

Closed End Pen Turning Techniques

What is a “Closed End Pen?”

A closed end pen is one where the timber of one or both barrels covers the end of the brass tubes. The most common forms of closed end pen are probably the Desk and Calligraphy Pen. The Calligraphy pen, and similarly the Desk Pen, would typically use a 7mm brass tube and as long as the tube length is not changed the pen is fairly easy to make (Please see the PK010 – Calligraphy Pen Instructions, www.nativepens.co.nz/instruction). By contrast, when looking to turn a standard rollerball or fountain pen into a closed end pen, a few things must be considered and planned.

Planning

When deciding to make a closed end pen from a standard pen kit, first plan out how the blanks need to be drilled to ensure it will function correctly.

Things to consider:

1. Is there enough depth in the barrel for the refill or pump?
2. Is there enough depth in the cap for the refill or nib?
3. What techniques are going to be used to turn the pen?
4. How long do the blanks need to be?

I. Depth in Barrel

The main questions to answer are related to the refill or pump, in the case of the fountain pen. In the barrel, typically on a standard pen kit the refill will extend into the end cap when pressed into the brass tube. In the case of the closed pen, the blank must be drilled so it replicates this arrangement for the refill and spring. Or, in the case of a fountain pen, there must be enough room inside the barrel for the cartridge or pump. The example below shows a rollerball refill and spring. The blank will be drilled past the end of the brass tube to provide a housing for the spring.

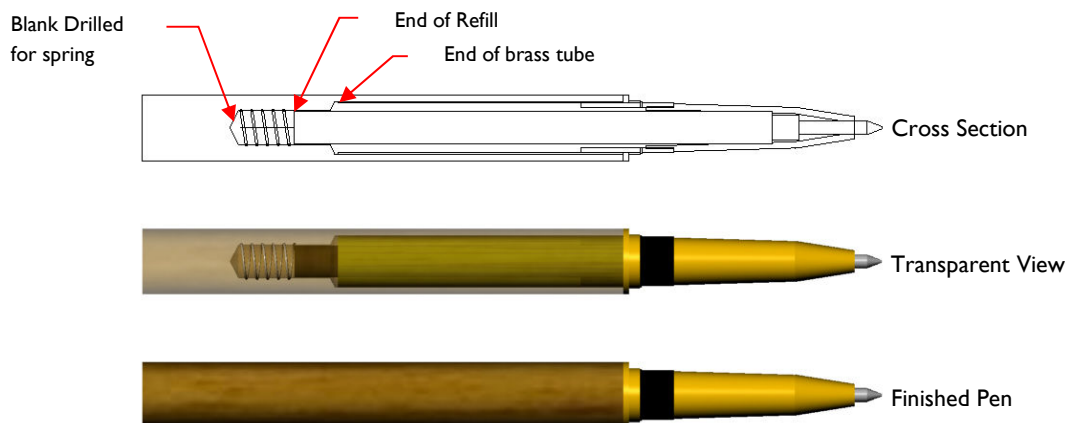


Figure 1: Pen Barrel Layout

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2. Depth in Cap

At the cap end, the same can be true, particularly if the intention is to remove some of the detail rings from the cap coupler. Quite often, the clip assembly has a hollow inside which allows the pen nib (or refill) to extend slightly past the end of the brass tube. Thus, the hole in the cap blank may need to be drilled some distance past where the brass tube ends to provide clearance for the refill or nib. The example below shows a rollerball refill, the tip of which extends just past the brass tube. The blank is drilled only 1 or 2mm past the tube to allow adequate clearance.

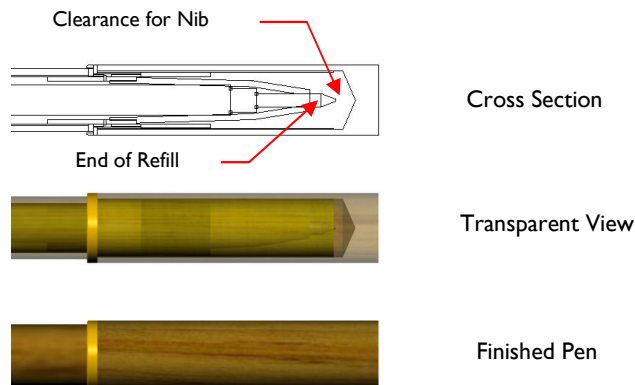


Figure 2: Pen Cap Layout

3. Techniques

Thought can now turn to the techniques that might be used for turning the pen. Described here are 3 common techniques used for turning closed end pens; Pin Mandrel, Tap Mandrel and Pin Mandrel with Milling Bush.

3.1. Pin Mandrels.

This method is most commonly used for Calligraphy Nib Holders or Desk Pens made from 7mm pen kits. The mandrel itself is $\frac{1}{4}$ " and has a small flat machined into it; the pin recess. When the lathe spindle is rotating, the pin will roll across the recess and lock itself against the brass tube, which in turn will drive the blank so it can be turned.

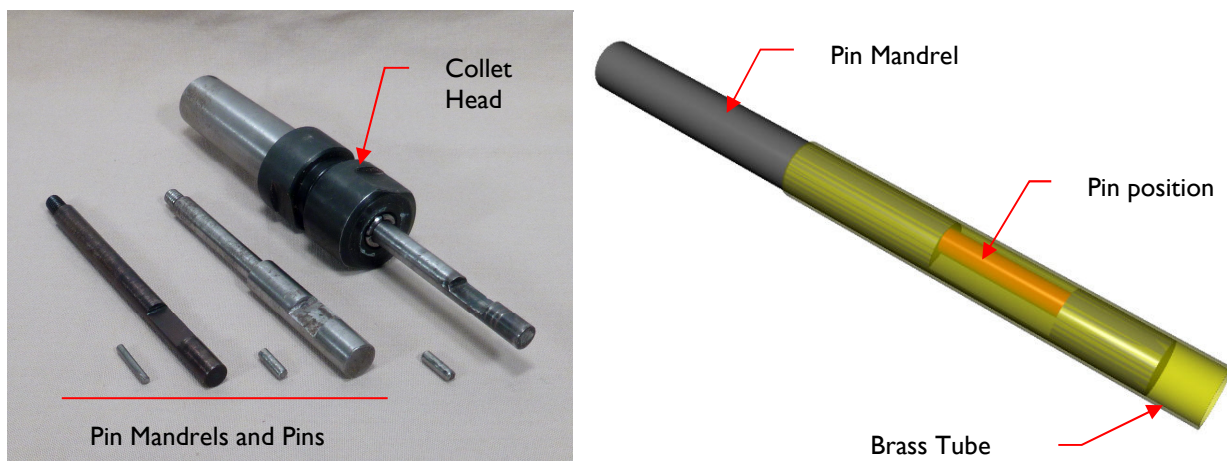


Figure 3: Pin Mandrels and Set-up

3.2. Tap Mandrels

This technique is typically used on pen barrels, where the refill hole in the barrel can initially be drilled smaller to accept the Tap Mandrel. It is also best suited to blanks where there is some length available for the tap hole.

A Tap Mandrel can be made from the end of an old Pen Mandrel. It is a short mandrel usually with a 1/4"-20 thread on the end. The threaded end is then ground with 3 flat sides. It works by cutting a thread into a suitable sized hole drilled inside the pen blank. In this case a 13/64".

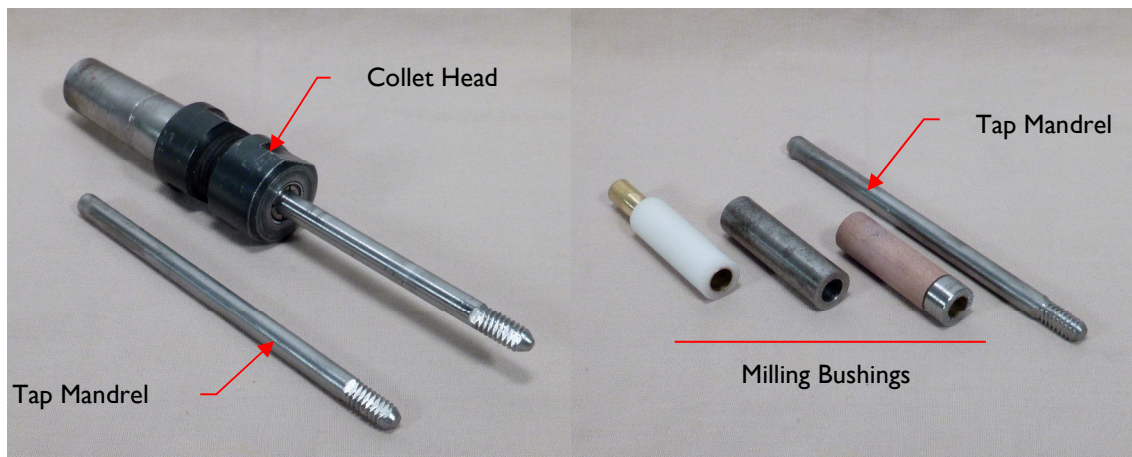


Figure 4: Tap mandrel

Held in a collet mandrel head, I have found this type of mandrel works best when combined with a Milling Bush. Three types of milling bush are shown in the right hand picture above, from left to right;

- Plastic with a brass tube through the centre. The brass tube is glued with CA and the plastic turned down to a snug fit in the pen tube.
- Steel, 1/4" hole through the centre and turned on a metal lathe to suit the pen tube.
- Timber with a cut off bushing and brass tube. For the cut off bushing use a worn bushing, drill it to 7mm inside, then cut off the part that would normally support the pen tube. Glue this to the brass tube.

With the milling bush inside the pen tube, the Tap Mandrel is held more central in the pen tube as it winds into the tap hole within the barrel. The figure below shows the Tap Mandrel, Milling Bush, Pen Bushing and Pen Blank in place.

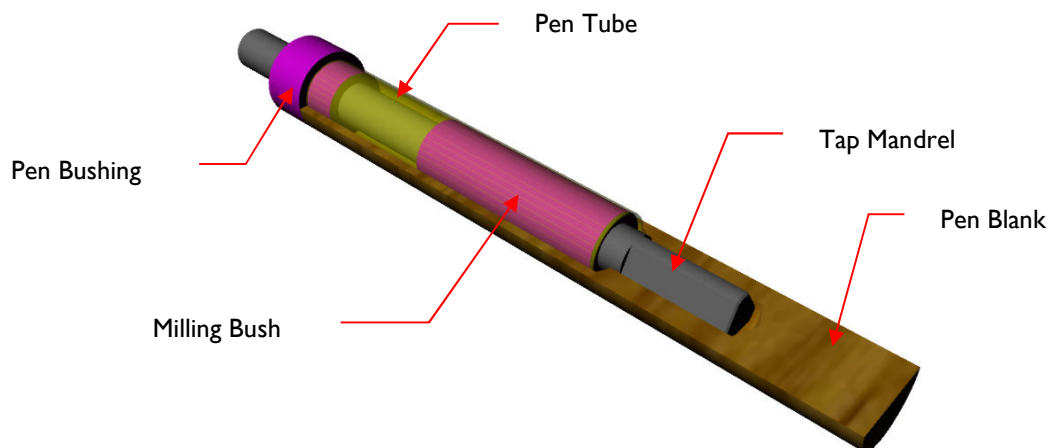


Figure 5 Tap Mandrel Set-Up

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3.3. Pin Mandrel with Milling Bush

This technique is used where there is only a short extension of timber past the pen tube, i.e. no length for the tap mandrel hole.

In part, it relies on friction between the Milling Bush and Pen Tube and tail stock pressure to drive the blank. A wrap of masking tape over the collet head end may also be required once the barrel is turned to secure it and allow tail stock to be removed and the end turned.

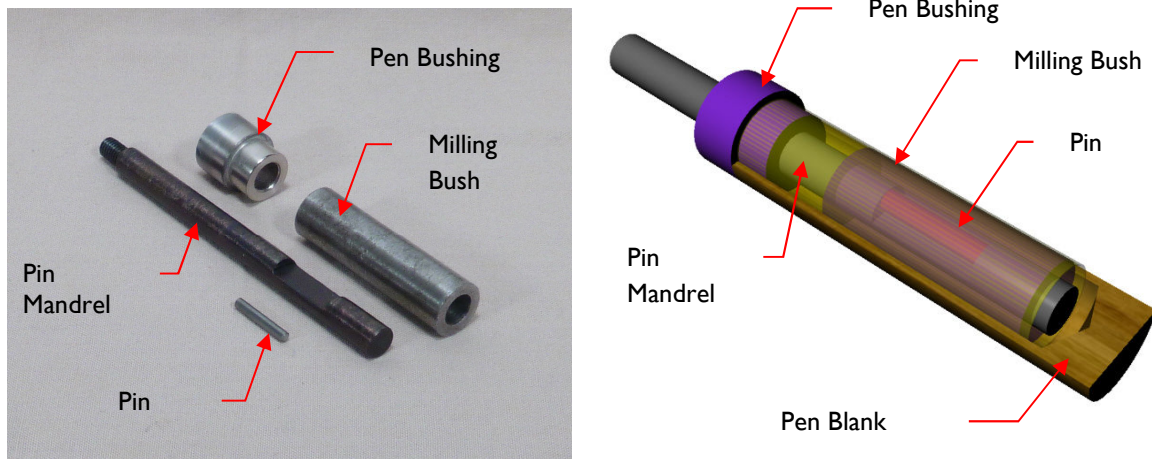


Figure 6 Pin Mandrel with Bush Set-Up

4. Final Drilling Plan Example

The final drilling plan and finished pen blank lengths are shown below for a rollerball pen. This will of course vary depending on the Pen Kit you are using.

For the barrel, first drill the 10mm hole for the pen tube, followed by the 13/64" hole for the Tap Mandrel.

For the Cap, drill the 12mm hole slightly over length as shown.

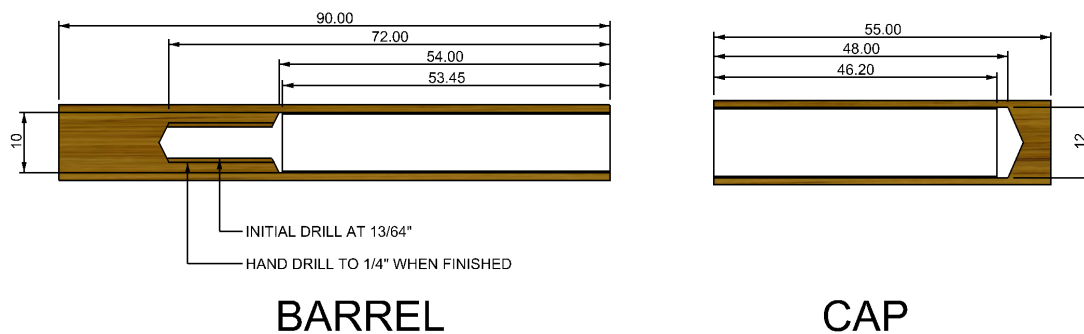


Figure 7 Drilling Plan (mm)

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A word about Accuracy

Before starting to set up and turn a closed end pen, it pays to check the accuracy of your mandrels. This can be done with the aid of a dial indicator gauge held in a simple jig as show here.

The mandrel is tightened into the collet mandrel head and inserted into the Morse taper of the lathe. The dial gauge is first set up close to the collet head and the mandrel spun by hand. Record the distance that the mandrel is run from the lathe centre axis.

Next, move the dial gauge to the end of the mandrel and spin the mandrel by hand. Check that the mandrel is running in the same location as previously recorded. If the mandrel is running off axis it may need to be gently bent until it runs in the same place.

This should be repeated for both the Pin Mandrel and Tap Mandrel.



Figure 8 Dial Gauge

Start Turning.

With the accuracy checked the blank can now be mounted onto the mandrel and the turning started. As for the final shape of the outside of the pen, well, that is up to you 😊. Happy turning!