# Making “Transit” (2018)



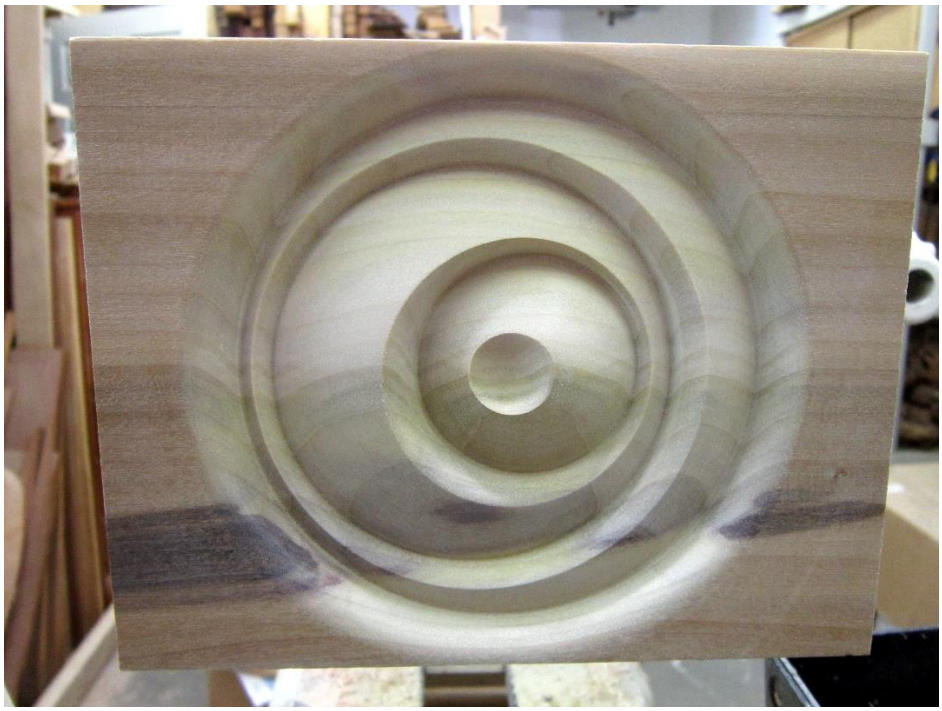
## DISCLAIMER

**Woodworking is an inherently dangerous activity. Any non-woodworking techniques described here probably aren't all that safe, either. Sharp tools, powerful motors, big lumps of wood, chemicals, fumes, etc. can cause you serious bodily injury or even death. This document is NOT intended as a substitute for instruction by a qualified teacher, just a description of the process I follow when planning and executing a multi-axis woodturning project. I take no responsibility for any mishaps you may experience during a fit of inspiration. You've been warned.**

AUTHOR’S NOTE: Multi-axis woodturning can involve turning as much air as wood. The blank being turned may be significantly out of balance, meaning that a slow spindle speed is necessary to keep the lathe from walking around the workshop. It’s not for the faint of heart, but it’s also something that can be built up to gradually. It doesn’t take a huge amount of offset to make a dramatic change in the way two surfaces interact. Use sound wood and small offsets to start, follow normal woodturning safety procedures and use good tool technique. If you don’t know what those are, seek out a qualified teacher and take some lessons first.

## Introduction

This document outlines the process I followed, more or less, to turn “Transit” (2018, w.i.p.).



*“Transit” (2018, work in progress) by Johnna Y. Klukas. Poplar, approx. 7” L x 5.5” W x 1.5” D.*

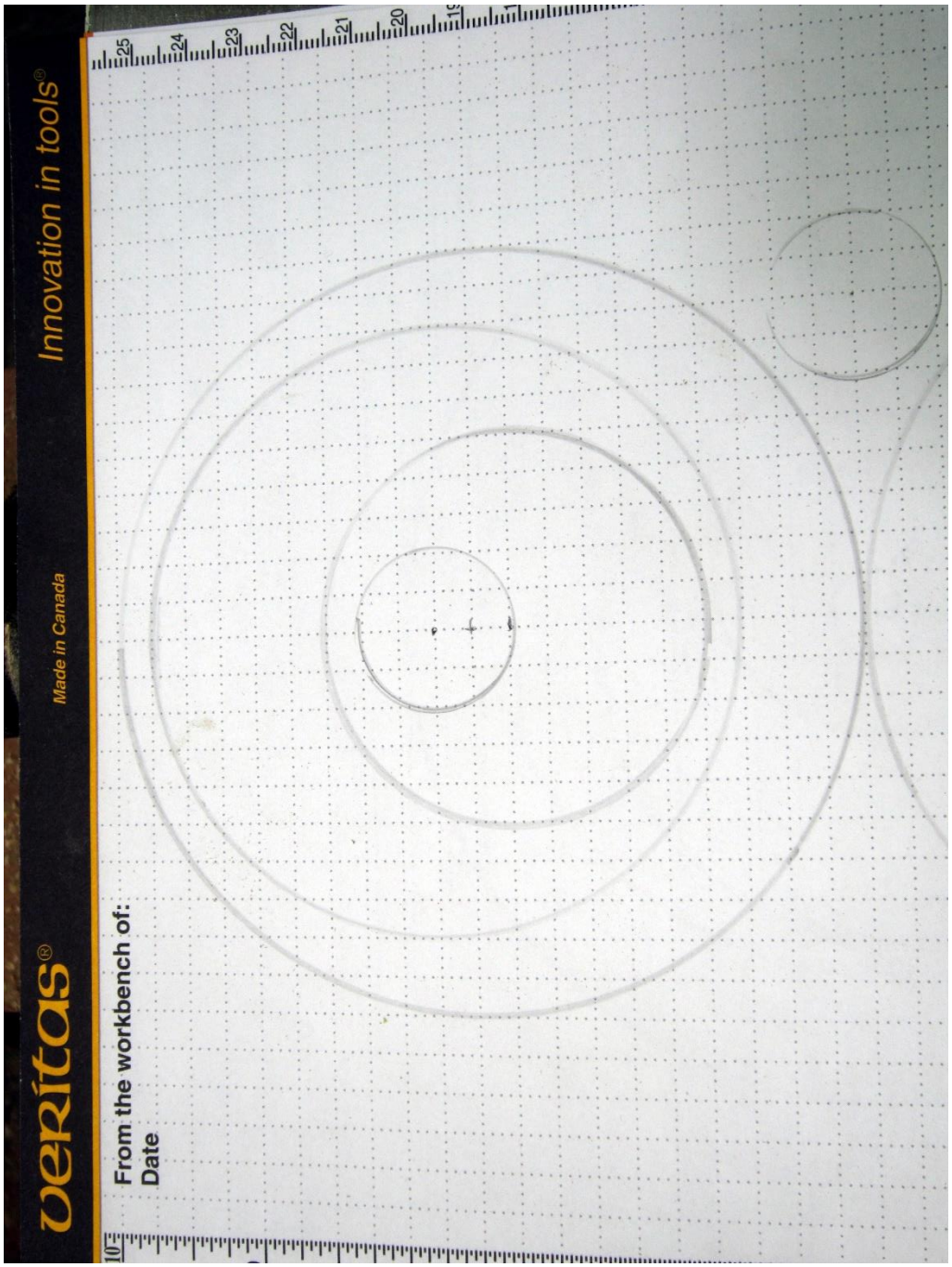
“Transit” is a series of simple shallow domes turned on only three centers, none of which are more than ¼” away from the true center of the blank. My goal in this demo is to illustrate how even small offsets can generate a significant change in the way surfaces turned on those offsets interact. What you do with these ideas beyond this demo is limited only by your imagination.

Turning tools I used:

- Bowl gouge – I used a Packard ½” “Celtic grind” (sometimes called an “Irish” grind or swept-back grind) bowl gouge to cut the bulk of the dome shapes. Any bowl gouge will do, the only real difference is how much of the dome you’ll be able to cut before the gouge’s wings interfere with the sides of the cut.
- Spindle gouge – I used a Sorby ½” spindle gouge that originally had a fingernail grind, but I’ve ground it down to act like a detail gouge with a narrow tip and long bevel. You can use whatever tool you have that will get down into a tight space to clean up the curve in places the bowl gouge can’t get to.
- Diamond-shaped “point” tool. I used a Carter “Axe” carbide point tool. Again, use whatever you have that will give you the cut you want. I use this to cut the initial circle that I’ll later turn into a dome.

There’s no magic to these particular tools, use whatever you have that will get you the cut you want to make. If need be, alter the design and/or the shape of the cuts to accommodate the tools you have.

I will not be showing tools on the wood in this document – I couldn’t take pictures and turn at the same time. Hopefully the series of pictures I present below will be sufficient to illustrate the cuts I’ve made at each step.




*Picture 01a – Initial design sketch. Note the three small dots in the center; these are the three centers used in the project. (1/4" square graph paper)*

## Demonstration

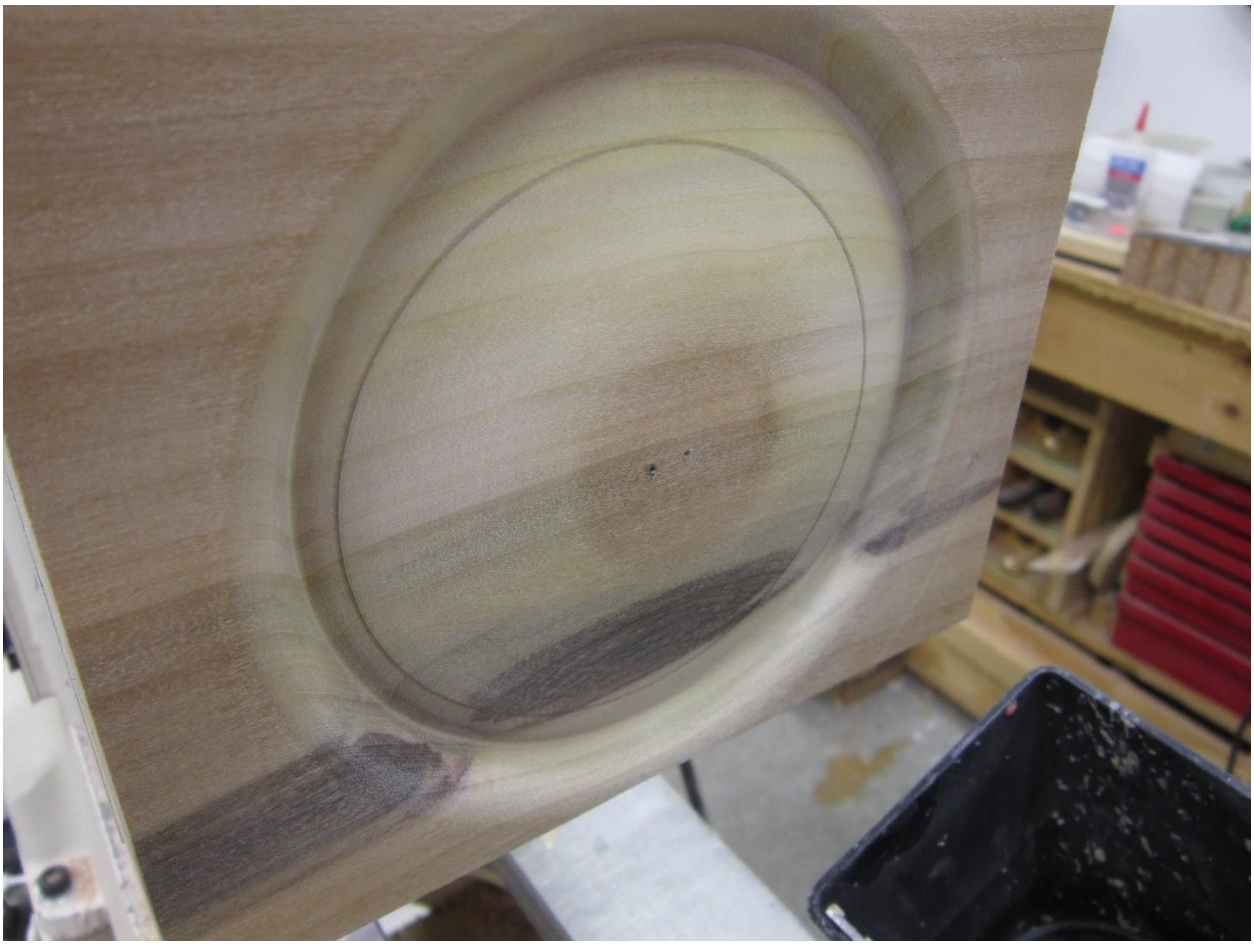
For this project, I started with a sketch of what I had in mind. I like using graph paper so I can work with accurate placement and measurements easily at this stage. Things likely will change once I start turning, but a sketch gives me an idea of the space I have to work with for a turning blank of a given size.

*Picture 01b – The blank, a nice piece of poplar.*

I started with a block of poplar, roughly 7” long x 5.5” wide x 1.5” deep. The block is mounted on a jig that will allow me to turn on center and ¼” to either side of center. In the above picture, the jig is set up to turn on-center. I’ve used the tail center to make a little dimple in the center and used that to seat my compass so I can draw a 5” dia. circle.

Before turning, make sure the tool rest is locked firmly in position, at the proper height for the tool you’re going to use next (in this case, I started with the diamond point tool). Turn the piece by hand with the power OFF to make sure the blank clears the tool rest and the lathe bed. Stop the lathe and follow these steps every time you change tools.

Also stop the lathe frequently to check your progress, and to check that your mountings, jig, tool rest, etc. are all still tight and sound. Keep an eye on where the mounting screws are in relation to the cuts you’re making. I use brass screws, which will cut without much effort if I hit them accidentally, but it’s better not to hit them at all.



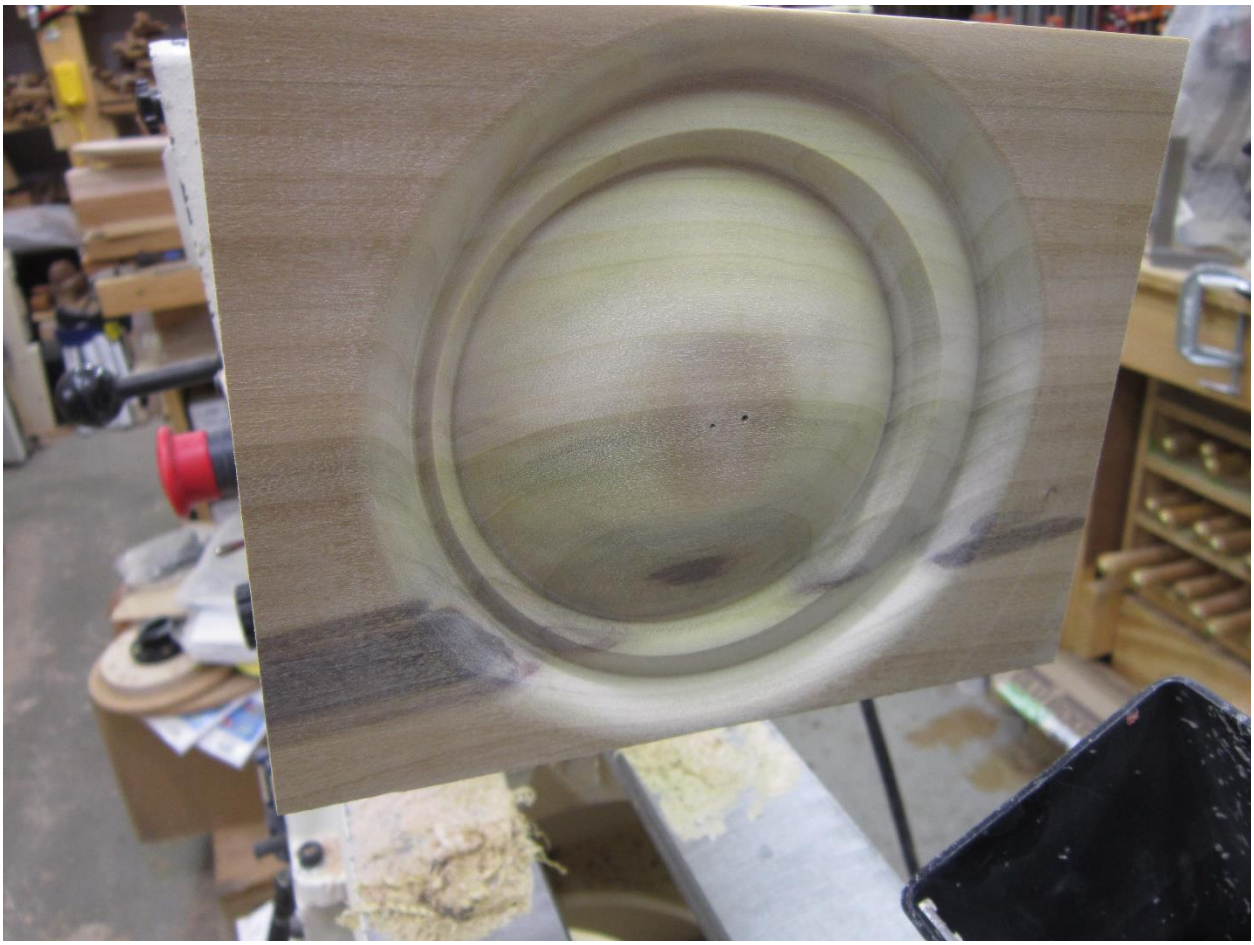
*Picture 02 – The central dome has been cut.*

I used my diamond-shaped point tool (Carter Axe diamond carbide cutter) to cut the initial groove right on the 5” circle I drew in the previous step. As I deepened the groove I also widened it as well to give the diamond-point room to cut without binding. I also used diamond-point tool like a scraper to round off the walls of the groove a bit, especially on the center side where I’ll eventually cut a shallow dome. The groove ends up being about 3/8” deep.

After cutting the groove, I used my bowl gouge to make a shallow dome from roughly the center out to the groove. Be *very* careful with the wings of your bowl gouge, it’s easy to catch the wing on the wall of the deep groove cut if you’re not paying attention. If necessary, use a spindle gouge or other “detail”-type tool to go in and take care of where the dome meets the groove.

After the dome was cut and sanded, I shifted to one of the ¼” offsets, made a small mark with the tail center and used the compass to draw a circle for the next cut. This circle is about 3/8” from the edge of the first circle at its closest. You can already see how part of this smaller circle rides up on the high section of the central dome, while the other part lies in lower down.

**(ADD A PICTURE SHOWING THE SECOND GROOVE PARTIALLY CUT TO SHOW THE EFFECT OF THE OFFSET)**



*Picture 3 – ¼" offset from center (left-hand mark in picture): the second shallow dome has been cut.*

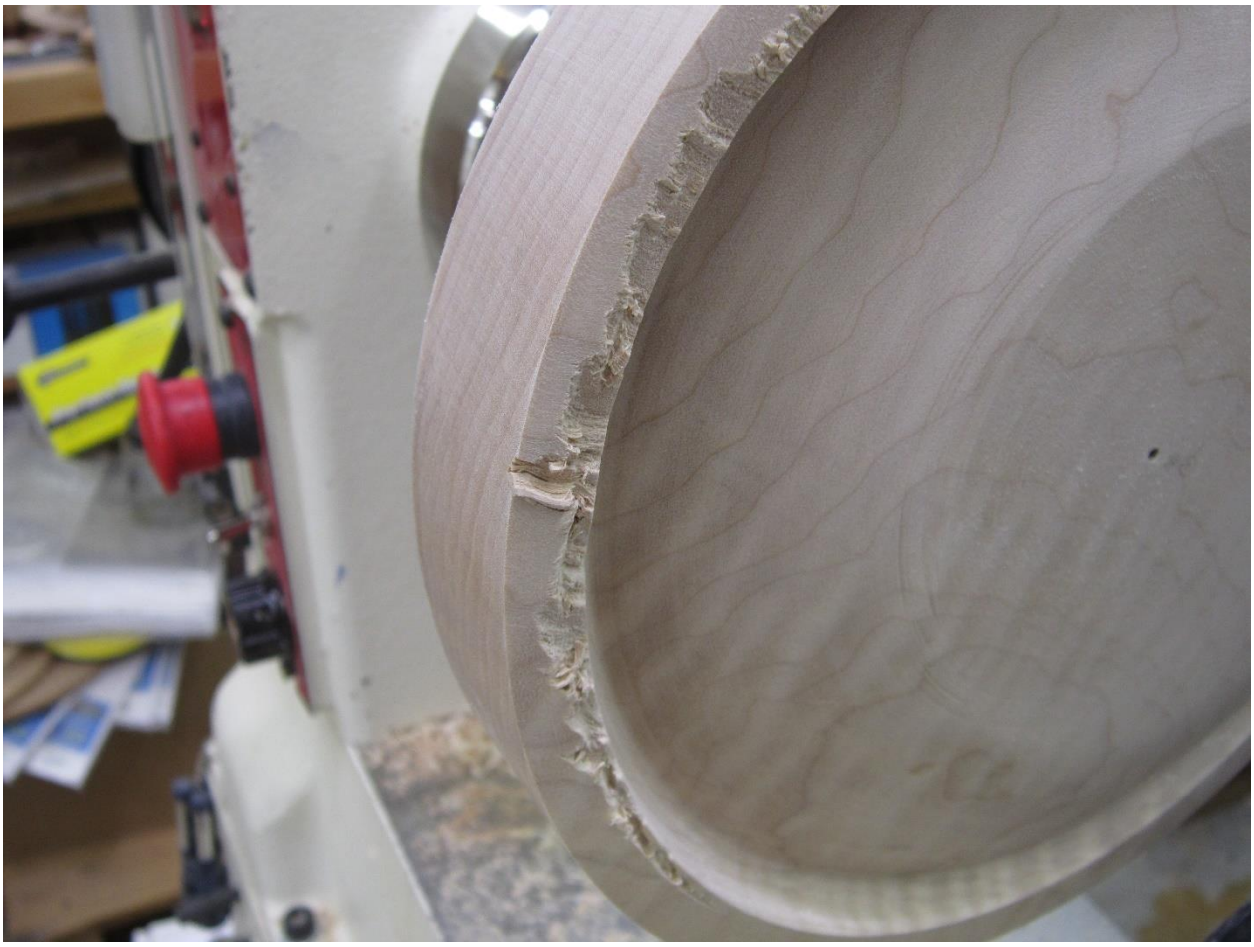
Again, I used the diamond point tool to cut a groove on the circle I drew in the previous picture. Given the change in elevation between one side of the circle and the other, I was careful to anchor the tool on my tool rest and gently bring it into contact with the wood. There should be little to no forward pressure on the tool when making this cut, let the tool cut and clear its own path. Also, it's even more important to widen the groove so the tool has room to cut.

When cutting air and wood intermittently like this, it's important to watch the "ghost" image so you have a sense of where the cutting edge is in relation to where the solid wood is. Eventually, the groove will form a circular cut, but at first, you'll be making an arc on the high side of the first dome and not even touching the low side.

With the bowl gouge you'll also be cutting air and wood at first. And, also, it's important not to jam the cutting edge into the wood, the bevel should put little to no pressure on the wood, but instead "follow" the shape you want to cut. Watch the "ghost" image and try to align the bevel *as though* you were going to let the bevel contact the wood and make your cut. Unfortunately, this isn't a great description, but it is easier to do than to describe.

I used the bowl gouge to shape the bulk of the dome in this new smaller circle but finished with the spindle gouge to get the dome shape cut all the way into the bottom of the groove.

One more thing to consider: when pulling the tool out of a cut, pull it straight back until you're *sure* you're clear of the wood, or you will get a godawful catch. (See picture below.)



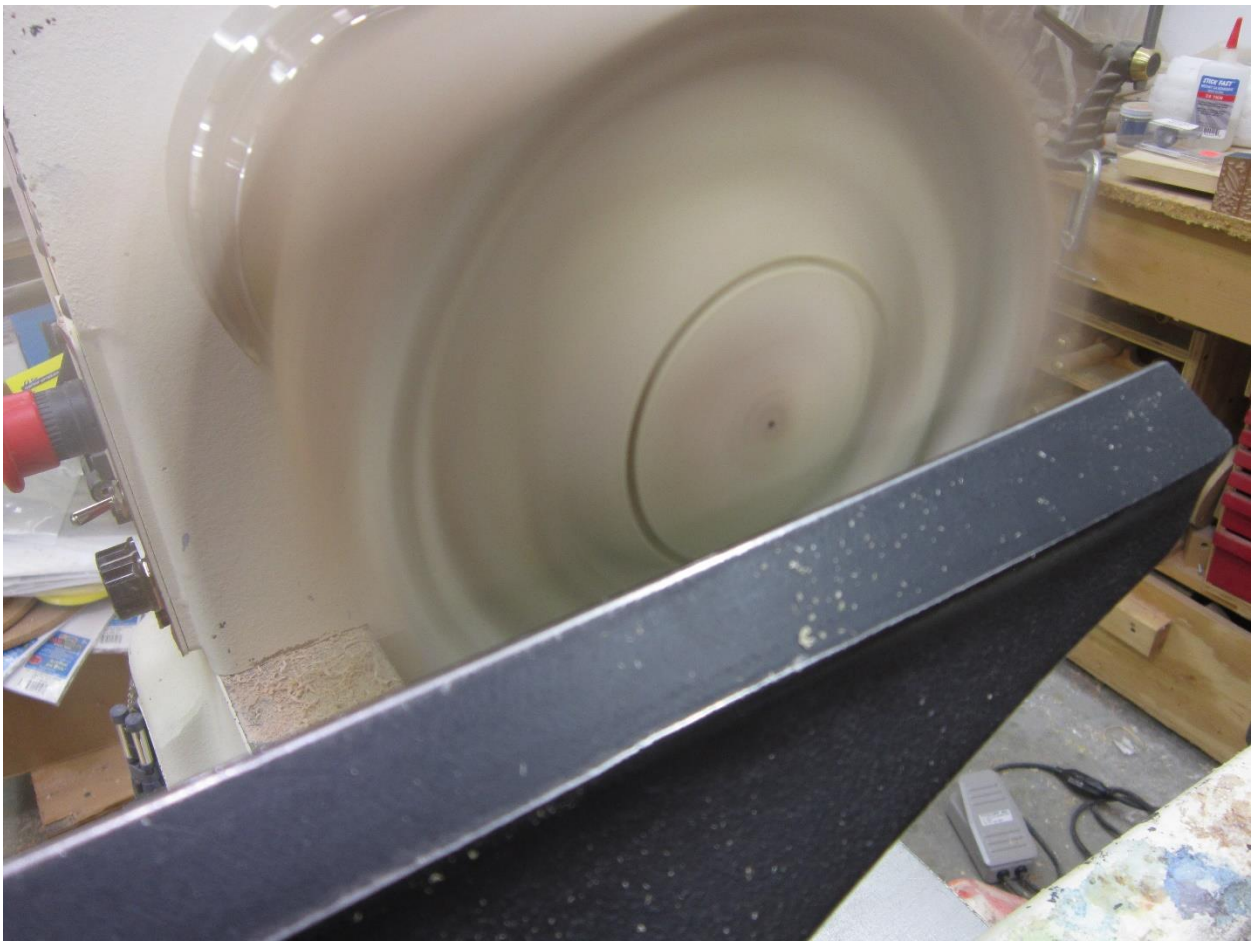
*Picture 03a – Ooops. This is an example of what happens when you <u>think</u> you've pulled the tool clear but you actually haven't.*

This is another multi-axis turning I was working on. In this case the workpiece was held at an angle as well as off-center. I was cleaning up the bottom of the dome with my spindle gouge, pulled it out of the cut and moved it, thinking I was clear of the spinning workpiece. Fortunately, the result this time was only a ragged edge and some swearing.

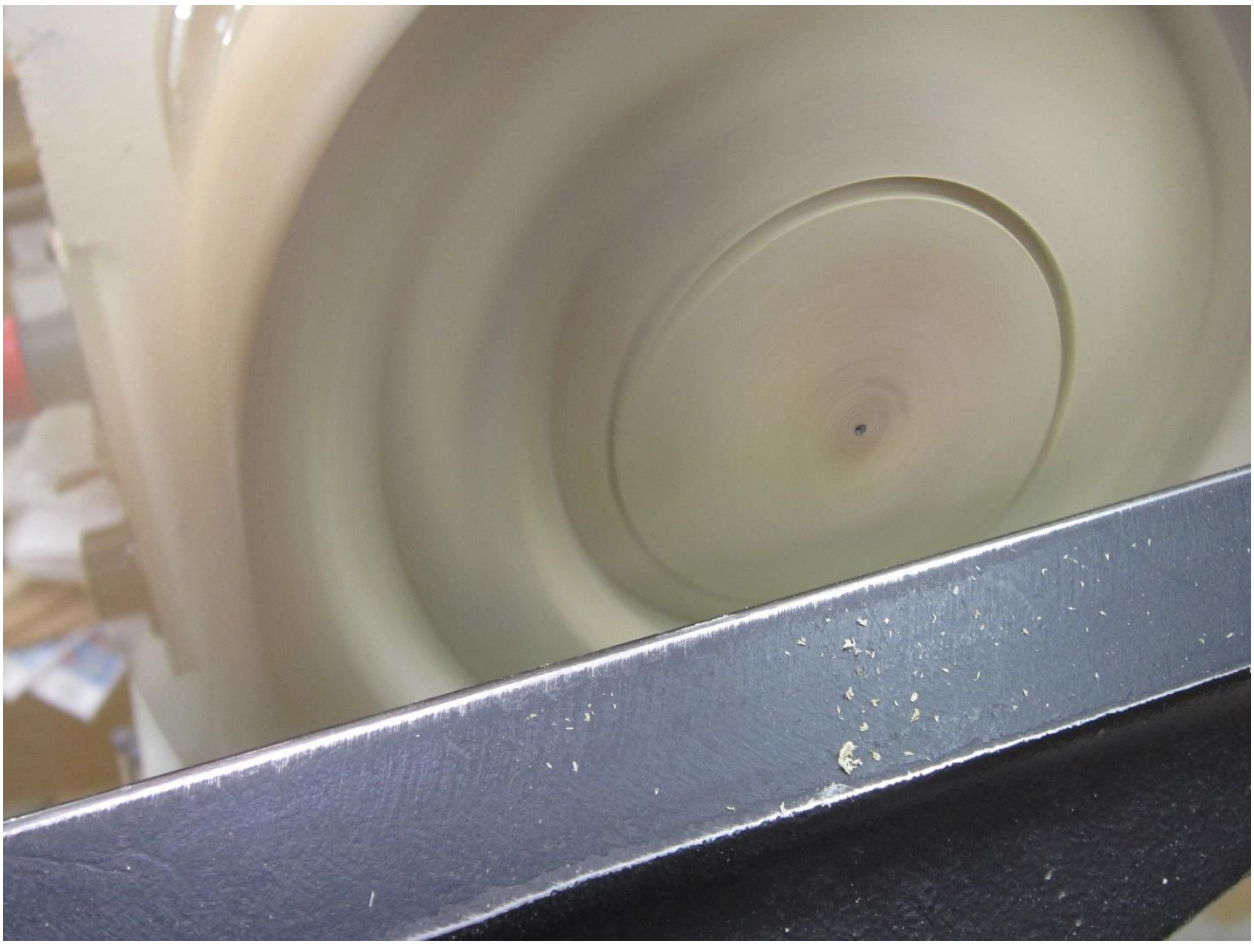
*Picture 04 – Setting up the third dome, ¼" off-center in the other direction.*

I've shifted the workpiece to the third center, ¼" off center in the opposite direction to the second dome. Again, I used the tail center to make a mark and again used the compass on that mark to draw my third circle, about 3/8" inside the second circle at its closest approach.

You can see there's now quite a lot of elevation change as you travel around the innermost circle. Also, the tighter diameter of the circle means there will be less room for my bowl gouge to cut the third dome, so I'll need to do more cutting with the spindle gouge than on the previous circles to get a full dome.



*Picture 05 – Ghost image of the partially cut groove for the third dome.*



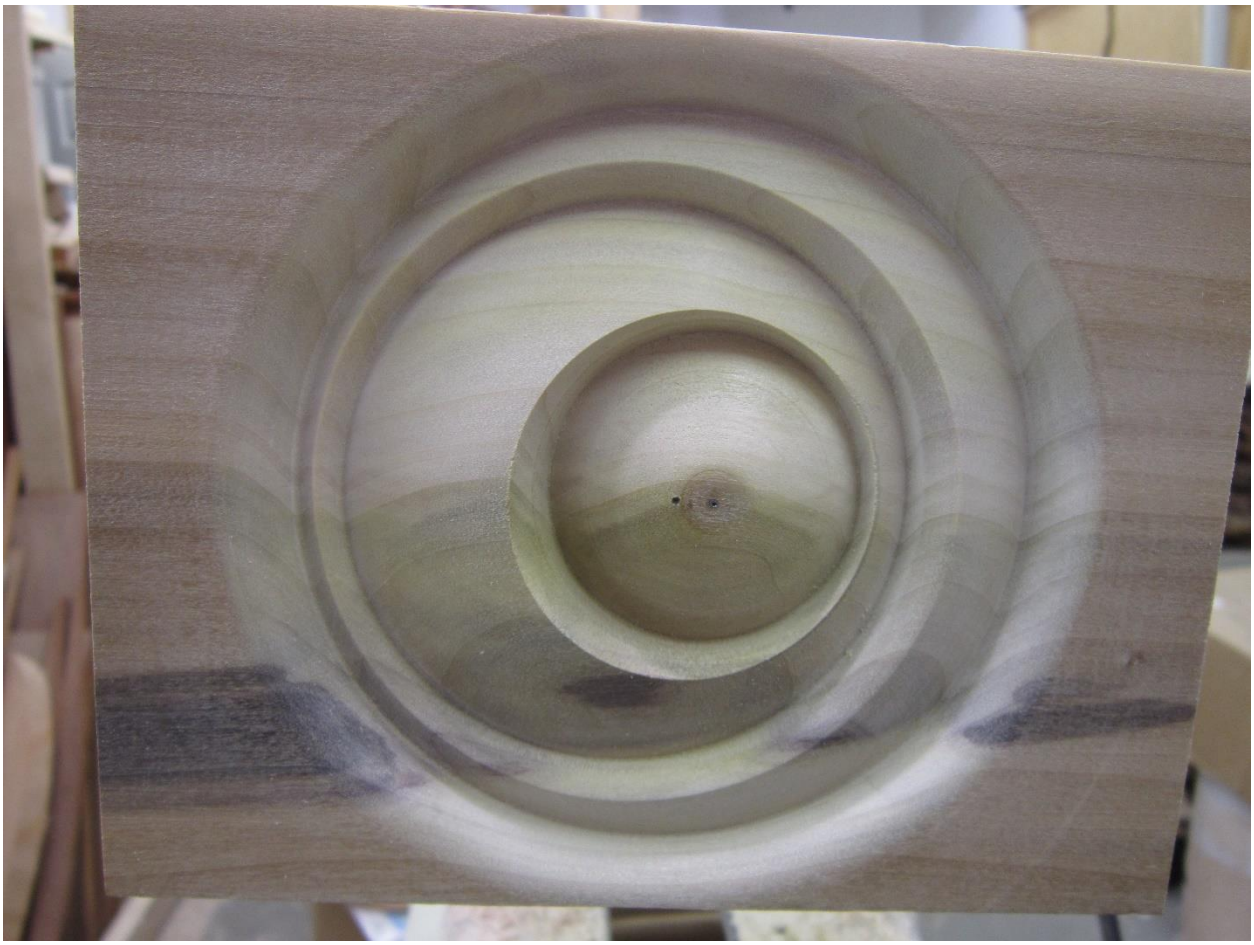
*Picture 06 – Ghost image of the partially cut third groove, from a slightly different camera angle.*

This image and the previous one show the ghost image, more or less. You can see both the cut section of the groove and the pencil mark where the cutter hasn't even come close to the surface of the wood. Still pictures, and even video, aren't great for showing this phenomenon, but it should give you an idea of what I mean by "ghost image".

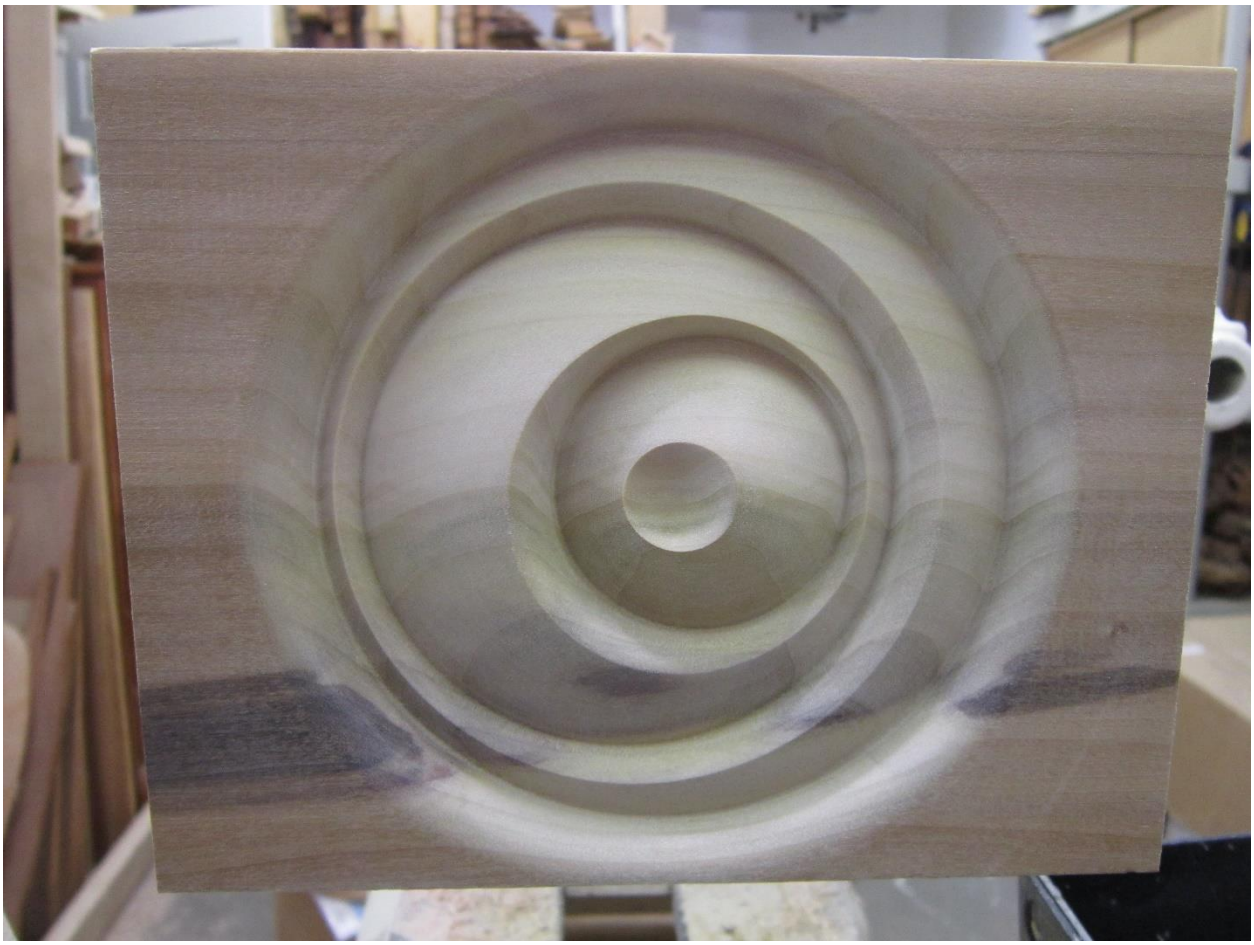
*Picture 07 – The third dome.*

You can see from this picture how much change there is in the surfaces from a relatively small offset – ¼" is not much at all, right?

Note that I've turned away one of the center marks, in this case the one ¼" to the other side of the true center. At this point in the turning, I don't need that reference point anymore. If I did still need it for some reason, I would have been more careful, stopping the lathe to deepen the center mark enough to preserve it.

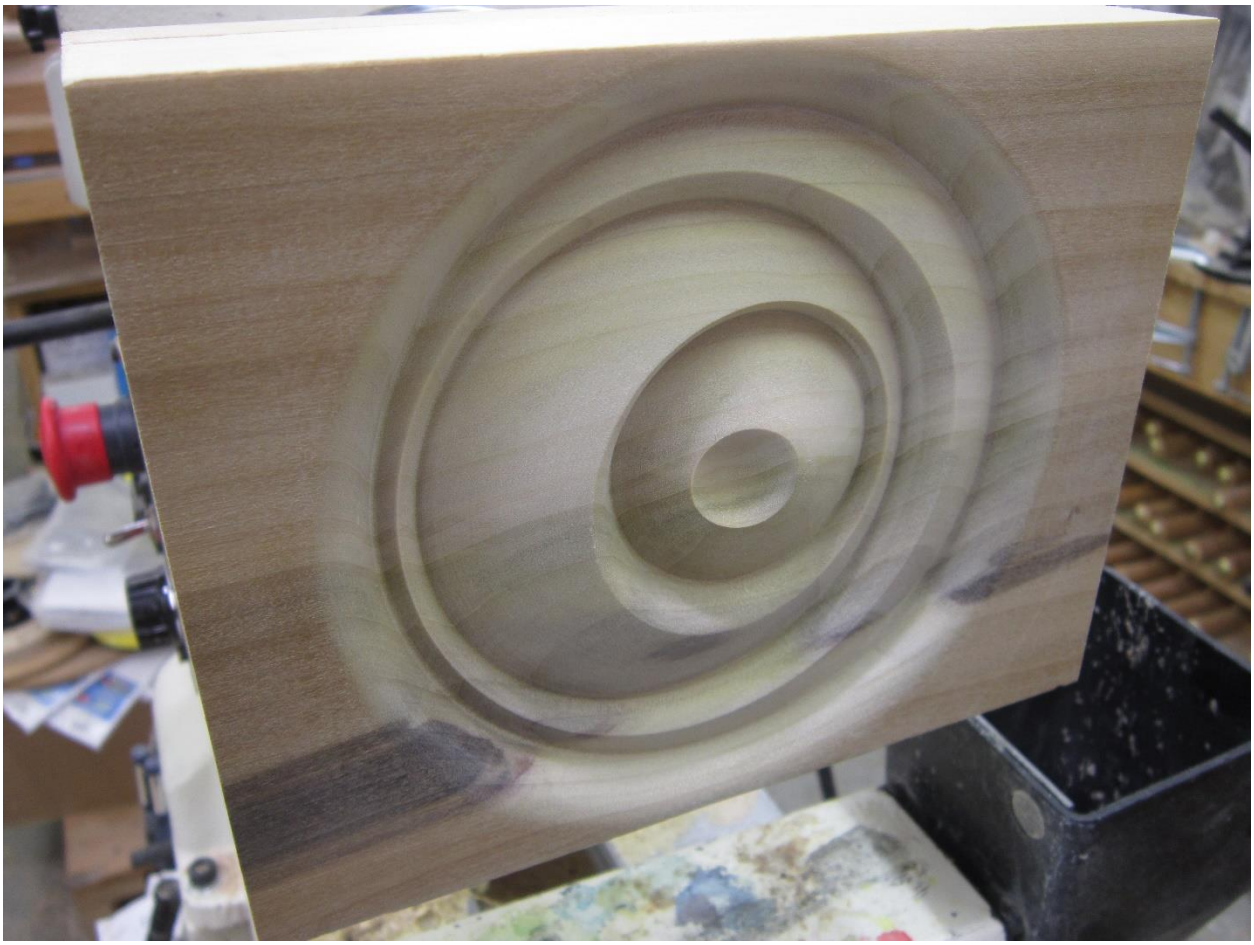


*Picture 08 – The third dome from a different angle.*

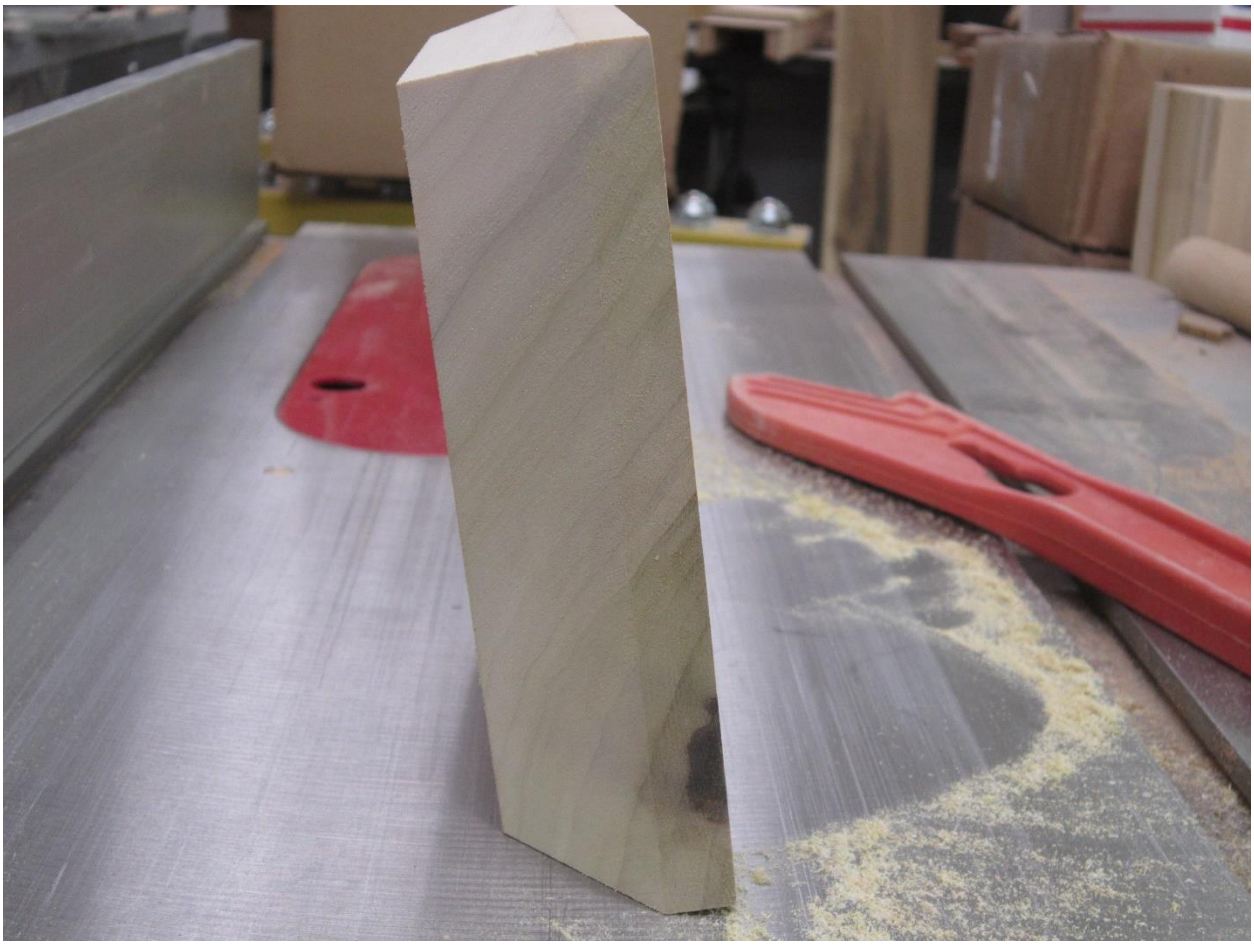


*Picture 09 – Back on center, the last circle is a small bowl.*

This last circle is turned with the blank back on its true center. I could have turned another very small dome here, or drilled a hole to inset a small cabochon, or even hollowed part of the central dome, but instead I opted for a small bowl to change things up. Given all the convex surfaces, this concavity catches the light and shadow differently and will bring the viewer's eye back to the center of the piece.



*Picture 10 – Alternate camera angle.*

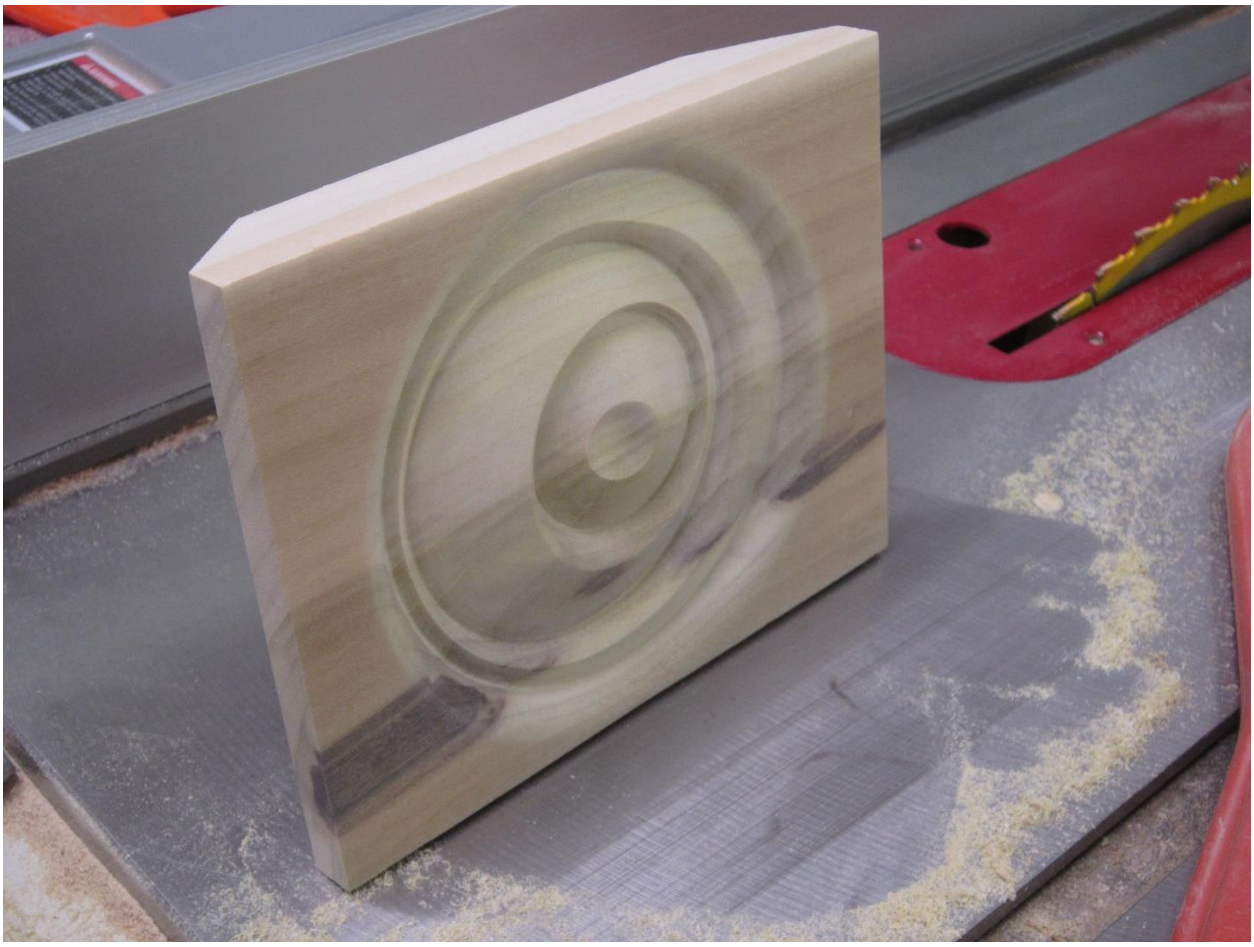


*Picture 11 – Getting rid of the mounting points while preparing the piece to stand on its own.*

Initially, I placed the mount points – the four screw holes – about ½" in from the corners of my turning blank, thinking I would simply cut off the ends and have a square sculpture as a result. As it happened, I liked the look of the rectangular block, so I had to come up with another way to deal with the screw holes. I could have plugged them and covered the plugs with small felt feet, then used a wall hanger to allow the piece to be wall mounted. Or I could have used a large flat plate attached to my faceplate, reversed the workpiece and brought the tailcenter to provide enough pressure to turn something decorative on the back of the block. Instead, I opted to use my table saw to remove the screw holes by cutting a steep angle on the ends of the block. Then I changed the angle of the blade to cut a shallower angle on the long sides, allowing the finished piece to stand on its own at a slight angle, and in the horizontal orientation I want it to have. If I wanted to ensure that the viewer had to orient the piece a certain way, I could go back and cut a steeper angle on one of the long edges, so the piece would not stand upright.

How you deal with the mounting points depends a great deal on where they are and how you mounted the piece. If you're working to a plan, deciding where the mounting will be should be part of it. If you're turning without a plan, it's still important to consider where you'll place your mount points. In either case, placing the mountings in extra wood that will be cut off later is one way to go, as is incorporating a

way to hold the work so you can remove the mountings later. If all else fails, there's always the option of removing the mount points by hand off the lathe, covering them up with the base or an applied component, etc.



*Picture 12 – Another angle.*

The piece in the picture still needs final sanding on the flat surfaces and angled edges, and to have finish applied. I intend to use an oil finish (Waterlox or Liberon) and go with a matte or satin sheen.

Think about how your choice of finish will affect the color and surface appearance of the turning, not to mention if it will look different on end, edge and face grain. If you're not sure you'll like the look with a particular finish, make a test board from the same species of wood, sanded to the same degree as your turning, and try out the finishes you're considering. I usually think about what finish I'm going to use during the design phase rather than waiting until after the piece is turned. Again, I may change my mind, but I've at least got a starting point to use as a reference to mentally compare any changes to.

## Conclusion

I hope this little project has shown that multi-axis turning techniques need not require huge offsets, or even a large number of offsets, to get interesting surface relationships. Bringing grain patterns, wood

figure, more complicated shapes, different centers, texture, color, etc. into the mix opens up a lot of woodturning terrain for exploration.