Making the Down Feed, Clapper Box, Cross Slide Support, and Cross Slide Patterns plus Fitting the Slide to the Rotating Head

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I don't really enjoy woodworking but having the right tools certainly makes these jobs easier to tolerate. About 5 years ago I bought a very nice Bosch portable table saw. It permits me to make very precise cuts with minimal fuss. I also have a disk sander and 1" wide belt sander. They are handy for adding draft to my patterns. Originally I thought I would use the table saw to cut the draft on all pieces but in some cases it is better to do it after assembly by sanding.

Pattern Making

One thing I had to rediscover is that written procedures are needed when cutting wood just as they are needed for cutting metal. Duh.

Here you see my first two tries at cutting the down feed pattern base. They are very simple yet I screwed both of them up. Once I returned to my standard operating procedure of writing down the steps before starting to cut, all went well.

The task is so much easier when I take the time to write procedures and then follow them. The down feed pattern came out fine. For ease of molding, I made the gate too. I later glued on a small block to the gate to provide a land for the sprue.

The inside edges of the blued on thin blocks were cut with a 1 degree relieve on my table saw. The vertical block was cut square and slightly oversized. The relief angle was formed with the disk sander and included both the edge of the base and the end of the block. In this way I have a smooth surface with no discontinuity between base and block. I was able to sand in the relief on the inside face of the vertical block using my 1” wide belt sander.

The large outside curved edge was rough cut on my bandsaw and then cleaned up on my disk sander. It has the relieve angle as set on my disk sander's table which is about the same as on my table saw.

The two small inside curved transitions were rough cut with my scroll saw and smooth with a half round file. MDF sure is easy to work.

Here you see the pattern being glued up. You can never have too many clamps...

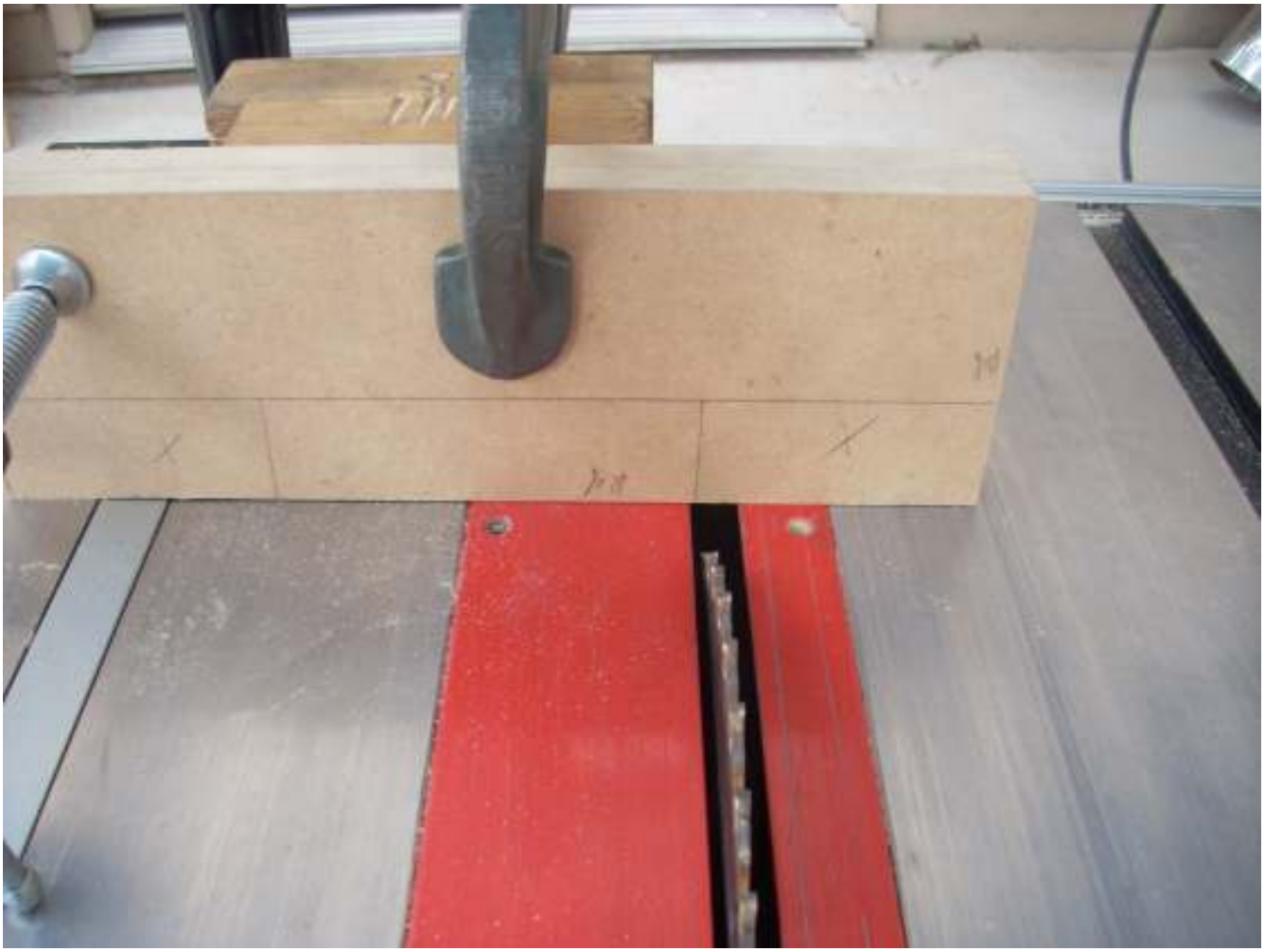
I put the letter “N” on all pieces to remind me which face is narrow. The pattern cannot be pulled from the sand unless all relief is in the same direction.

The clapper box is being glued up. I chose to do the final shaping of the curved end after assembly. In this way the curve and the draft will all be smooth over both the base plate and the two blocks. The disk sander has 60 grit and makes quick work of MDF yet the finish is decent.

The fillets don't look so good here but the curves came out nicely.

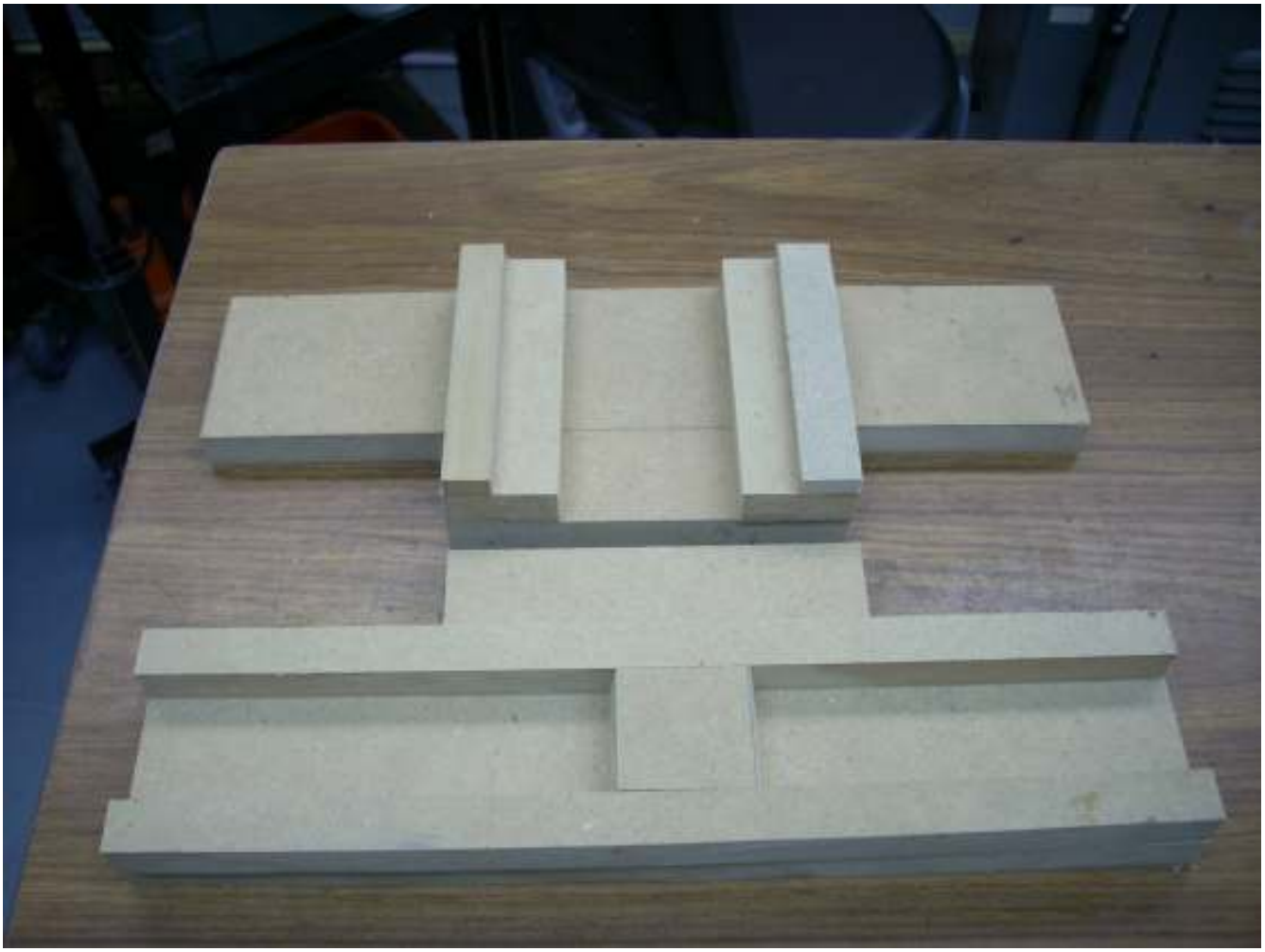
I was experimenting with different fillet materials. In this case I used sawdust from the table saw, Elmer's Glue, and water to make a paste. Later I used sawdust from the sander, Elmer's Glue, and water to make a much smoother paste. It worked better but I will probably run a fillet of store bought wood putty later.

I use Petrobond sand which is oil based so no water will get to my patterns. I therefore don't bother with protective coatings. I do use 400 grit to make the surfaces nice and smooth.



The cross slide support pattern requires matching base plates. I have clamped two pieces of 1/2” MDF together and will run them through my saw. I chose to go with 1/2” MDF rather than the 3/8” specified by Gingery for two reasons. First, I like having the extra material in the casting. Second, I have 1/2” MDF but must build up layers to get 3/8”.

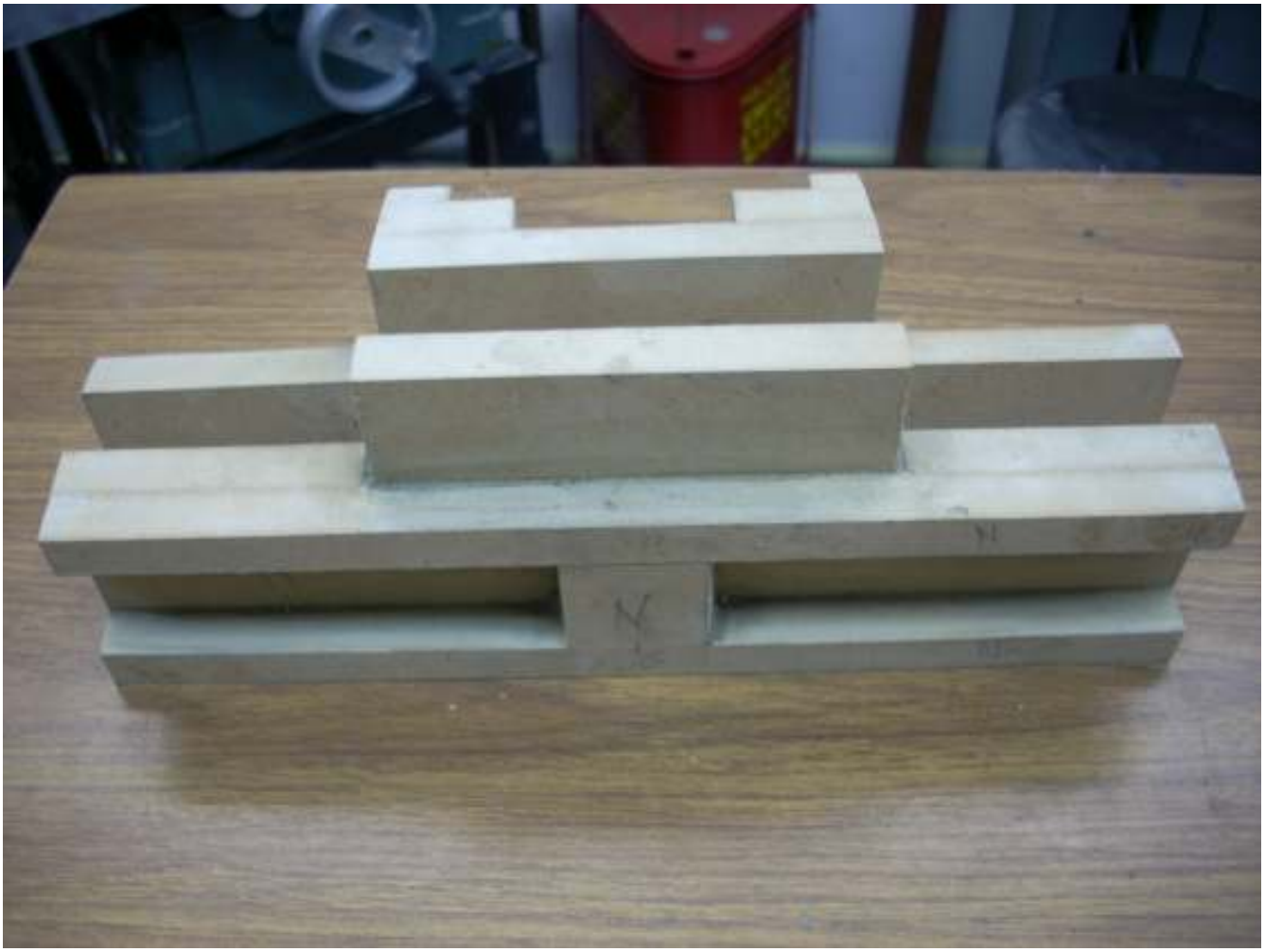
By placing the base on edge I am able to get square cuts with no undercut from the blade. The C-clamps and 2x4s allow me to keep my hands away from the blade plus keep the MDF stable.



The rest of the pieces for this pattern are rather simple. Here is the pattern dry fit.

After gluing up, I used my disk and belt sander to get a slight draft.

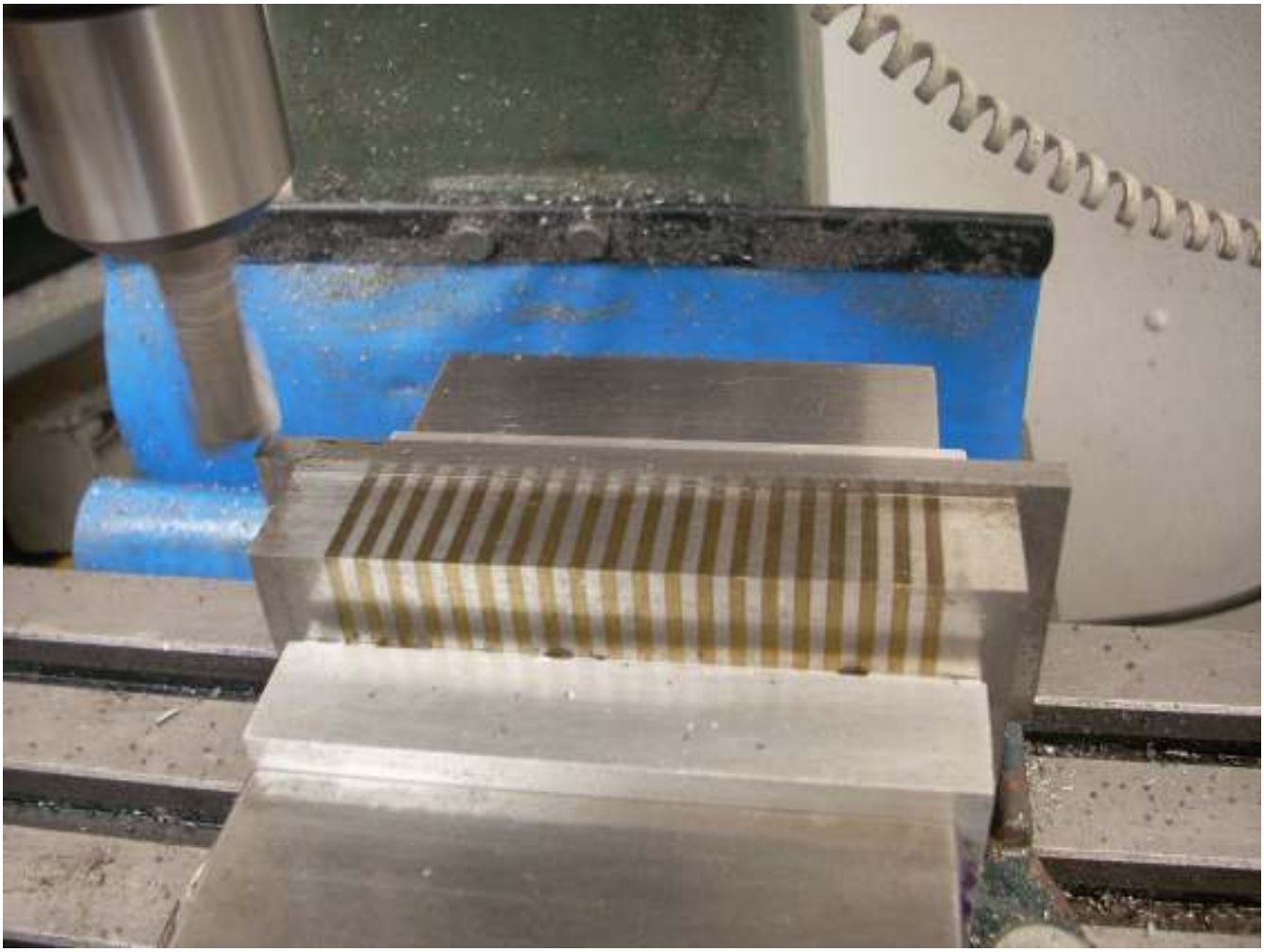
Note the two tiny dark dots on the top face flanking the built up section. They are the ends of cut off nails that align the cope and drag pieces.



You are looking at the cope side of the pattern. The channel will form blocks of sand that must hang down into the void. It is essential that there is plenty of relief plus smooth surfaces.

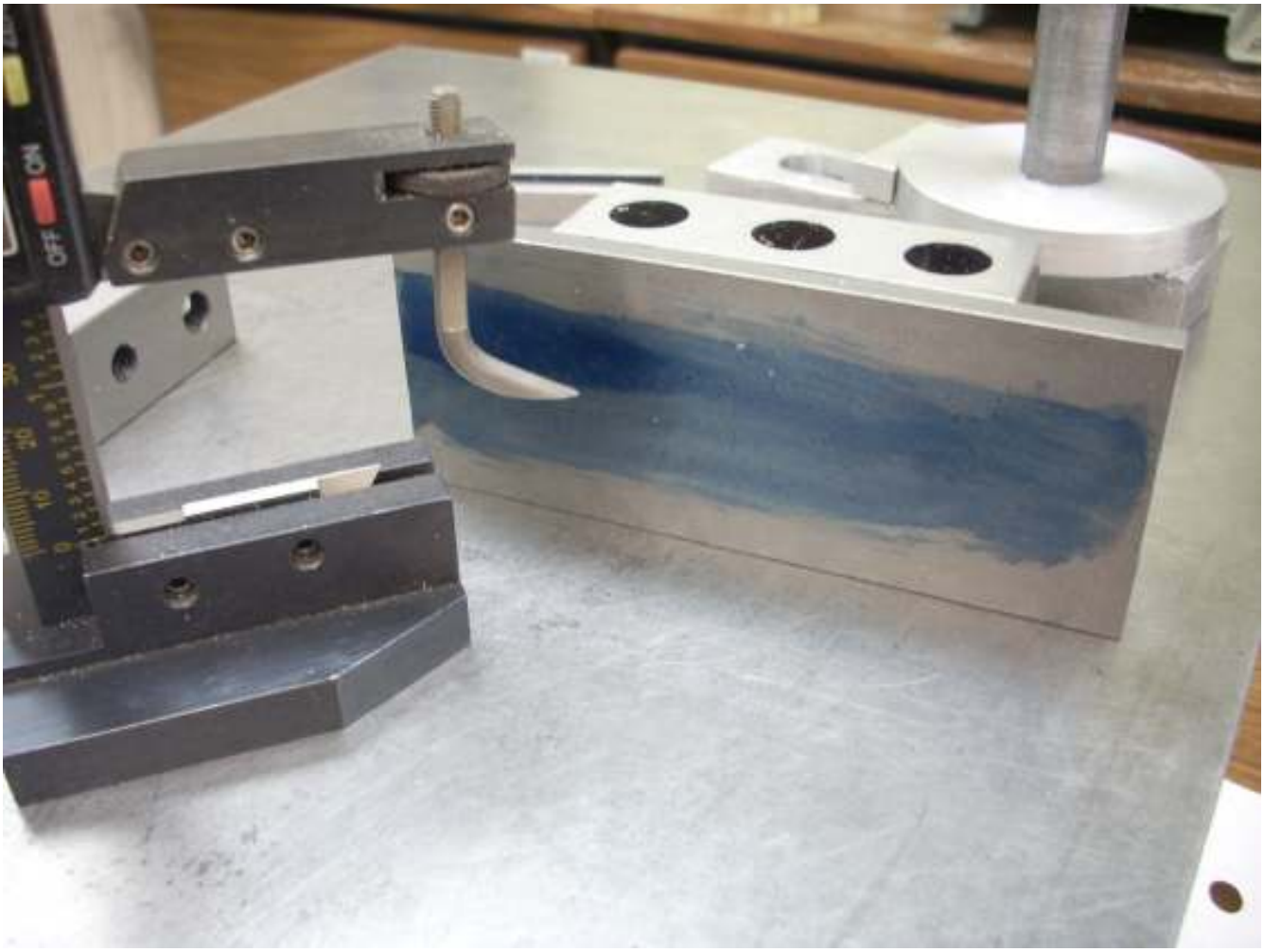
I simplified the cross slide pattern by not making 1/16” pads for scraping. I will mill out the center section and mill the pad area.

Fitting the Slide

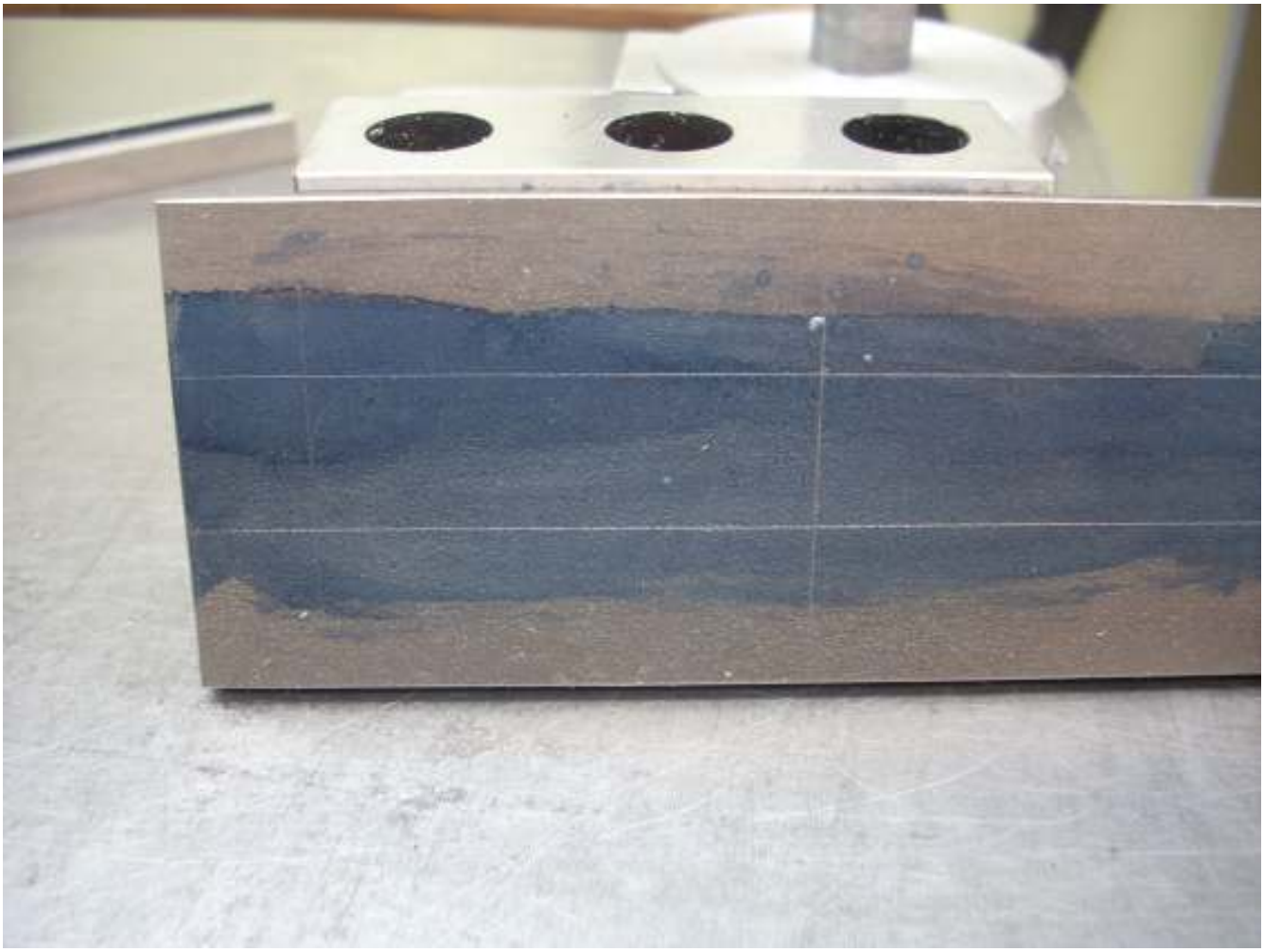


Now I'm back to cutting metal. I didn't have any 1/4” x 2” bar stock so had to saw up some 1/4” x 3” plate. It was rough sawed on my bandsaw and then milled to size.

Both longitudinal edges were milled to insure they are parallel. The ends differ in width by 0.000 5”. This is the same error that I found on my vise ways using my Dial Test Indicator. If I had milled a support block under the plate, the error would most likely have been less.

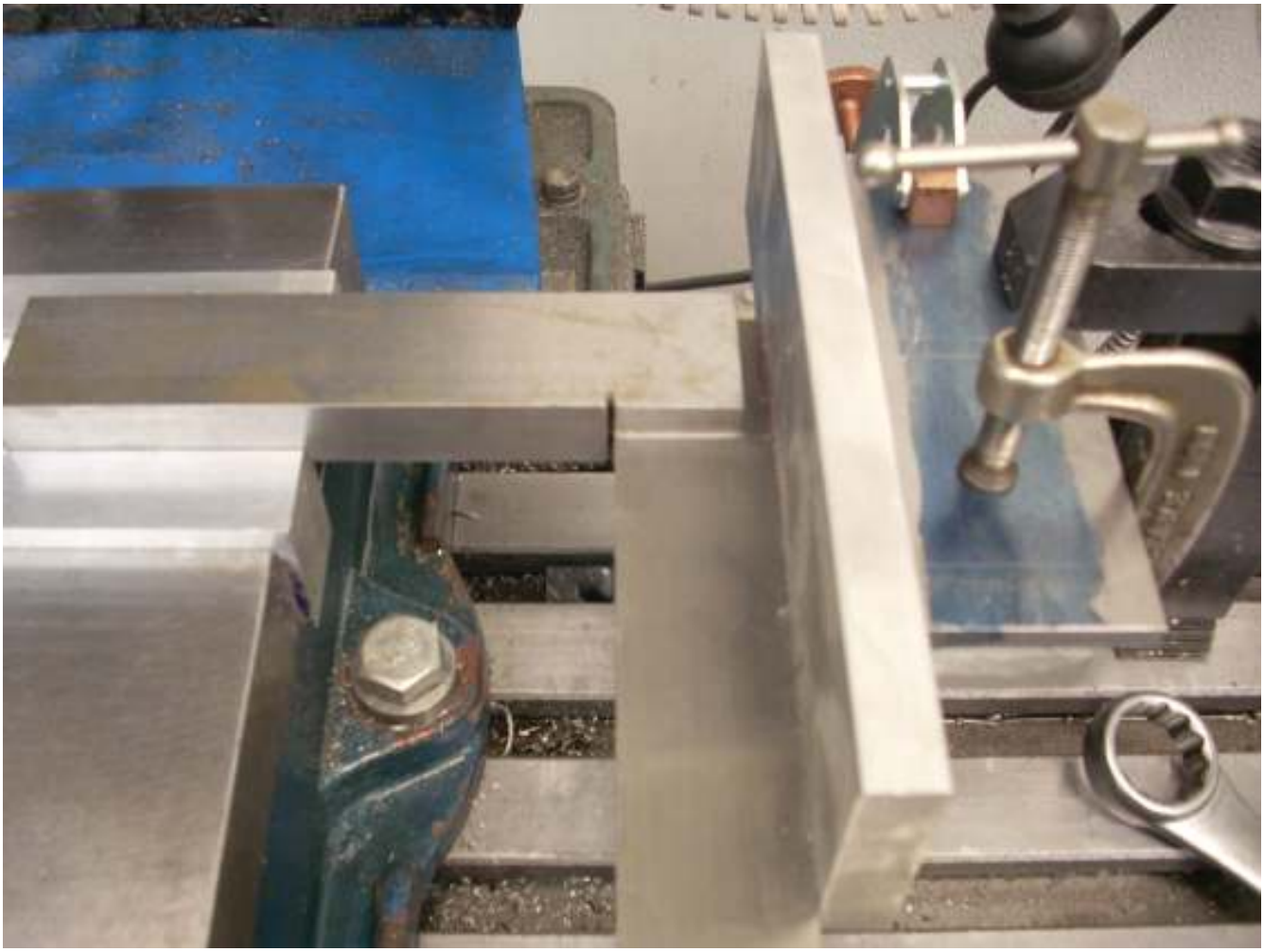


The head has a 0.625” wide slot in it. To facilitate alignment, I first located the longitudinal center line of the plate.

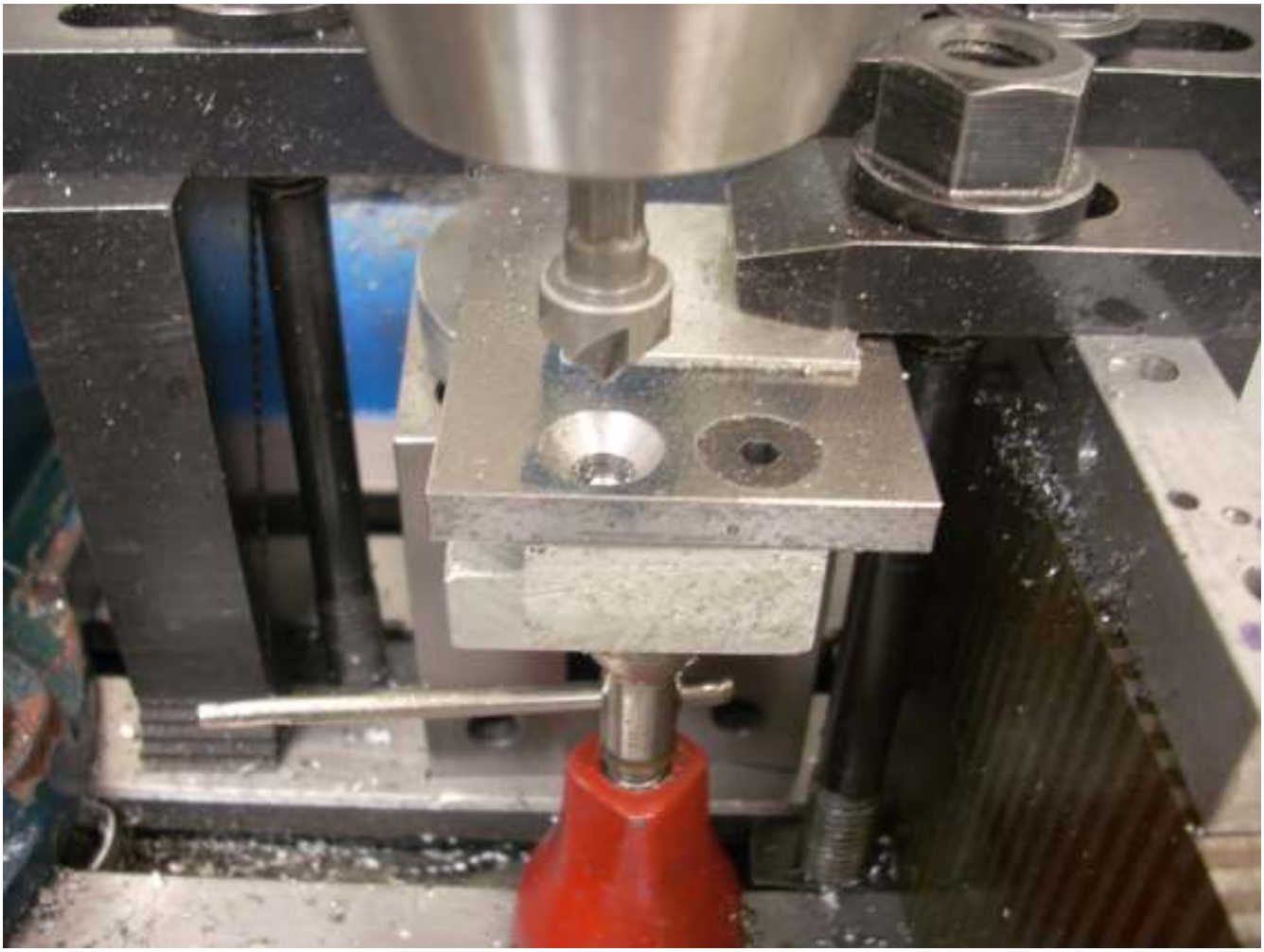


I scribed a line 0.312” below the center line and 0.312” above the center line. The casting was placed on the plate and the ends of the slot marked in the bluing. I scribed lines to show these end points. Both faces of the plate were marked out.

I set the casting down on the plate and clamped them together when the scribed lines matched the milled slot. The screw hole locations were then marked out.



The assembly was moved to my mill/drill. I clamped my machinist square into my vise and used it to set the plate parallel to the Y axis.

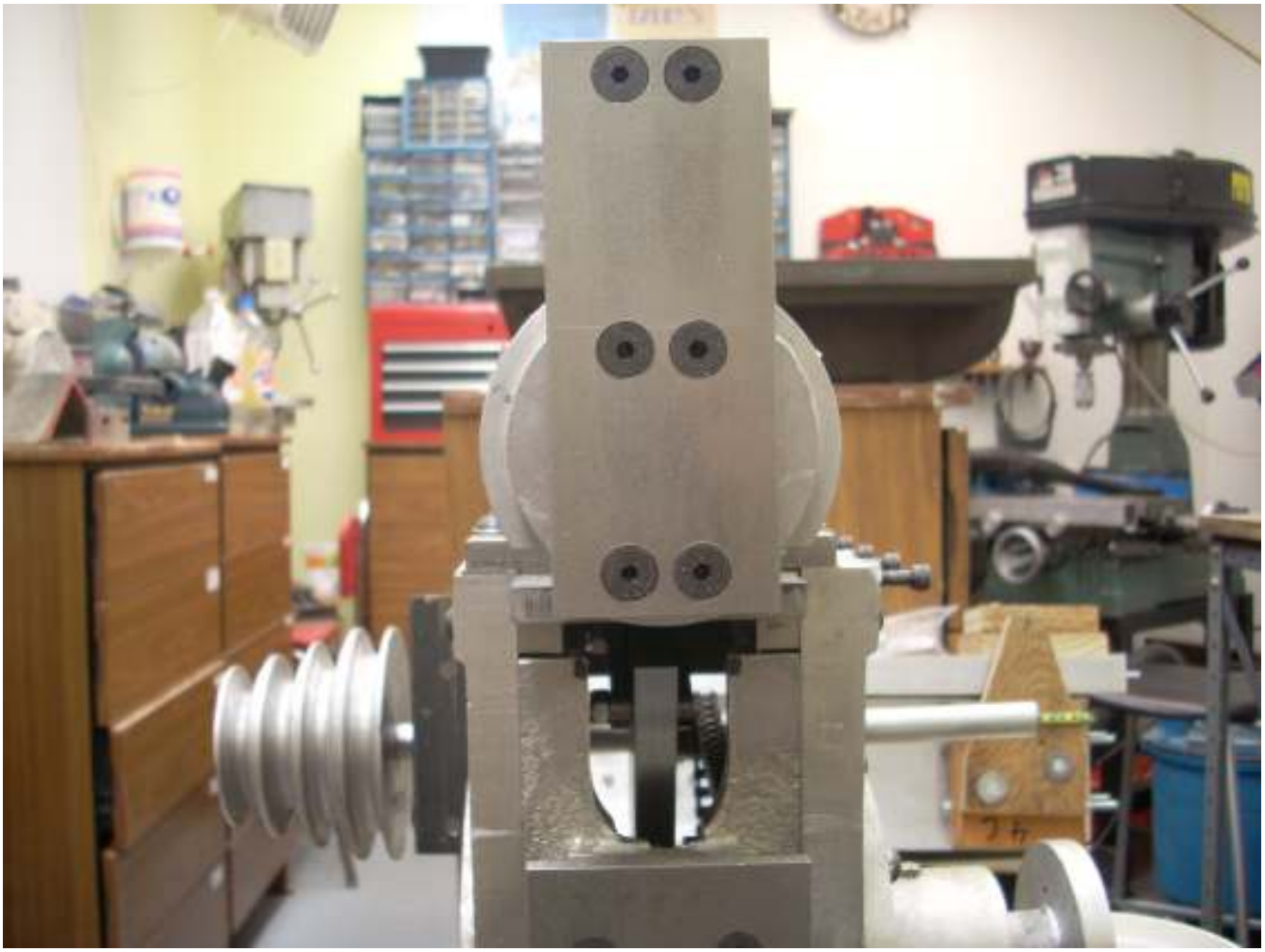


The assembly was clamped in 3 places just to be sure nothing moves. Here you see the first hole completely done and the screw installed. I am almost done with the second hole. The procedure was to first locate the hole position using my DRO. Then the X and Y axes were locked. The center drill came down first. It was followed by the clearance drill to a depth of 0.250” to get me through the steel plate. The tap drill was next.

For these holes on the end of the plate, I went all the way through since that makes it easier to tap the hole. The rest of the holes are blind which increases the risk of breaking off the tap. I used a spiral point tap in my drill chuck. The mill/drill was run up to full speed and then power cut. After the spindle coasted down a bit, I ran the tap into the hole. It worked very well. I even did this with the blind holes but waited a bit longer before driving the tap into the hole. I then released the drill chuck and fed the rest of the way by hand. I then switched to a bottom hand tap to both finish the thread and remove some of the chips. The final step was to counter sink the hole. I again used the trick of running the mill/drill up to full speed, cutting down, and feeding the tool down. It took 13 passes but the work went quickly and with lots of control.

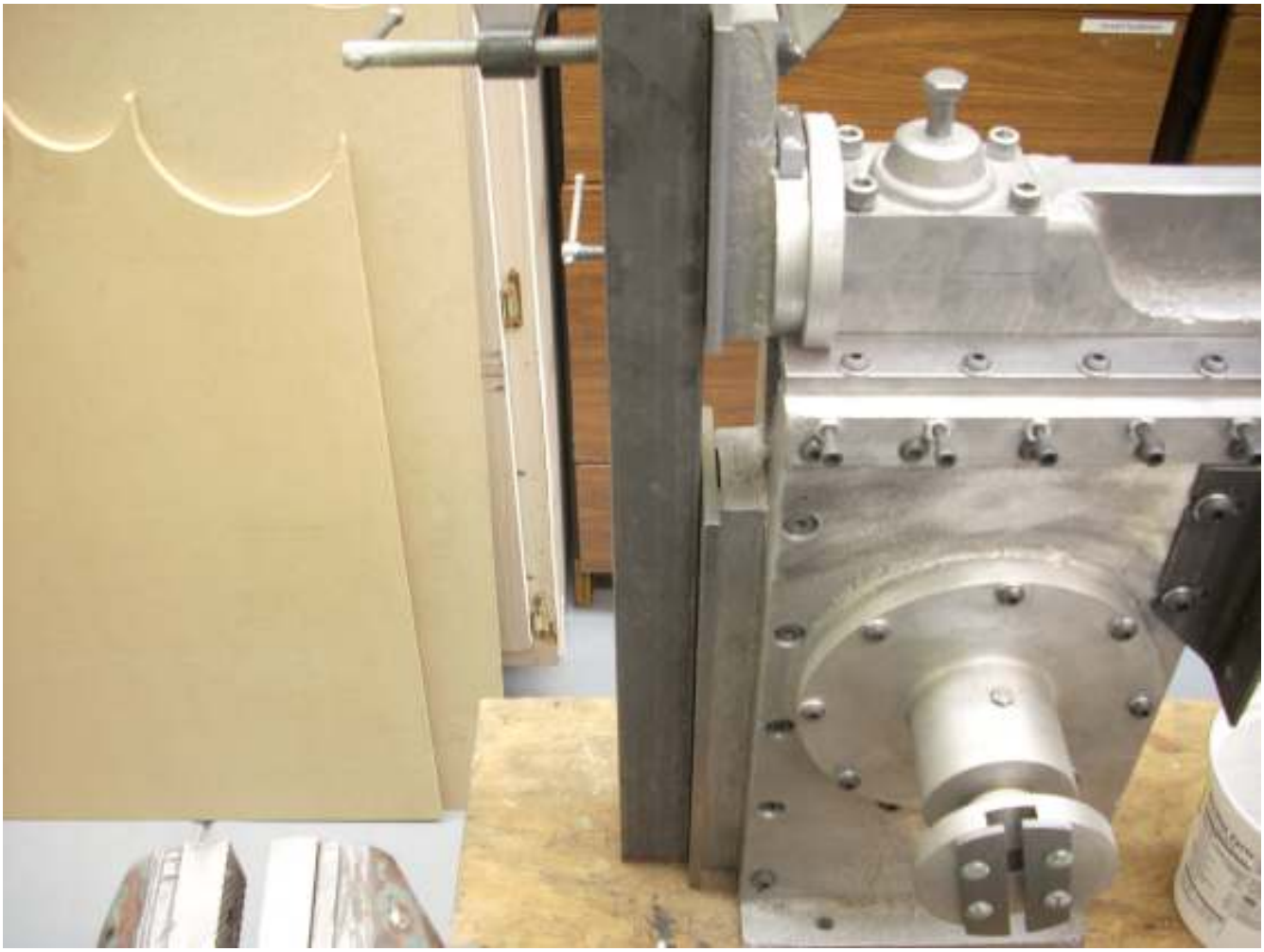
The best news is that I did not break a tap. All 6 of the screws fit nicely with about 5 thou of recess.

You can see that I am a safe distance from the slot. The scribe lines can barely be seen inside the slot.



One more piece added to the shaper.

As soon as I put this slide plate on the machine, it was obvious that I could check my accumulated error by seeing how closely the surface of the slide plate aligns with the surface of the vertical slide ways.



With a length of angle stock clamped to the slide ways, I was able to adjust the ram until the bottom of the angle stock touched the bottom of the vertical slide ways. The top showed a gap of around 0.01”. Not sure if this is good news or bad news. If necessary, I could shim the slide ways or even re-cut the associated casting.

I now have enough patterns to justify starting my furnace. Sadly, monsoon season is upon us and there is a chance of rain all week. I may just turn the down feed screw on my lathe while I'm waiting.

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