Making the Basic “Transit” Jig

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 construction of a jig that could be used to turn the piece “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.

This design allows for turning a piece on three centers: the true center, and ¼" offset to either side of the center (horizontally or vertically, depending on the orientation of the workpiece with relation to the jig). This is a simple jig that can be extended to allow as many offsets at whatever distance your lathe will support safely.

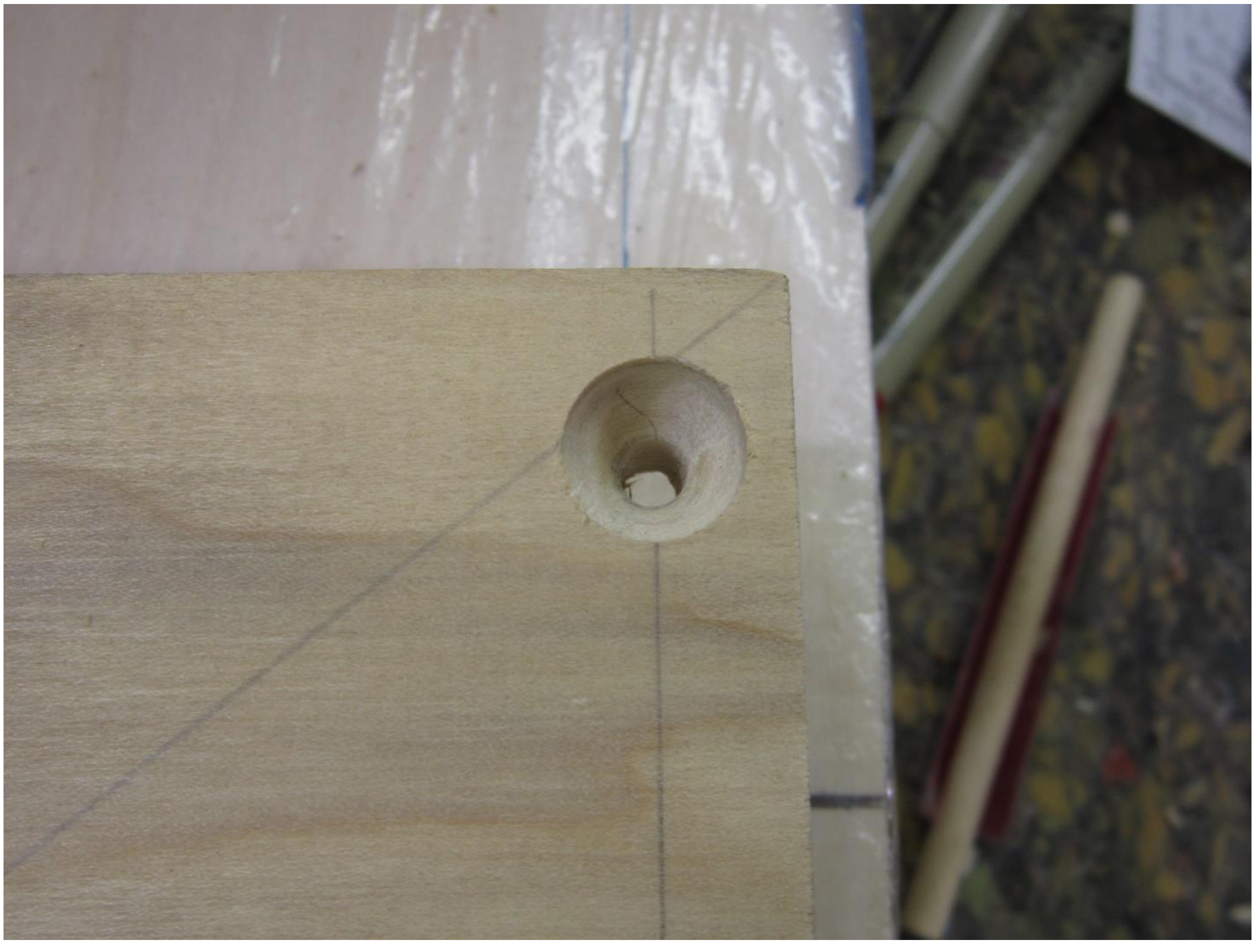
The jig itself is made from two boards. One board, what I call the **faceplate board**, acts as a surface extension for your faceplate. The other board, what I call the **workpiece mounting board**, supports your workpiece during turning.

By using a two separate boards, you can control where in the workpiece the screwholes will be, placing them wherever it works for your design. (I've chosen the corners in this case.) When you want to turn on a different center, you change the position of the workpiece mounting board relative to the faceplate board instead of having to drill an additional set of holes in your workpiece.

Note that once the faceplate board is set up, you can have as many workpiece mounting boards as you want, in whatever sizes you need. Simply transfer the relevant markings to the new workpiece board and drill new screw holes in the workpiece board so it can be mounted on the faceplate board. This method can also be extended to more and different center offsets than the ones I describe here. The sky – and the swing of your lathe – is the limit.

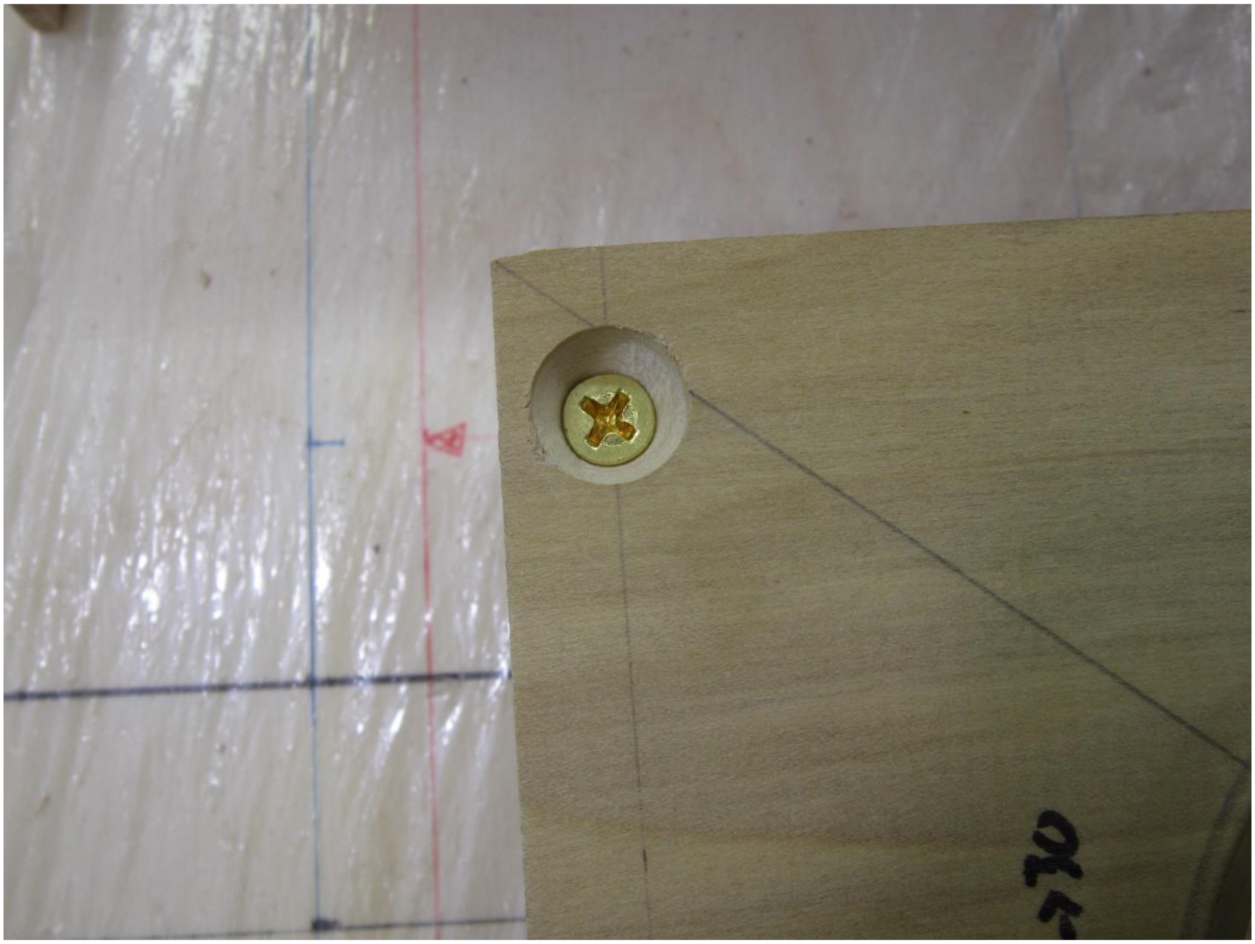
Picture 01 – Tools used. From top to bottom: square, large drill bit (approx ¼"dia.), small drill bit (approx. 1/8" dia.), 60 degree countersink bit.

The size of the drill bits used will depend on the size of the mounting screws you want to use. I used #8 brass screws, so my large drill bit was 7/32" dia. and my small drill bit was 1/8" dia.



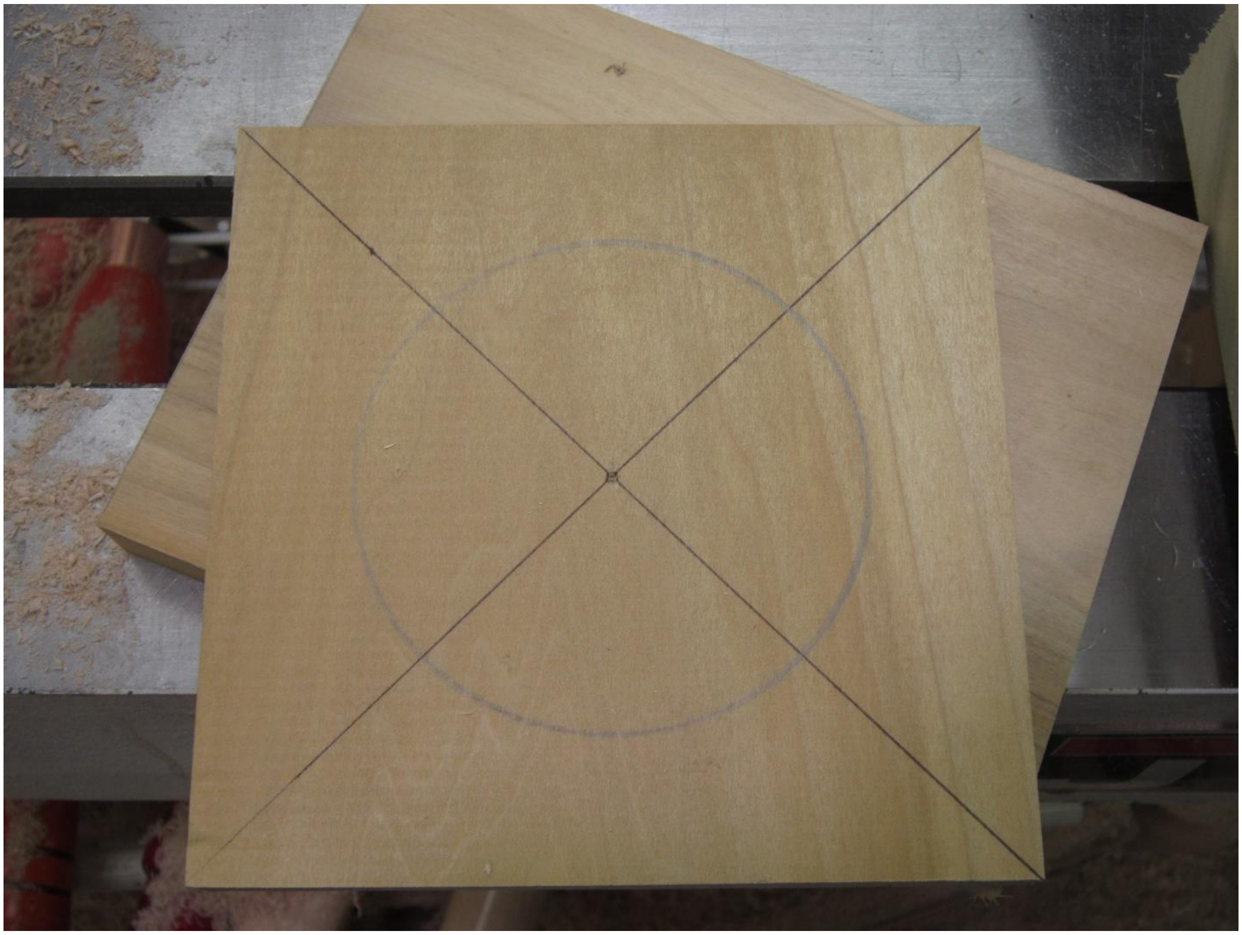
Picture 01a – countersunk screw hole (detail). Note the tapered hole to support the head of a typical wood screw.

Countersinking the holes is very important if you're using wood screws. The tapered sides of the screw hole support tapered screw heads, distributing the force across the whole screw head instead of focusing it on the narrow area between the head and body of the screw. If, for some reason, you want to avoid countersinking the holes, use flat-backed screws, such as sheet metal screws.



Picture 01b – Brass wood screw seated in and supported securely by the countersunk screw hole.

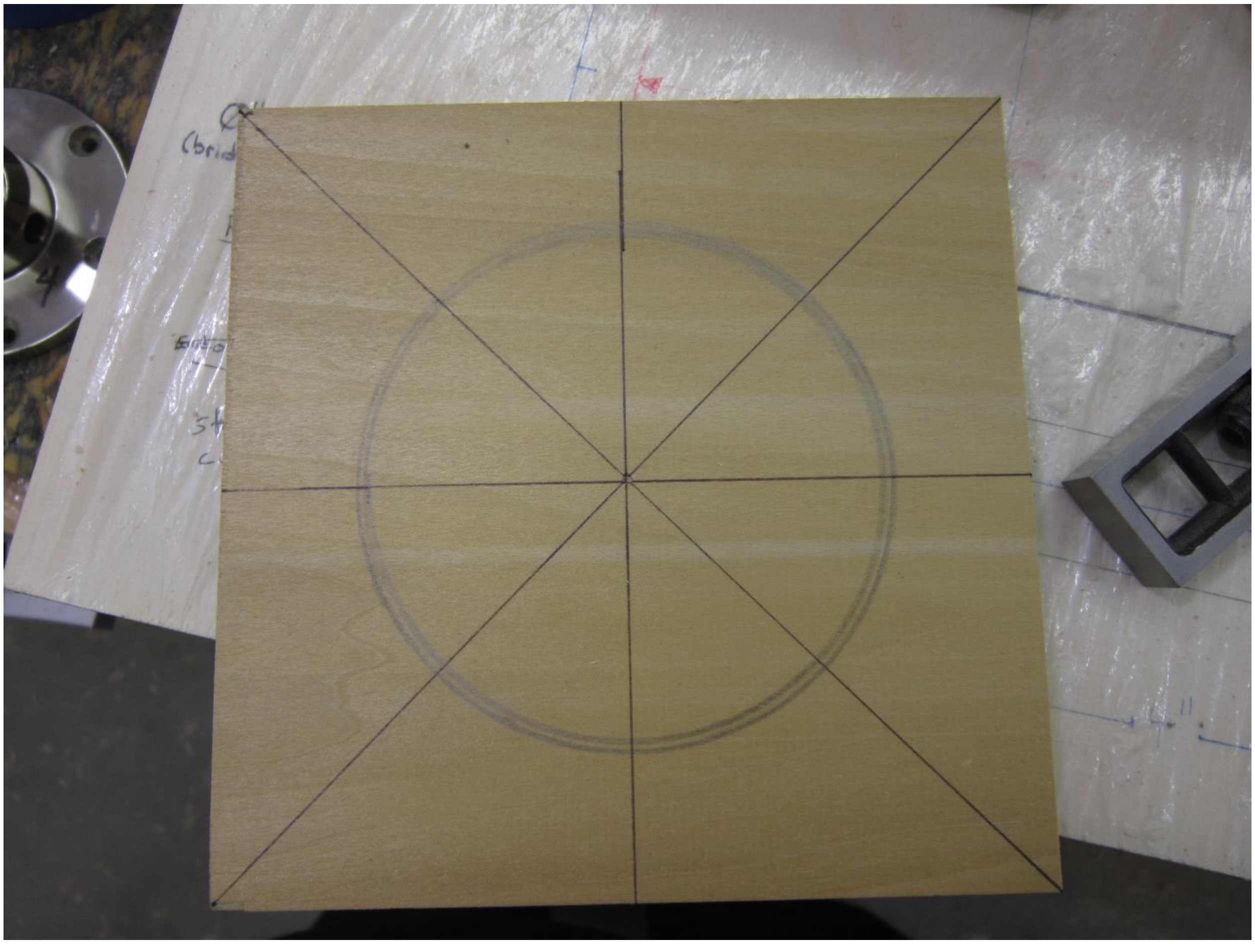
Note that this advice applies to your lathe faceplates as well – if the holes in the faceplate are countersunk, use tapered head screws like wood screws. If the faceplate dos not have countersunk holes, use flat-backed screws like sheet metal screws.



Picture 02 – faceplate board (top), workpiece mounting board (bottom)

The faceplate board is approximately 5.5" square. It's cut from a poplar 1x6 board I got at the local big-box home store. The workpiece mounting board is cut from the same poplar 1x6 and, in this case, is approximately 7" L x 5.5" W to match the blank I have for "Transit".

I've marked the center of the faceplate board with a center punch (you can use the point of the countersink bit to press in a mark, too), then used that as the reference point for my compass. I've drawn a circle that's slightly larger than my faceplate so I can use it to align my faceplate on the center of the board.

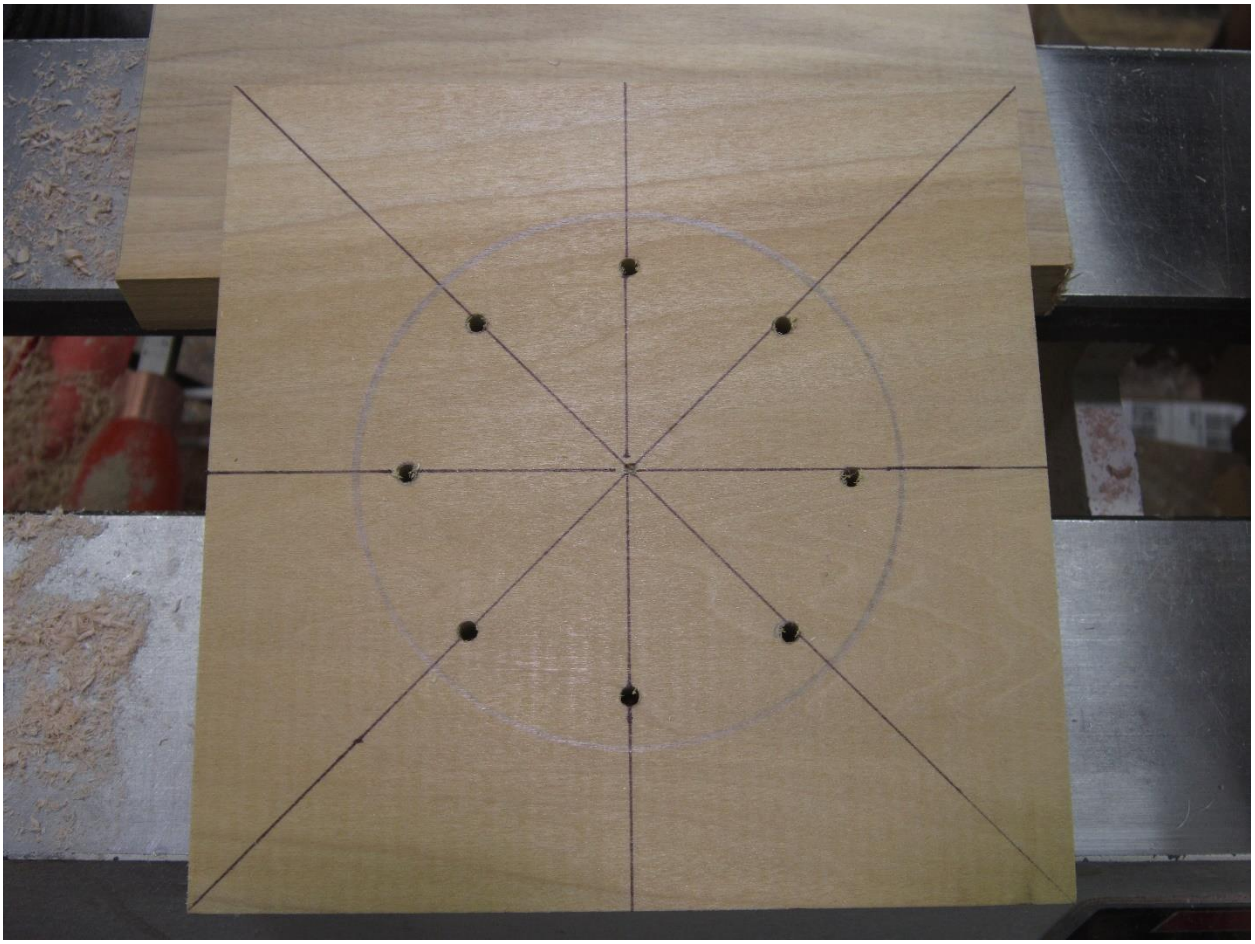


Picture 02a – Adding more reference marks through the center after marking.

Picture 03 – faceplate on the faceplate board, aligned in the circle so I can mark where the screw holes need to be. You can just see the faceplate board's reference lines through the screw holes in the faceplate. Because of the geometry of my faceplate board, if these lines pass through the center of the faceplate holes, my faceplate is centered on the faceplate board.

I'm aligning the faceplate by eye here, but you can use whatever method you want if you require more accuracy. I'll use a mechanical pencil to draw in the hole locations, then use my center punch to put a dimple in the center of the pencil marks.

Note that in this case, because my faceplate board is square and my faceplate has eight evenly spaced holes, I can center the faceplate fairly accurately by eye by lining up the reference lines on the board so they pass through the center of the holes in the faceplate.

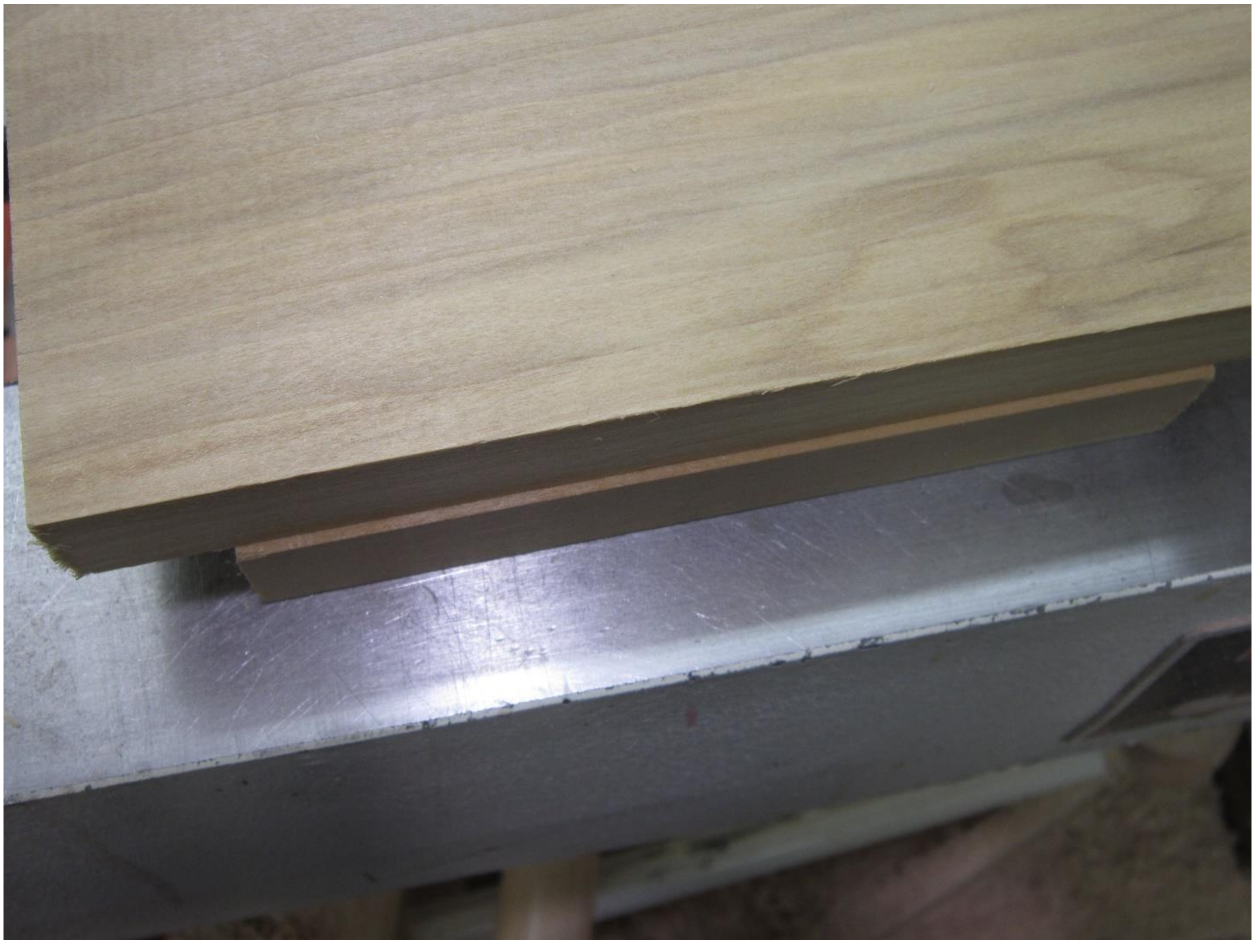


Picture 04 – 1/8" holes drilled with the small drill bit.

I'm using 1" long #8 brass wood screws, so my small drill bit is 1/8" dia. In my case, I needed the holes to be 5/8" deep. How deep yours need to be will depend on the length of the screws you're using and the thickness of our faceplate. (Note that for #10 wood screws I use a 9/64" drill bit, etc.)

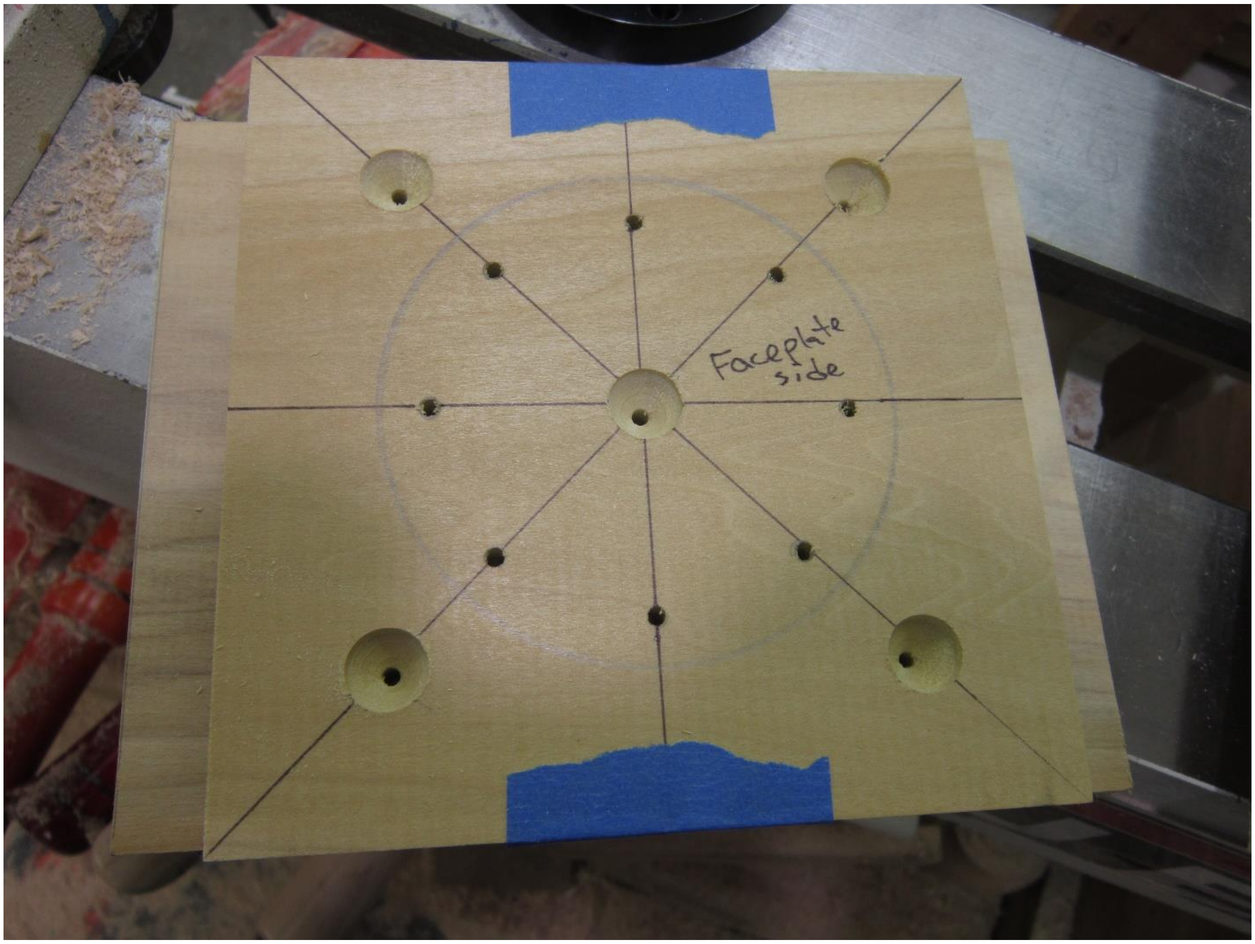
Picture 05 – Marking the width of the faceplate board in the center of the back of the workpiece mounting board.

To start with, I want the faceplate mounting board to be centered on the back of the workpiece mounting board. This will be the “on center” or “true center” position. The lines act as a reference for aligning the two boards.



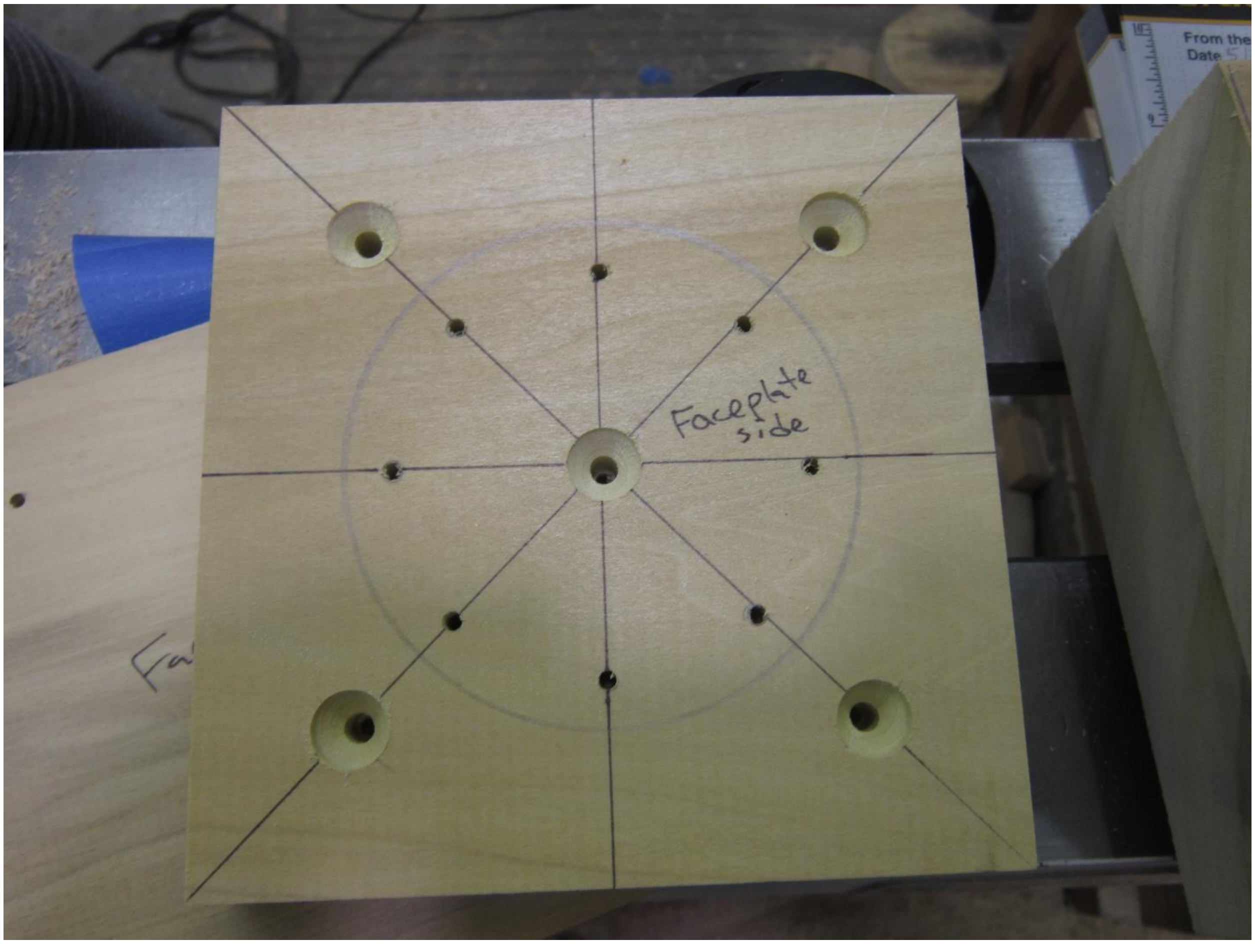
Picture 06 – Hmmm. The boards are NOT the same width…. Grumble.

I noticed that my two boards, despite having been cut from the same 1x6 poplar board, are not *quite* the same width. If this happens to you, or you choose to have the faceplate board and workpiece mounting board not be the same width, just make sure the faceplate board is in the center of the workpiece mounting board before doing any drilling. It's not absolutely essential, but it could make life a little easier down the road.



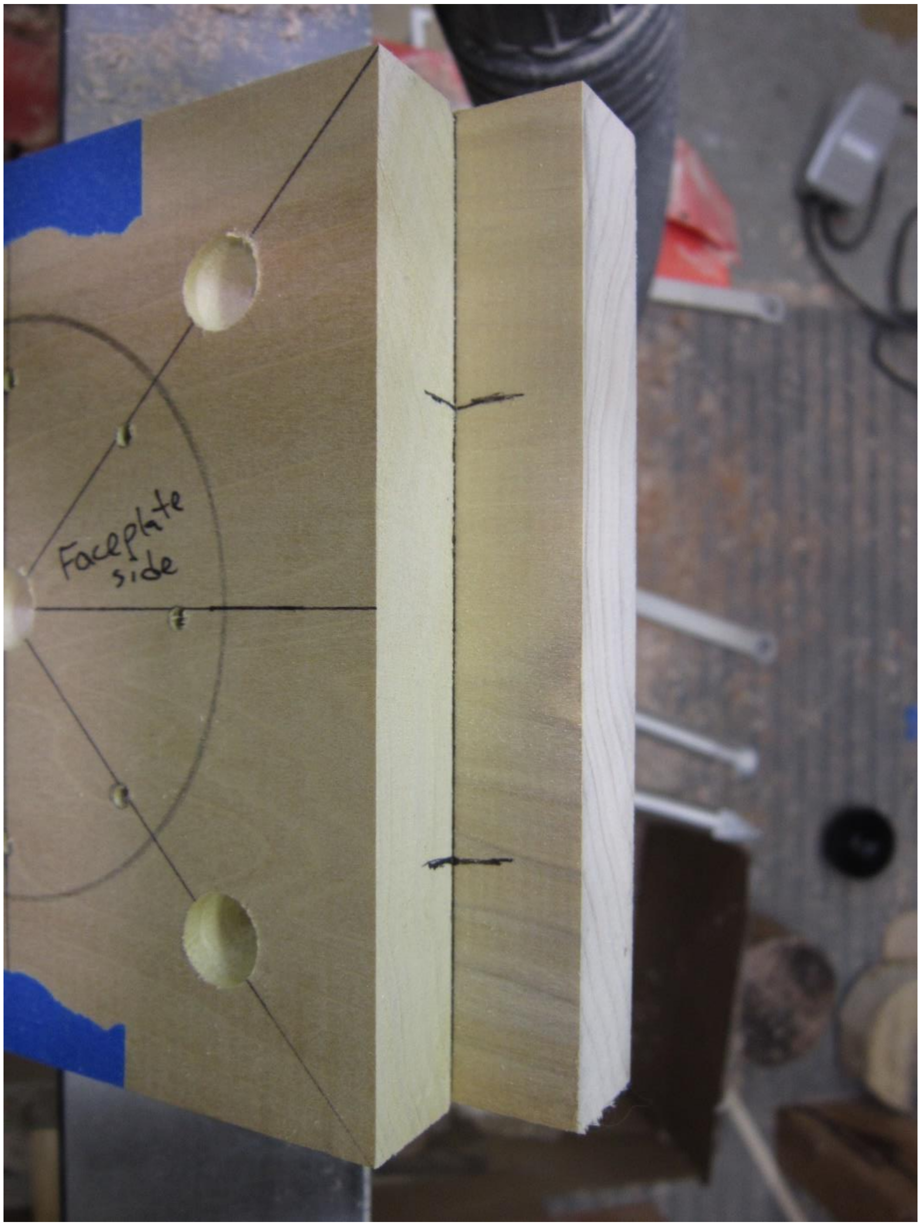
Picture 07 – The faceplate board and workpiece mounting board taped together so they don’t move, then drilled to give the “on center” alignment.

With the faceplate board centered on the workpiece mounting board, it’s time to tape them together so they don’t shift, then drill the “on center” mounting holes. When the workpiece board is attached to the faceplate board via these holes, the workpiece will be considered “on center” – wherever you’ve decided that that center is on your blank.



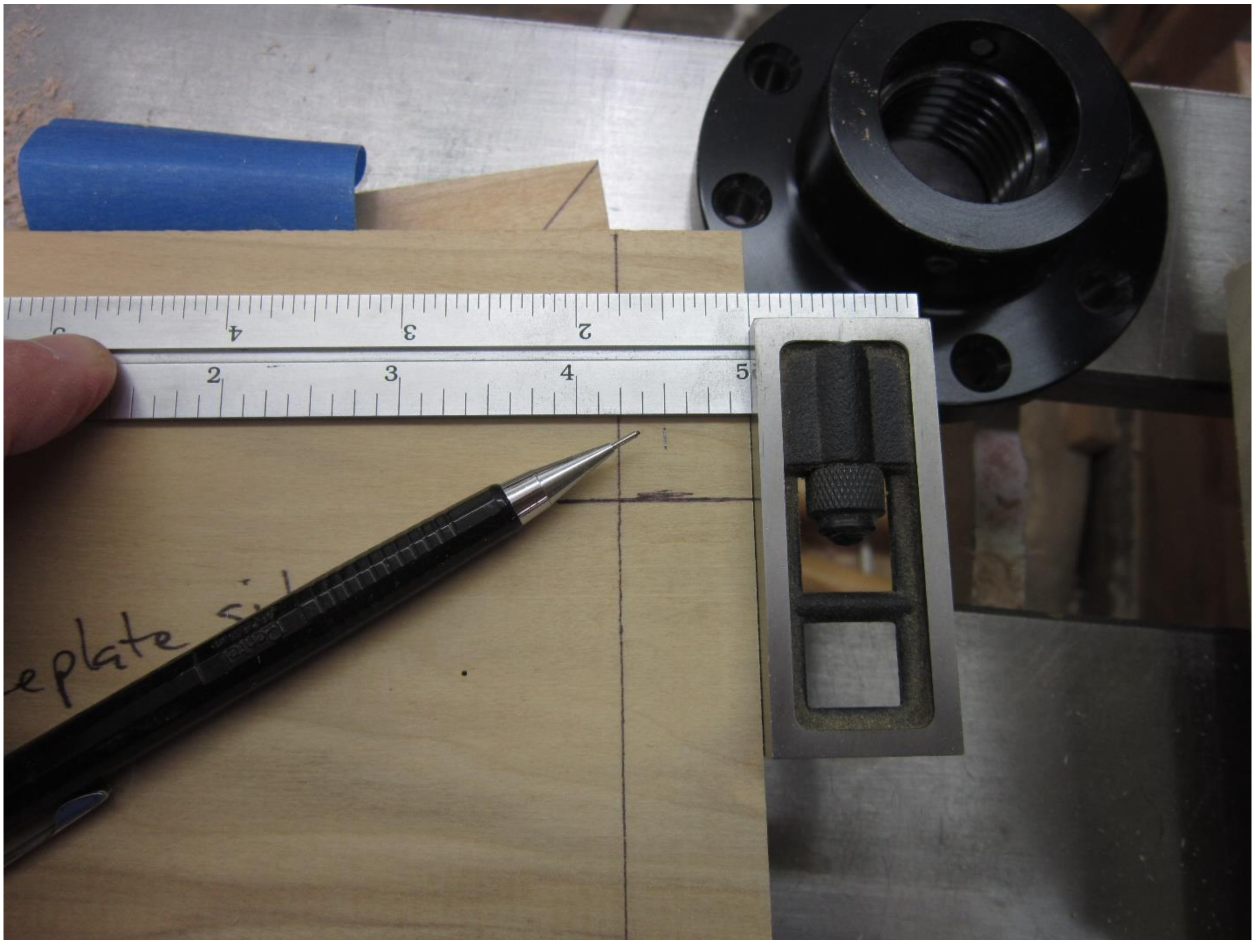
Picture 08 – Enlarged the screw holes on the faceplate board.

When using screws to join two boards, it's important to have the screw threads bite only in the board furthest away from the screwhead. The hole in the board nearest the head should be large enough for the screw to pass through cleanly, slightly larger still if you want some "wiggle room" to make alignment adjustments before tightening everything up. Here, I used a 7/32" bit as my large drill bit for my #8 wood screws, but I could have gone as large as ¼" to give myself a little bit more room in case I need to realign my "on center" mark for some reason.



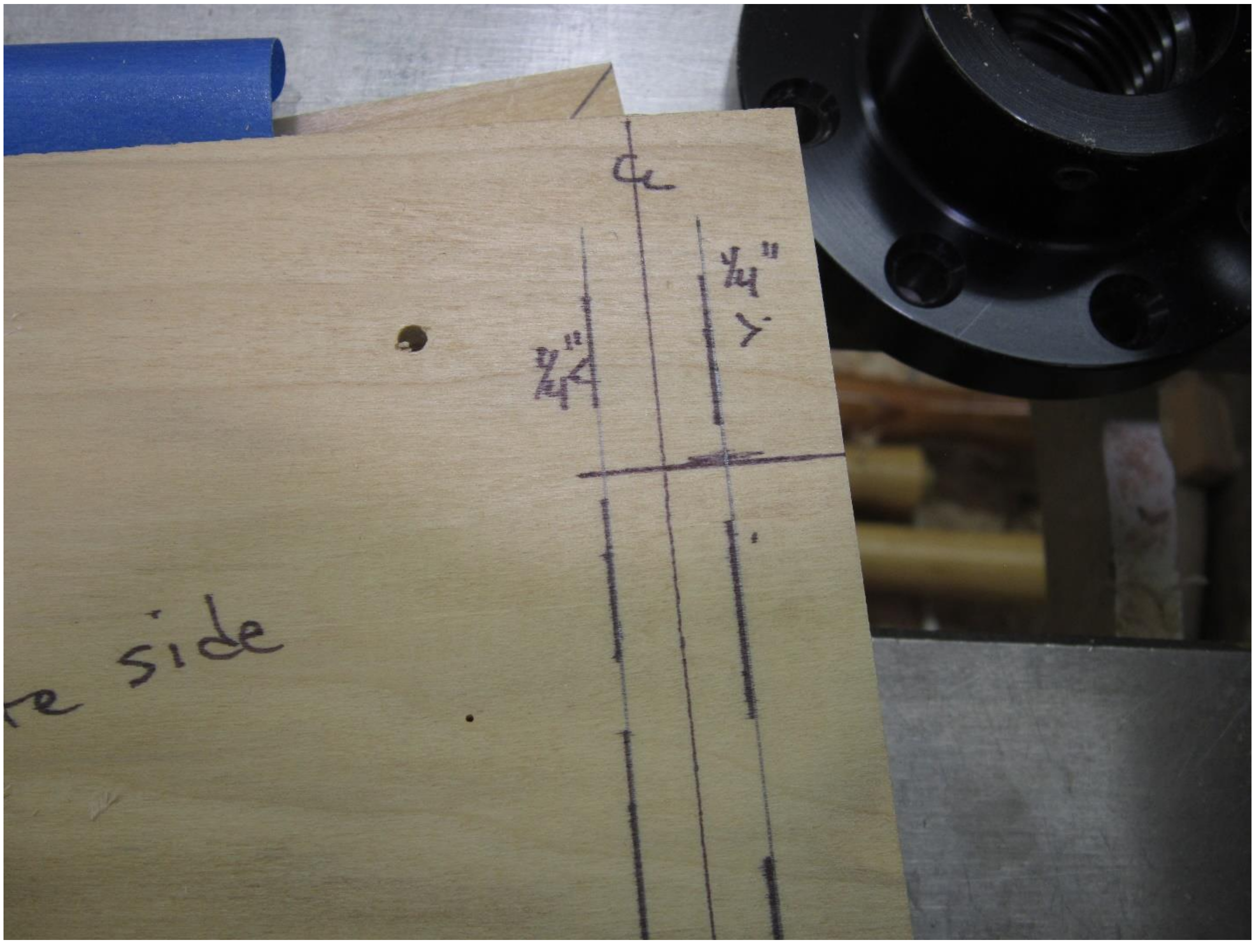
Picture 09 – Alignment marks on the edge of the faceplate board and back of the workpiece mounting board.

I made alignment marks as shown, above, to give myself a guide for marking my ¼” offsets.



Picture 10 – I used the square to extend the alignment marks and mark ¼" to the right of the line indicating the workpiece mounting board's "on center" position with respect to the faceplate board.

Marking the line for one of the ¼" offsets.

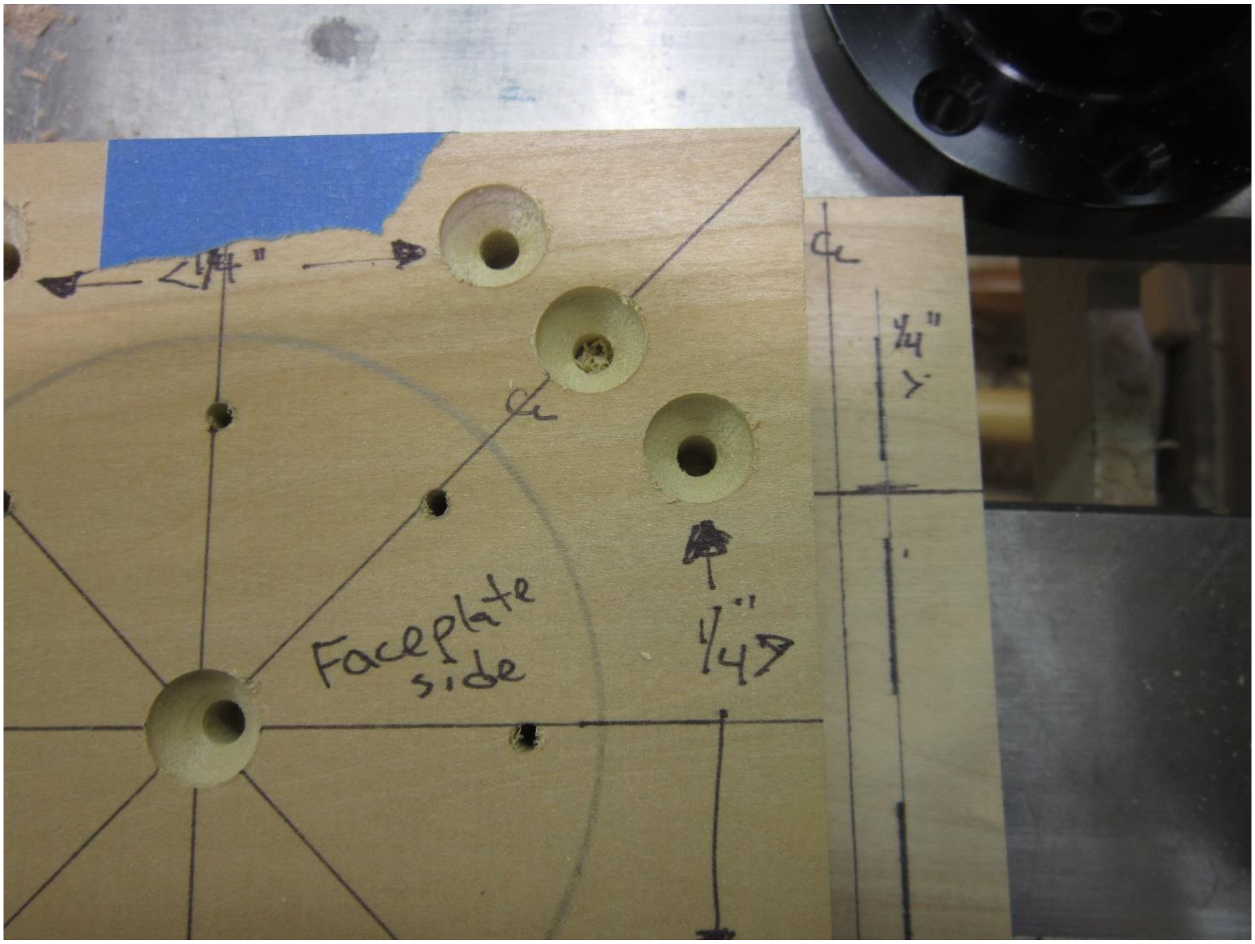


Picture 11 – Both ¼" offsets measured and marked.

After drawing the guidelines to align the faceplate board and workpiece mounting board for each of the ¼" offsets, it's time to align the boards to one of the offsets, tape the boards together and drill the mounting holes.

Picture 12 – The mounting holes for the first offset have been drilled, and the faceplate board holes enlarged so the screws can pass through.

Note that I've written that the holes are used for this ¼" offset. (Faceplate board shifts right relative to workpiece mounting board from this perspective.)



Picture 13 – Close up, after drilling the remaining offset holes and marking them. CL is my mark for the "on center" holes.

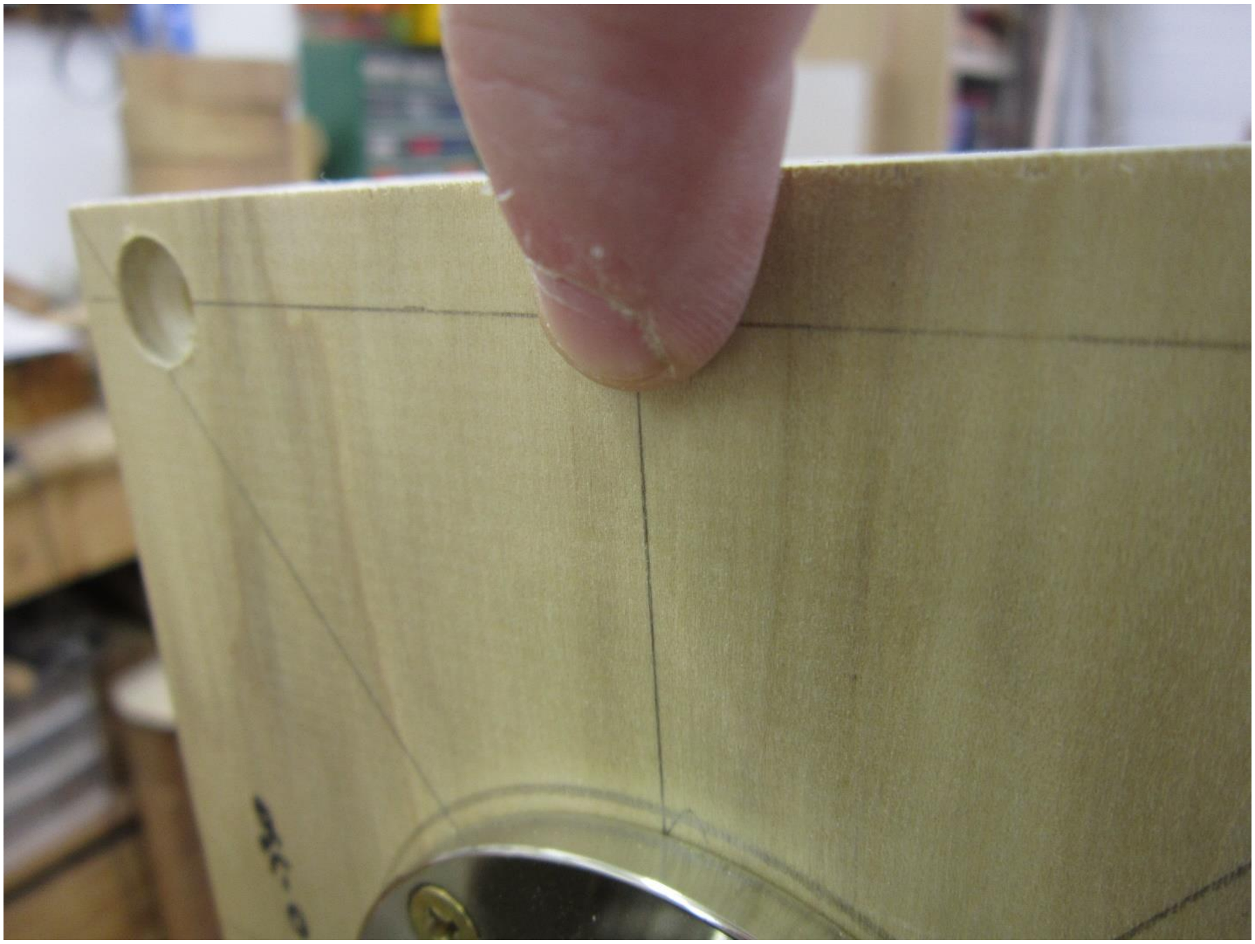
Again, note that I've indicated which holes go with which offset. ¼"> goes with the alignment line marked ¼">. Though not visible in this picture, there is a corresponding <¼" marking on the other alignment line.

To use the jig:

- Attach the faceplate to the faceplate board.
- Attach your turning blank to the workpiece mounting board.
- If you're starting on-center, mount the workpiece mounting board to the faceplate board using the "on center" holes. If you're turning on one of the ¼" offsets, mount the workpiece mounting board to the faceplate board using the appropriate holes.
- Put the whole thing on your lathe.

Picture 14 – counterweight made from a wood screw and washers.

When your workpiece is off center, it will probably be off balance as well. One way to counteract this is to add a little bit of weight to the jig, opposite the side you offset to. A wood screw with some washers on it is a convenient counterweight.



Picture 15 – Where to put the counterweight, more or less.

If you are using the jig as described above, with a ¼” offset to either side of center, a good place to put the counterweight is on the opposite side, near the end of the jig but so the washers aren’t sticking out past the edge of the board. The line marked in the picture above is about ½” in from the edge, which suits the washers I’m using. Drill a hole suited to the diameter of the screw, and deep enough that you can screw the washer collection down tightly. You may need to change the length of the screw you use, depending on how many washers you need.

Don’t go crazy, it usually doesn’t take a lot of weight to counter the offset. You can “guesstimate” the number of washers in the following manner:

- Run the lathe without any counterweight and see how high you can set the speed without vibration. If that speed is high enough for your turning comfort, great, skip the counterweight.
- If, on the other hand, you get vibration at a low speed, start with five washers. Compare the speed you get with that to what you had with no washers. Jump by five washers every time.
- If you run out of room for screws and washers, you’ll just have to live with a slower turning speed.