

# Adjustable Length Rod, version 1.0

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By R. G. Sparber

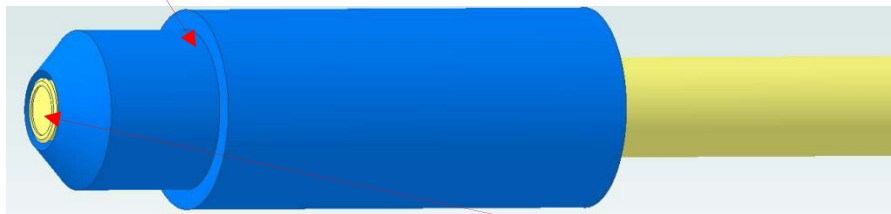
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This article is intended for those new to the hobby of metal working. A lathe is needed to make these parts. Except where noted and related to drill bits, all dimensions are  $\pm .01$ ".



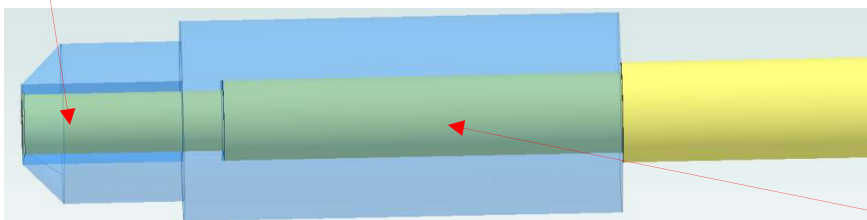
I needed to construct a rod that could be adjusted to be 0.4" longer. This would be an easy task except that I also needed to insure that no parts could come off.

The rod is  $\frac{1}{4}$ " cold rolled steel (CRS). I made a threaded sleeve from  $\frac{1}{2}$ " CRS to go on the end. One end is turned down to a .4" diameter in order to give me a shoulder.



.15" diameter post with the end flared out after assembly.

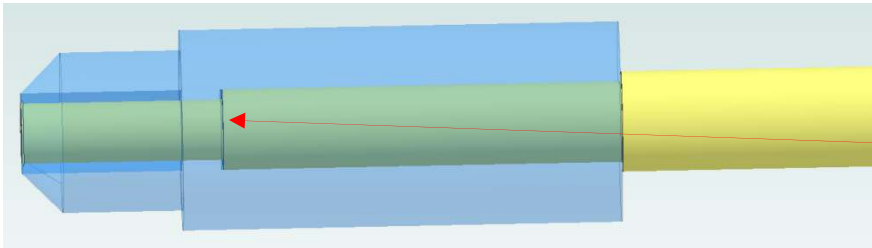
The fun part was finding a way to prevent this threaded sleeve from coming off. I chose to add a



In this rendering, I have made the sleeve translucent. The rod has been threaded  $\frac{1}{4}$ -20.

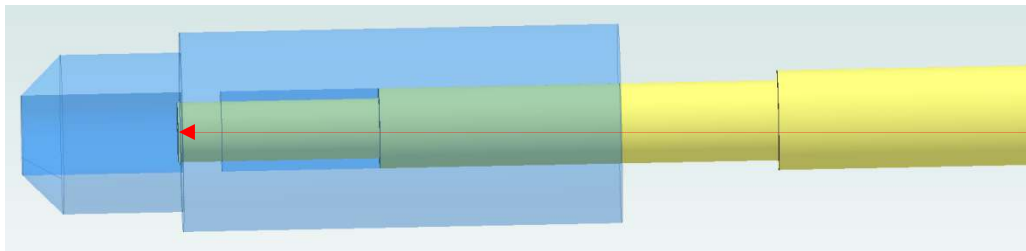
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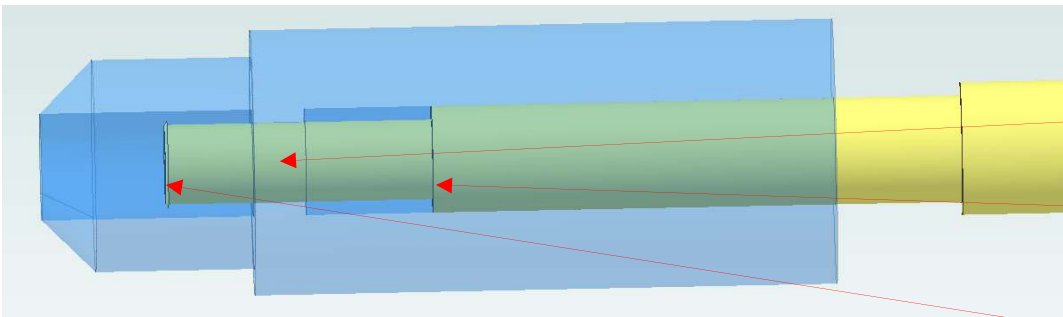
The sleeve is fully retracted. In this state, the end of the threaded section is bottomed out in its

hole. This prevents further retraction of the sleeve.



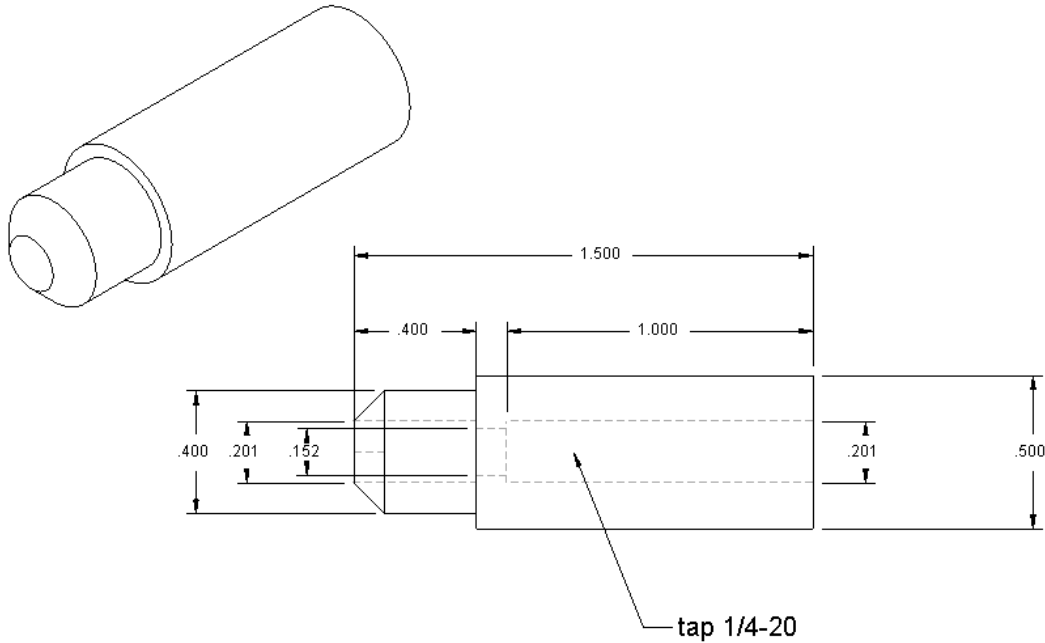
With the sleeve fully extended, a flange on the end of the rod contacts the

bottom of its hole. This prevents the sleeve from further extension.



The sleeve is between its two stops. The constriction in the hole is flanked on the right by the threaded section and on the left by a flared out disk.

## Shop Work



The threaded Sleeve will be made first.

All work was performed on a lathe holding a 3 jaw chuck. I used a Diamond<sup>®</sup> Tool Holder, a parting tool, and various drill bits.



After sawing off a 1.55" length of 1/2" diameter CRS, I faced the end using my Diamond Tool Holder and deburred with a file.



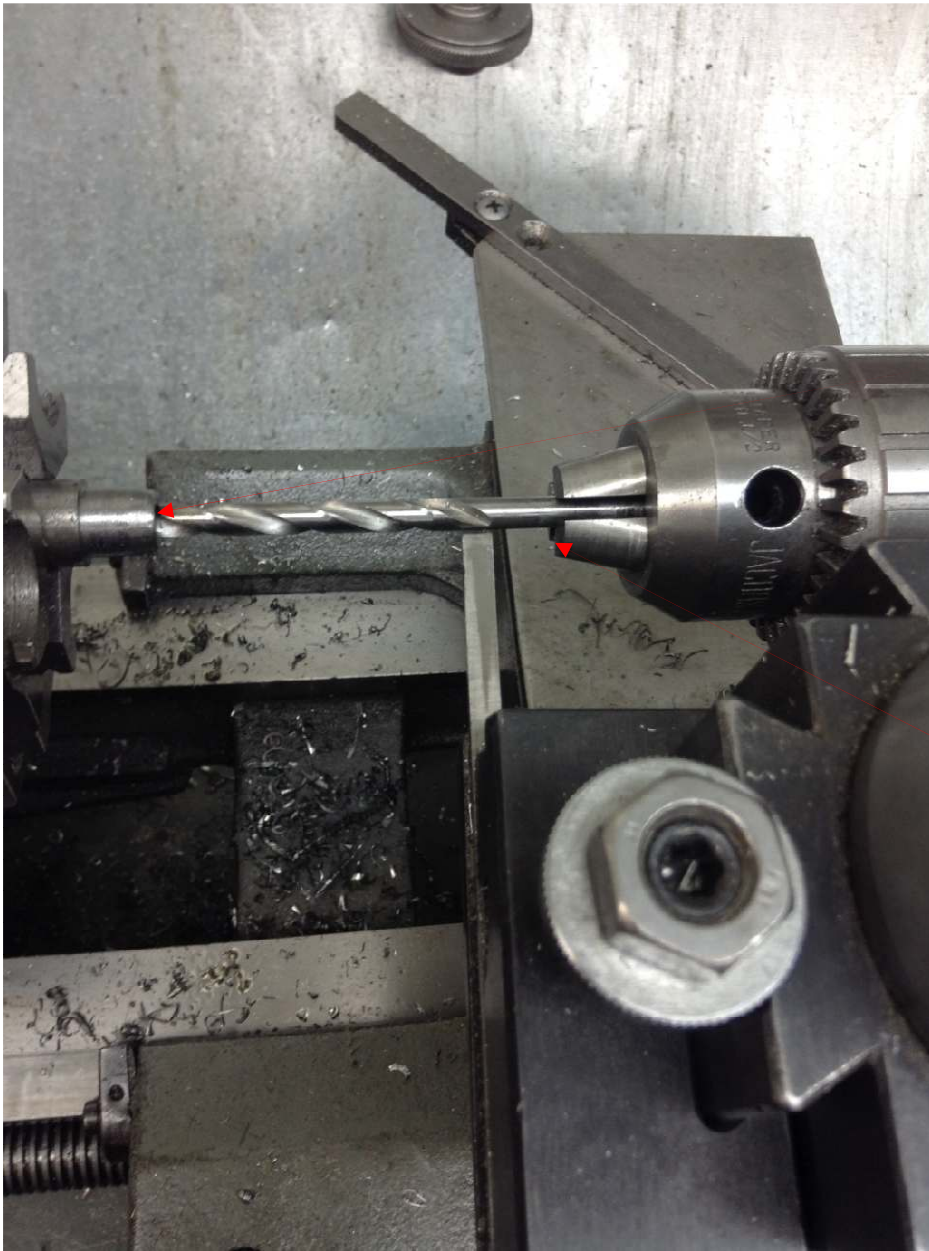
Then I turned the diameter down to 0.400" for a length of 0.400".



I then used my parting tool to cut a bevel on the end. It is done by eye because accuracy is not important here.



In preparation for drilling the .201" hole, I used a spotting drill to cut a cone shaped depression. This prevents the drill point from moving off center.



I needed to drill down 0.400" with my "F" drill (.201" diameter). The depth was set from the lip of the drill and not the tip. The cone shaped depression made by the spotting drill let me set the lip at the face of the workpiece. I then set up my parting tool so it touches the outer face of the drill chuck. This was my zero point. Then I moved the parting tool to the left 0.400" and locked the apron. I fed in the drill bit until the outer face of the drill chuck again touches the parting tool.

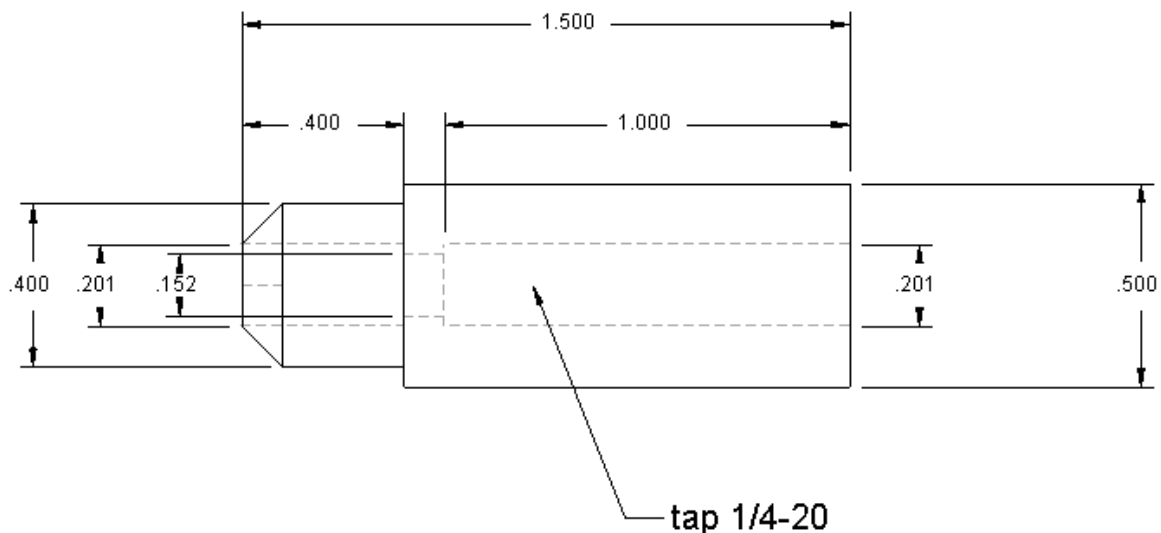




The workpiece was turned end for end with about  $\frac{1}{2}$ " sticking out. I then faced the end and deburred it. Leaving it in the chuck, I measured its overall length. Then I fed in the apron and cut the length to  $1.5" \pm 0.01"$ .

Using the parting tool trick to set depth, I drilled down 1" with my F drill. Then I drilled through with my #24 drill which is  $.152"$  in diameter.

A  $\frac{1}{4}$ -20 tap was then run to finish the job. Note that the bottom of the hole will not have full depth threads. When I made the matching threaded rod, some of the threads on the end were removed so the end of the rod fully seated in the bottom of the hole.



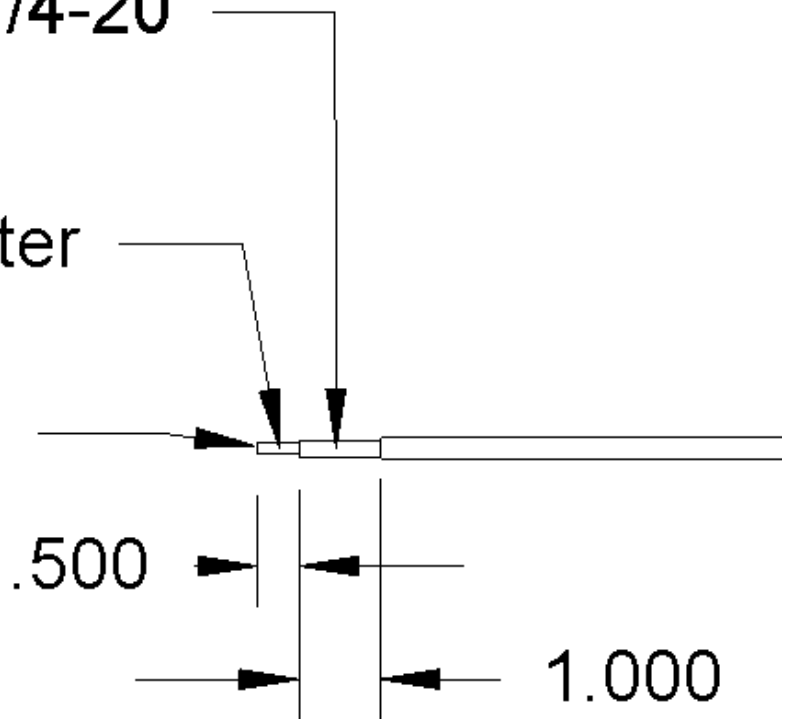
## Rod End

The rod was made from CRS.

.24" diameter  
threaded 1/4-20  
taper end

turn .15" diameter

spot drill end and  
flare after assembly



The rod was about 2 feet long so must pass through the hollow spindle of my lathe. A piece of fabric was stuffed around the rod to prevent excessive flopping about.

With 0.6" of rod sticking out from the chuck jaws, I turned the diameter down to 0.15" for 0.500".



Then the rod was repositioned to have 1.8" exposed. This was a minor error because I needed to cut a bevel to allow for the partial thread. This is really excessive overhang when using a parting tool. But I went slow and was not taking much metal so got away with it.

After cutting the bevel, I turned the diameter down to .240" for 1" in preparation for running a 1/4-20 die.

I also used my spotting drill to cut a depression in the end of the rod. This partial hollowing out the end of the rod to make it easier to spread open a little.



The sleeve is threaded onto the rod. You can now see the cone shaped hole in the end of the rod.



Note that the sleeve was not in contact with the face of the jaws. The next machining step required maximum support for the rod so I loosened the chuck and slid the assembly back.

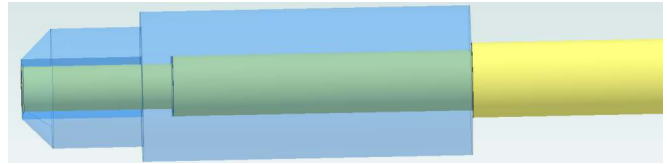


I mounted a piece of broken tap into my drill chuck. The end of this tool was ground flat. It is about 0.18" across.

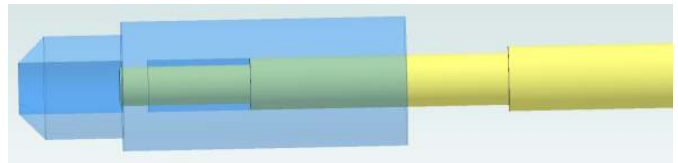
With the lathe running, I forced the tool into the end of the rod. What started as a bowl shape becomes more like a disk. The disk has an outside diameter larger than the .15" post.



The enlarged end of the rod prevents the threaded sleeve from falling off. Here you see the sleeve fully retracted. This puts the end of the rod even with the sleeve.



When the sleeve is fully extended, the end of the rod is down at the bottom of the hole.



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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