Introduction

My daughter is getting married. She and my wife thought it would be nice if I turned wine bottle stoppers as wedding favors. About 70 of them. The stopper kits attach to the turning with 3/8x16 thread, and I wanted to turn the blanks in spindle orientation. I also wanted the threads to be durable so they could be unscrewed and rescrewed easily and repeatedly for cleaning of the fitting. To enable this I wanted use a 3/4" PVC rod threaded insert, which meant drilling 3/4" x 5/8" holes in all of the blanks. I wanted to drill the holes on the lathe using a 4-jawed chuck because it centers slightly irregular blanks automatically.

I had a drill chuck tapped for a 3/8x16 threaded rod, so I threaded the all-thread into the drill chuck and used a pair of 3/8" nuts to lock in the stop position. This worked well as a stop, but got in the way of easily and speedily advancing and retracting the tailstock ram. The next day it occurred to me to cut the threaded rod to a minimum and make a handle extension for the tailstock hand wheel. While I was at it I ordered a pair of 3/8” speed nuts. This worked very nicely. It’s not worth attaching the threaded rod and handle extension for one hole, but it certainly was for multiples.

Briefly, this article starts with drilling and tapping a drill chuck and then cutting the all thread to length. Two ways of making the handle extension are shown, followed by using the drill depth stop.

Modifying the Drill Chuck

The first step in threading the taper of the drill chuck is to cut off the flat tang. If doing that gives you pause, consider buying an extra mounting taper for your drill chuck. Most lathe drill chucks I’ve seen use a JT33 taper, some a JT3 taper. First look on the chuck body, as it very well may be printed there. If not, the JT33 taper is about .635” in diameter at the fattest part. You can buy an import quality JT taper for $8 or so at most any Industrial Supplier. To remove the taper from the chuck open the chuck fully, and place it tang down over a partially open vise or a hole in your workbench. The use a mallet and knockout rod to remove the taper.

As the JT taper is tapered at both ends, it’s easiest to hold it for cutting, drilling, and tapping while it’s mounted in the drill chuck which is then mounted in the #1 jaws of a 4-jawed chuck. Hold the drill chuck by the nose, not by the tightening ring. Once the flat tang is removed, using whatever saw or cutoff wheel you like, mount a combined drill and countersink in another drill chuck in your tailstock and start a true hole in the end of the JT taper as in Figure 01. Yes, this means you have to have two drill chucks. It might be possible with an extra JT taper, to turn the very end of the Morse taper to a cylinder and then hold it in the 4-jawed chuck. But really, if you’re doing the kind of work where a Lathe Drill Depth Stop would be handy, then so would having an extra drill chuck or two.

Now mount a 3/16” drill (the tap drill size for 3/8”x16 threads) in the tailstock mounted drill chuck and drill in about an inch, as in Figure 03. Then use a 3/8” x 16 tap to tap threads in the drilled hole. You’ll get more accurate threads if you do it on the lathe using a mini-tap guide, as in Figure 24.
You can now attach 3/8” all thread to the drill chuck. You’ll also find this handy if you ever use the drill chuck to hold items for turning on the lathe, as with a draw bar you won’t have to worry about the drill chuck vibrating out.

Preparing the All-Thread

Extend the tailstock ram fully and measure how far it extends (read the scale if it has one). Then back up the tailstock ram to the zero position, or where it begins to eject tapers. Place a length of 3/8x16 All-thread through the tailstock ram and screw on your drill chuck as far as it will go. Seat the drill chuck firmly in the Morse taper of the tailstock.

Decide what kind of nuts you’ll use to set the depth. Two ordinary 3/8” nuts are certainly cheapest, but for ease of use, consider buying a pair of quick thread nuts (McMaster-Carr # 98150A150: Black-Oxide Steel Push-Button Quick-Thread Nut, Hex Style, 3/8”-16 Thread Size, 1” Wide, 5/8” Overall H). These have a push button that when pressed lets you slide the nut along the thread, then revert to screwing action when the button is released. Have something handy to put in the quick nuts whenever you remove them or you’ll be chasing springs and push buttons. Decide how much of the tailstock ram’s action length you wish to use. If you have a really long tailstock ram you should limit the length of all thread to a length you’re likely to need to drill to or it will get in the way regardless of a hand wheel extension.

With the tailstock ram fully retracted thread the nuts you’re going to use onto the threaded rod until the distance between the back of the hand wheel and the front of the forward nut is the distance you’ve decided to use. Then make a mark on the all-thread rod at the back of the back nut as in Figure 04. An option would be to add an inch for putting a knob on the end of the rod to both protect your hand and to make it easier to screw the drill chuck on to the all-thread.

Remove the all thread from the chuck and lathe. Thread two ordinary 3/8” nuts onto the all-thread so that they straddle the mark. Clamp the all-thread securely in something and cut the all-thread to length as in Figure 05. Use a grinder to true and bevel the cut ends of the all-thread as in Figure 06. Then remove the nuts from the rod, removing any grinding swarf from the threads in the process.

To true and bevel the cut ends of the all-thread

If you are going to add a knob, turn and attach it to the end of the all-thread now. You can use a set screw or a 3/8” nut to lock the knob in place. You can easily turn a knob by drilling and tapping for 3/8”x16 thread in the side grain face of a knob blank. Mount a short piece of 3/8x16 threaded rod in a chuck and thread the blank on, then turn to the shape you want. This would be an excellent time to try out using your recently threaded drill chuck with some of the left-over all-thread through the headstock as a drawbar. Remember the drill chuck is designed to mount metal. The small contact area of the jaws will dent a wood tenon. This can be remedied in several ways. You can use slotted PVC or copper pipe. You can also, especially for non-cylindrical items use aluminum flashing padded with 2mm craft foam.

Extended Handle

I’ve temporarily remounted mounted the drill chuck and all-thread in position in the tailstock ram in Figure 07 to show why you need to make an extended handle (or a handle extension as in the next section). Your wrist bangs into the all-thread so that it traces out a cone to avoid the all-thread. However you’ll have little power this way. In the planning phase I was concerned about the strength of an extended handle, but for reasonable lengths it felt quite solid.

Remove the handle from your hand wheel. If you’re lucky like me (Powermatic 3520B), the threads will be 3/8x16 and you can use the all-thread left over from the depth stop for the handle rod. Lay the all-thread on a convenient surface and align the hand wheel handle with the left end of it. Add the maximum extension of the depth stop rod past the hand wheel as in Figure 08 and make a mark on the all-thread. Straddle the cut mark with 3/8” nuts and cut and grind the all-thread as before.

You can now attach 3/8” all thread to the drill chuck. You’ll also find this handy if you ever use the drill chuck to hold items for turning on the lathe, as with a draw bar you won’t have to worry about the drill chuck vibrating out.
Mount the extension blank in #1 jaws in a 4-jawed chuck. Use a combined drill and countersink to start a centered hole as in Figure 10. Then drill through the blank with the smallest drill the 3/8” all-thread will fit through (Try a U bit) as in Figure 11. Use a 3/8” bit if you don’t have a U bit.

Now mount the handle blank and drill a recess on the end with a 1” Forstner bit deep enough to recess two nuts and a washer as in Figure 12. Then drill through the blank with a 3/8” bit.

Prep the all-thread to mount the handle by locking two 3/8” nuts against one another at the end of the rod and adding a washer as in Figure 18. Thread the handle onto the all-thread followed by another washer. Lock two 3/8” nuts against one another leaving a slight gap between the nuts and the washer to let the handle rotate as in Figure 19.
Handle Extension

Another way to keep your hand from fouling on the depth stop rod is to make a handle extension that the existing hand wheel handle can be mounted to. This requires finding a rod of some kind that can be drilled and tapped. I used 1” PVC rod. Acrylic rod, steel rod, aluminum rod, or brass rod (if you’re rich) could also be used. The advantage is the existing handle won’t squeak. The disadvantage is you have to have a suitable material.

Measure the maximum extension of the depth stop rod beyond the hand wheel. Cut a rod of suitable material to this length. Mount it in your 4-jawed chuck with #1 jaws. Mount a center drill in the tailstock ram and start a true hole as in Figure 22. Then mount a drill bit that is the tap drill size for the threads on your hand wheel handle (Powermatic 3520B is 3/8x16) in a tailstock mounted drill chuck and drill in about 1-1/2” as in Figure 23. Now mount a mini-tap guide in the drill chuck to keep your tap aligned axially with the lathe, and tap the threads as in Figure 24. Reverse rod to drill and tap the other end in the same way.

Wind an appropriate size nut onto threaded rod or a longish bolt that is the same as your hand wheel handle. Screw the threaded rod into the end of the handle extension with flats as far as it will go and loosely tighten the nut against the handle extension. Place your hand wheel handle next to the extension and mark how far the threads extend beyond the hand wheel handle as in Figure 26. Remove the threaded rod from the handle extension and cut the threaded rod to length. Then grind the end and use the nut to restore the threads as before. The threaded stud and other parts for the hand wheel extension are shown in Figure 27.

Mount the extension on the rod and use two 3/8” nuts tightened against each other and the extension to lock it in place as in Figure 20.

To set up the Hand Extension first remove the metal handle from the hand wheel. Then screw in the handle extension rod as shown in Figure 21. You can see that the handle extension will move your hand back far enough that it won’t bang or foul on the depth stop.

If you desire, file flats on the end of the rod to accept a wrench for easy removal of the extension as in Figure 25.
Screw the threaded rod into the handle extension as far as it will go and tighten the nut against the handle extension to lock in place as in Figure 28. Then screw the extension into your hand wheel, as shown in Figure 29.

Using the Depth Stop

To mount the depth stop jig, retract the tailstock ram fully. Move the nuts to the end of the all-thread. If you’re using the quick nuts DO NOT REMOVE THEM from the rod or you may be chasing the spring and push button. Insert the all-thread through the tailstock ram from the back and thread on the drill chuck. Then seat the Morse Taper of the drill chuck fully in the tailstock ram. Mount the drill you wish to use in the drill chuck.

If you’re drilling multiple blanks, insure that the blanks are the same length. Furthermore insure that there is enough room between the point of the drill and the jaws of your 4-jawed chuck to swap the blanks, then lock the tailstock firmly.

Don’t move the tailstock until all the blanks are drilled (unless you mark its position so you can reposition it exactly) or you’ll have to reset the depth stop.

If you want to measure the total depth of the hole (to avoid drilling through, say) advance the tailstock ram until the nose of the drill bit touches the blank. If you want to measure to where the hole is full width (for inserting a plug, say) turn on the drill and advance the tailstock ram until the shoulder of the drill just starts to cut as in Figure 30. Now set the nuts so that the front edge of the front nut is the depth you want to drill from the surface of the hand wheel using a ruler, as in Figure 31, or by putting the plug you want to mount in between the hand wheel and nut as in Figure 32. If you find yourself setting up to drill to certain lengths repeatedly you could make some snap on depth gauges by cutting a slot out of PVC pipe.

Now drill all of your blanks as in Figure 33. You can’t use a center drill without disturbing the set up. However with all but small drill bits you can usually start a true hole by slowing down the advancement of the ram when the point of the drill enters the wood. Then drill to depth while watching how well the drill bit is clearing chips and back the drill bit out if it starts to clog.

If you’re concerned about damaging the threads when using a knock out rod to remove the drill chuck when not using the depth stop jig, make a small threaded stud to insert in the drill chuck. File flats on the end of the stud to aid in removal with a wrench.