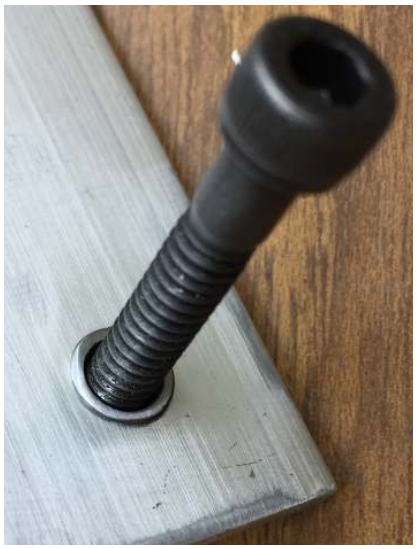
An Experimental Threaded Insert, version 1

By R. G. Sparber



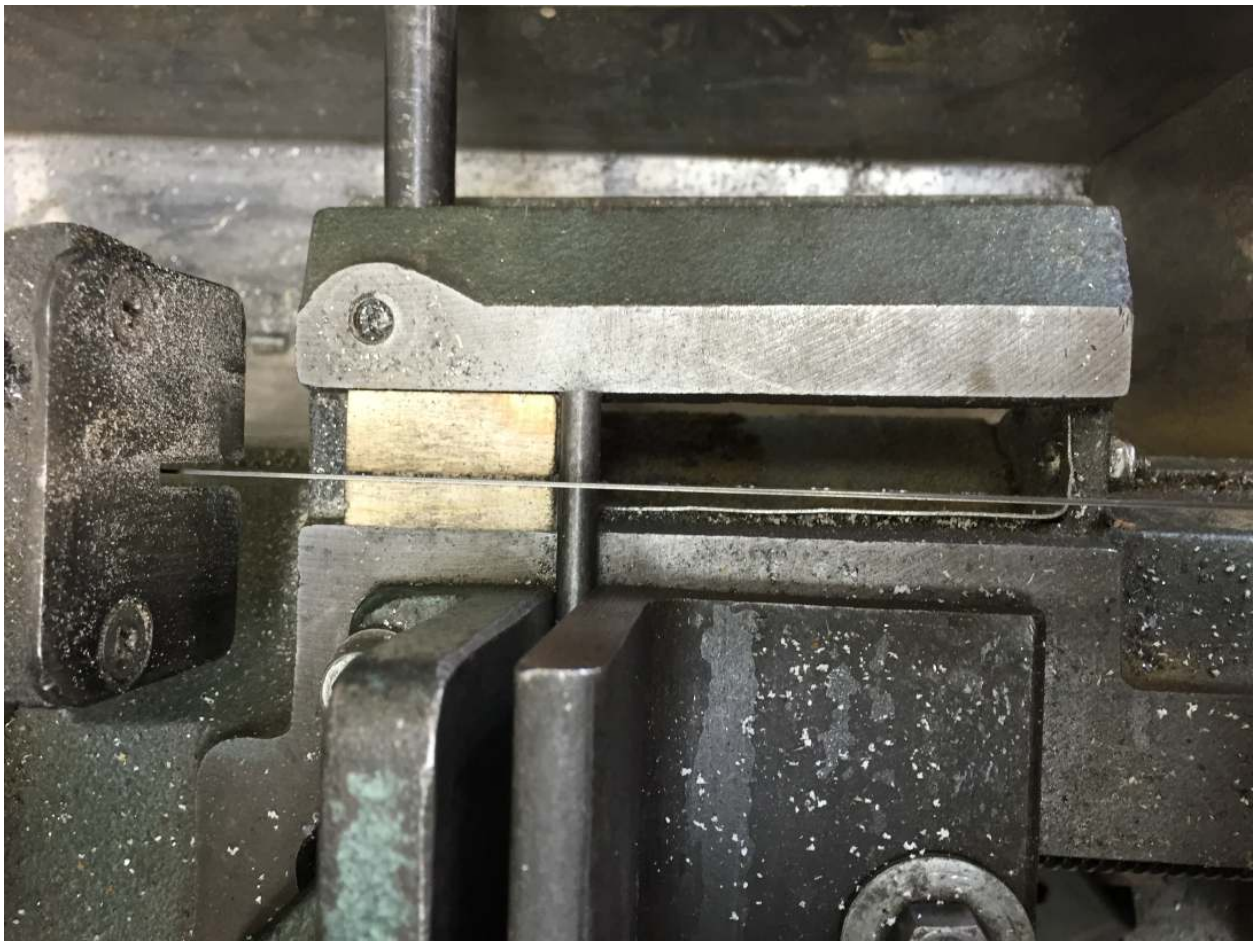
With tools commonly found in a metalworking shop, it is possible to make your own custom threaded inserts. The one shown here fits a ¼" hole and accepts a 10-24 bolt. It is designed to fit through 1/8" thick plate.

The dimensions were mostly figured out by experimentation. I will explain what I did so you can work out how to make these fasteners in any size you like.

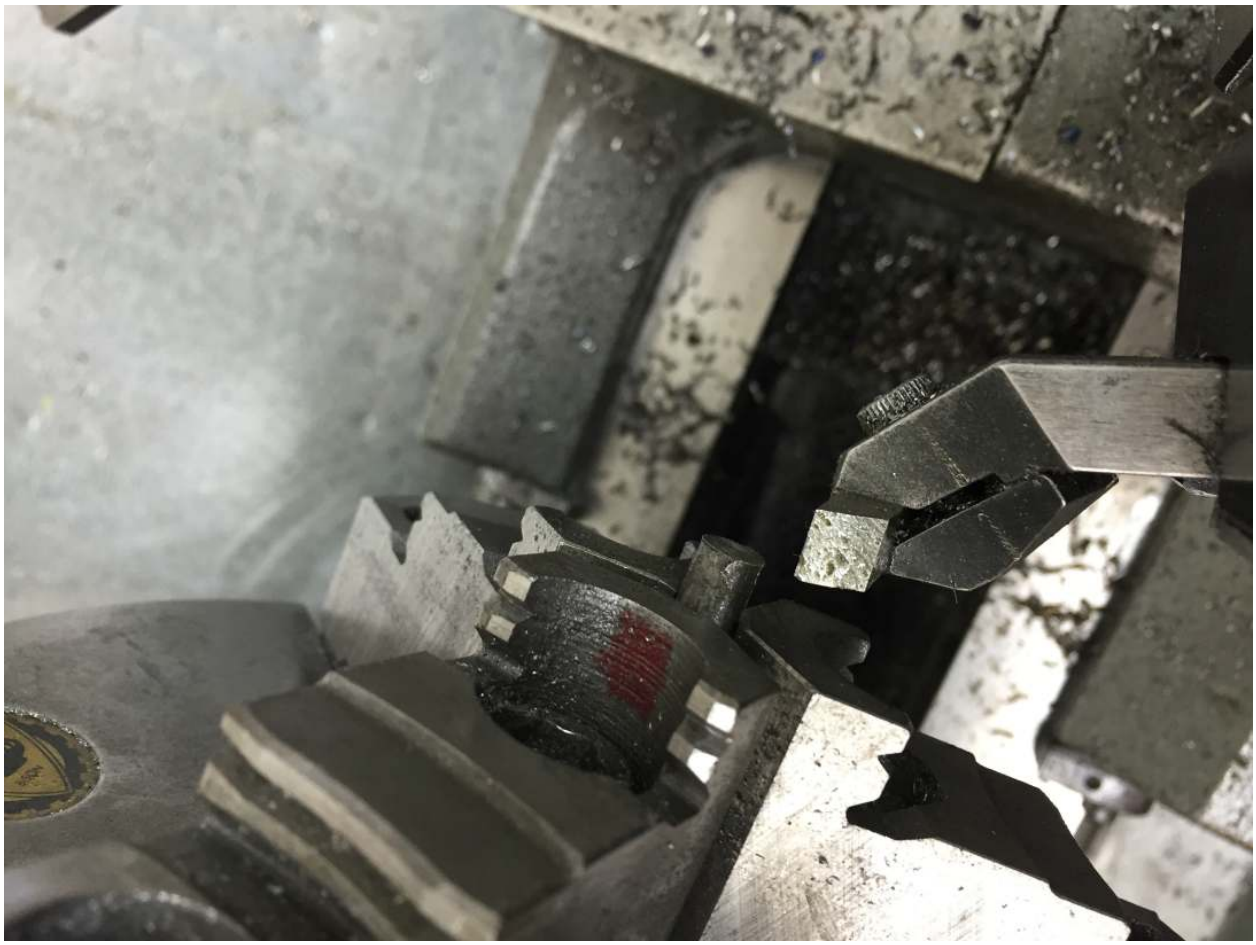
Here is a store bought version:

http://catalog.pemnet.com/viewitems/straight-shank-insert/straight-shank-threaded-insert-unified

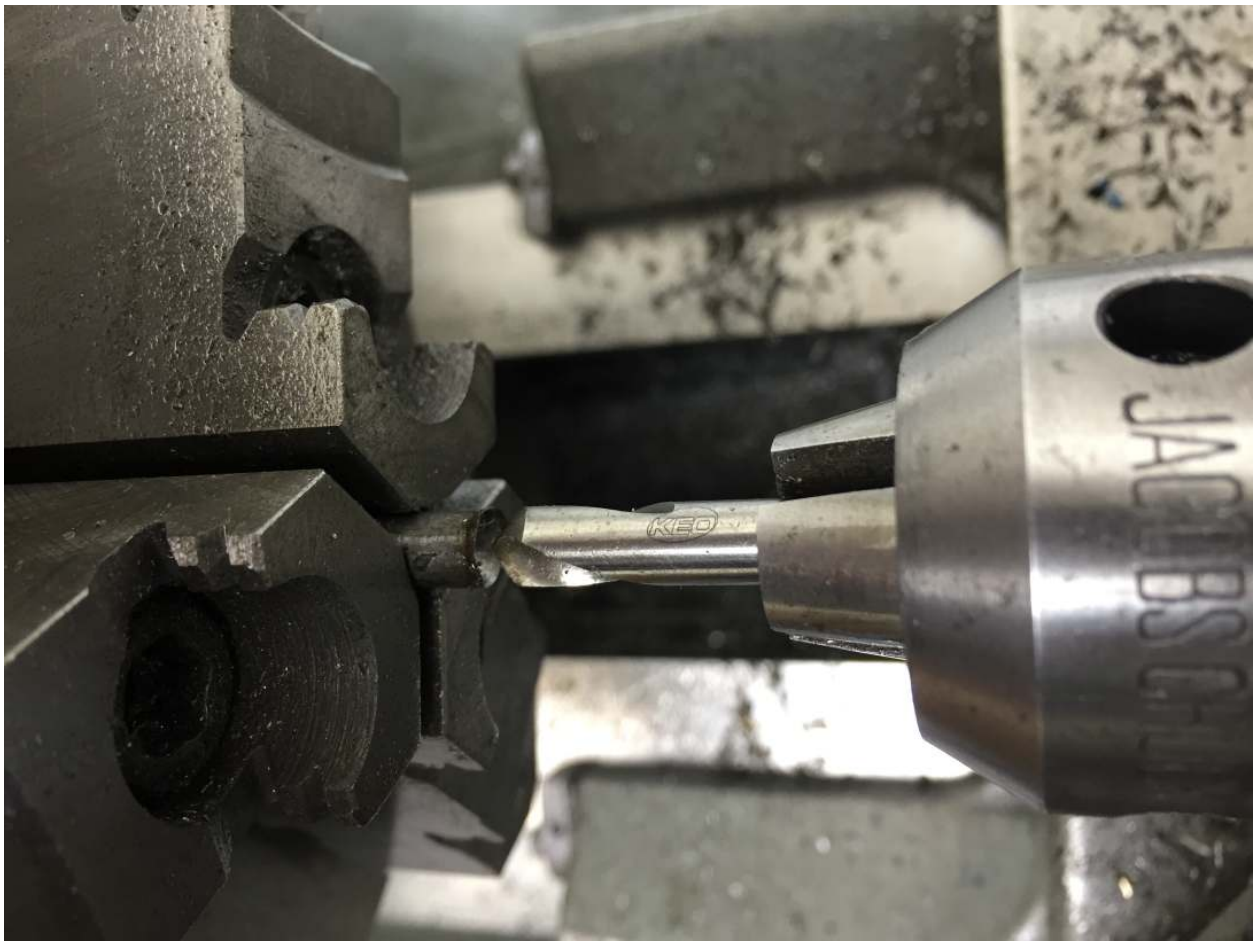
[1] You are free to distribute this article but not to change it.



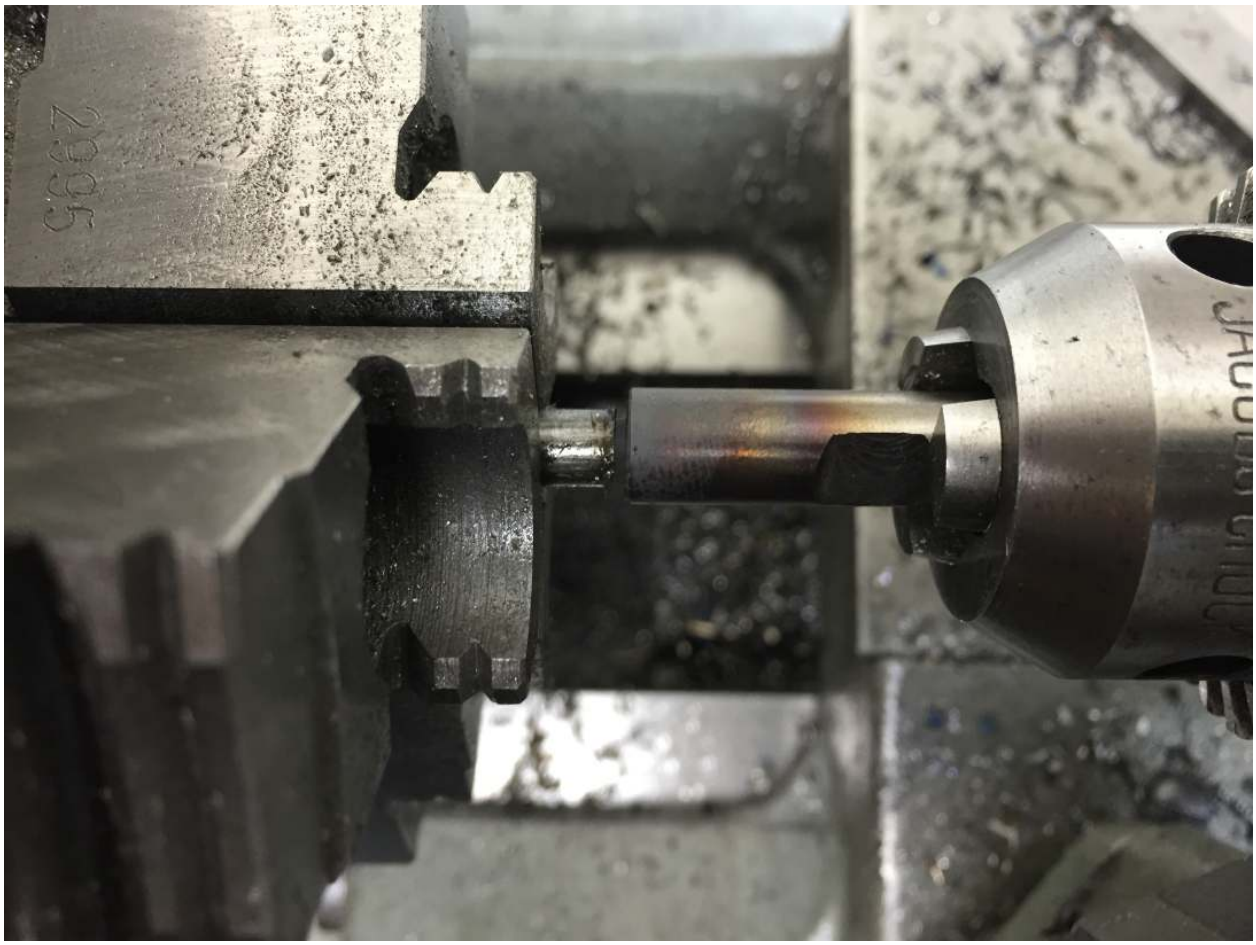
I started by cutting off a 0.55" length of ¼" CRS. This gives 0.05" to square up the end and still have ½" for the fastener.



Then I mounted the blank in my lathe with about ¼" sticking out. The end was faced off to make it square.



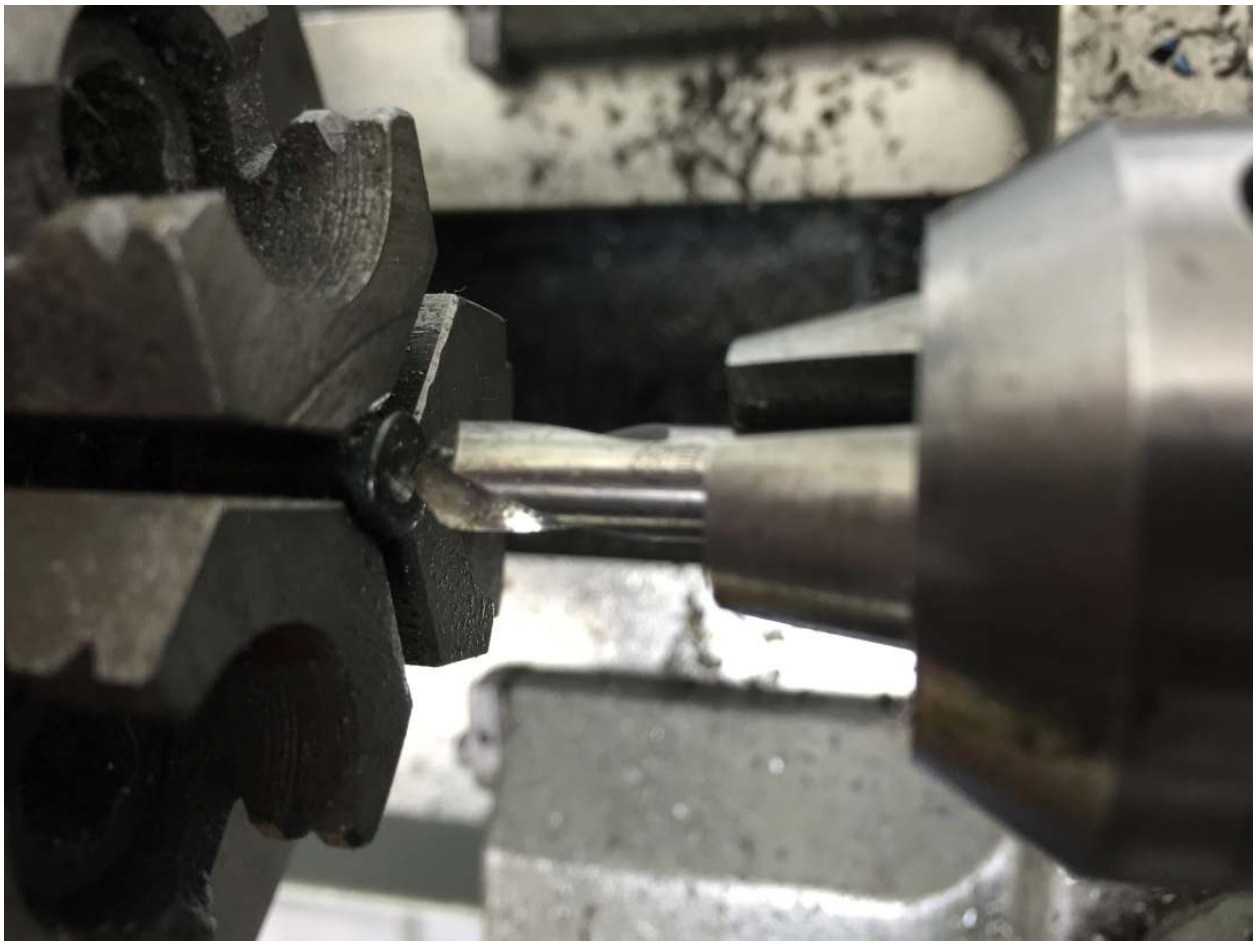
I used a ¼" spotting drill to form a cone shape hole. Note that this cone extends all the way out to the perimeter of the rod.



Using the back end of a broken end mill, I friction formed a lip. This was done with the lathe running at about 2000 RPM. I applied pressure until sparks started to fly. Then I applied pressure for about another 5 seconds. Be careful, the end mill is hot.

A word of warning at this point. If you accidently used water hardened drill rod for your stock, the lip will form nicely. However, any attempt to cut the lip after it cools will cause the cutter to be damaged. Learned that one the hard way. Thankfully, it is easy to re-sharpen my tangential cutter.

When done correctly, the lip is uniform and smooth. The center doesn't matter.



I again used my spotting drill to cut a new cone shaped hole. This time it is shallow. It is essential that we do this step to insure that the holes being drilled next are centered in the rod.

This fastener is to be fit through an 1/8" plate. I found that having a "crush zone" of ¼" worked. More on the crush zone later. For now, it means that the #2 drill goes in ¼".

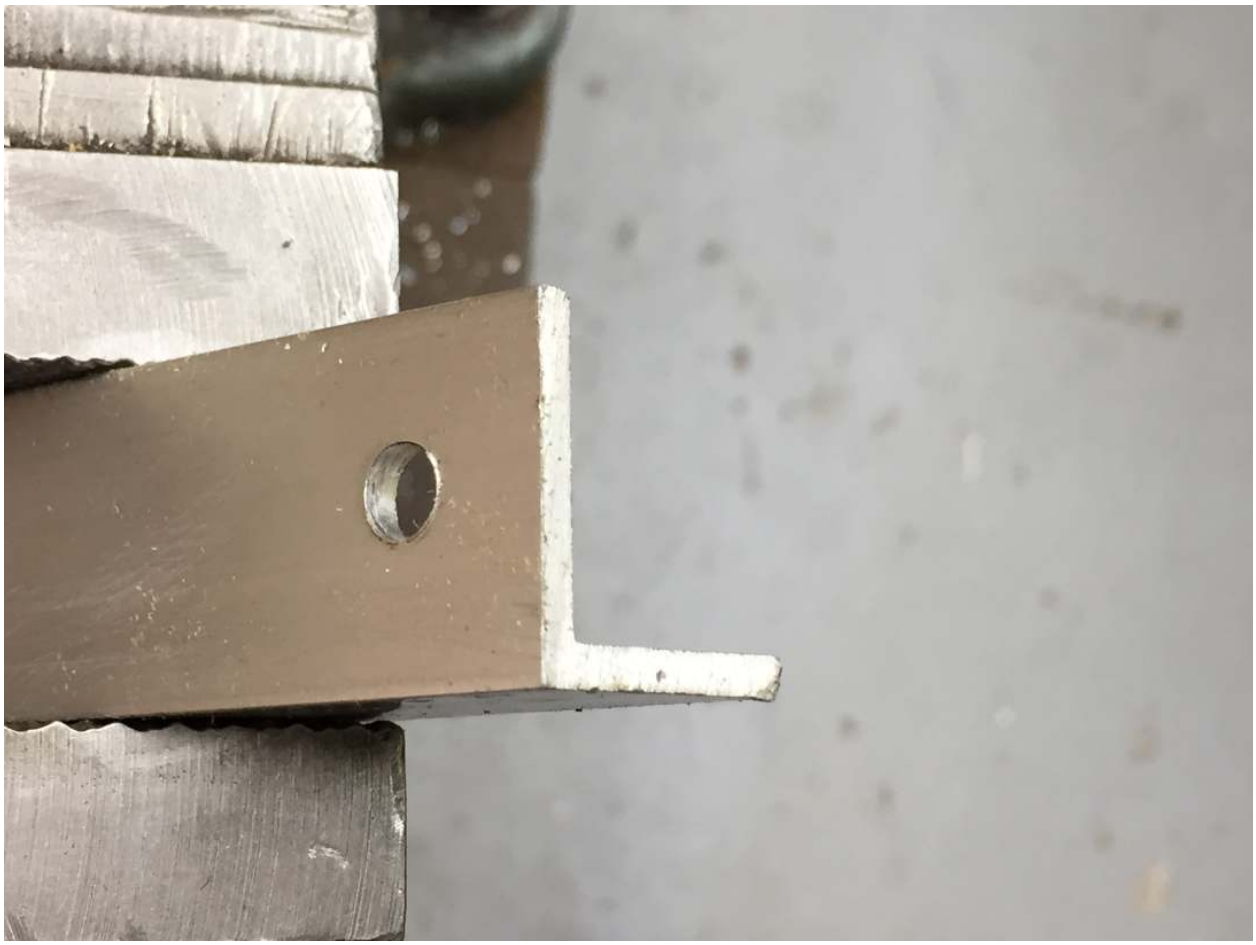
Using a #2 drill, I fed in ¼" as measured from the lip of the drill. The rod is about 0.248" in diameter and this drill is 0.221". This gives us a wall thickness of around $\frac{0.248-0.221}{2} = 0.013"$. The goal is to form as thin a wall as possible without breaking through. When I used a #1 drill, the wall thickness was around 0.010" and I broke through the side of the hole.

I then drilled through with a 10-24 tap drill, a #25.

The resulting part has a nice lip around the top to prevent the fastener from falling through the hole drilled in the plate. Then there is a crush zone of ¼" that will deform to grip the plate. Further in is a hole ready to be tapped 10-24.

Since the tap hole goes all the way through the stock, it is easy to tap without having chips build up in the bottom of the hole.

After tapping, the part was removed and deburred. A small bevel was sanded into the perimeter to make it easier to fit into the plate.



Time to try out the fastener. I drilled a ¼" hole in a piece of 1/8" extruded aluminum angle.

The goal is to pull up on the threaded part of the fastener such that the crush zone will expand and lock it into the plate. The crush force comes from a Socket Head Cap Screw with a nut on the end. It is passed through a piece of 1/8" steel strap drilled for a close fit to the screw.

The allen key holds the bolt from turning while the nut is tightened down. The idea is to apply force to the fastener without having it rotate. As long as the crush zone's wall thickness is not excessive, it doesn't take that much force. Too much force can cause the threaded section to tear out.

The front of the fastener looks a bit ratty in this close up. But with a little time on my buffing wheel, did polish up nicely.

The backside of the plate shows another story. The crush zone did not form a uniform lip. One side is very solid but I don't see any lip on the other side. However, when I screw in a bolt, it sure feels secure.

Commercially made inserts often have slots cut in their flanks to help guide the crush zone as it opens. That is an area of future experimentation.

Acknowledgments

Thanks to Dave Kellogg for sending me the URL.

I welcome your comments and questions.

If you wish to be contacted each time I publish an article, email me with just "Article Alias" in the subject line.

Rick Sparber
Rgsparber.ha@gmail.com
Rick.Sparber.org