

Polygon Box Instructions

The ideal size blank for me is 1-3/4 inches, thick but anything close will be fine. Make sure the top and bottom of the blank are parallel. If not the sides of the box will be at different angles. It makes them look odd.

The formula to layout the polygon is:

$$L = \sin(180^\circ/N) \cdot 2 \cdot r \quad \text{or} \quad \sin(180^\circ/N) \cdot \text{diameter of layout circle}$$

L = length of the sides of the box

r = radius of the circle you will draw to start the layout

N = Number of sides your box will have

$(180^\circ/N)$ = the angle you need for calculations

To make it easy, refer to the chart on the last page

When I make these boxes I use metric measurements, they are more accurate and easier to work with. You do not have to be a whiz with the metric system, just count marks on a ruler.

A five-sided box is an easy size to do. Start with your compass set to 60 mm. This is about 2 3/8 inches. Draw your circle on the blank making sure to mark you center.

Then doing the calculation above $2 \times 60 \text{ mm} \times \sin(180^\circ/5)$

$$2 \times 60 \text{ mm} \times \sin(36^\circ)$$

$$2 \times 60 \text{ mm} \times .587785 = 70.5 \text{ mm}$$

So the length of the sides of this 5 sided box will be 70.5 mm. I set my compass to between 70mm and 71 mm. If you are close that should be good enough. If you are off by 1 mm that is just 1/25 of an inch.

After setting your compass to the calculated value, mark your starting point on your circle and place the point of the compass there. Then step around the circle with the compass marking each point the pencil end of the compass crosses the circle. When you go around the complete circle you should have five equally spaced points marked on your circle. Connect these points with a straight edge and you will have the sides of your box marked.

Carefully cut the sides on the bandsaw using a steady cut to make them as straight as possible. I sand the sides at this point using a disk sander set carefully for square between the table and the sanding disk. Carefully drill a centered hole marked by your compass point from drawing your circle, sized for your screw chuck.

Place the blank on the screw chuck and you're ready to turn. At this point, mark one corner of the box with a point centered between the top edge and the bottom edge of the box for a

reference. True up the bottom of the blank. With a parting tool, turn a 1-1/2-inch diameter recess about 1/4 inch deep in the box bottom. Then about 1/8 inch outside this recess turn another recess about 1/8 inch deep, this will leave the foot of your box. With a small bowl gouge, clean up the inside of the foot leaving a flat or slightly concave surface. Start shaping the bottom of the box. Try to turn a pleasing curve from the foot toward the centered point marked earlier. Stop about 1/4 inch before reaching the reference mark. When you are satisfied with the shape of your box bottom sand through the grits to your desired finish.

Remove the blank from the screw chuck and the screw from the chuck. Reverse the blank and expand the chuck jaws into the recess turned earlier. Now turn a recess 1-3/4 inches in diameter 1 inch or so deep to define the top opening of the box. Shape the top of the box trying to match the curve turned on the box bottom. Stop about 3/8 inch from the reference mark on the box corner used when turning the bottom. Hollow the box using whatever hollowing tools you have, I use a 1/2 inch round nose scraper or round carbide tool. Try for a smooth curve inside the box with no ridges or flats.

Sand the top and inside of the box using the same steps as the bottom.

To turn a top for the box use the same or a contrasting wood to accent the box color or grain. Place the blank between centers and turn a tenon to grasp with your chuck. Place the tenon in the chuck and start by turning a tenon to fit the opening in the top of the box. Sneak up on this as you want a good fit not too tight and not too loose. When pleased with fit sand the bottom of the box top. Reverse and grasp the tenon just turned in the chuck or place in a jam chuck to turn the top of the box top to a pleasing shape. Sand your box top and apply your favorite finish to the parts of the box.

Set back and admire your work you clever devil.

Easy Way to Determine the Length of the Sides of Your Box

Number of Sides for Your Box

Multiply the Diameter (2 x r) of the Layout Circle by

5	0.587785
6	0.500
7	0.433884
8	0.382683
9	0.342020

Example: A box with five sides and a circle radius of 50mm, gives a diameter of 100mm.

Multiply 100 x 0.587785 ≈ 58.8mm, I would use 59mm for the sides and call it close enough.

Example: A box with seven sides and a circle radius of 60mm, gives a diameter of 120 mm.

Multiply 120 x 0.433884 ≈ 52.06mm again 52mm for the sides is close enough.