

Closed-end pen

Sterling Instrument

If you're ready to depart from the kit routine, here's a distinctive fountain pen with a classy sterling-silver band.

By Richard Kleinhenz

In the last few years, closed-end pens have become popular with penturners.

The techniques are not new, but they are not widely known in the penturning community. The 7mm closed-end pens (desk pens) have been around for decades, but you can't turn today's popular larger pens with the same methods.

This style of pen provides an additional challenge of mounting the blank on the lathe. Today, fixtures for turning closed-end pens are easy to acquire. See additional details in the sidebar on *page 31*.

The project shown here offers the additional challenge of incorporating a sterling-silver ring as a centerband, as detailed in the sidebar *opposite*.

Design from the inside

The Little Havana uses a short main body tube. To turn a full-size pen, you'll need to order replacement tubes that fit its cousin,

the Havana (or the El Presidente from Arizona Silhouette), which is a rollerball. (Of course, you can complete the pen as a rollerball.) Alternatively, you can use the short Little Havana tube up front, a smaller tube further down, or even no tube. Incorporating the long rollerball tube is the least complex design plan.

Because you will not use the stock finial, you have to make room inside the pen body to accommodate a spare cartridge or a conversion pump. For the most flexibility, design a pen compatible with the larger and popular Waterman cartridge.

Be sure to dry-assemble the parts and take a measurement, as shown in **Photo 1**. For length, the longer Schmidt premium conversion pump is used (see **Resources** on *page 31*). Here, the required drill depth is 2.75". For the diameter, the 0.300" cartridge requires a #N or $\frac{15}{64}$ " bit.

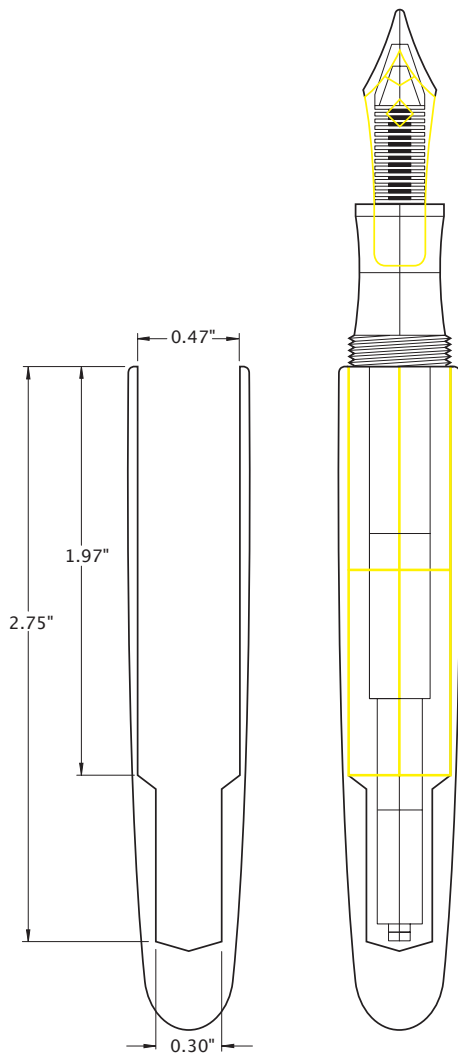


Prepare the blanks

For the main body, you need a 3"-long blank. This allows for a minimal $\frac{1}{4}$ " space to terminate the main barrel. The cap requires 1.97", so a standard pen blank works fine. I mark the center of the pen on the blank.

Don't get totally hung up on grain matching—often, with two diameters coming together at the pen center, it is not easy to recognize the grain match.

If you also want to turn the cap finial as shown *above*, you need an extra $1\frac{1}{2}$ "-long piece of matching stock. (Tip: It's a good idea to have an additional $1\frac{1}{2}$ " around just in case something goes wrong.) As a last resort, you can always revert to the stock finial. The pen shown *above* uses Bethlehem olive wood—one of my favorite hardwoods for expressive grain.



Search for a sterling ring

In searching the web for sterling-silver rings, I found that although there is a uniform sizing system for rings, not all sizes are commonly available. U.S. size 4 is on the large side for a pen (nominally 0.586") but is easily found (see **Resources**). After I received my order of size 4 rings, I was surprised that none of them exactly fit the size specification—they were all larger! Most were around 0.610".

The ring size must match the pen kit hardware. I chose a pen kit that has a fitting close to the ring ID. The Little Havana fountain pen kit (see **Resources**) has a fitting at the finial end.

You also could eliminate the metal fitting and transition the wood to the grip section, but I prefer metal because the cap thread will stop on the little ledge and the metal wears better. Arizona Silhouette has a similar kit (the El Toro) that also will work. Be aware that kit parts are not 100 percent interchangeable.



A conical steel round will allow you to slightly expand a sterling-silver ring.

If the sterling ring is slightly too small, it is possible to expand it a little by driving a gently tapered steel round into it, as shown above. If you have a metal lathe, it is easy to turn such a tool from a piece of scrap. You can purchase a similar tool at widgetsupply.com (item BCZ36).



1 To determine the drill depth, assemble the pump on the front section.



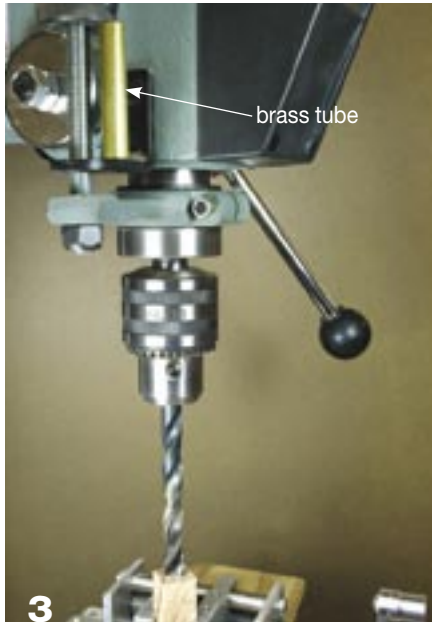
2 Square the blank before turning.

Drill the blanks

Cut a 2¼" blank for the cap—¼" longer than required. That way, you can stop the 35/64" bit before it exits and avoid chipping the end or cracking the blank as the drill bit breaks through. Then cut the blank to a smidgen longer than the brass tube. Square the ends of the blank

using a pen mill and shim barrel that centers the 7mm shaft.

The pen mill should cut just to the brass tube, as shown in **Photo 2**. After squaring, remove any burrs from the inside of the brass tube that may interfere later with assembly.



Use the brass tube to set the drill depth.

For the main body, drill exactly to the length of the brass tube, 1.97", using a $3\frac{1}{64}$ " drill bit. If you have a drill press with a rod-type depth stop, you can use the brass tube to set the depth, as shown in **Photo 3**. Start to drill until the corner of the cutting edge is even with the top of the blank, lock the quill, and set the depth to the brass tube.

After drilling the first hole (and without removing the blank from the vise), switch to a #N bit (or $15\frac{1}{64}$ " if you use the mandrel-tap method). Again, lock the quill with the bit even with the top of the blank, set the depth stop to 2.75", and drill to that depth. Refer to the illustration on *page 27*.

Glue in the brass tube with epoxy, square the face of the blank using a pen mill, and remove burrs. Test the blank by inserting the brass tube (it should fit in completely) and use the dry-assembled front assembly with conversion pump inserted (without brass tube) to test that it can be completely inserted into the blank, as shown in **Photo 4**.

If everything checks out, glue

in the brass tubes using 5-minute epoxy. You can turn the blank after 30 minutes of curing time.

Chuck your pen

Refer to "Specialty Chucks for Closed-End Pens" on *page 31* for three options for chucking the pen blank. These instructions include an expansion chuck that just came on the market. (Because I chose the larger trim ring that is usually at the other end of the body, the sizing ring packaged with the chuck wasn't usable.)

Whichever method you choose to hold the pen blank, you still must attach the blank to your lathe. Some penturners use a Jacobs drill chuck; others prefer a 4-jaw scroll chuck with #1 jaws. I like a Beall collet chuck with appropriate ER32 collet. Any method that produces a runout of less than 0.003" is acceptable for penturning.

Turn the body

You can turn a bushing to fit on either the expansion mandrel or the pin chuck. I prefer to use calipers. The diameter of 0.610" is taken off the trim ring. Make sure you choose and then measure the larger of the trim rings in the kit.

You need to mark the end of the internal brass tube and make sure you leave sufficient wood at that spot for strength. I like to leave around 0.040" so the diameter needs to be no less than 0.550".



Dry-fit the pen parts to test the drill depth.



Measure the thickness at the end of the internal brass tube to avoid breaking through on the blank.

Put a spare tube lined up with the open end on the tool rest to find the end of the internal brass tube, as shown in **Photo 5**. Use a skew on the final cuts to produce a surface requiring little sanding.

Turn your favorite pen shape. I favor a classic slightly tapered, rounded-over shape.

The simplest, most forgiving way to round the end is using a diamond-point tool. I like the ability to swing the tool through the arc without repositioning the tool rest, as shown in **Photo 6**. A spindle gouge or skew also works for this cut.



Using a diamond-point tool is an easy way to round over the end of the main body.

Finish the body

Check the body over carefully for blemishes that require filling. If there are no defects, sand with appropriate grits to 400.

With the lathe running at about its slowest speed, rub thin cyanoacrylate (CA) into the grain as a filler using the same sheet of 400-grit

sandpaper—the dust embedded in the sandpaper mixes with the CA to fill tiny cracks or open grain. Accelerator sets the CA quickly.

Using a fresh sheet of 400-grit sandpaper, sand back the first CA application to bare wood. This produces a hard, smooth surface that is an excellent base for finish.

Spread thin CA on with a poly-bag covering your finger and hit it with accelerator; repeat three more times. Then smooth the surface, scraping with a skew laid flat on the tool rest. Look for nearly the entire shiny surface to disappear—the pen surface should be a uniform gray.

With 400-grit sandpaper, sand until all shiny spots disappear. Follow this with Micro-Mesh 1500, 1800, 2400, 3200, and 4000. Finally, take the mandrel to the polishing wheel charged with white diamond, and polish to a beautiful shine.

With a $\frac{1}{16}$ " parting tool, square up the shoulder of the body that the trim ring sits against.



Assemble the main body using soft leather to protect the finish.

Assemble the pen

Use extra care because you will apply clamping force directly on wood, not a metal fitting.

As shown in **Photo 7**, a piece of leather covers the anvil of the press.

Make sure there is no burr on the brass tube or glue inside that may interfere with the fit. It is much better to have a loose fitting in the brass tube and use a little epoxy than to have to apply excessive force and risk damage to the pen.

Screw the grip section into the center coupling and push it on by hand, aligning the nib with the pen's best grain. Carefully remove the grip section without disturbing the center coupling and press the fitting home.

Turn the cap

Turn the cap on a mandrel, using bushings. Turn the clip end of the barrel to the bushing; turn the centerband end to the outside diameter of the sterling ring.

The ring will sit on a tenon. To meet the square shoulder without a gap, sand the face of the ring carefully on a flat surface, as shown in **Photo 8**. If the thickness of the ring is not entirely uniform, roll over the wood at the shoulder, and create a "V" at the joint to hide the imperfection.

The width of the tenon accepting the ring is important. The ring should protrude beyond the wood



For a seamless transition, square the ring on a piece of sandpaper.

just enough to cover the trim ring when the pen is closed. This is 0.080", so subtract that from the width of the ring to arrive at the tenon width.

Specialty tools



Some tools specific to penturning are essential, and some just streamline tasks. The photo *above* shows several. An **insertion tool** (1) is optional but nice to have—it keeps glue off your fingers when adhering the brass tube into the pen blank. A **deburring tool** (2) removes the burrs from the brass tube edge, which are often present after squaring. It also creates a little chamfer that helps during assembly. **Shim tubes** (3) turned from scrap stock guide the pen mill's centering shaft, assuring a square face. Each tube size requires its own shim tube. The **pen mill** (4) allows you to get the face of the pen barrel absolutely square to the axis of the pen.

Centerband variations

The centerband does not have to be a sterling-silver ring—you can find other suitable centerbands in many catalogs. You also can turn your own from aluminum or wood using any number of decorative techniques. Or, turn both barrels closed-end, omitting the clip. There are other pen models that lend themselves to this variation; it works best when there is a separate, internal plastic cap thread.



9 With a skew, turn a gentle curve.

Begin turning the barrel to match the ring diameter. Use your calipers to size the tenon for a slip-fit. Leave the tenon just a little short so you can square the cut after applying finish.

Add a gentle curve down to the clip-end bushing, as shown in **Photo 9**. Sand and finish, making sure to preserve the shoulder. After sanding with 2400 Micro-Mesh, square the final cut on the tenon.

Turn a wood finial

The wood finial is optional. Mount the 1½" long cutoff in a scroll chuck with spigot jaws. The idea is to turn a ⅜"-long tenon to insert into the cap's brass tube plus a ½" waste piece for holding the finial after it is reversed.

First, drill a hole to make room for the pen nib. Determine the depth by dry-fitting the cap onto the pen. Drill a ⅜" hole the same depth as the tenon (⅞" deep here), as shown in **Photo 10**. Use the brass tube to size the tenon diameter.



10 Drill and turn a wood tube for the finial.



11 Chuck the tube and turn the finial to shape.

Now, switch to the Beall chuck with an appropriate collet and hold the finial reversed. Shape it, using calipers for sizing, as shown in **Photo 11**. Try to match the slope of the cap tube for a continuous look, sand, and finish. End with a squaring cut at the shoulder. Then part off the ½" waste piece, leaving a ⅜" section to glue into the tube.

Assemble the cap

Slip the clip onto the tenon, then glue the finial into the cap tube using epoxy. It's a good idea to bend the clip-mounting ring a little so the clip just touches the body without tension. A quick-grip clamp applies gentle pressure while the glue cures without marring the finish.

Next, glue the sterling-silver ring onto the tenon with epoxy.

Finally, glue the internal threads into place. Note that one of the differences between the Little Havana and El Toro models is the cap thread: The Little Havana uses a 4-lead thread (four possible rotational alignments between cap and main body); the El Toro uses a single-lead thread. If grain alignment matters a lot—such as in a glued-up blank with a pattern that goes through both blanks—the El Toro is a better choice because the single-lead thread will always align the same way.

Apply a small amount of epoxy to the inside of the cap's brass



12 Assemble the cap threads.

tube. Screw the black cap threads tube onto the pen (the grip section and nib may be removed to avoid getting glue on them). The reduced-diameter end faces the cap, as shown in **Photo 12**. Apply a small amount of epoxy to it also. I try to make sure I have some glue in the circular grooves, too, since surface glue will likely be pushed off. Align the cap to the pen where you want it and push the two together. If the inside of the brass tube was clean, hand pressure should suffice.

You may be able to make a correction by turning the cap clockwise to improve alignment. Carefully unscrew the pen and wipe off any epoxy that may have been squeezed out.

Resources

- Little Havana pen kit (woodturnerscatalog.com, item 050-0320) or El Toro pen kit (arizonasilhouette.com, item BHW-512)
- Havana brass tube (woodturnerscatalog.com, item 050-9181) or El Presidente brass tube, item BHWT-526)
- deburring tool: machine-shop supply houses or use-enco.com
- Ring sizer (widgetsupply.com, item BCZ36)
- Schmidt premium conversion pump (arizonasilhouette.com, item BHW-710)

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Specialty Chucks for Closed-End Pens

The primary challenge in producing closed-end pens is securing the parts for turning. With a standard pen blank, bushings at each end of the mandrel keep the blank centered. Tighten the mandrel nuts and presto! You have friction and drive.

But that won't work when turning a closed-end pen, which requires an internal drive.

Here are three ways to mount a closed-end pen. The fixtures are shown in the photo *above right*: pin chuck and pin, tap mandrel, and homemade and purchased expansion chucks.

Whichever method you choose, light cuts with a sharp tool allow you to work without a support on the outboard end. You can support the outboard end with a revolving center. However, this creates a dimple you'll have to remove later.

Pin chuck

The pin chuck is not new, but it was introduced to penturning enthusiasts just a few years ago. A few sizes are commercially available from pen suppliers, but it is easy to make your own.

A pin chuck consists of a piece of steel rod with a machined flat. The diameter of the rod must fit the brass tube exactly. Drill rod is available in many sizes but often needs to be reduced a little to fit the brass tube exactly. You can accomplish this on your lathe with a file or sandpaper; the rod shouldn't be too loose or it will not hold well. Create the flat spot with a grinder and file.

For the pin, a piece cut from a nail will do the trick. The depth of the slot needs to match the diameter of the pin. The pin can be around 1/8" in diameter and 3/4" long, with the slot 1/2" from the end of the chuck. None of these dimensions are critical.

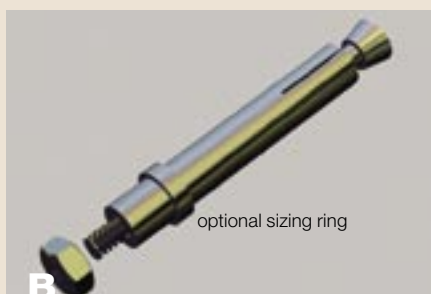
When you slip a brass tube over the pin and chuck, and twist the brass tube, the pin acts as a cam and locks the tube in place, as shown in **Drawing A**.



Fixtures for turning closed-end pens: pin chuck (1), home-made expansion chuck (2), tap mandrel (3), and commercial expansion chuck (4).



A
Pin chuck



B
Expansion chuck



C
A standard pen mandrel converted into a tap mandrel



D
Tap mandrel

Expansion chuck

A few months ago, expansion chucks became available for popular pen parts, including the Havana kit used for this project. You simply slip the glued-up pen blank onto the mandrel and tighten the nut, which draws a cone into the far end and expands the diameter slightly. This action solidly locks the pen blank into place.

Drawing B illustrates an expansion chuck. This is by far the most secure method of mounting, and I recommend it for the several kit models available (\$18–\$20).

Modified pen mandrel

For this application, the Berea B mandrel works better than other commercial mandrels because it uses a coarser thread (1/4-20) than most other mandrels. Given a choice, I prefer the Berea B for all pen projects because it has a larger diameter and is therefore a little stiffer.

To modify the mandrel for closed-end pens, grind three flats on the threaded end, creating a tap, as shown in **Drawing C**.

Start by drilling for the brass tube as required by the pen kit. Without removing the blank from the vise, drill the extension hole required for a fountain-pen conversion pump or a rollerball refill; a 1 5/64" bit is ideal. Then screw the mandrel into the extension hole. Support the open end of the tube with a bushing and thread the tap mandrel directly into the drilled hole, as shown in **Drawing D**. Chuck the parts and begin turning. The mandrel, threaded into the pen blank, drives it securely.

The nice thing about this method is that it's universal—all you need is one bushing of the right size for the pen kit and a 1 5/64" blind hole to thread into. I use this method to get turning quickly with a new pen setup.

Because of the smaller (1 5/64") diameter of the extension hole, you will have to enlarge the hole slightly after turning to make room for the spare cartridge.

—Richard Kleinhenz

Resources

- Drill rod to make your own pin chuck: use-enco.com
- Commercial pin chucks: mannmadecreations.com
- Expansion chucks: arizonasilhouette.com