How to Get a Perfect Neck Set

I've now built around 20 guitars. The first few were kits and then I built one from scratch using the Cumpiano book. Then I discovered Robbie O'Brien and his OM course which introduced me to radius dishes, go-bar decks and everything in-between.

The initial learning curve focused around tools, the finish and bracing, etc., but one thing that always bothered me was the inability to get a good neck set with the fingerboard extension flat to the top. "Fall-off" as it's called always looked amateurish and unacceptable to me. On one guitar I would get it perfect, the next there was an 1/8" gap. Repeatability was impossible.

The following method has been used on the past 6 guitars – all with the same results. The way I do it is not anything I dreamed up or invented – I just watched lots of videos, read books and talked to people.

I'd like to thank the following who really impacted the way I get a good neck set now.

Robbie O'Brien (For the Neck Joint Jig)

John Hall – Blues Creek Guitars (Initial setup of sides geometry and radius dishing)

William Cumpiano – (cutting the neck tenon on a table saw)

Greg Nelson – Nelsons Stringed Instruments (table saw techniques for cutting neck tenon)

Hesh Breakstone – From the OLF thread "Flattening Upper Bout" (establishing the angle on the upper bout for proper fretboard contact)

I'll divide my procedure into Sections to make it easier to follow.

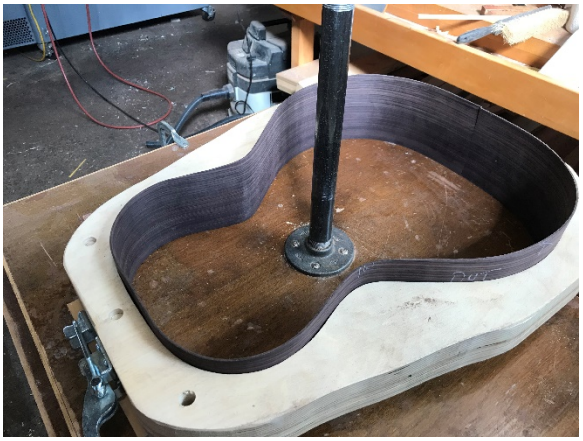
Section 1 – Pre-profiling the sides

Section 2 – Final side Geometry

Section 3 – Cutting the Body Mortise

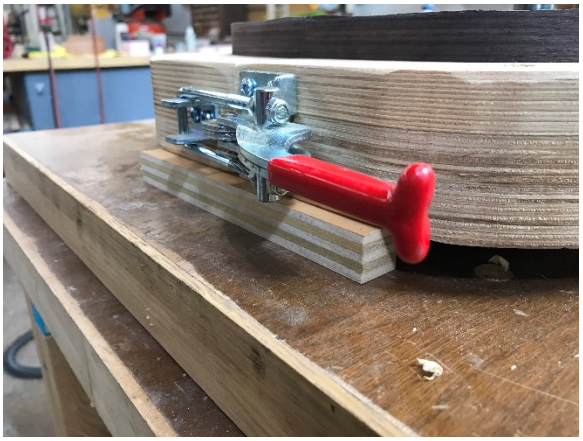
Section 4 – Cutting the Neck Tenon

Section 1 - Pre-Profiling the Sides



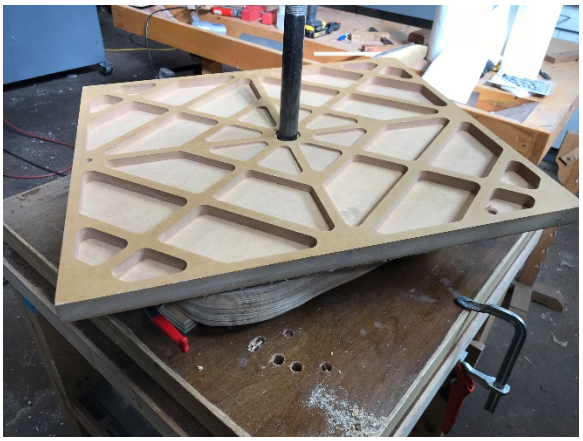
I use acrylic templates (Waldron) to lay-out the side profile and add 5mm. After bending and cutting to length, put them in the mold, top side down.

Put in the stretchers.

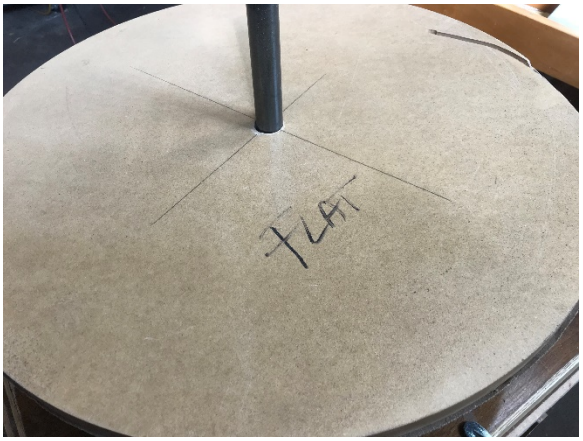


Raise the mold up using ¾” plywood blocks, one at each end.

Chalk the sides (stretcher removed)

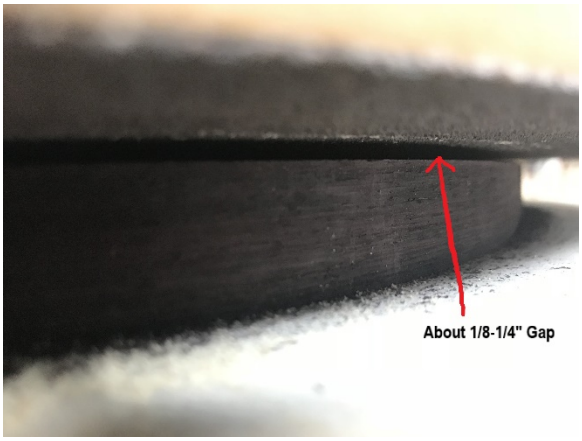


Put the radius on the back – I'm using a standard 15' dish. It should only take a few minutes to remove the chalk.



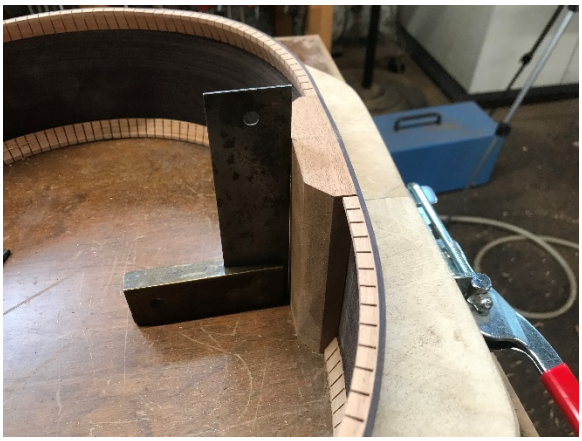
Flip the mold over. Chalk the top and FLAT sand the top. No need to radius it now.

When the chalk marks are gone, you will now put the initial angle on the top bout for the fingerboard extension. Put a 1/8" thick shim at the tail block end between the sides and the radius dish and hold it with one hand as the other hand turns the dish bearing down on the neck block end.



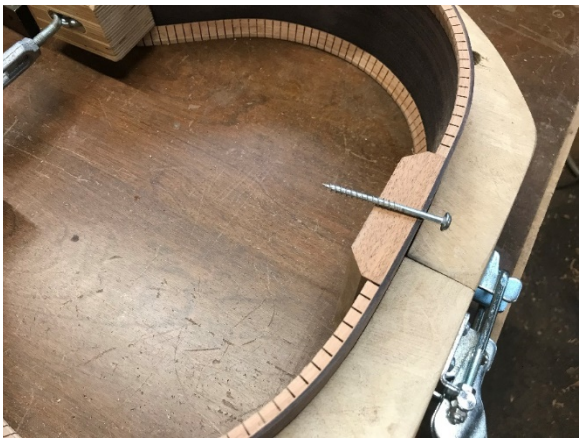
Take the shim out and press down on the dish at the tail block end. You want to see a gap at the neck block end of about 1/8" to 1/4". Don't fuss the measurement too much, you'll do the final profiling after the kerfing, head and tail blocks are installed.

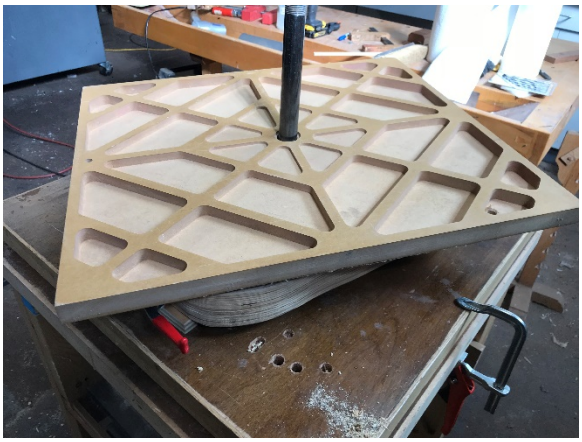
Install the tail and neck blocks and then the kerfing as usual.



Make SURE the body is square in the mold after the screws are installed. If not put shims between the body and the mold to get it square.

Section 2 – Final Side Geometry





Chalk the sides and put the back radius on with the dish (in my case 15’)

With body top down in the mold, put the ¾” plywood spacers (see pre-profiling) and press down firmly so the top is flat on the table. Make sure all the stretchers are in place. Using 3” wood screws, screw the body to the mold at the neck block and tail block. Make sure the screws don’t go through the blocks. You will not remove the body from the mold now until after the top and back are glued on.

The next step is critical to proper neck set but more importantly having the fingerboard lay flat on the top. I've found that all braces above the sound hole (except for the X-Brace) should be flat, with no radius.

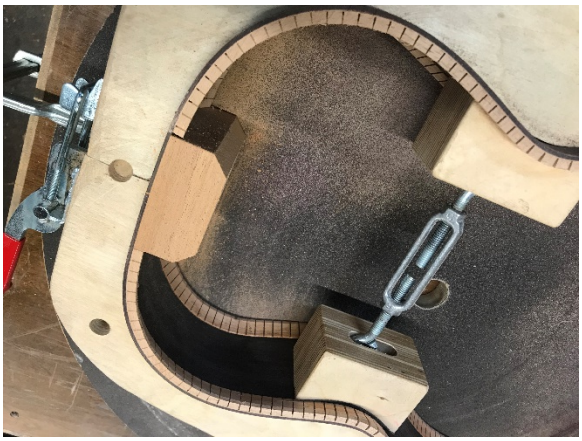
Turn the mold over and turn your attention to the top. Everything below the sound hole will get your radius (in my case 40'), and everything above the sound hole will be flat sanded at an angle. This is how it's done.

Chalk the sides up to about 3" down from the neck block

Using the 40' dish

Profile with the dish until the chalk is gone. You really only need to profile the top at this point from the tail block end to about 3-4" from the neck-block.

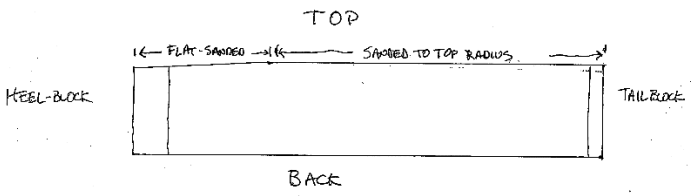
Turn the mold over and with the top now resting on a FLAT sanding dish, put a 1/8” (3.5mm) shim under the tail block.



Then sand the rest of the top down about 3”.

Here’s a sketch of what you just did to the top

Holding the mold at the tail block end, push the neck block end and start to sand. At first you will see action at the neck block.



Go ahead and complete the body and neck.

Section 3 – Cutting the Body Mortise

Flat sand the top of the body where the neck will be attached. Get it dead flat.

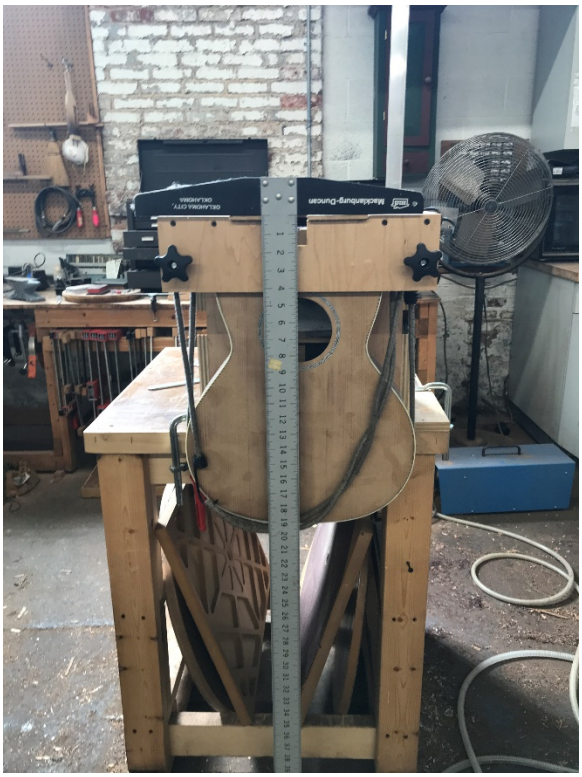
To calculate the neck angle, you will have to use a shim at the bridge location. In Robbie O'Brien's course he uses a 3.5mm shim. I like a lower saddle in the bridge, so I use a 3.0mm

Also scrape or sand the area where the fingerboard extension will lay.

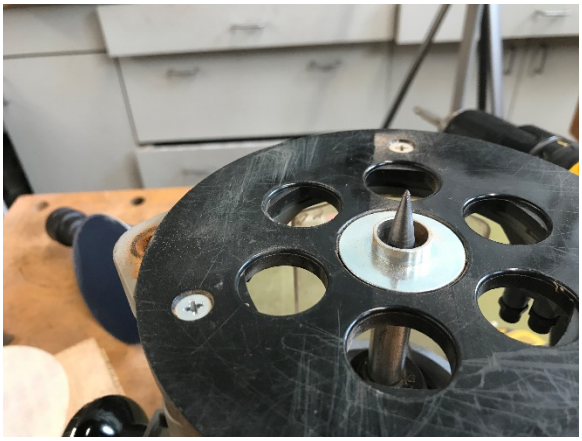
Put the 3.0mm shim at the bridge location and clamp a straightedge to the body. Hopefully it will lay flat where the fingerboard extension will go (if you did the top final profiling correct it will)

Now read the angle – in this case 89.7 degrees. Write it down.

NOTE: I bet you're used to 1.5 degrees for a neck angle – right? Well the neck angle will be whatever angle you need to get the right bridge height and will change slightly for every instrument you build. Here's the neck angle from a prior build that's closer to 1.5.

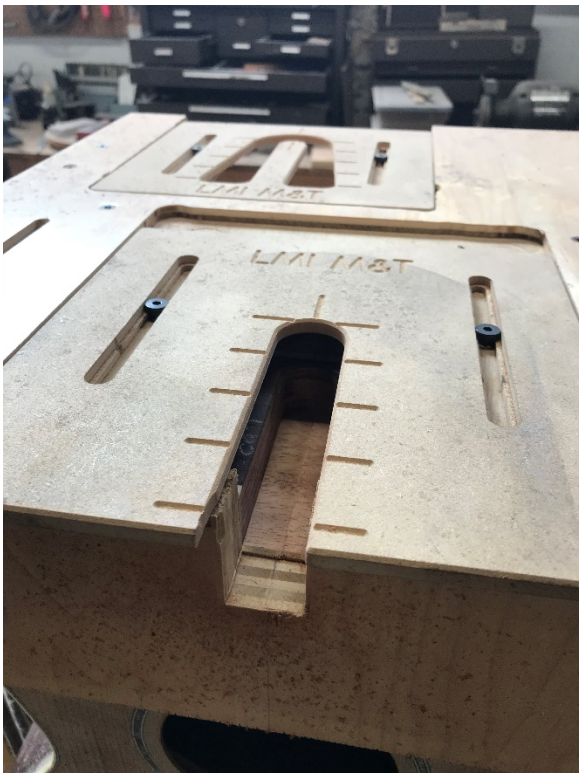


I use Robbie's neck jig to cut the mortise. However, I made some slight changes to the procedure and the jig. First, I get better contact with the body top by using bungee cords to pull the body up. I also use a T-square to make sure the body is in the jig on the centerline of the body.



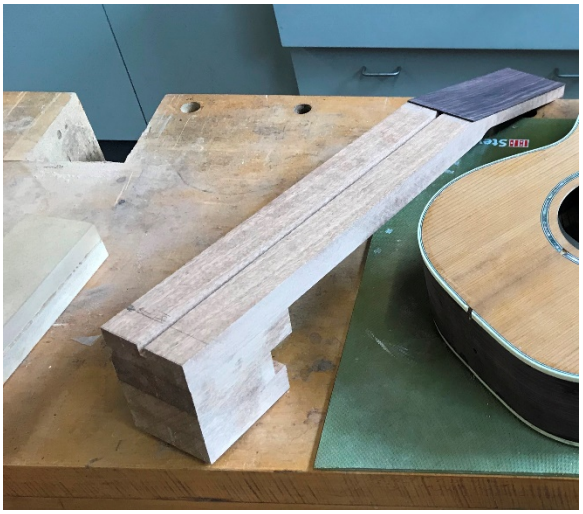
To make sure the mortise is centered front to back, I made a ½' metal scribing bit for my router.

And bottoming out the scribe, I scribe light lines to make sure the mortise I cut is centered to the layout line.



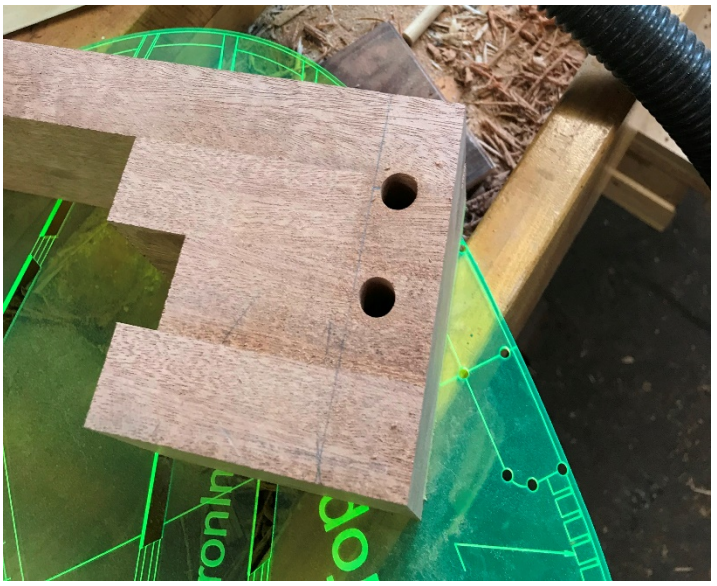
When all is good, cut the mortise in the body.

Section 4 - Cutting the Neck Tenon

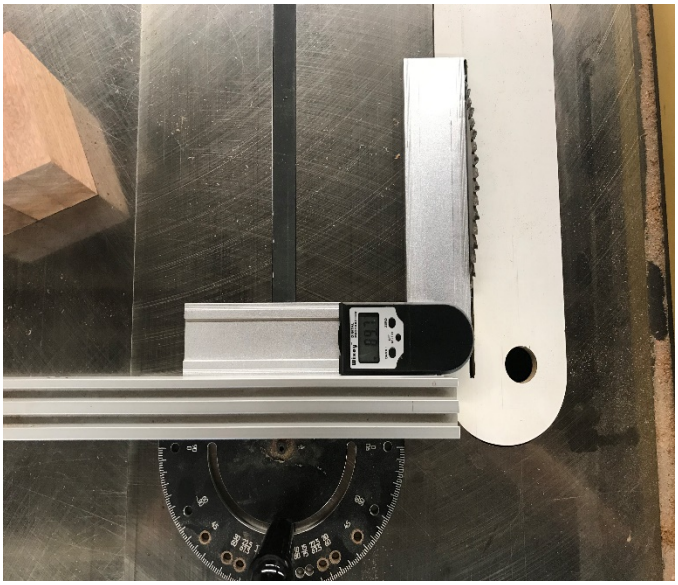


Notes - The truss rod channel is one of the two most important centerlines in my builds. I used to cut it with a router, but I got inconsistent results. Now, I cut it on a table saw using a dado blade. Using a blade that's just under ¼" wide (the width of my truss rods) I run it down the center of the 3" wide neck blank, then run it down the other side. This centers the channel perfectly in the neck blank. Then I'll attach the peg-head overlay and stacked heel.

To prepare for cutting the tenon, make sure the neck blank is flush with the stacked heel.



Drill the holes for the KD fitting barrel bolts.



Transfer the angle you measured earlier for the neck (in this case 89.7 degrees) to the miter gauge for your table saw.

The peg head overlay keeps the blank from seating flat –

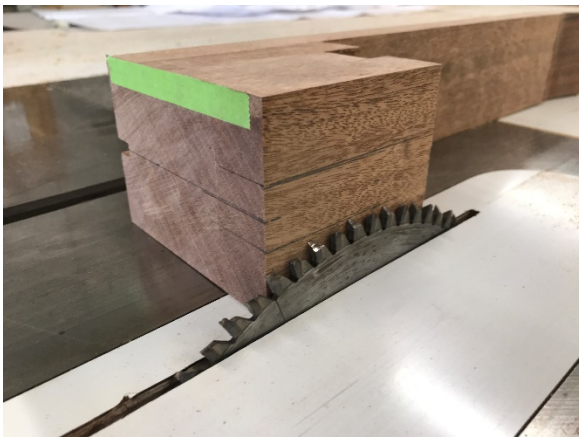
So, use a shim at the other end.

Raise the saw blade as high as it will go. (Note mine does not go up to 3”) And cut a small amount of the end off – leaving 7/8” past the mark for the 14th fret. Make sure you use a cross-cut blade, not a rip blade. A good combo blade works as well.

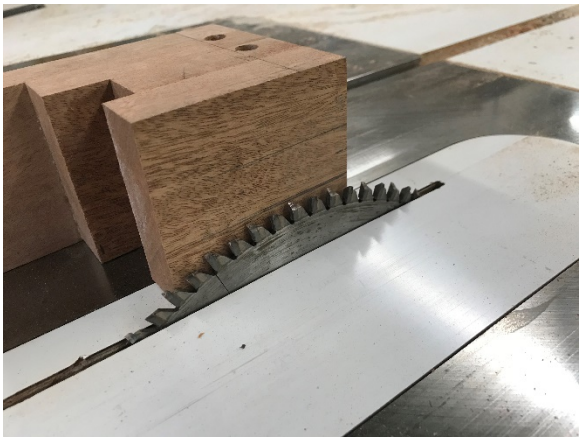
Remove the piece that’s left with a flush cut saw.

Measure the cut for square. Note the gap at the left.

I put a piece of tape there to compensate – the cut MUST be squared perfectly for the next step of cutting the tenon.



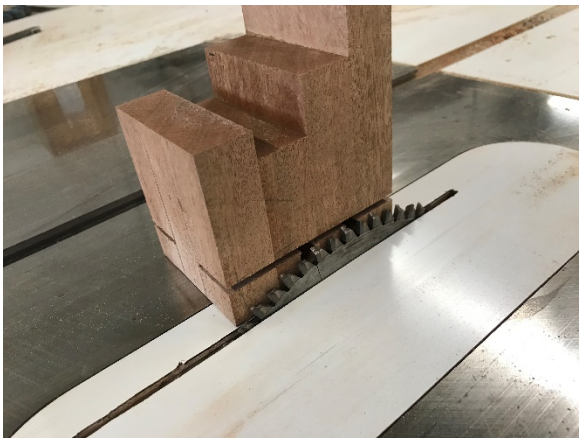
Layout the tenon lines using the truss rod channel as a reference point (that's the reason it must be perfectly centered). Don't raise the sawblade past the line, make it just under.



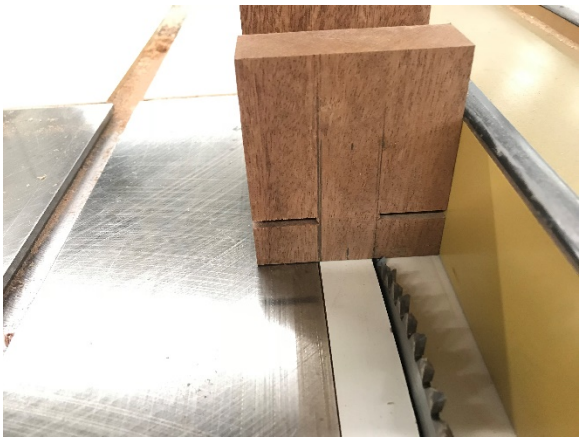
Flip the neck over and make sure it's the same on the other end.

Holding the end of the heel firmly against the fence, cut one cheek.

Then the other. You now have two cuts made at 89.7 degrees.



For the final cuts, set the blade just under the cheek cut.



Set the fence to cut just outside the pencil line of the mortise. It's prudent to go well outside the line and "sneak" up on the final cuts.

When you do these final two cuts, use a piece of wood that's thinner than the cut to keep the piece from kicking back.

When you get a 7/8" wide tenon, mark it where it will stop in the mortise.

And cut off the excess. Note how I'm pushing down on the saw blade to get it to cut flush. It's OK though if you don't, it's covered up by the heel-cap. Check the final fit in the mortise and adjust if necessary with a shoulder plane.

I'm spot on!

With the neck in the mortise, check with a laser or straight-edge. Use the truss channel center and the body center-lines as reference.

Go ahead and do the rough taper and heel sculpting. Then clamp your fingerboard to the neck and check the fit. This is the result after no flossing or tweaks!!!!

Here’s a view of the other side.