Installing The Cross Slide Ways

By R. G. Sparber

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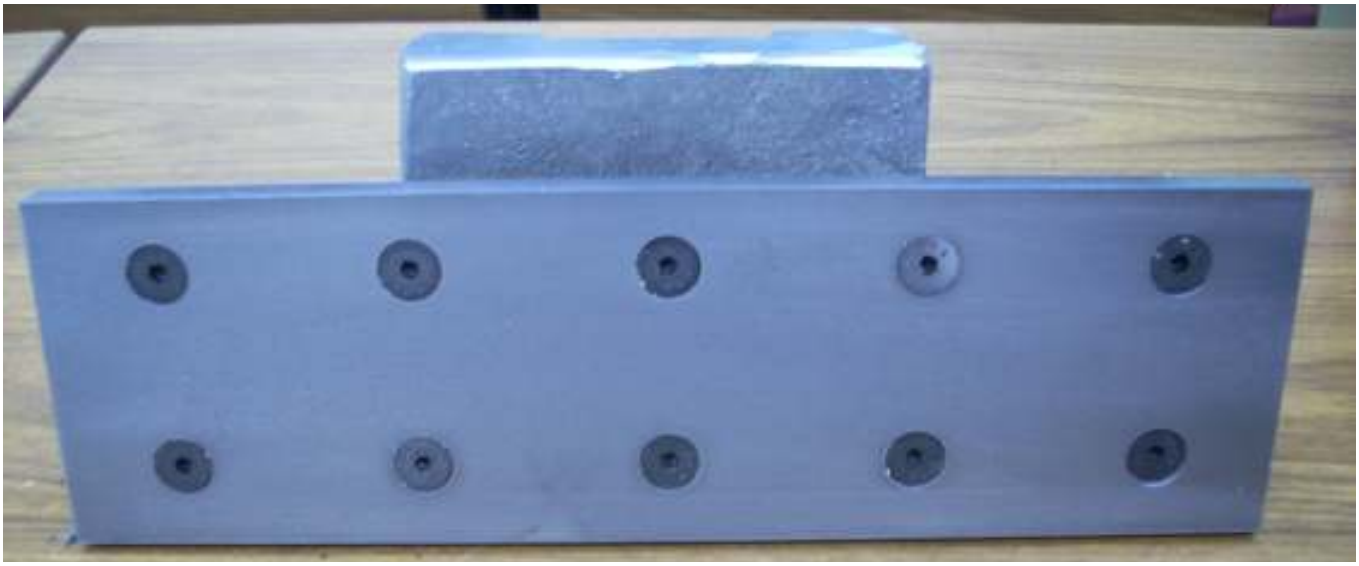
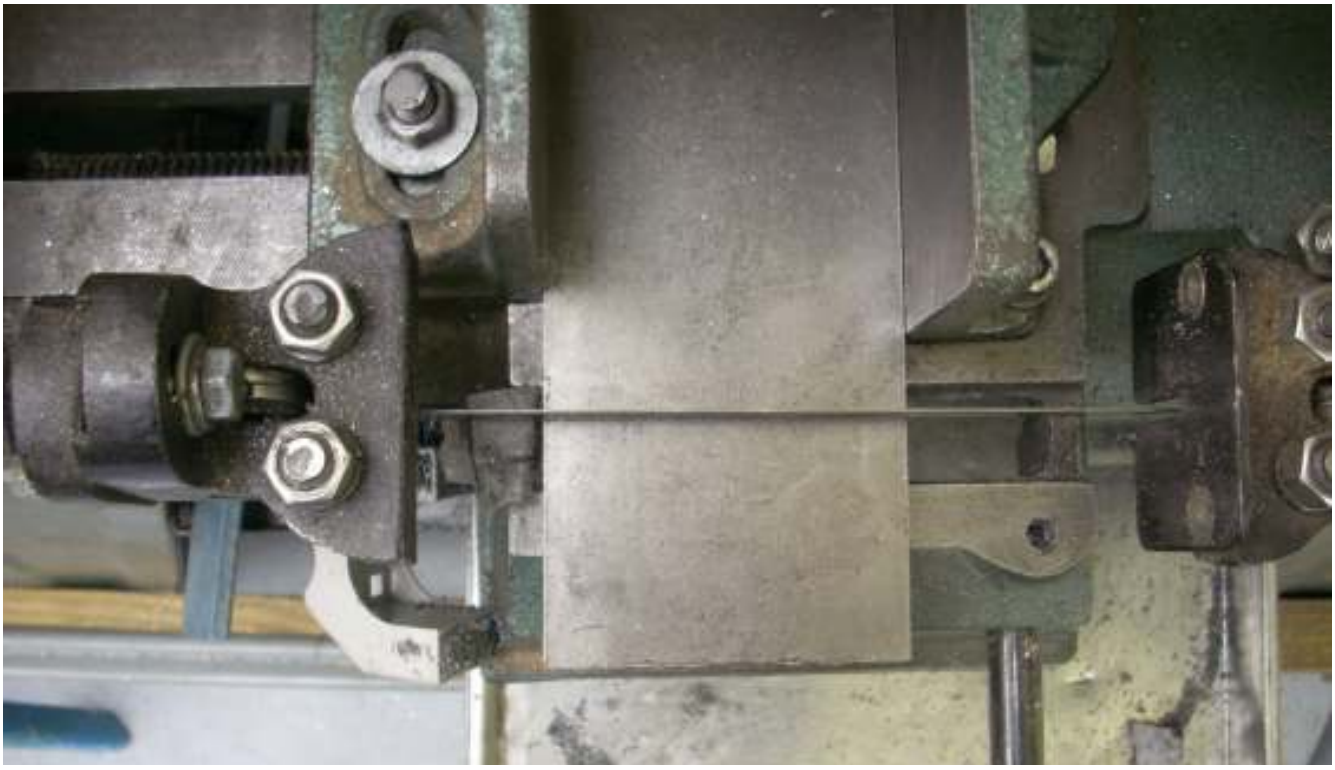


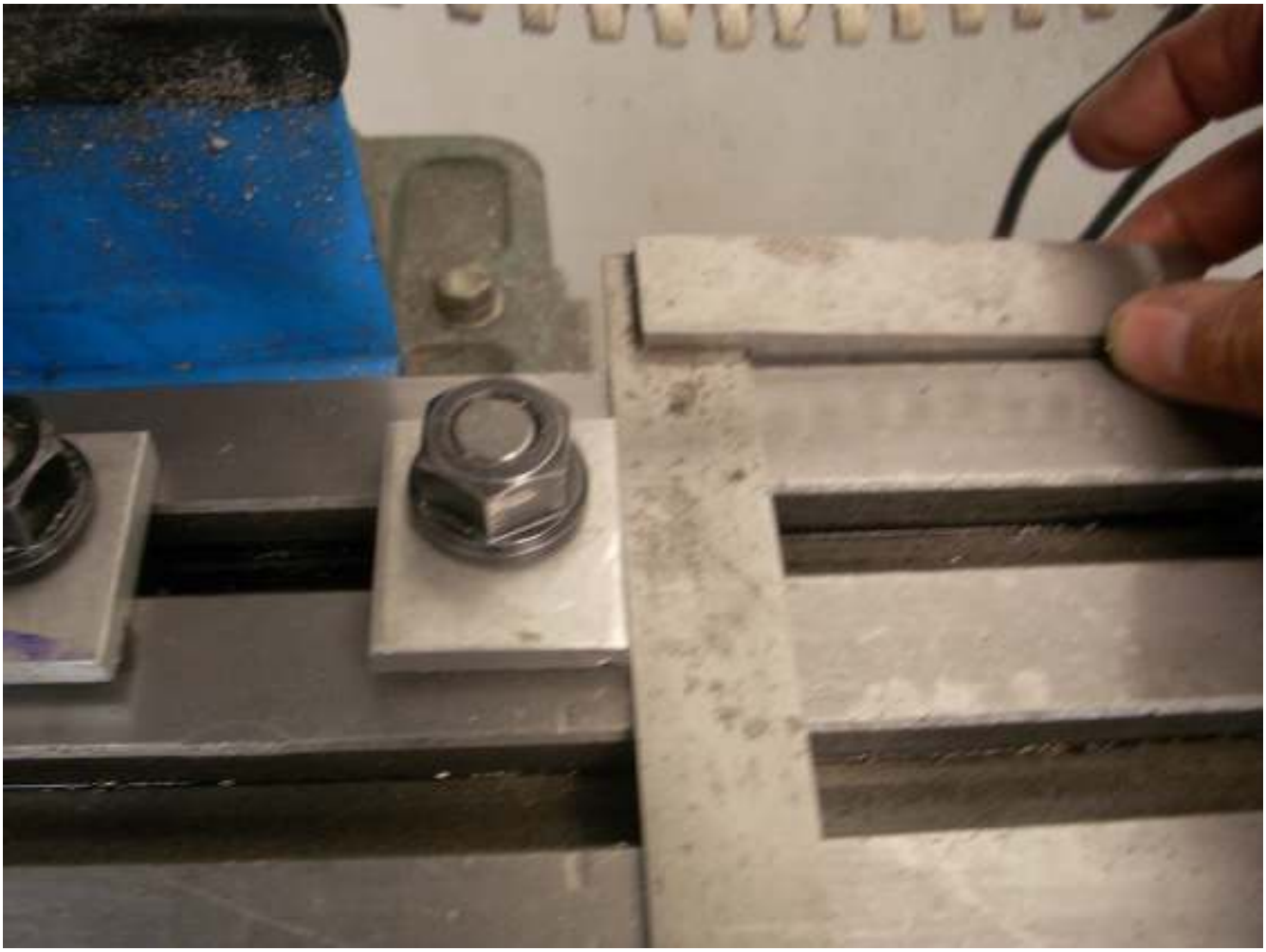
I've done a few of these now and am actually getting good at it. The task was to attach a CRS plate to the casting with a lot of countersunk screws. This plate is the ways that the table rides on for horizontal motion.

Gingery calls for a plate ¼" x 3" x 10" but my supplier only had 3/8" x 3" x 10". This will not be a problem. I just have to remember to modify the cross slide to accept 3/8" rather than ¼".

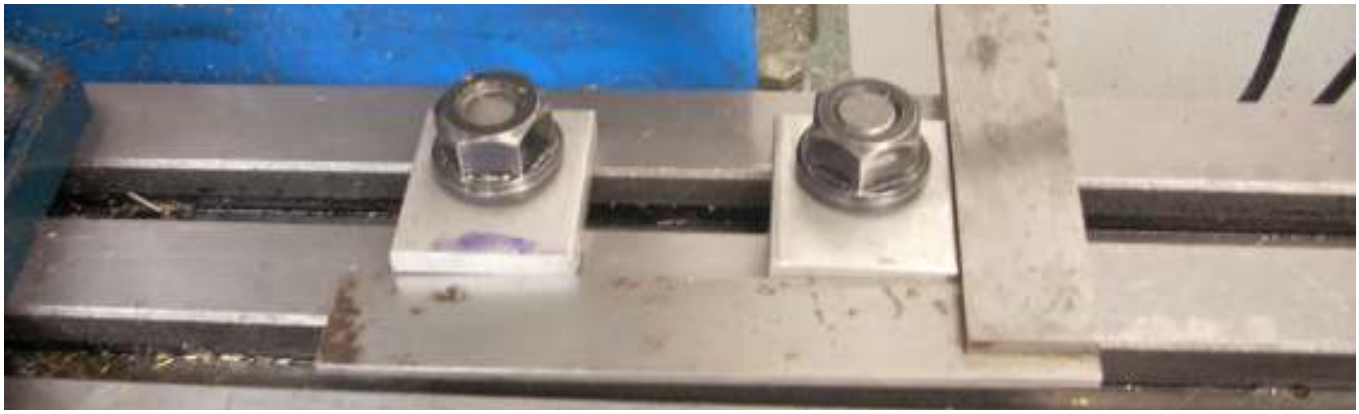


The first step is to cut the plate to a little over 10”. I did this on my horizontal/vertical bandsaw with the stock laying flat. It takes longer to cut through but it turns out closer to square this way. If you look close, you will see a chunk of paraffin wax parked to the left of the plate. The wax lubricates the blade just before it reaches the stock.

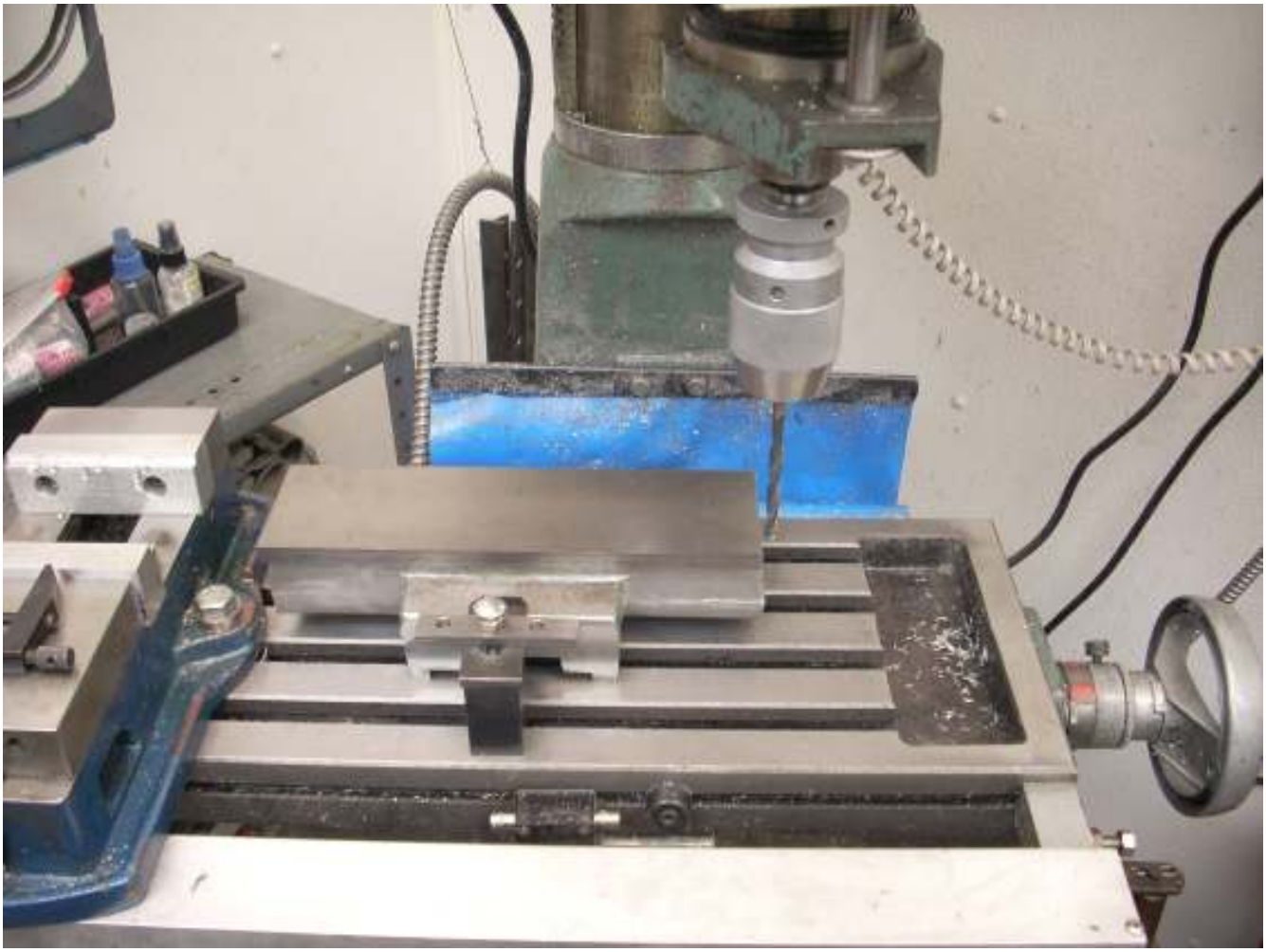
The plate was then put in my mill vise and the ends squared up by side milling with my 5/8” end mill. The overall length was not that critical and it ended up being 1/16” over.



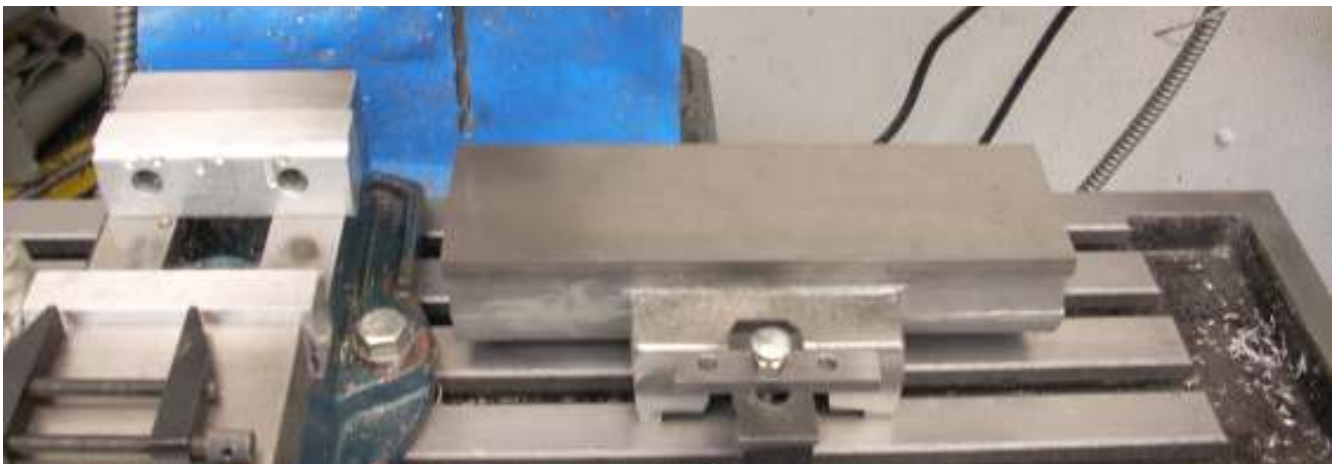
In preparation for drilling a lot of holes in the cross slide casting, I put down two pads on my mill table. Their location was dictated by putting down the casting and being sure that the pads contact machined surface. I then used a square to get the first pad approximately square.



I then used the square to align the second pad's vertical face to the first pad. This minimizes how much material I must remove as I side mill. After milling these vertical faces, I am left with precision stops aligned with the X axis.

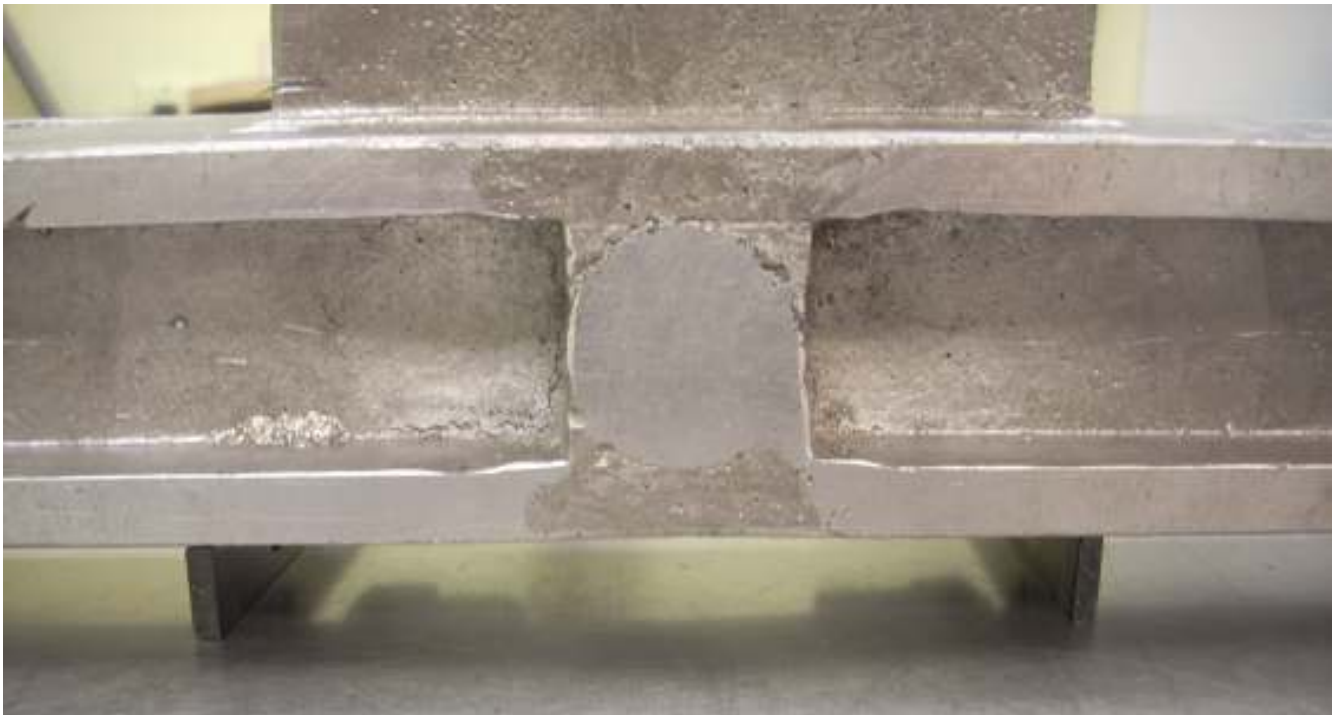


The next step is to put down the casting with plate and test that I can reach the entire surface with my drill. Note that my head has been rotated to the right and therefore has no trouble reaching the front right corner of the plate.

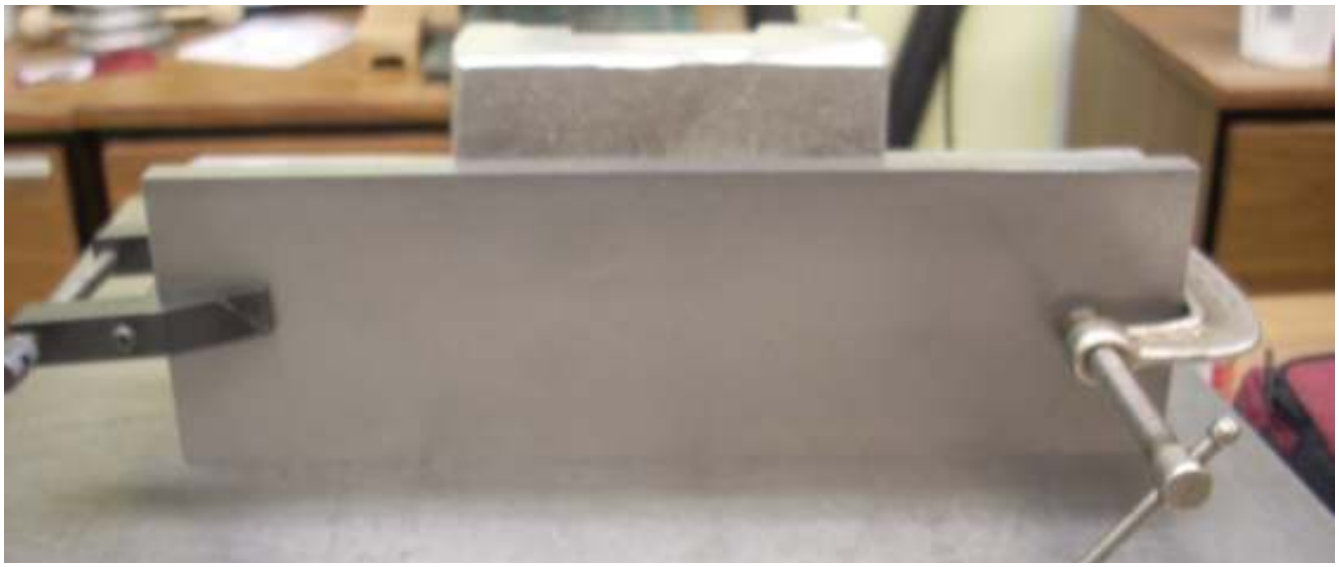


I can also reach the back left corner. Best to test this now rather than half way through machining.

The casting is gently held in place with a small clamp and also firmly bedded both on the table and the two stops. I need to locate the centerline of each pad. This was easily done with a spud mounted in my drill chuck and my DRO. Once the plate is put down on the casting, it will be hard to see these pads and find their centerline. I just recorded these numbers for later use.

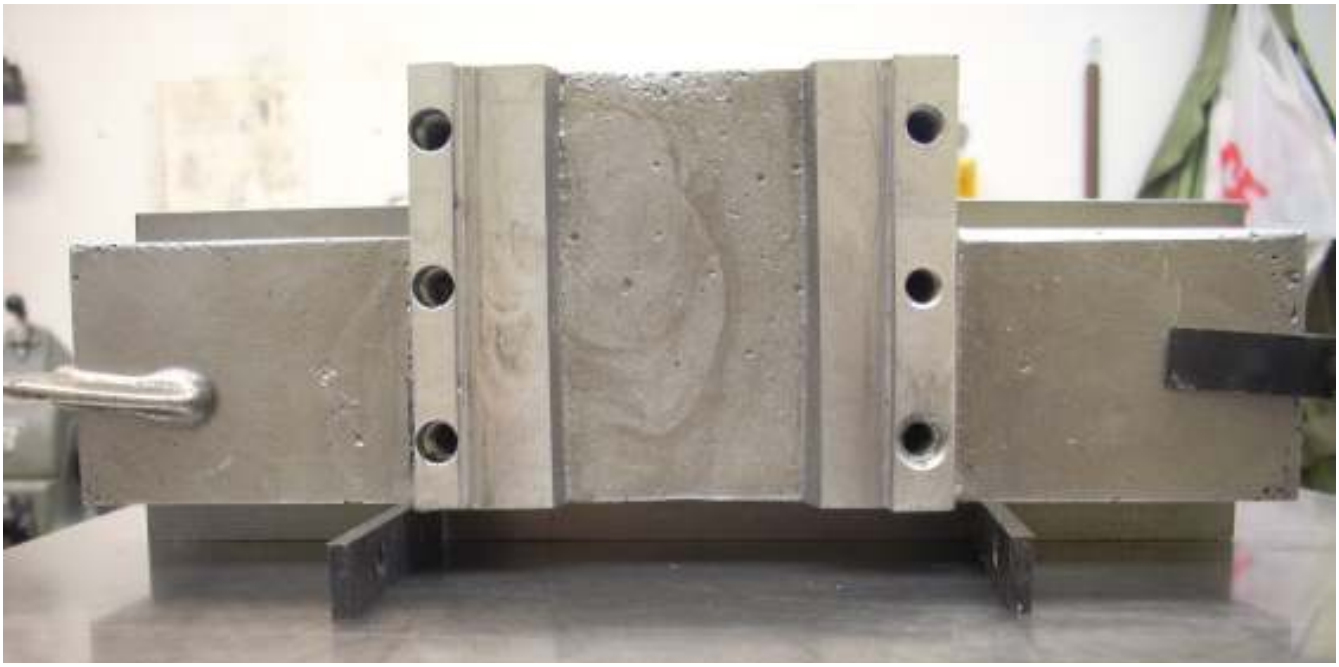


It is now time to align the plate to the casting. The lip of the casting must be ½" beyond the pad. I first put the casting on ½" parallels. I am working on a surface plate here.



The plate is then positioned on the surface plate and roughly centered on the casting. The surface plate is dead flat, the parallels are of equal height, and the plate is square. The result should be a plate that is aligned with the casting.

Narrow clamps were used so they would fit into the slots on my mill table as you will see later.



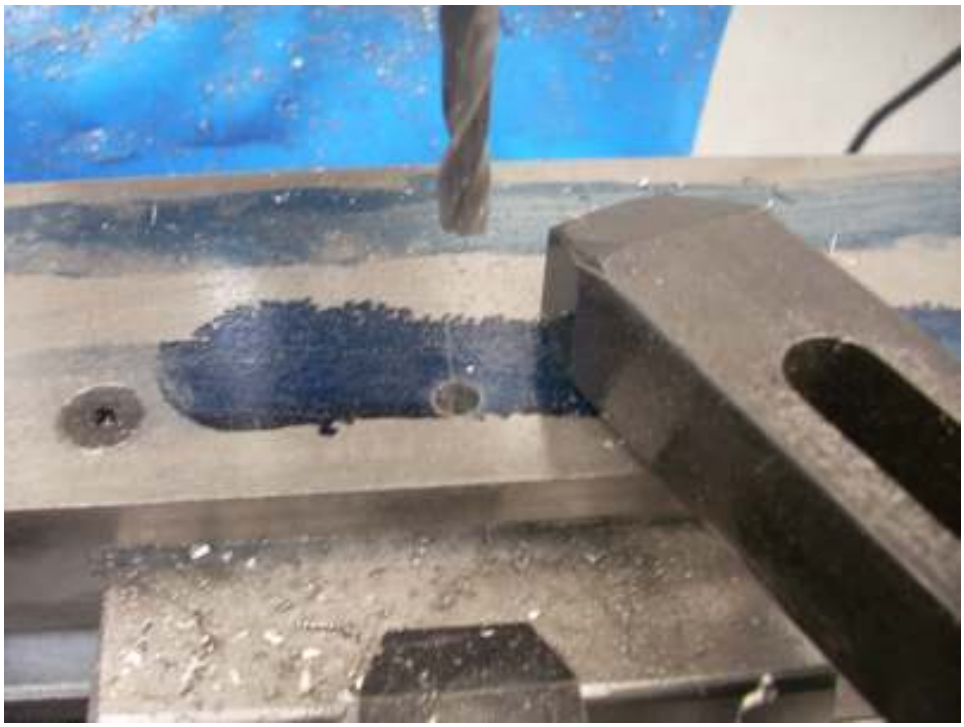
Here is the back side. The parallels are in contact with my “primary reference 2” as well as the surface plate. The 3” CRS plate is also in contact with my surface plate. As long as all surfaces are clean, I am insured that the edge of the 3” plate is parallel with my casting.

It took a few tries to get the clamps in the right position, but the casting and plate are now secured to the table. The casting has been secured with the reference pads on the back and the small clamp on the front. The plate and casting are secured with the large clamp seen on the right. Part way through the drilling sequence I will have to reposition the large clamp but nothing will move because the small clamp is not disturbed.

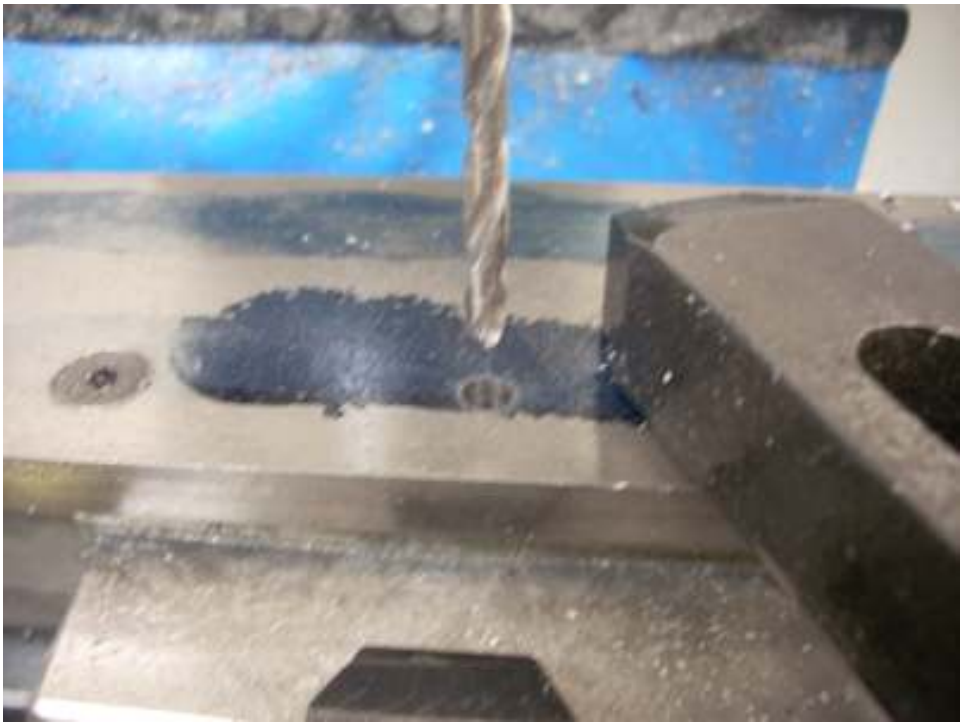
I dialed in my first centerline value and then marked out the X axis location of all holes. Having a DRO make this work go faster but that is no guarantee that I will not drill a hole *exactly* 1.000” off. I've done it. The layout lines are a good sanity check.

The left clamp interfered with the drill chuck so I started with the second hole from the left.

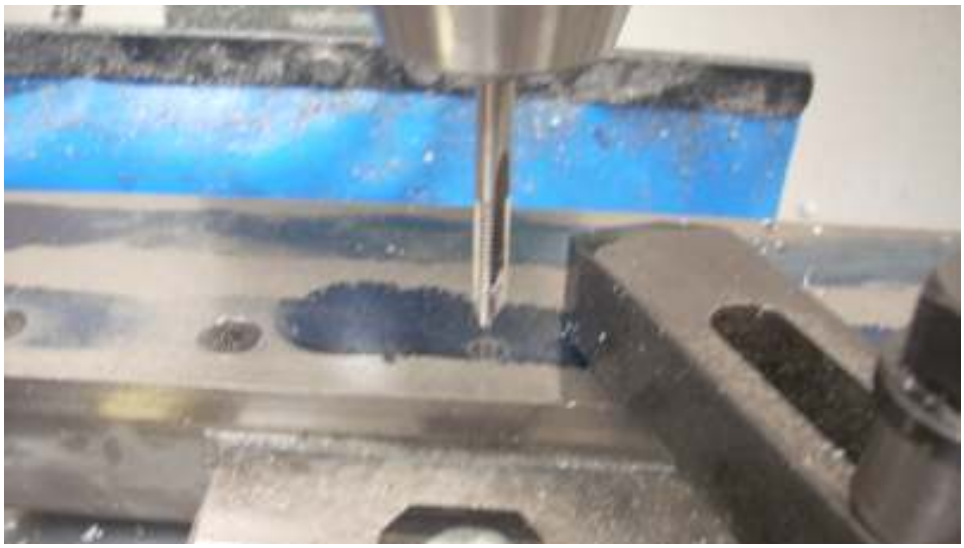
The first step is to use my ¼” center drill.



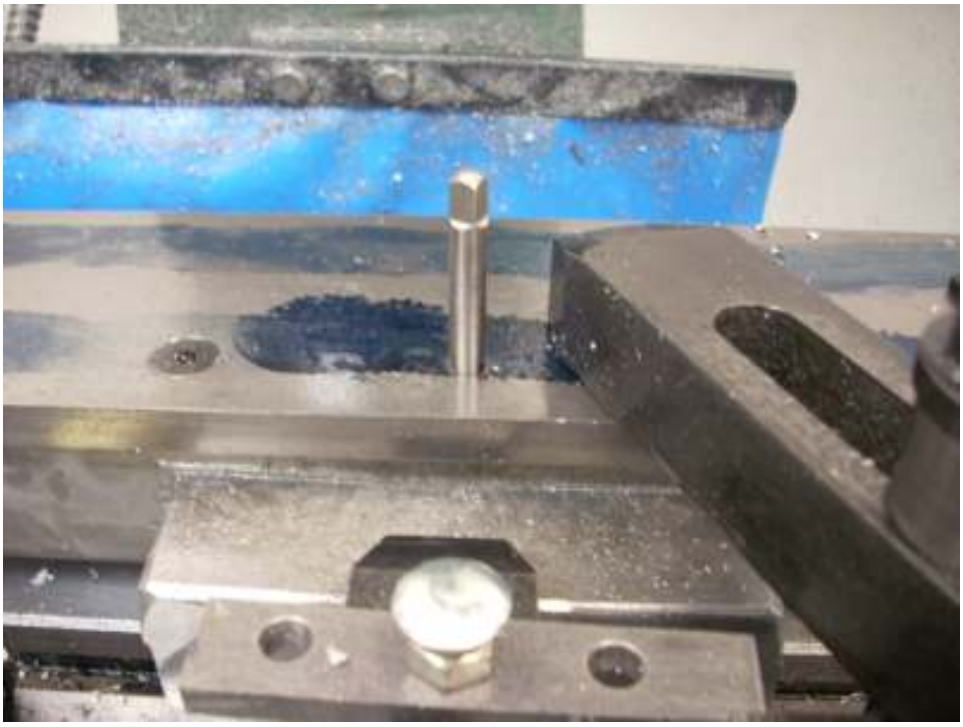
I then went through the 3/8” steel plate with my clearance drill.



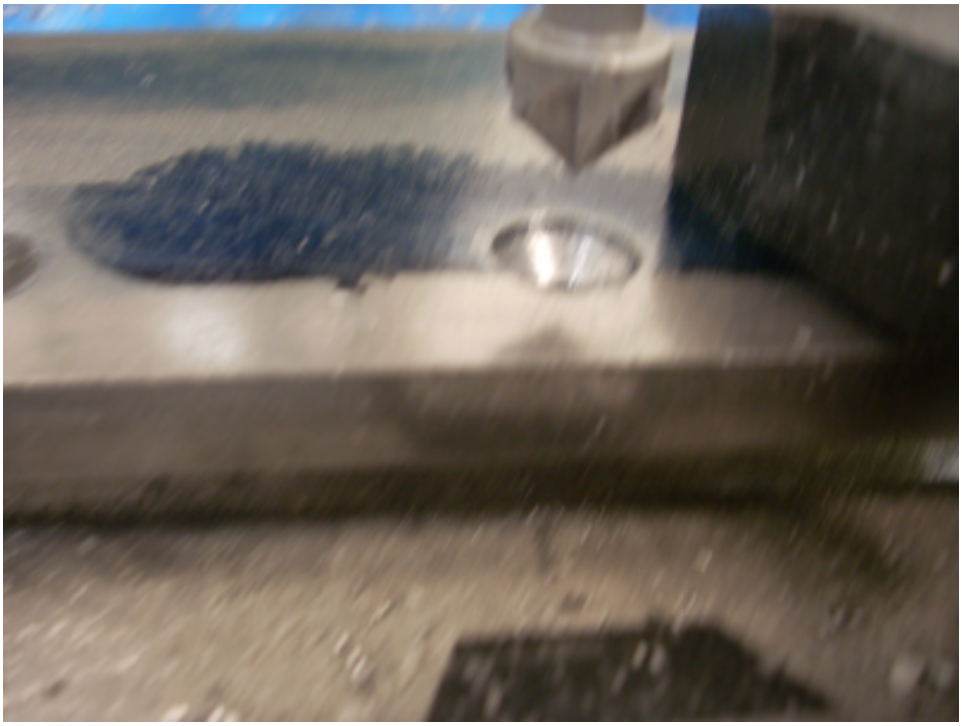
Using my tap drill, I went down 1.3” to give plenty of room for the shavings that will shoot out the front of my spiral point tap.



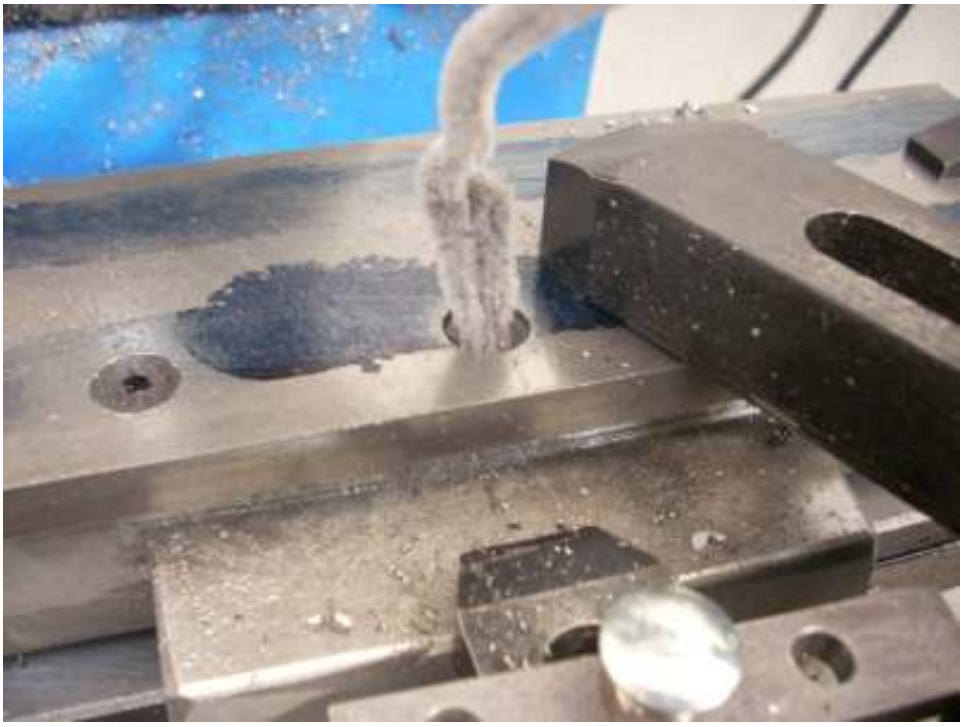
Next my spiral point tap is placed in the drill chuck. Cutting fluid is generously applied to the hole and to the tap. The mill is brought up to full speed and then power is cut. I then plunge the tap into the hole. It was a bit unsettling the first time I tried this but have since done it dozens of time without any problem. It is essential that you use plenty of cutting fluid and a sharp tap. It is also essential that you don't bottom out the tap since that could cause the tap to break or the threads to strip out.



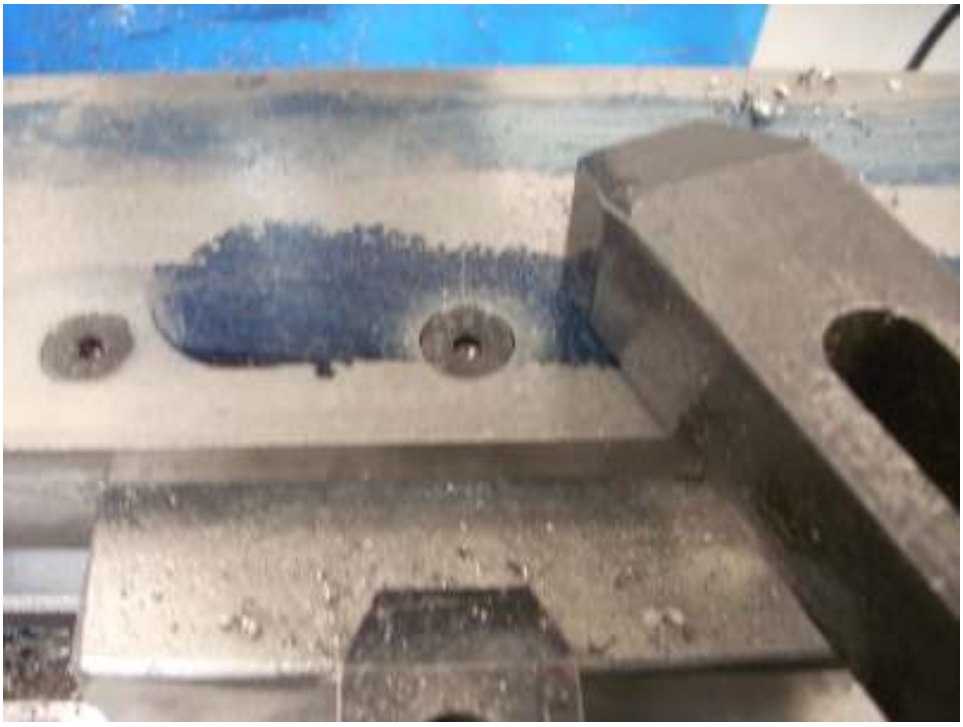
I was able to consistently get the tap to go all the way in without having to advance it the rest of the way by hand. A small closed end wrench was then used to back out the tap.



The next operation was to countersunk the hole. I used to do this with the same technique as employed with the tap but now just do it under power with lots of cutting fluid. It was a little rough on the countersink but all holes came out fine. Lots of cutting fluid used.

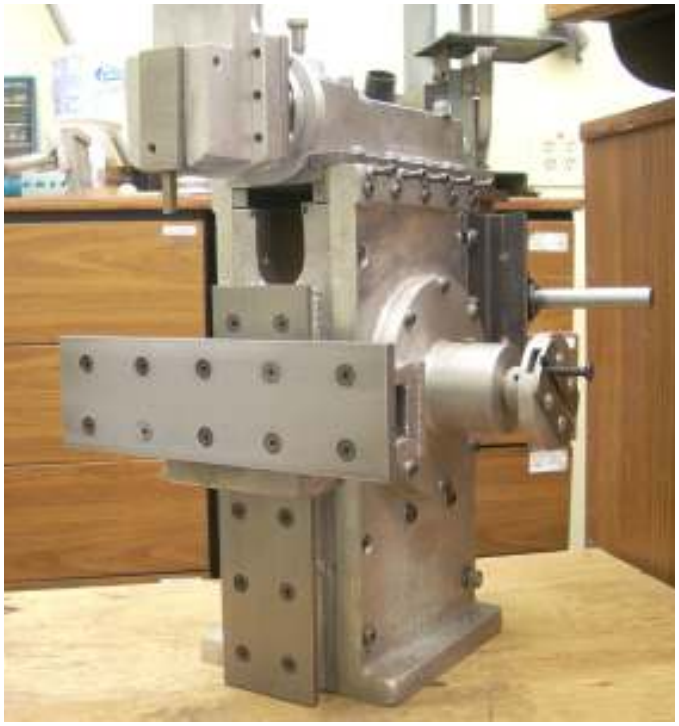


A fat pipe cleaner was used to remove swarf from the threads. Some swarf has been jammed into the bottom of the hole but it is harmless



The screw is installed and I'm ready to start the next hole.

With all of these drills, tap, and countersink, plus the two depths, it is easy to get confused. I organize all of these tools in my tray which is built into my X axis power feed. As you can see, I have a pocket reserved for my clearance drill and another for my pilot drill. The rest go in the middle. Mixing up those two drills can sure ruin your day.



The cross slide now joins the other finished parts on the shaper.

The next part to me machined is the cross slide. I have the casting in hand but that is for another day.

By the way, ever wonder about my photographic equipment? I use a Nikon Coolpix® digital camera that I picked up at Target for $85. It is protected from the grease and swarf in my shop with this fancy protective case:

It was made by taking a snack size Ziploc® plastic bag and cutting a hole for the camera lens. I've used this reliable camera case for over a year.

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