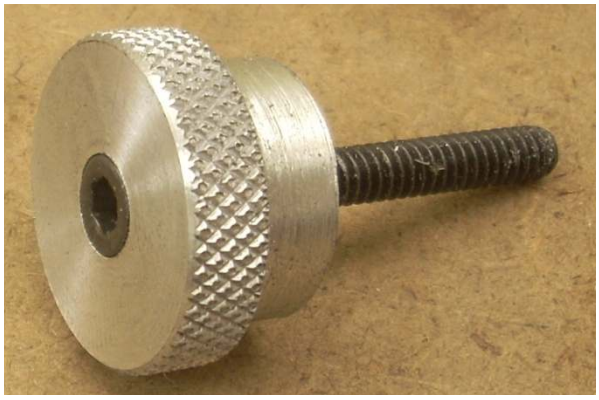
Making a Knurled Knob for a Socket Head Cap Screw



By R. G. Sparber

This article is intended for those new to the metal working hobby. You will need access to a lathe that has a knurling attachment. The rest of the work can be done with hand tools.

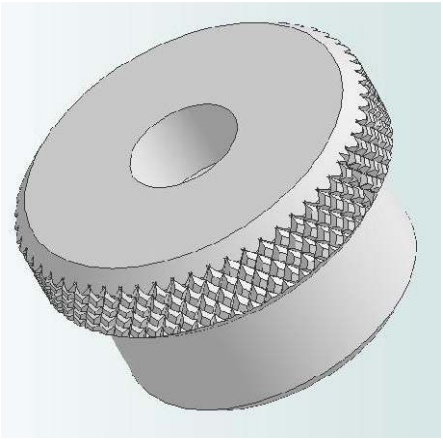
I have a number of Socket Head Cap Screws (SHCS) that must be adjusted periodically. Not much force is needed but I had to reach for an Allen wrench every time. In most of these applications, a 1" diameter knob would be fine. The way the knob has been designed, I can still insert an Allen wrench in the hole for further tightening.

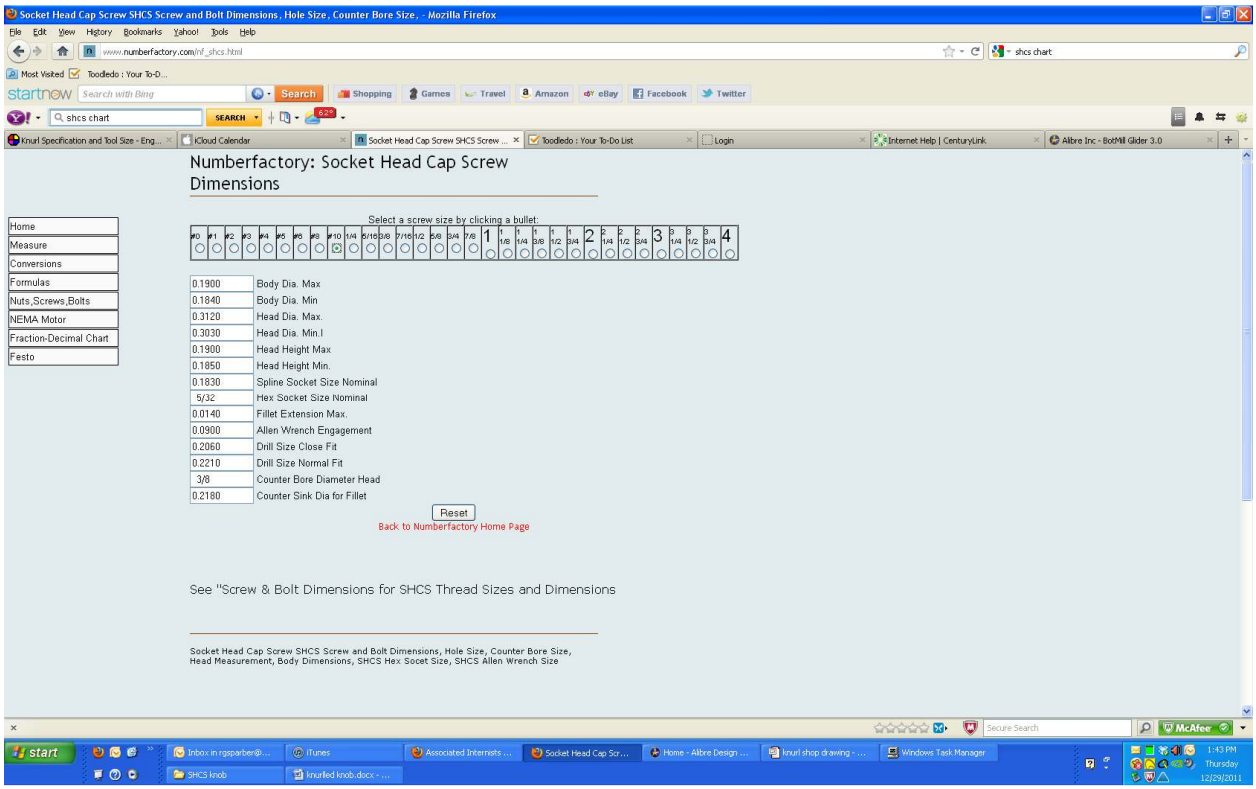
[1] You are free to copy and distribute this document but not change it.

SHCSs have a fluted head that makes doing a press fit into a slightly undersized hole easy. I used a 10-24 screw but this design can be modified to handle any size. See

http://www.numberfactory.com/nf_shcs.html

for the dimensions of the head.



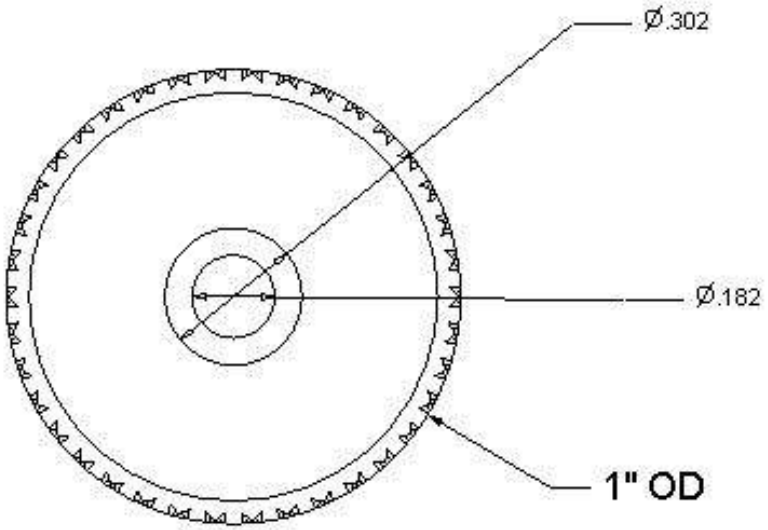


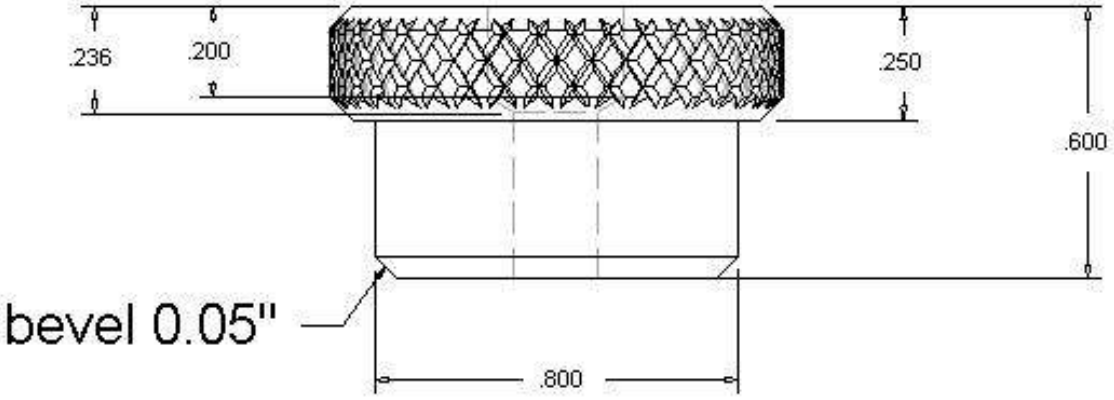
When I went to this site and clicked on #10, I got this screen. It tells me that the minimum diameter of the head is 0.303” and the height of the head is slightly under 0.2”. The shank has a minimum diameter of 0.184”. That is all I need to know.

I selected a drill that was just below the minimum head diameter – a size “N” which is at 0.302”. I also used a 3/16” drill to pass the shank because I don’t want to damage the threads by making it too tight.

Measure the SHCS you plan to use and adjust the hole size accordingly.

Knurled Knob for #10 Socket Head Cap Screw





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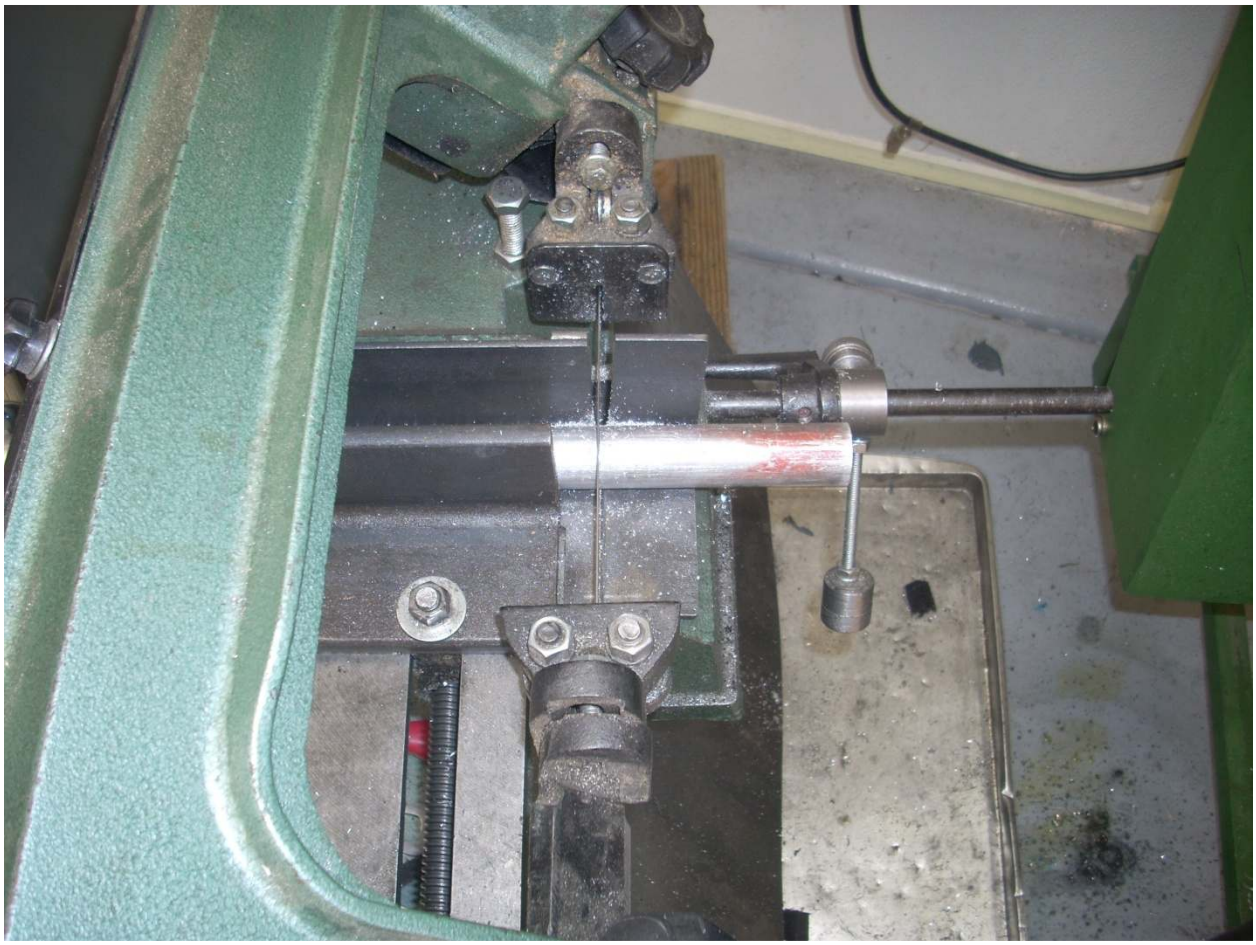
12/29/2011

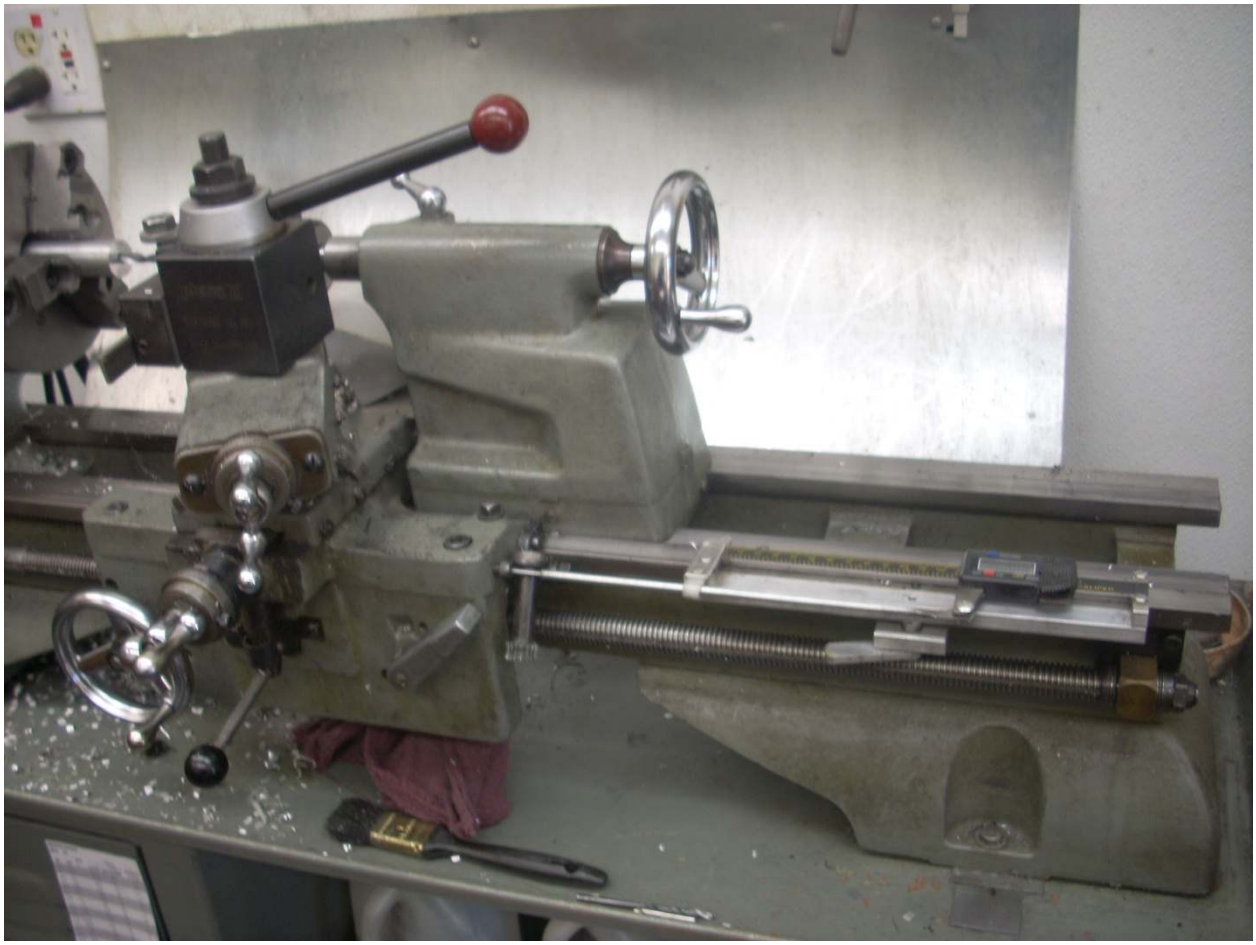


My first step was to cut off about 4” of 1” diameter 6061 aluminum. Then it was chucked into my lathe.

After facing the end with my cutter, I used a spotting tool to cut a cone shaped hole in the end. This helps the drill to stay centered.

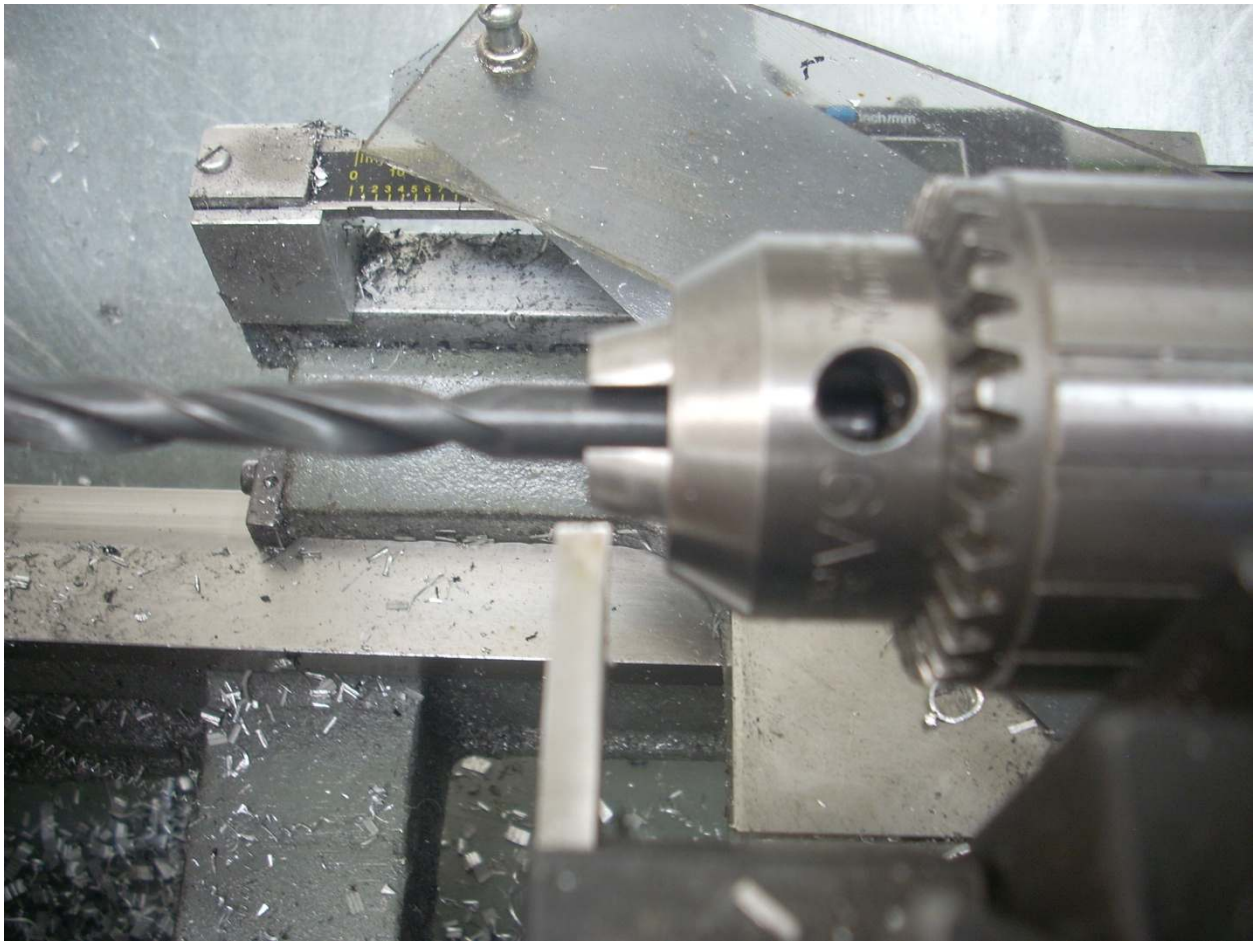
I drilled my small hole first to a depth of about 0.7”. Do you see that cut-off tool that is near the jaws of the drill chuck? I’m using that as my depth stop.

I set this depth stop by first moving the end of the drill into the hole so the point is just out of sight. Then I move the depth stop so it touches the jaw.

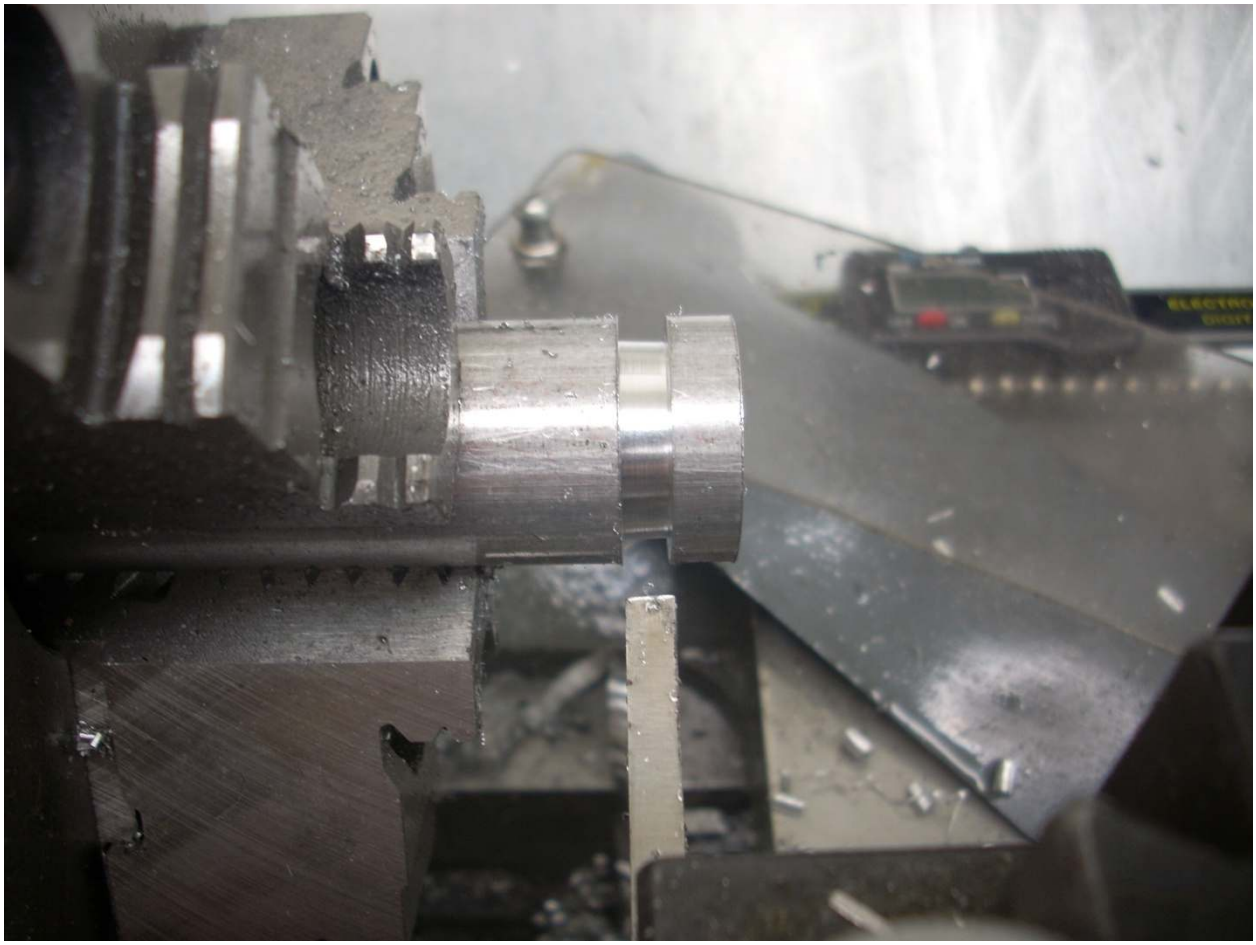


I then use my digital caliper that is clamped to the ways to precisely move the apron 0.70”. Then when I feed the drill in, I stop when the jaw hits the stop and I have a hole that is 0.70” deep measuring just the straight sided part of the hole. This particular hole does not have to be precise; I’m just showing how it all works.

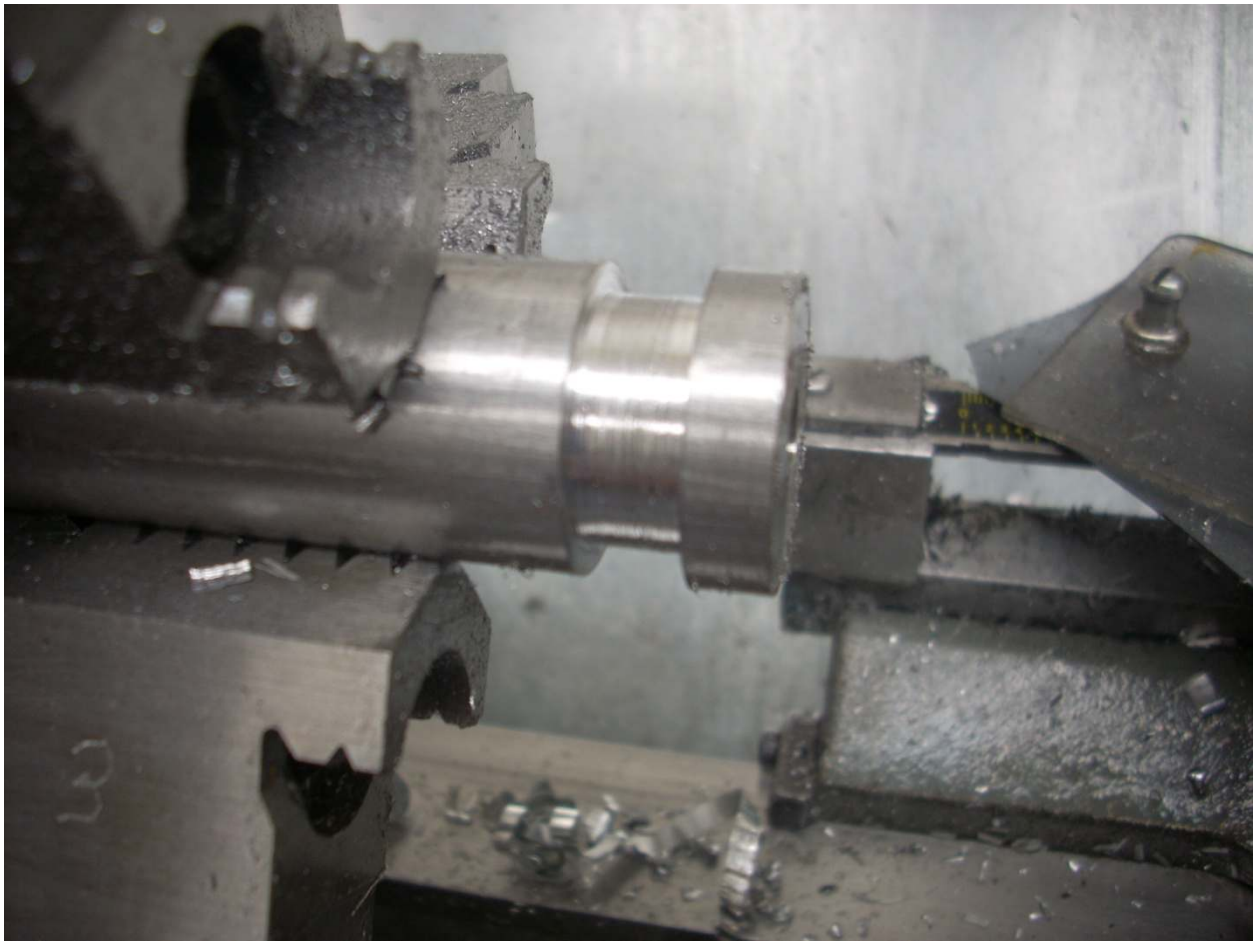
I want the hole to be a bit longer than the finished part to insure that when I saw it from the bar stock, I don’t have to further drill out the hole.



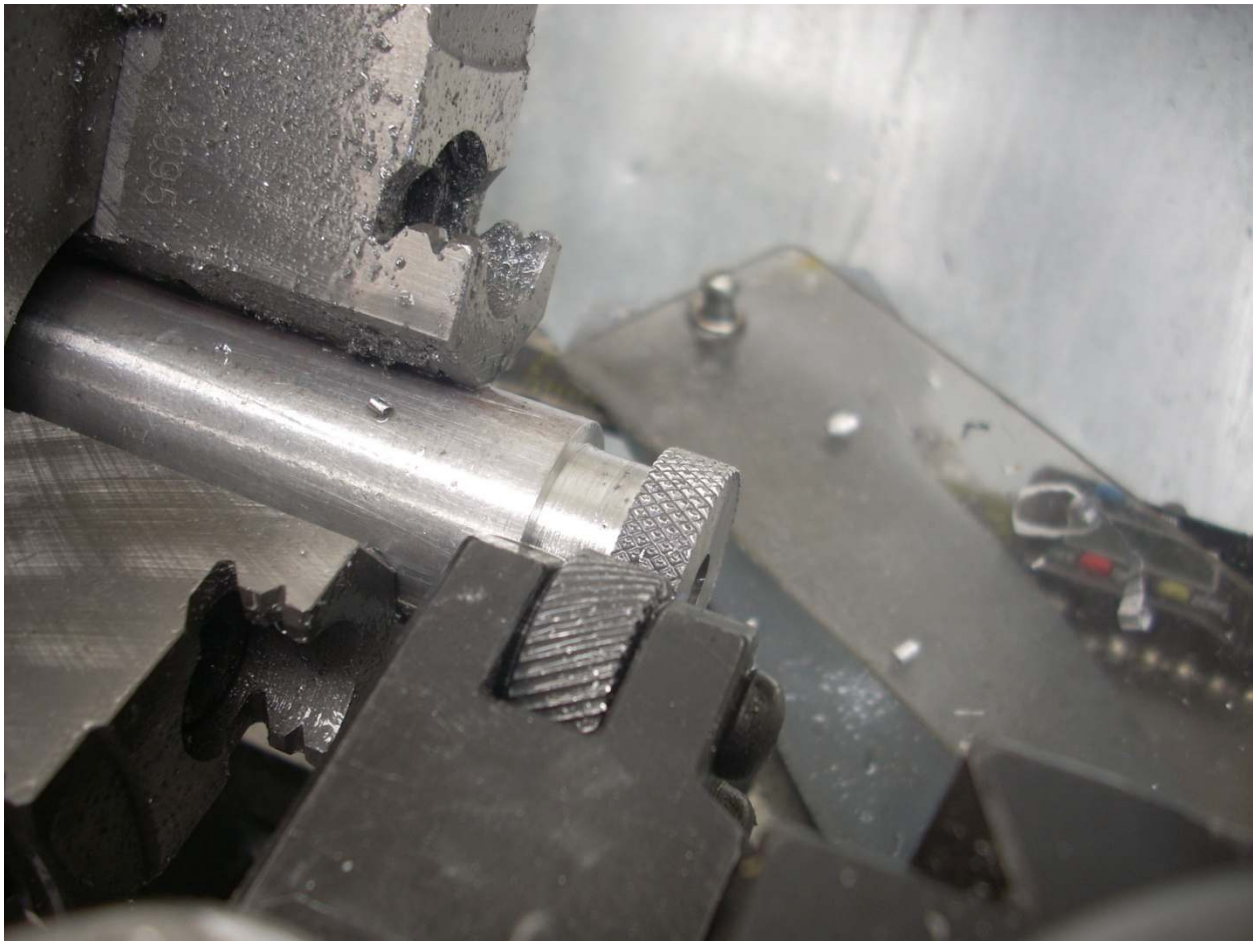
With the 3/16” hole drilled, my “N” drill has less metal to remove. I am again using my cut off tool to set the depth. This hole does have to be a bit more precise. I want to go in 0.200” from the surface.



Here I’m actually using my cut off tool for cutting. I moved over 0.250” and fed in 0.100” from the surface. This will give me the 0.800” diameter called out in the shop drawing.

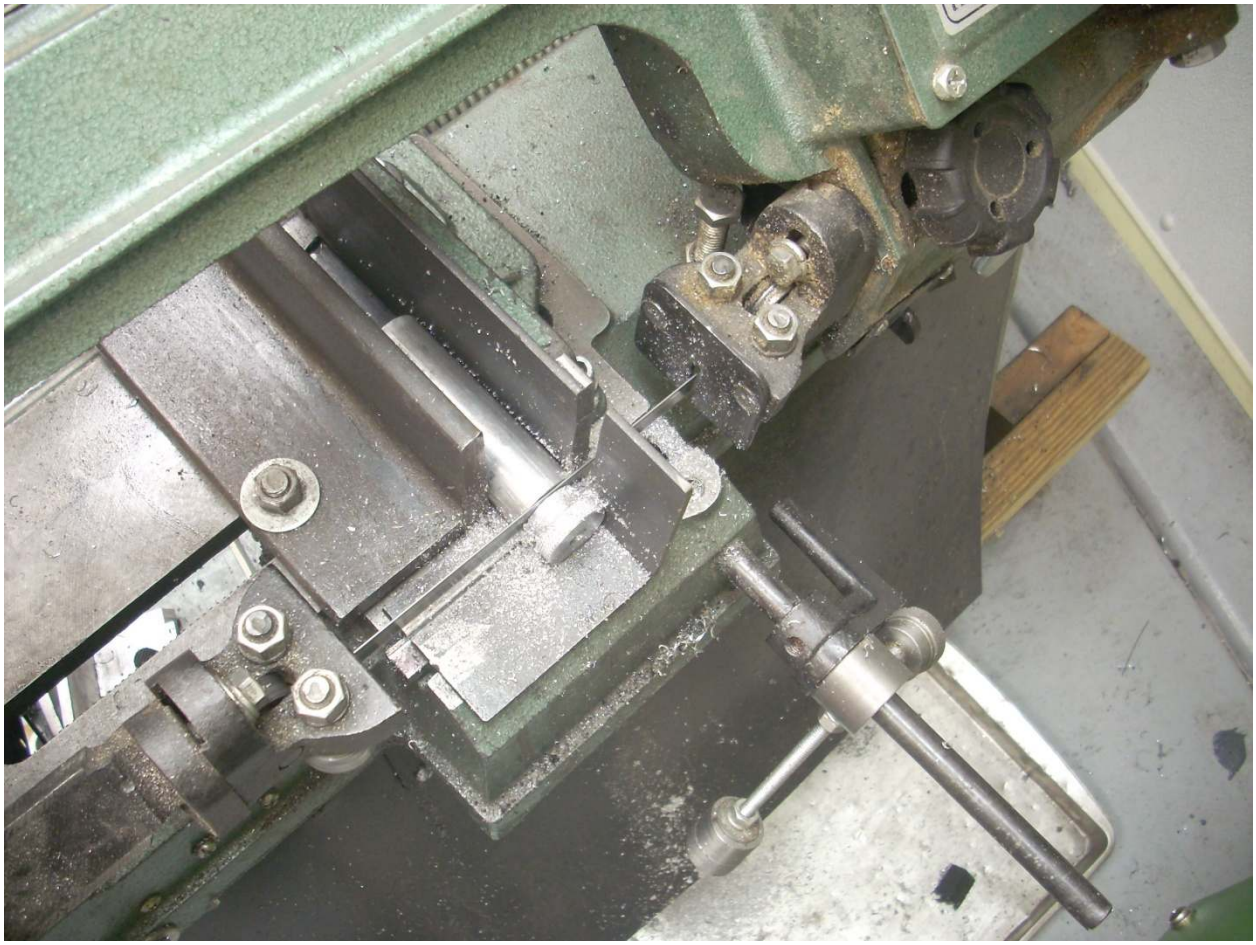


I fed the cut off tool in twice in order to cut the 0.800” diameter a bit longer than called for. This gives me room for my saw.



With my knurling tool mounted, I fed it into my part with lots of cutting fluid flowing. Feed in slowly and do not disengage until done. You can turn the lathe off, inspect, and turn it back on. If the knurling does not come out clear, you may have a knurling tool that is not compatible with a 1” diameter cylinder. You may need to turn the cylinder down to a smaller diameter to get proper forming.

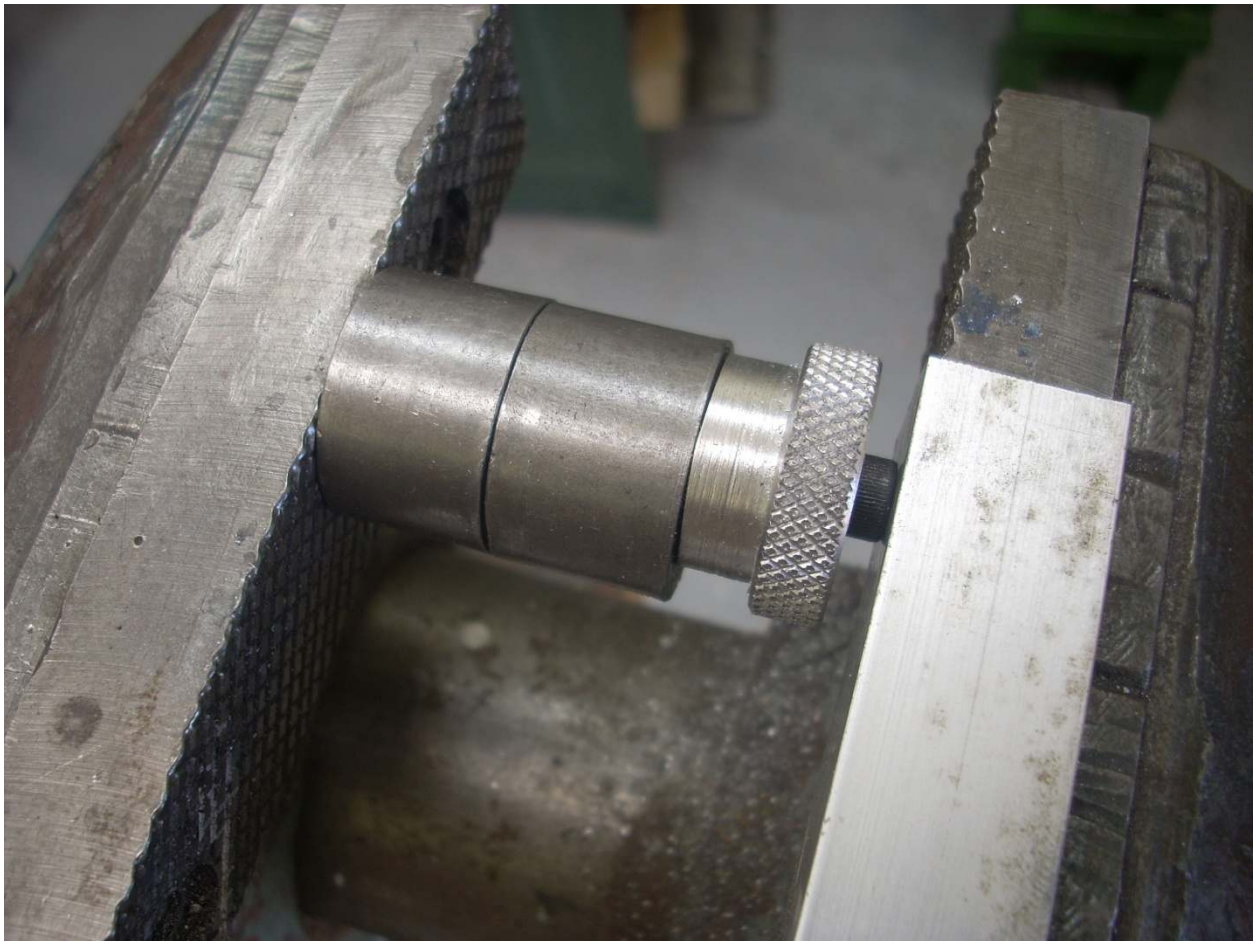
I put a small bevel on the sides of the knurling using a file. This is a potentially dangerous operation with only cosmetic results. If unsure, do not form the bevels.



It’s back to the saw to cut off the part.

The 10-24 SHCS has been threaded down the hole. The hole is just a bit smaller than a clearance hole so the screw easily cuts its own thread.

The screw is all the way through. I have placed the knob on a stack of steel cylinders in preparation for pressing in the head.



Nothing fancy here. I'm using my bench vise to apply the pressure. A piece of aluminum covers the jaw so the top of the screw head is not marred.

A few turns of the handle and the head has been pressed into the knob.

If you can't get the head to press in, use the next larger size drill for the large hole. If the head does not hold, make a new knob and go with a drill one size smaller. You might be able to salvage the knob by using Loctite® Red to glue it in place.

I welcome your comments and questions.

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