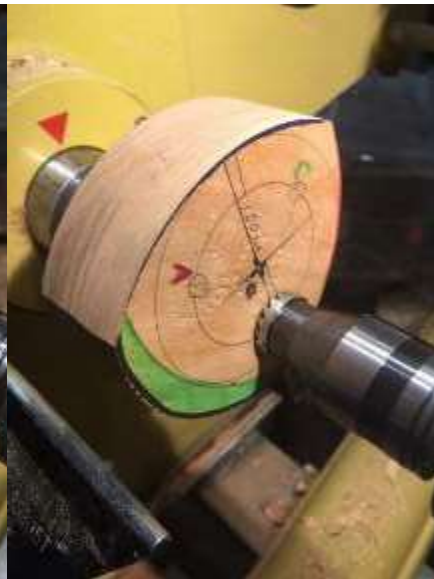
Initial Mounting of Block



Turn from Center pos'n #1



Turn from Offset #2



Turn from Offset #3