

A Sunday Suit for a Pentel Pencil

by Richard Kleinhenz



The Pentel pencil has probably the most brand recognition of all the mechanical pencils in the United States (the simple P205 model seems to be particularly popular with accountants and draftsmen). Though Pentel also makes many other models, this one is popular because of simplicity, price, and excellent functionality. Unfortunately, it only comes in one color for each lead width: the 0.5mm model (P205) is made from black plastic, the 0.7mm version (P207) is blue, and the 0.9mm model (P209) is yellow (boring, isn't it?). Luckily, we can dress this pencil in a lathe-made Sunday suit, using wood, resin, or stone blanks, and make it really stand out above the rest!

I have been making Pentel-based pencils for a while, using some homemade tooling. This method, described in my book *The Pen Turner's Bible* (available from Woodcraft—see Supplies) works perfectly well. For most people, the most challenging part of the construction is drilling a 4" deep hole; therefore, in this article, I will describe an alternate method that does not require the deep hole.

Additionally, it can be made on a standard 7mm pen mandrel—no custom tooling is needed! The project does involve modifying a metal fitting, but this can be done on a wood lathe with standard tooling. By the time you read this, one of the major pen kit suppliers may be offering a kit that includes this modified part.

PREPARATION

The P205 is easily disassembled by unscrewing the tip. You can then slide the mechanism out from the end, and the clip can be slipped off. **Fig. 1** shows the disassembled pencil.

Select a 5" straight-grained wood blank for your first pencil. Burls are much trickier to turn for this pencil than they are on a standard kit, so I recommend not starting with a burl. I'm using curly mahogany and the open grain is a little bit of a challenge. Cut two pieces, 2-3/8" and 2-1/2" long. To help with grain alignment, mark the adjacent two sides across the cut line. Use a 7mm drill bit to center drill the blanks from the marked end, **NOT** letting

SUPPLIES

Tools: lathe with 7mm pen mandrel and 60° revolving center; collet chuck, such as Beall collet chuck, with 6mm to 7mm and 9mm to 10mm collets; drill press with 7mm drill bit; lathe tailstock-mounted drill chuck; center drill; No. 22 and 15 drill bits; bandsaw; belt sander; assorted turning chisels, including parting tool, pyramid tool, skew, and bedan; calipers; razor saw and miter box (such as X-acto X75320 or Olson 35-231*); buffing system**; polishing wheel; clamps and clamping block; finger-groove tool; deburring tool; barrel trimmer; pen mill; 7mm bushing; drilling vise; 3/8" open-end wrench
Pentel P205 pencil (or P207 or P209 for thicker lead)
10" long 7 mm brass tubes***
5" long pen blank
2" to 3" piece of scrap hardwood
Slimline clip finial or 7mm Euro finial fitting***
Assorted grits of abrasive paper
Micro-Mesh polishing pads**
Thin and medium cyanoacrylate glue (CA or superglue) and accelerator
5-minute epoxy
Small amount of playdough or dental wax
Ruler, marker, and pencil
Small wood applicator (optional)
Dry cloth
Plastic bag

*Available from Woodcraft,
PO Box 1686, Parkersburg, WV 26102;
phone: 800-225-1153;
website: www.woodcraft.com;
order: Olson 35-231 Saw and Mini-Miter Box Set.

**Available from BG Artforms,
2189 Philip Drive, Bensalem, PA 19020;
phone: 888-717-4202 (toll-free);
website: www.bgartforms.com;
order: acrylic pen buffing system and
Micro-Mesh polishing pads;
or from Penn State Industries,
9900 Global Road, Philadelphia, PA 19115;
phone: 800-377-7297;
website: www.pennstateind.com;
order: acrylic pen buffing system, Micro-Mesh
polishing pads, and 10" long 7mm brass tubes.

***Available from Wood-N-Whimsies,
9985 Lawrence 2239, Monett, MO 65708;
phone: 800-820-1099;
website: www.woodnwhimsies.com;
order: Euro finial fittings (XEURO-CAP NUT)
and 10" long 7mm brass tubes.

Please refer to all manufacturers' labels for proper product usage.

the bit exit the wood.

It is important to drill a hole that fits the brass tube rather snugly (but the tube should still slide freely), so the "I" or 7mm drill bit will work better for most people than the "J" or 9/32" drill bit commonly used for slimline and other 7mm pens. Orient the blanks in the drilling vise so that the two marked faces are against the same vise faces to ensure grain alignment (see Fig. 2). (Note that the diameter of the tip that butts against the wood measures 0.262", while the diameter of the 7mm brass tube is 0.267". Therefore a small rim of brass will be visible; this is normal! You do not want to look at the glue though, which is the reason why the brass tube should be a snug fit in the drilled hole.)

Cut the blanks to final lengths of 2-1/4" and 2-1/8" respectively to expose the exit hole. If you want to use a wood centerband, subtract its thickness from the overall length. Suitable centerband slices can be cut from pen-blank cutoffs on the bandsaw using a piece of wood as a zero-clearance table (see Fig. 3). The overall length of wood should add up to 4-3/8".

Slide a temporary brass tube into the hole and square the ends on the belt sander with an appropriate jig (or use a pen mill)—to reduce play here is one of the reasons for making sure that the brass tube fits snugly. If a wooden centerband is being used, make sure that the ends of the centerband slice are flat by sanding on the table. Gross saw marks and ridges should be removed, or they will detract from the clean appearance in the final pen.

CUSTOM TUBES

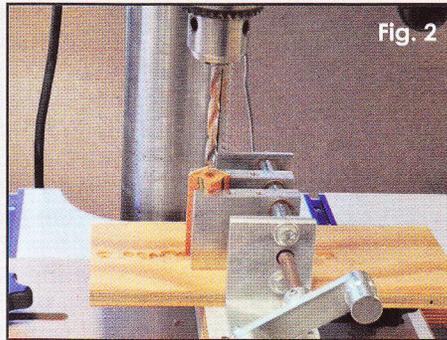
Cut a 4" long piece of 7mm brass tube from long stock (see Fig. 4). (Note: Length is not supercritical, so a ruler and marker are adequate for marking.) You also need a 3/4" long piece of brass tube to be used in lieu of a bushing; this can be reused for subsequent pencils. A small miter box for cutting model railroad rails made by X-acto with their razor saw works well for cutting brass tubes (see Fig. 5). Square the ends using a barrel trimmer and remove any burrs. Scuff up the brass tube with abrasive paper to improve glue adhesion and place a mark 1/4" from the end.

Plug the end of the brass tube that has the 1/4" mark with something similar to playdough or dental wax. I suggest using epoxy to glue in the brass tube for this project. Some axial pressure will be put on during construction, and cyanoacrylate glue (CA or superglue) is not known for high shear-strength. Polyurethane glue expands and can interfere with functionality.

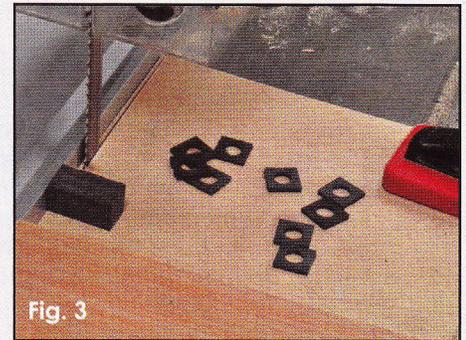
Apply epoxy to the inside of the front (longer) blank and the outside of the brass tube. Insert the blank from the (marked) center of the blank, letting 1/4" extend out in front. Do not coat the inside of the upper (shorter) blank, just the brass tube on that side. Add the centerband slice if you are using a centerband. Slide the upper blank onto the brass tube. When you slide on the second blank, the brass tube will likely shift. Readjust the tube position for 1/4" protrusion and let the epoxy cure for at least fifteen minutes. Since the glue line will be hidden later, there is no need to clamp. However, if you use a wood centerband, the blanks will need to be clamped or you'll see glue lines.



There are few parts to the Pentel P205 and it disassembles easily.



Mark two faces of the blank across the cut line, and locate them on the same faces of the drilling jig.



Thin slices for centerbands can be cut on the bandsaw using an auxiliary table.

Because of the tube extension, use a clamping block at the tip, which can simply be a block of wood with a drilled hole. The important part in locating the blanks on the brass tube is that the tube is at least 5/8" shy of the upper end to provide clearance for the clicker—the amount of extension in front is not critical, because it will eventually be ground off.

TURN THE PEN

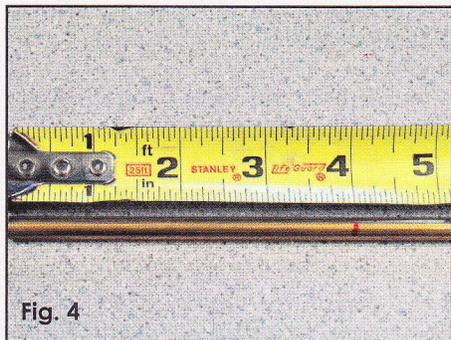
Load the blank onto a standard pen mandrel. Start with a 7mm bushing to provide some working space. Next comes the blank, nib end (exposed brass tube) first. Follow it with the 3/4" piece of brass tube (slide it inside the blank), and another 7mm bushing, and the mandrel nut. If your mandrel is not adjustable length, add more bushings or shim pieces as needed to allow you to tighten everything in place with the brass nut (see Fig. 6). I use a Beall collet chuck with 6mm to 7mm collet (also sold as 9/32"). I highly recommend an ER32 collet chuck such as this for its versatility over a standard adjustable mandrel. For this project, the collet chuck also is the best way to hold a metal fitting that will be modified later.

Turn the blank to approximately 0.4" diameter. Since the end pressure is only by way of the brass tube and not as usual directly to the blanks, use a gentle touch and sharp tools. If you are having trouble getting the blank

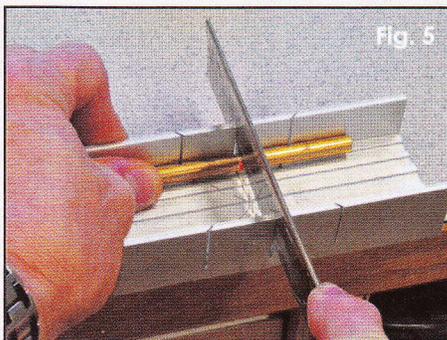
round initially, knock off the corners on a belt sander before mounting on the lathe. Once you are at roughly 0.4" diameter, remove the 3/4" brass tube and let the bushing press directly against the barrel. The last 5/8" is now unsupported, so be careful at this end, particularly if you are using a burl.

(Note: Why use the 3/4" brass tube at all? In the first stages of turning, before the blank is round, there are a number of impacts [since the cuts are interrupted] and this tends to tighten the mandrel nut. If the bushing bears against the unsupported wood, the actual force holding the blank in place is sheer force that pushes the brass tube into the wood. This can result in glue failure or the bushing deforming the wood. So, while not absolutely necessary, it's a good precaution!)

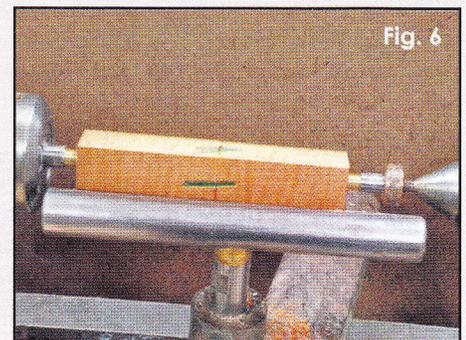
Turn the barrel to the final dimension of a 0.375" uniform diameter; use calipers to check. The diameter is not critical, close is good enough, so a 3/8" open-end wrench can also serve as a gauge. Now taper the clip end (tailstock side) to the bushing over a 1/2" length, and the tip end to 0.300" over a length of 1", rolling the end over, down to the brass tube. Abrasive paper can also be used to round over the end if you are not comfortable with the tools, but it should not be left square. This is the reason a bushing was not used at the tip, but rather the brass tube was left exposed.



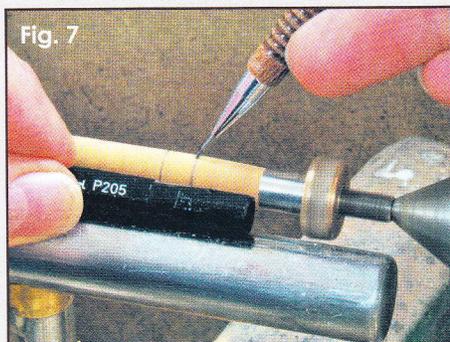
About 4" of 7mm brass tube will be needed.



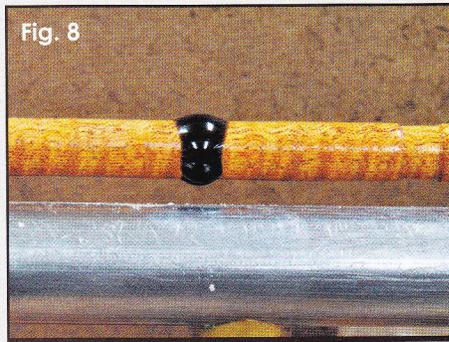
A small miter box is used to cut the brass tube.



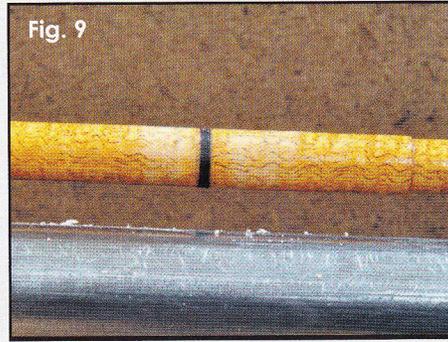
The blank is mounted and ready for turning.



Use the original sleeve to mark off the clip recess.



A groove filled with a wood dust/epoxy mix hides the glue line.



A nice centerband emerges after the epoxy mix is turned down.

Do the initial sanding to 400 or 600 grit. Mark two pencil lines for the clip recess, about 0.6" and 0.925" from the end. The original sleeve can also be used to mark off the locations (see Fig. 7). With a parting tool, turn a small recess for the clip, roughly 0.030" deep (to a diameter of about 0.315").

HIDE THE GLUE LINE

Since I did not use an explicit centerband here, it is now time to hide the junction line between the blanks. First, seal the wood in the area to avoid open grain picking up colorant; I use a coat of thin CA. Cut a groove, using a thin parting tool. For the epoxy fill used here, the groove does not have to be deep, 0.020" will suffice; however, you need to cut a little deeper if crushed stone is being used to fill the groove. I created some black dust from a piece of African blackwood, using a piece of coarse abrasive paper on a flat surface, and mixed it up with 5-minute epoxy. The mixture is then packed into the groove with a small wood applicator, making sure that there are no gaps, and liberally overfilling the groove (see Fig. 8). Keep the lathe running on low speed while it cures, because the epoxy is still a thick liquid (it's time to take a break anyway!).

After the epoxy has set, turn it down carefully to the original wood surface. There, the junction line has disap-

peared, replaced by a nice centerband (see Fig. 9)!

ADD OPTIONAL FINGER GROOVES

I like adding finger grooves to the front of the pencil. You can lay out evenly spaced lines, but I prefer using a finger-groove tool sold by Penn State Industries (www.pennstateind.com). Because of the thin wood near the tip, I don't cut full-depth beads; I just score the lines, using this tool first and then a pyramid tool to enlarge the lines. Simply lay one of the edges of the tool into the scored line, raise the handle till the tip starts cutting, and widen the groove (see Fig. 10). The end result is not unlike the grooves in the original pencil.

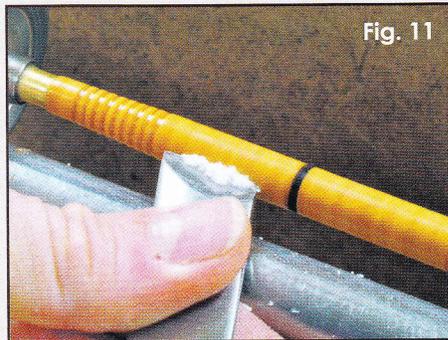
APPLY CA FINISH

I apply a CA finish to the pencil. The piece was already sanded to 400 or 600 grit earlier, so just make sure that the center where the epoxy centerband was added has no tool marks. With the lathe running slow (300 rpm or thereabouts), apply one coat of thin CA, followed by two or three coats of medium CA (I use a plastic bag on my finger to spread the CA evenly)—be careful not to fill in the finger grooves completely! Each coat gets a quick shot of aerosol accelerator, and a few seconds later, the next coat can go on.

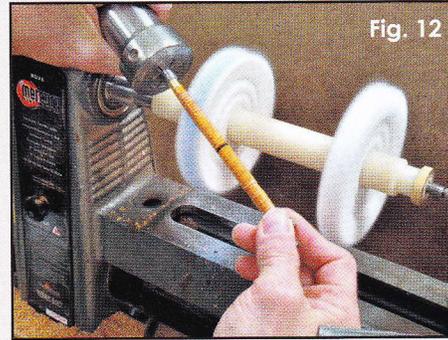
You probably need to work a little bit on the clip recess



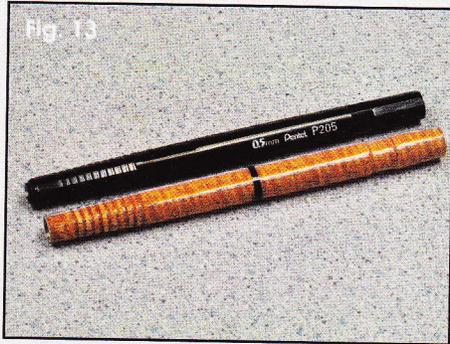
A pyramid tool is an efficient way to cut the finger grooves.



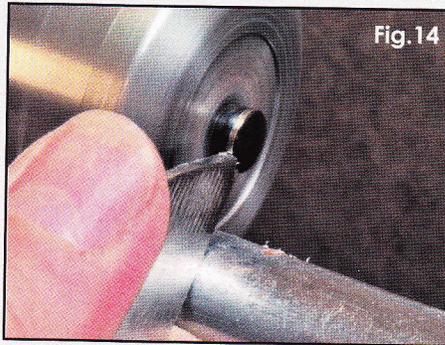
Before polishing, scrape the CA lightly with the skew to level it.



The final wet look is achieved on a polishing wheel after polishing to 12,000 Micro-Mesh.



I know which one I prefer!



The first step in converting a slim-line finial is turning down the mushroomed end with a parting tool.



A center drill marks the center and allows a No. 22 drill bit to drill a concentric hole.

with the parting tool in order to regain its shape, since the CA tends to fill in the steps. Level the CA using a skew laid flat on the tool rest, scraping lightly, and picking up fine white shavings of CA from the high spots (see Fig. 11). Make sure that most of the shiny areas disappear. The areas that were scraped and leveled should appear dull. Follow this step by sanding with 400-grit paper until **all** the shiny spots have disappeared. Be careful through the whole polishing process when polishing close to the steps for the clip and by the finger grooves—these are the easiest places to sand or polish through the CA. Finish this step by sanding lengthwise to remove any circular grooves.

I employ a wet-polishing process on CA. Cover the lathe bed with a dry cloth and start the process with wet 1,500 Micro-Mesh. Polish with the lathe running at a medium speed, around 1500 to 2000 rpm. Keep moving the polishing pad to keep it from drying out. Only a few seconds (ten to twenty) are necessary. Stop the lathe and apply some lengthwise strokes to remove any circular grooves. Wipe the blank dry with the cloth. Repeat this process all the way up to 12,000 mesh. You should now have a nicely polished pencil sleeve, hopefully without having broken through the CA finish, which would result in dull spots. If you do, re-apply CA and repolish.

Follow up with a polishing wheel to give the finish the final wet look. I use the acrylic pen buffing system that

Barry Gross provides (see Supplies); it is carried by most pen kit suppliers. Though its name implies use on acrylic blanks, it does an excellent job on CA. I leave the barrel on the mandrel in the Beall chuck, because it makes a convenient and secure handle. Polish with the blue compound, running the barrel over the wheel diagonally from both sides (see Fig. 12).

The final step is buffing with the soft cotton, which basically removes any traces of the compound. To reduce the danger of CA chipping, cut through the CA, just outside the wood, down to the brass tube at the tip, and to the bushing at the clip end. Remove the barrel from the mandrel. I clean up the clip end by polishing freehand with 2,400 Micro-Mesh. Now grind off the brass tube extending at the tip—this is most easily done on a disk or a belt sander. I do this freehand until the brass is nearly all gone, and then use a pen mill by hand to square and trim back to the wood. Again, make sure that you polish off any burrs. The finished *Pentel* dress suit is shown in Fig. 13.

MAKE A CUSTOM FITTING

Now it is necessary to make a fitting for the mechanism. The easiest part to modify is the finial fitting from a 7mm Euro. These are available for purchase (see Supplies) if you don't have any in your scrap/spare-parts bin. You can also use a clip finial from a 7mm slimline pen; again, these can



Fig. 16

Test-fitting the insert; the tip should screw down and hold it firmly.



Fig. 17

This is the clip jig.

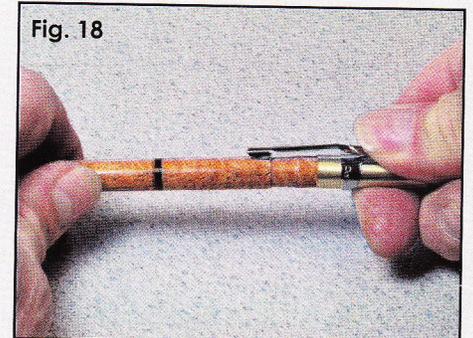


Fig. 18

The clip jig is shown in action; push the end of the clip only.

be purchased if you don't find one in your shop. I used one of these here to show the process.

Chuck the finial in a collet, keeping the mushroomed end slightly away from the collet. Work the rim down to the same diameter as the barrel so that it will slide fully into a brass tube during assembly (I use a parting tool or bedan). Start with the corner of the tool at the outboard side and cut toward the headstock (see **Fig. 14**). The end is usually domed—that can be squared up also, though it's not absolutely necessary.

The next step is important—you need to drill a concentric hole through the fitting. Use a center drill to mark the center and to give the drill bit a starting point. A center drill is a very short drill with an accurately ground point (see **Fig. 15**). Being short and stubby, it resists deflection and the ground sharp point actually pulls it into the center. The tailstock needs to be reasonably well aligned with the headstock spindle axis for this to work. Drill only a little bit. Check that the shape of the dimple is a "V" and not a "W." If you are not able to do this on your equipment, use the alternate fitting as a starting point.

Remove the centering drill and drill a hole all the way through, using a No. 22 (0.157") drill. This drill is rather long and skinny, and it would never drill a centered hole without the starting dimple. Turn the fitting end to end in the chuck so that the reduced diameter end that is first inserted in the tube is facing out, and drill partially through, using a No. 15 (0.180") drill bit, stopping about 1/8" from the end. On my lathe, two turns of the handwheel from where the drill contacts the fitting is about right.

If you started with the Euro fitting, both holes can be drilled from the same side. Mount the fitting so that the reduced diameter end that is inserted into the brass tube faces out, and drill that same No. 22 through hole, followed by the No. 15 stopped hole—the existing threaded hole will keep the drill centered. To test it, slide the fitting onto the pen mechanism and screw on the tip. It should screw all the way against the fitting and hold it firmly (see **Fig. 16**).

To assemble, press the fitting into the tip of the pencil sleeve. Insert the mechanism from the other end and screw the tip onto the protruding thread, locking the mechanism in place. Test the operation!

MAKE A CLIP JIG

There is one more reusable tool you need to make: a clip jig that allows the clip to slide on without scratching the finish. Use a 10mm brass tube, such as a spare tube from a

cigar pen kit, and a 2" to 3" piece of scrap close-grained hardwood. Turn a 1/2" long tenon sized to slip on the brass tube. Use epoxy to glue on the brass tube. When the epoxy has cured, mount the brass tube in a collet (or scroll chuck or drill chuck with draw bar) and turn a taper from the brass tube down to 0.3". Break the sharp edge of the inside edge at the open end of the brass tube using a deburring tool, a Dremel with small sanding drum, a file, or even a pocketknife. **Fig. 17** shows the completed clip jig. Slide the clip onto the clip jig, set the open end over the end of the pen, and slide the clip forward, pushing the end of the clip with your thumb (see **Fig. 18**). It should slide on without making any scratches and settle into the recess. Some wax on the brass tube helps to slide the clip along it.

FINAL THOUGHTS

Now it's time to sit back and admire your beautifully dressed *Pentel* pencil! And once you show it to all your friends, you will have to start making more of them! The construction method shown here eliminates the need to drill a 4" deep hole, which can be challenging for most turners. The pencil is turned on a standard pen mandrel. The trade-off is a centerband, which (in my opinion) does not detract from the good looks of this pencil, and the need to fabricate a custom fitting, which is easily achieved with standard woodturning tools.

Richard Kleinhenz



Richard Kleinhenz started turning pens in the mid 90s and sells pens at crafts shows, galleries, and on his own website at www.beautifulhandmadepens.com. He is moderator of the Penturners Group meeting on Yahoo! and founded the Penmakers Guild on Yahoo! in 2003. He has demonstrated at local craft shows as well as the Utah Woodturning Symposium. Richard is a physicist working in the semiconductor industry and turns in his spare time. His scientific work and German background are probably what makes him focus on technical details and perfection in his turning.

Richard welcomes your questions and comments and can be reached by sending a SASE to him at 153 All Angels Hill Road, Wappingers Falls, NY 12590 or by e-mail at richk@beautifulhandmadepens.com.

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