

TURNING A PEN

ORIGINAL BY MIKE RUDE

SEPT 2006

REVISED BY GORDON PATNUDE - AUGUST 2015, OCTOBER 2016

PHOTOGRAPHY BY JIM GOTT

AUGUST 2015

EQUIPMENT AND SUPPLIES NEEDED

A PEN TURNING TUTORIAL [this document]

Safety equipment – SAFETY GLASSES and Dust mask [exotic woods can be hazardous!]

Saw – Table saw, **band saw**, or handsaw to cut blanks.

Lathe – Almost any lathe can be used;

Mandrels and Bushings – A Mandrel is a device that grips or clamps

materials to be machined. Mandrels mount into the headstock with a #1 or #2 Morse Taper. For pen-turning, mandrels are typically 0.247in \pm 0. Bushings are specific to the pen kit and fit on the mandrel to hold the pen blank for turning. The top photo at right shows an older style mandrel with bushings. Newer mandrels [bottom right] have a tailstock component that presses directly on the bushings, thus preventing the mandrel from bending.



Your notes: _____

Turning Tools and Accessories



Tray to hold pen blanks throughout the process

Pen Blanks – Dry wood, plastics, bone, horn, corncob, etc. See “Preparing the Pen Blanks”.

Drilling Jig – Holds blank precisely for drilling accurately on a drill press;

Alternatively, a scroll chuck can be used on the lathe with a drill chuck in the tailstock. We will use this method.

..... continued

Barrel Trimmer – Cutter with pilot for tube size or table sander **[photo-right]**

Assembly – Pen Press or ratcheting clamp

Calipers – Digital readout in Imperial and Metric

Sandpaper – 120 through 600 grits for wood; grits up to 12000 are often used for acrylics or stabilized wood; brown paper bag

Finish – Sanding sealer, Lacquer, French polish, EEE cream, Hut Crystal Coat, CA glue, Boiled Linseed Oil [BLO], etc.

Miscellaneous -- -- Masking tape, pipe cleaners or rubber bands; paper towels or lint-free cloth;



Your notes:

FAMILIARIZE YOURSELF WITH THE PEN PIECES AND READ THE ENTIRE INSTRUCTIONS.

PREPARING THE PEN BLANKS

FAMILIARIZE YOURSELF WITH THE PEN PIECES AND READ THE ENTIRE INSTRUCTIONS.

If starting with wide boards, rip them into strips $\frac{3}{4}$ " x $\frac{3}{4}$ " or 1" x 1", then cut into 5" or 6" pen blanks

Have a box or tray ready to hold the cut blanks to keep them matched and organized.

Square the ends of the raw, uncut blank. They often are not squared, particularly stabilized woods.

Mark a line across the cutting point [photo] so pieces can be grain-matched. If doing multiple pens, label them [a, b, c, etc.]



Your notes:

FAMILIARIZE YOURSELF WITH THE PEN PIECES AND READ THE ENTIRE INSTRUCTIONS.

5. Cut the stock to the size required for the pen kit.

[photo]

6. Cut to the required length(s)
– Check PEN KIT INSTRUCTIONS for length required for each tube.

THEY ARE NOT ALWAYS EQUAL!! [gp]

7. Use masking tape, rubber bands or pipe cleaners to keep two-part blanks together.



Your notes:

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DRILLING THE PEN BLANKS

The pen blanks must be drilled to accept the brass tubes. There are a few different methods may be used for drilling the blanks. The first method shown uses the lathe and chuck.

Measure the tubes with calipers and compare with recommended drill size(s). Make sure the tube fits easily into the drilled hole and leaves enough space for the glue to fit.

Make a test drilling in a similar scrap wood – some drill types make larger holes than others of the same size. Also make sure the drill is sharp. Dull drill bits may overheat the blank and cause it to crack.

Most drilling can be done best using a brad-point drill bit. There are some drill bits designed specifically for ACRYLIC materials. I have not yet tried these, but have had reasonable success with acrylics, using brad-point bits.

Your notes:

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DRILLING THE PEN BLANKS [CONTINUED]

My preferred method for drilling the blanks is done on the lathe with the blank held in a scroll chuck with jaws designed for this purpose. A drill chuck is mounted in the tailstock and the **lathe turning at a moderate speed [$\approx 500\text{rpm}$]**.

This absolutely ensures that the drill bit will remain centered the full length of the pen blank during drilling. The drill is advanced into the wood as the lathe turns the workpiece.



An alternate method for drilling the blanks uses the drill press. It will be described on the next pages. Skip ahead to the “Gluing” section if not using the drill press.

Extra care will be necessary when drilling acrylics, antler or other materials that are irregular in shape.

Your notes:

DRILLING PEN BLANKS - DRILL PRESS METHOD

You will need a vise or some other means of holding the pen blank securely and firmly in position.

Mark the center of the first blank (of each size). Set the drill depth-stop to just below the surface – make sure the drill platform does not have a hole where you are drilling or you may easily blow out the bottom of the blank. Setup the drilling jig and clamp it into position over the center mark. If all blanks are of the same size you won't have to move the jig again! [photo]

Clamp the blank into the jig and drill the hole carefully, **clearing chips frequently** to prevent overheating. If drilling is very hard and slow then you may need to check if the blank is getting hot – it may explode on you! Drill slowly through the bottom to avoid blowout. [photo]



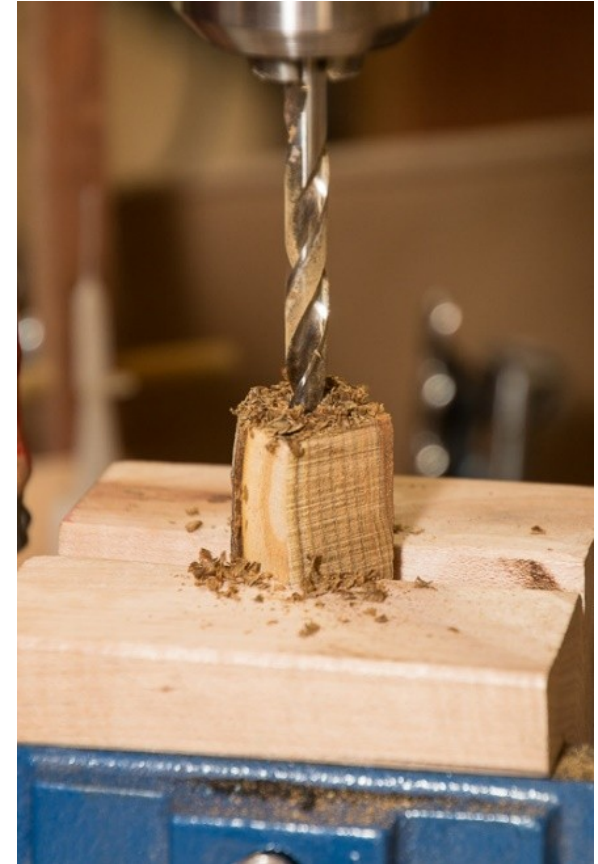
Your notes:

FAMILIARIZE YOURSELF WITH THE PEN PIECES AND READ THE ENTIRE INSTRUCTIONS.

DRILL PRESS METHOD continued

Check the alignment of the hole in the blank. If it is not centered on the top and bottom then realign the drilling jig. Clear out the chips in the drilling jig before mounting a new pen blank.

Return the drilled blank into its position in the tray and when a pair is completed, tie them together with masking tape, a pipe cleaner or rubber band.



Your notes:

GLUING THE TUBES INTO THE PEN BLANKS

Prepare a gluing area and cover with wax paper. Cereal bags make an excellent glue-resistant protector.

Have the pen blanks and tubes organized so that you don't try to put the long tube into the short blank!

Sand each of the brass tubes with 180 – 220 grit to improve the glue adhesion. *[top photo]*

It's a good idea to plug one end of each tube (use a raw potato or Play Doh™) to keep the adhesive out. *[photo below]*



Both tubes are sanded and you can see the sanding marks on the tubes.



Your notes:

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GLUING THE TUBES INTO THE PEN BLANKS

[CONTINUED FROM ABOVE]

I prefer to use **two-part epoxy** adhesive – I have never had a gluing failure with this method.

Measure the proportions carefully and mix for about a minute to ensure fully mixing the hardener with the resin.



Your notes:

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GLUING THE TUBES INTO THE PEN BLANKS

[CONTINUED FROM ABOVE]

Apply the glue to the tubes and rotate/twist while inserting to ensure the adhesive is evenly distributed inside the blank. [photos above]

Allow time for the adhesive to cure completely. When the adhesive is dry remove any excess with a hobby knife. I usually let my glued blanks dry overnight. [gp]

Epoxy can set in 5 to 30 minutes but should be allowed to cure overnight before turning the pen. Polyurethane glue [like Gorilla glue] can also be used. In most cases it cures in 4 hours.

In the next step, the blank will be milled so that both ends of the blank are square with the axis of the pen blank, i.e. the faces of the blank ends will be perpendicular to the axis. This ensures that the pen will be symmetrical about the axis.



Your notes:

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MILLING THE BLANK

Hold the blank **SECURELY** [I use a wooden screw clamp] and use a barrel trimmer with the appropriate pilot shaft to clean out any excess adhesive that may have entered the tube and trim the excess material at each end down until you can **just see** the bright brass tube. [photo]



Approach this with caution, as it is possible to damage the blank with the barrel trimmer if you are too aggressive. (A table sander can be used instead but only if the blank can be held **precisely** perpendicular to the sanding surface.) Cleanup any remaining glue inside the tube ends with an Exacto™ knife. I have found that 220 grit sandpaper on a dowel is sometimes a better choice. [gp]

Your notes:

FAMILIARIZE YOURSELF WITH THE PEN PIECES AND READ THE ENTIRE INSTRUCTIONS.

TURNING THE PEN BLANKS

Lay the pen blanks out on the tray so that they will go on the mandrel in the correct orientation. **I'm right-handed, so I put the tip on the right [toward the tailstock] and the cap-end toward the headstock.** [gp]

Assemble the mandrel with the **appropriate bushings for the pen kit** and mount on the lathe. [photo]

Bushings for the cap, center and tip are not always the same size. Make sure you know which bushing goes in each position – compare with the pen kit instructions if you are not sure.



Your notes:

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TURNING THE PEN BLANKS

Tighten the tailstock before tightening the mandrel nut so that the assembly is centered. Make sure not to apply too much tailstock pressure to the end of the mandrel. It is easy to bow the mandrel which will result in the pen sections being oval rather than round.

Turn the lathe BY HAND to make sure the pen blank does not hit the tool rest. Then, start the lathe and check that the mandrel is not wobbling (check the rightmost bushing) – adjust tailstock pressure and check that headstock taper is clean. Also polish the tool rest and wax it for smooth sliding of lathe tools. (Check the tools also, and wax them as well.)



Your notes:

FAMILIARIZE YOURSELF WITH THE PEN PIECES AND READ THE ENTIRE INSTRUCTIONS.

TURNING THE PEN BLANKS



Run the lathe at a moderate to high speed (1800-3000 rpm) and rough down both blanks to round before finish turning either one. You may get better results at higher speeds.

Shape to desired contours and make sure the ends match the bushings.

Your notes:

FAMILIARIZE YOURSELF WITH THE PEN PIECES AND READ THE ENTIRE INSTRUCTIONS.

FINISHING THE PEN BLANKS

Once you are happy with the shape and any decorative details of your pen, you can prepare the blank for finishing.

Sand the blanks beginning with 120 or 150 grit and continue to 600 or 1000 for wood and 12000 for acrylics or stabilized woods. My rule of thumb is the next grit in sequence is **not more than 50% greater than the last grit you used.**

DO NOT SKIP GRITS!!

For wood, I often go to 1000 grit and after the final grit, burnish using a brown paper bag & shavings from the turned piece before applying any finish. [gp]

Your notes:

FINISHING THE PEN BLANKS



Sand the blanks beginning with 120 or 150 grit and continue to 600 or 1000 for wood and 12000 for acrylics or stabilized woods. My rule of thumb is the next grit in sequence is 50% greater than the last grit you used. **DO NOT SKIP GRITS!!**

Apply your favorite finish and polish.



Your notes:

FAMILIARIZE YOURSELF WITH THE PEN PIECES AND READ THE ENTIRE INSTRUCTIONS.

FINISHING THE PEN BLANKS

Apply your favorite finish and polish.



Use a lint-free cloth or paper towel; lathe at 800-1200.

Your notes:

FAMILIARIZE YOURSELF WITH THE PEN PIECES AND READ THE ENTIRE INSTRUCTIONS.

Assembling the Finished Pen

Remove the blank(s) from the mandrel and connect them together with masking tape, a pipe cleaner or rubber band.

If turning multiple pens, put these with the kit they belong with and move on to the next; if not, go to the assembly step.



Your notes:

The finished pen ready to remove after polishing.

Assembling the Finished Pen

AGAIN, FAMILIARIZE YOURSELF WITH THE PEN PARTS AND READ THE KIT ASSEMBLY INSTRUCTIONS.

FOLLOW THE SEQUENCE SPECIFIED IN THE ASSEMBLY INSTRUCTIONS!!

THERE ARE SEVERAL WAYS TO ASSEMBLE A PEN. TWO METHODS ARE DESCRIBED HERE.

I USE A PEN PRESS BUT IT IS POSSIBLE TO USE A RATCHETING BAR-CLAMP OR EVEN A VISE TO PRESS THE PIECES TOGETHER. (GP)

Your notes:

FAMILIARIZE YOURSELF WITH THE PEN PIECES AND READ THE ENTIRE INSTRUCTIONS.

Assembling the Pen [continued]

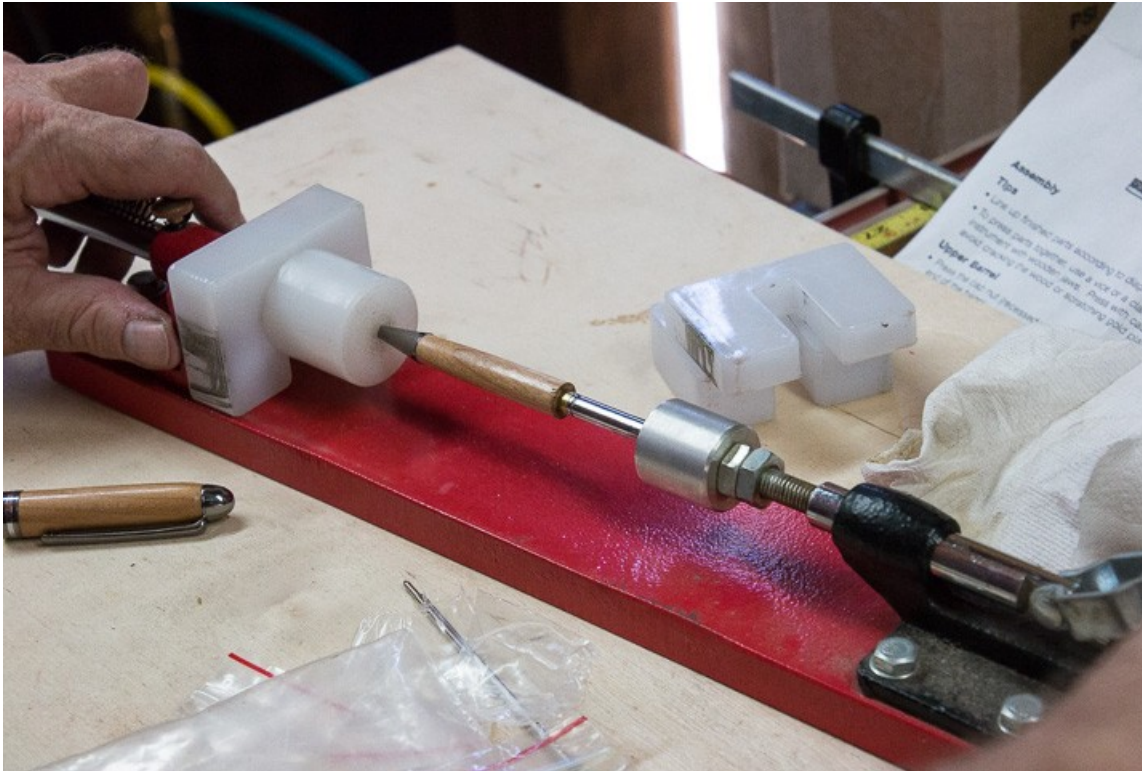


Pressing the tip [left] into the lower body

Your notes:

FAMILIARIZE YOURSELF WITH THE PEN PIECES AND READ THE ENTIRE INSTRUCTIONS.

Assembling the Pen [continued]



Pressing the mechanism into the lower body. The assembled cap can be seen at left center.

Your notes:

FAMILIARIZE YOURSELF WITH THE PEN PIECES AND READ THE ENTIRE INSTRUCTIONS.

Assembling the Pen [continued]

If you do not have a pen press available, here's an alternate method:

The lathe can also be used to good effect as a clamp using the tailstock as a ram. I do that all the time and never have a problem. (mr)
A V-block can be helpful if used as an aid in alignment.

Turn a hardwood blank to go into a chuck and true up the surface.

Chuck up a large bolt [1/2" or 3/4"] in a **DRILL CHUCK** and put that in the tailstock **WITH THE BOLT HEAD TOWARD THE HEADSTOCK.**

Make sure the pieces are straight and in line before pressing – misalignment can seriously damage the pen.

Place the tip of the nib on the wood piece in the chuck and press the nib into the wood with the tailstock bolt against the bolt head. Then do the same with the clip against the wood and the bolt against the brass tube. (jg)

If a piece is too loose in the tube, make sure you have it in the proper place and if so then use a small drop of CA to hold it securely in the tube. **BE CAREFUL NOT TO GET CA GLUE ON THE PEN MECHANISM.**

Your notes:

FAMILIARIZE YOURSELF WITH THE PEN PIECES AND READ THE ENTIRE INSTRUCTIONS.

Here is a completed pen!!



HAPPY PEN-MAKING!!