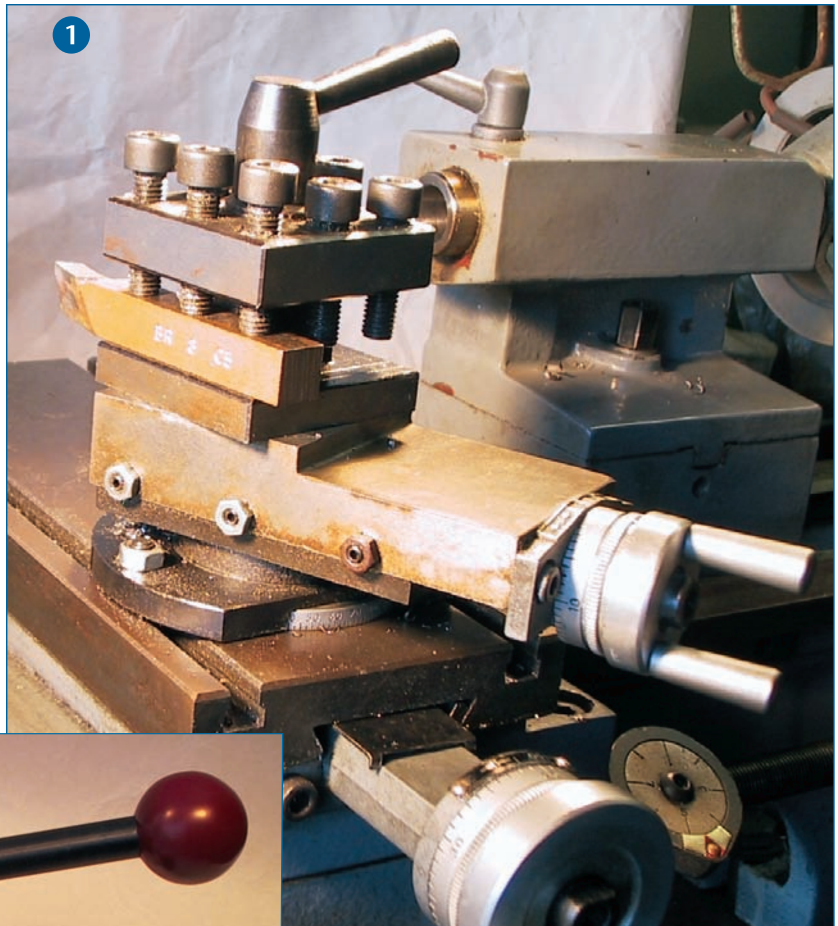
Adapting a Quick-change Tool Post to a 9" × 20" Lathe

by James F. Johnson

I have had my Jet 920 lathe for about 10 years now and have been quite happy with it at my "rank amateur" level…until I was visiting with the master machinist at a local factory. He was demonstrating his new $28,000 tool room lathe. It's clear "you get what you pay for" in the lathe world. The quick-change toolholder caught my eye, especially the micrometer height adjustment for the tool. My 920 has the standard toolholder as shown in *Photo 1*. To get the tool to the correct height, one must put shims under the tool. This involves several trials to get it just right. Using the screw adjust provided with the quick-change toolholder, this is a piece to cake!

I began to pore over my catalogs and searched the Internet for possibilities. The Phase II Model 250-100 tool post and holder set seemed to be about the right size and came close to fitting my pocketbook. It comes with the quick-change post, five toolholders, and a T-nut, which must be machined to fit your lathe. This caused me some pause, but I was willing to give it a try! *Photo 2* shows the post assembly and the T-nut.



The 920 Tool Post.

Two quick-change tool posts and T-nut.

Photo 3 shows the cross-feed of my 920 with the original tool post removed. I suspect this is the same in most 9" × 20" lathes on the market. It also shows the new T-nut for comparison. Clearly they did not have my lathe in mind!

The M8 × 1.25 screw on the 920 is about 2.25" high with a 3/4" high shoulder at the bottom. This screw is about 3/4" shorter than the 3" height of the new quick-change tool post! The hole through the quick-change tool post is .575". The outer diameter of the central cylinder is 1".

I weighed a lot of possibilities, including sending the quick-change set back and getting a refund. I finally came up with the idea of creating an "Adapter Bolt" that would fit the screw on the 920 cross-feed, and that fits the inside of the quick-change tool post.

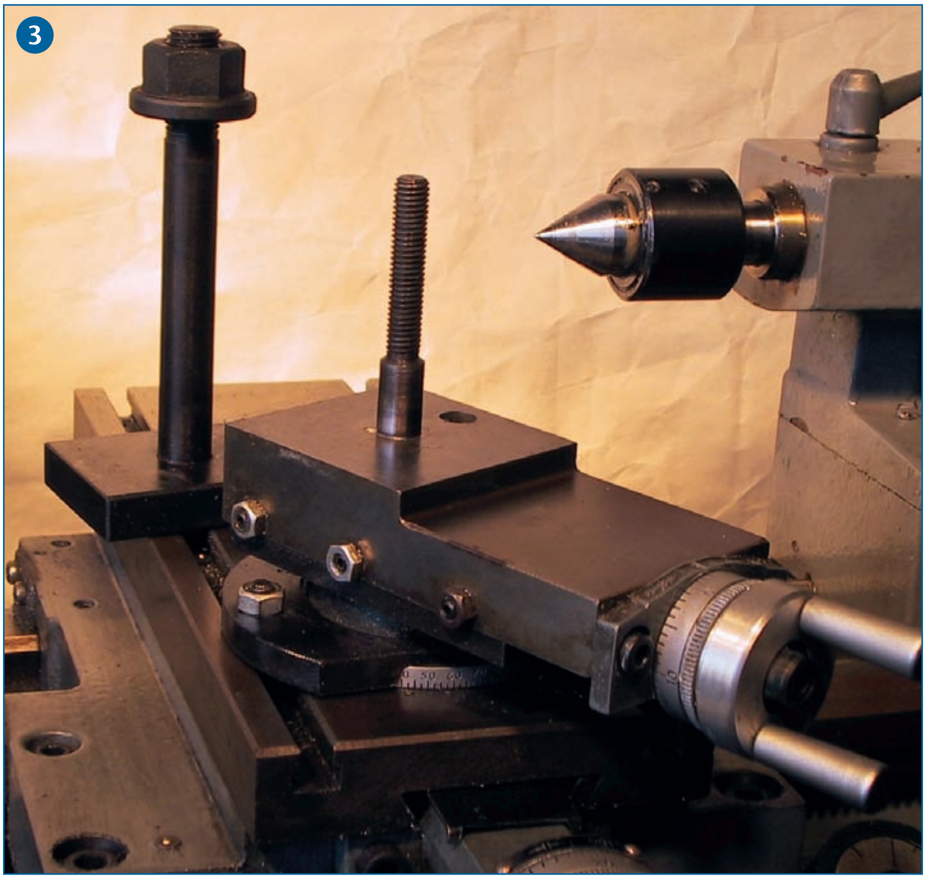
Detail 1 is a cross-section drawing of the adaptor that does the job. It has the added advantage that there are no modifications to the lathe, and the original post can still be used! For example, you can still use tools set up on the old tool post, but the change would not be as "quick."

I shopped the local metal supplier for a suitable remnant that would work. What I came home with was a piece of stainless steel with a 1" diameter and 8" long ($5). At least a 5" length is needed to allow about 2" above the bolt blank to allow chucking from either end. (I'm glad I thought of this ahead of time, as it was necessary to work from both ends!)

As with the original tool post, the adaptor bolt needs to be tightened down to hold the quick-change post at the desired orientation. Because I have a mill-drill machine, I chose to mill a 3/4" hex at the top, but you could also install a screw-in lever instead. The tightening method should not interfere with the quick-change lever that locks the toolholders in place.

Starting with the 5" blank, I first drilled a center-hole all the way through the blank. This hole needs to be smaller than the M8 tap drill that will be used later. Because my drills are shorter than 5", I had to drill from each end of the blank to the middle.

I next cut the hex head of the bolt. I used a 1" 5C collet and hex-shaped collet holder to hold the blank on the milling machine. I chucked the short (2") end of the blank in the collet holder and supported the long end by stacking metal and shims between the blank and the mill table and using hold downs on the collet holder and the long end. I used a 1/2" mill to cut the six faces of the bolt. I milled 1/8" off the diameter at each face to make the final 3/4" bolt-top. Since you have to break the setup six times (at least), it is a good idea to mill opposing faces and test with a wrench before proceeding to the next pair of faces.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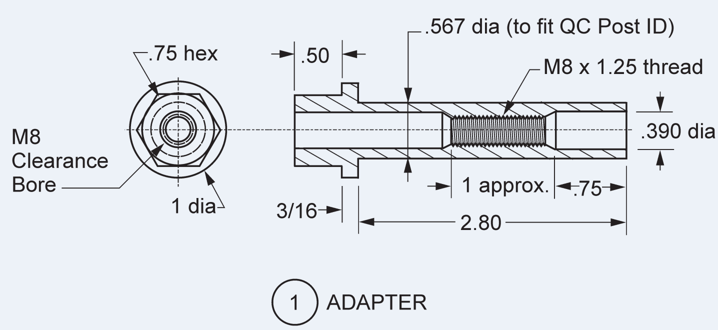
The 920 tool post mounting screw.



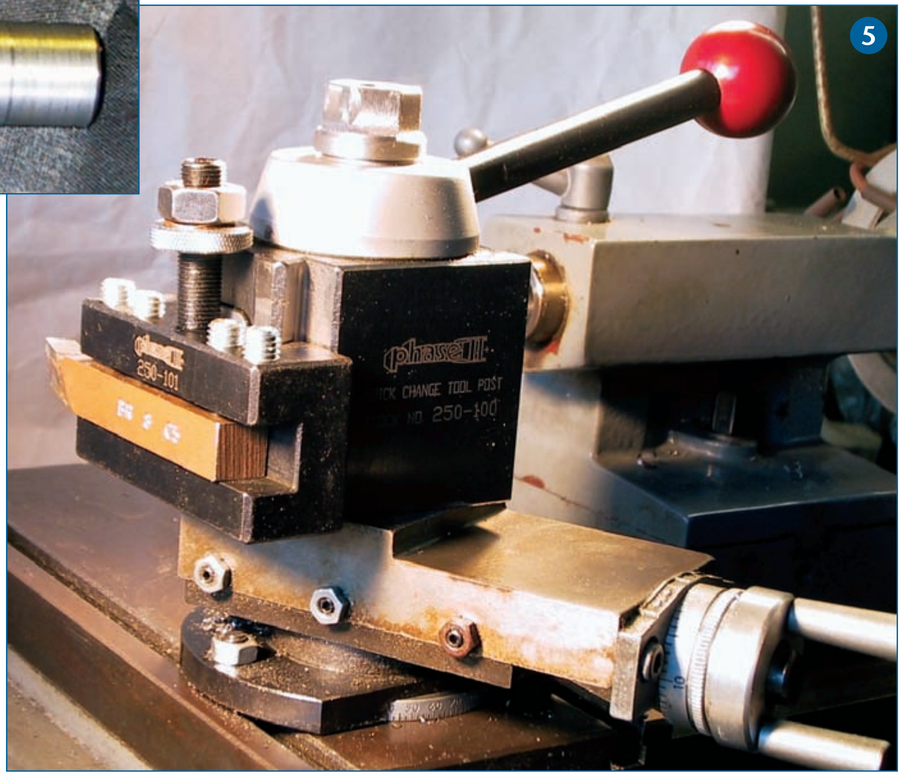
Back at the lathe, I prepared to make the internal threads on the adaptor. My confidence in cutting internal threads was low, so I chose to use an M8 × 1.25 tap. My tap only had about 1" of usable threads on it, but this is about twice the length of the thread on the original tool post nut, so this should be adequate. I used a 17/64" tap drill to enlarge the central hole to well past where the tap would reach. I next enlarged the tap hole to a .390" diameter to a depth of 3/4" from the bottom to clear the shoulder on the bottom of the tool post mounting screw.

The scariest part of the project is tapping the M8 × 1.25 threads. If you break off the tap, it's back to the metal store! Using the minimum torque on the tap wrench, I backed out the tap every turn or so, and cleaned out the chips. The idea is to drive the tap as far as possible without bottoming out on the tap shoulder. You won't be able to see the tap shoulder because it will be down in the .390" clearance hole, so I marked the tap shank where it would be when there was a thread or two before the shoulder bottomed. There was a big sigh of relief when this was over! The last drill operation is to drill an M8 clearance hole (~9mm) down from the top of the blank down to where good threads are. The bolt blank can now be removed from the lathe and tried on the tool post screw to make sure it screws all the way down, and clears the shoulder without interference.

The outside of the adapter can now be turned down to the ID of the hole in the quick-change post. When you get close, do a fit check with the quick-change tool post to make sure you get a snug, but free, fit. It was at this point I found that

Finished adapter bolt.

The quick-change post on the 920 lathe.



the bottom plate on the quick-change post was just a "taste" smaller than the ID of the central cylinder. I had to reduce the last 1/2" of the adaptor diameter so it would slide all the way through. The last operation is to saw ff the blank above the hex top and you're done! *Photo 4* shows the completed adaptor and *Photo 5* shows the new quick-change post mounted on the 9" × 20" lathe and ready to go!

In the interest of full disclosure, most of my experience has been machining aluminum, and the idea of using stainless steel or tool steel was intimidating. However, this turned out so well that I wanted to share it with the rest of us "rank amateurs."

Photos by Author