Another Diamond Toolholder Adapter, version 1.3

By R. G. Sparber

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Another? Where is the first one?

In Machinist's Workshop, issue August/September 2017 pages 22 and 23 is a brilliant article written by R.F. Pierce. It presents an adapter design that solves a problem I didn't even know I had.

Almost all turning and facing done on my lathe is with a left hand or right hand Diamond tool. Occasionally I use a boring bar. I also use a BXB Quick Change Tool Post (QCTP).

When using the Diamond Toolholder, I must unbolt the QCTP, turn it about 12° and then tighten the bolt. This puts the cutter at the correct angle for turning and facing.

When I want to install a boring bar, the QCTP face must be set parallel to the center of rotation of the lathe. More fiddling with the bolt. This puts the boring bar perpendicular to the face of the chuck.

Until reading the article, it didn't occur to me that this constant unbolting and bolting was counter to the Q in QCTP!

R.F. Pierce presented an adapter that held the Diamond

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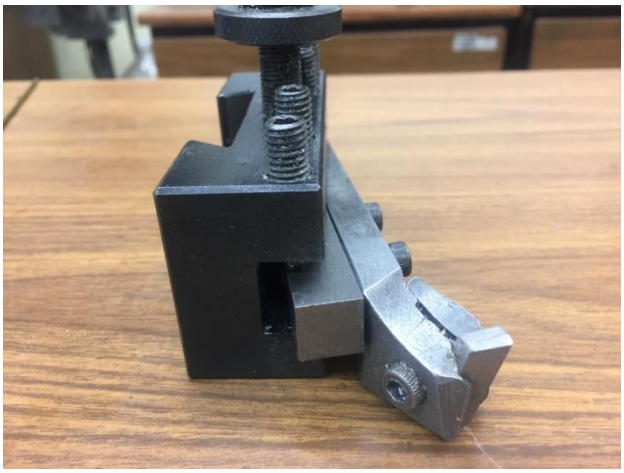
Toolholder at 11° while the QCTP was set true. Elegant solution! It inspired me to find another way to do the same thing. This is not a cut against the author, just the way my mind works.

My design requires no precision machining, and has an adjustable angle.



A sawed bar of ½" × ½" CRS is attached to the Diamond Toolholder. In this way the set screw furthest from the cutter locks directly to the end of the holder. The set screw closest to the cutter locks to the bar. I'll talk more about sawing it later.

I first set the cutter to the correct angle and tightened the set screw furthest from the cutter. This was done with the QCTP set true. Then I slid the CRS bar between the Quick Change Tool Holder (QCTH) and the Diamond Toolholder. Pushed it in as far as it would go and then locked it in place with the front two set screws.

Time to match drill. The Diamond Toolholder, CRS bar, and the QCTH as an assembly was moved to my drill press. Using a digital protractor, I set the flank of the Diamond Toolholder level. Then I used my ¼" spotting drill to cut two cone shaped holes. The exact hole placement was not critical. I held up a 10-24 socket head screw to be sure nothing interfered.

Using a few drops of cutting oil, drilling these divots was easy. Then I changed to a #25 drill. This is the tap drill size for a 10-24 screw. At first it drilled normally but quickly started to have trouble. The chips were tiny and hot. A quick trip to my Drill Doctor and I had a new, sharp edge. More cutting oil and I made it about half way down the first hole. Re-sharpened, and went all the way through the shank. Re-sharpened again and easily went through the CRS. The manufacturer sure uses some hard steel! Went through the same process for the second hole. Then I took the assembly apart and opened out the holes in the shank with a #9 drill. It took the same amount of re-sharpening.

The CRS was then tapped 10-24.

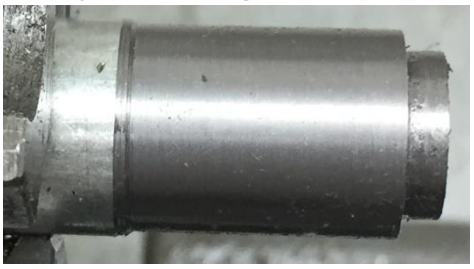
Since I match drilled, the mating holes are aligned even though their exact position is unknown.

After reassembly of the holder and bar, I ran my screws through. Since it was drilled in place, of course the parts all fit.

I can make small adjustments in the angle by loosening the set screws in the QCTH.

I chose to use 10-24 screws because going any larger didn't leave me a comfortable margin on the sides of the hole. If this wasn't strong enough, I planned to add 1/8" dowel pins. A trial cut in aluminum showed it was solid.

Here is a trial cut on steel. No visible chatter with a 0.002 inch deep cut which tells me the modified toolholder has not hurt my ability to take light cuts.



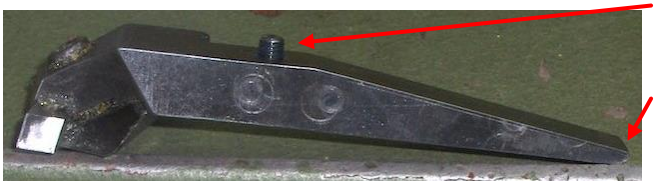
A few words about cutting the CRS bar. I first used Dykem on the surface. With a protractor, I marked a line at 12°. The exact angle is not that critical so ± 2° is fine. This cut is only to give clearance. I did not want a sharp point on it so the end of the resulting taper is about 1/8 inch thick.

Using my horizontal/vertical bandsaw vertically, I cut along the line about ½ inch. Then I removed the bar and changed to the horizontal mode.

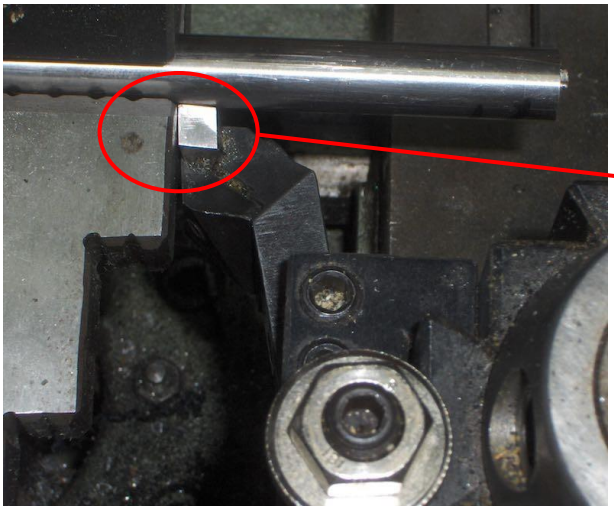
I then placed the blade back into its cut and clamped the part. You can see my blue extension jaws plus a small block of aluminum needed to secure the bar. In this position, the sawing went much faster than with the blade vertical and me pushing on the part.

When done, I cleaned up the saw cut on my belt sander just to make it look nice.

John Herrmann came up with a brilliant improvement: a fine adjust for the side clearance angles.



He added a set screw through the body of the tool holder. While pressing on the end of the holder and turning this screw, he can smoothly pivot the cutter to the desired angle. Then the Quick Change Tool Holder is tightened down.



Notice that the side clearance angles are perfectly equal. This would be extremely hard to do without John's fine adjust.

Acknowledgments

Thanks to R.F. Pierce and Machinist's Workshop for the inspiring article. Thanks to Dave Kellogg for catching one sloppy bit of writing and one typo. Thanks to John Herrmann for the improvement to the design.

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.

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