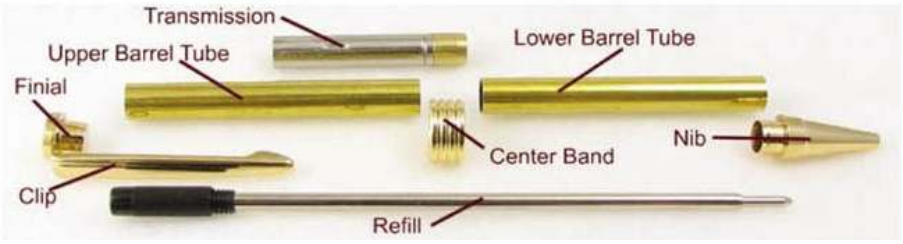
Native Pens

Turning an Acrylic Pen

The method to follow shows the process Native Pens uses to make a Pen turned from an Acrylic Blank. The pen kit used for this instruction was the Streamline Gold kit. The pen kit parts are shown in the diagram below.



General Notes:

1. Heat build up when drilling, milling or sanding must be avoided, some Acrylics begin to melt as low as 85°C.
2. Tools must be very sharp.

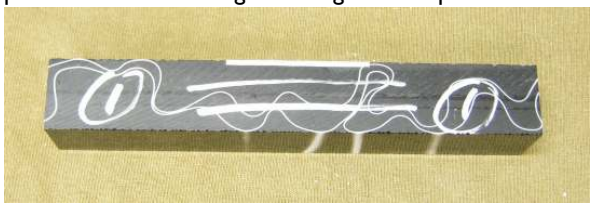
Required Accessories.

1 x Streamline Pen Kit
1 x 20mm x 20mm x 130mm Acrylic Pen Blank.
1 x ¼" Mandrel.
Micro Mesh Polishing Pad Set
1 x Streamline Bushings set.
1 x 7mm Drill bit.
1 x 7mm Pen Mill
Wet and Dry Sand Paper

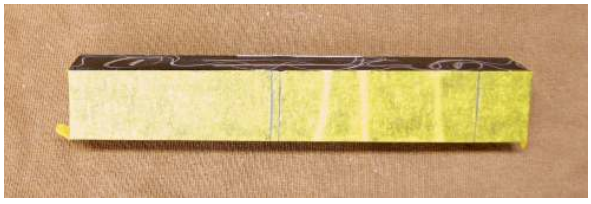
Preparing the Blanks.

1. Starting with the Acrylic blank at 20 x 20 x 130mm.

2. Mark the sides of the blank so you can keep the pattern matched through the length of the pen.



3. Mark off the required blank lengths and allowance for cut width. Blanks should be 3-4mm longer than the brass tubes. The centre cut width can be sized to suit the centre band of your kit with allowance for milling the end.



4. On a bench saw or bandsaw cut the blank to length. The centre cut is the "matched ends" of the blank.

5. Mark the centre of the matched ends. The holes are drilled from these ends so the pattern remains matched even if the drill wanders while drilling. Once marked check for any burrs etc that may hinder the blanks being clamped square for drilling.

6. Set up the first blank in a drill press or similar. Ensure the blanks are held firmly and are square to the drill bit.

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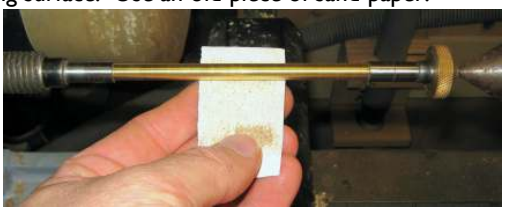
7. Carefully drill out the blank using a 7mm drill bit. Make small advances with the drill, backing it out often and allowing the shavings to clear out of the drill flutes. Take care near the end of the drilling; excessive pressure on the drill may cause the acrylic to chip away from the hole edges as the drill exits the blank.

8. Repeat the process on the second blank.

9. Next, place the Upper and Lower tubes from the pen kit onto your mandrel. Support the mandrel with the tailstock then, with the lathe running at a fairly high speed, up to 2000rpm, sand the tubes to key up the gluing surface. Use an old piece of sand paper.



10. Once sanded, insert the tubes into the blanks to ensure there is an un-obstructed fit and that the tubes slide in freely.

11. To glue in the tubes use a medium CA adhesive and wear gloves. This should be done in a well-ventilated area to avoid the CA fumes. First apply a small amount of CA to the inside of the first blank hole at the matched end. Run it around the entire hole circumference. Stand the blank on end so the CA runs down through the hole.

12. Apply CA to the brass tube in beads around the tube. Rotate the tube in your fingers to get a fairly even spread.

13. Insert the brass tube into the blank from the matched end. Work it in and out a couple of times while turning it to ensure a good even coverage of CA inside the blank. Then push the tube in to approximately 1-1.5mm under flush with the matched end.

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14. Check to ensure that both ends of the blank have glue coverage around the tube ends. If it looks a little dry you can wipe a bit of CA around the tube at the end with you finger and allow it to wick back along the blank inside. Allow the CA to cure overnight.

15. Once cured, hold each blank in a vice or similar. Using a battery drill on high speed carefully run the Pen Mill into the brass tube to clear out any CA. If there is CA build-up in the end of the tube the mill can be difficult to start. Back the Mill out to clear away the CA.

16. Next, using gentle downward pressure, start to mill the end of the pen. Take care and take your time, excessive pressure can heat the Acrylic up and cause it to soften. Mill the blank until the brass tube is reached. Back the mill away from the blank as you mill to check progress. Repeat this for each end of the two blanks.

17. Once milled, remove any burrs on the inside of the brass tube. This will also aid with assembly of the finished pen.

18. The blanks are now ready to mount on the mandrel in the lathe.

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Turning the Pen

1. Set up the pen blanks on the mandrel. This pen uses 3 Streamline bushings. One at either end, with one between the blanks; be sure to get the bushings in the correct position and decide at this stage which end will be the Nib end. Other bushings may be required at each end to allow the mandrel nut to be tightened. Insert the mandrel into the Morse taper of the headstock then bring up the tailstock into the mandrel end. Care should be taken to only support the mandrel with the tailstock. If the tailstock is too tight it can bend the mandrel.

2. Once set up you can start turning the pen.
   Roughing out the blanks.
   I use a ¾" Oval Skew for roughing the blanks. This chisel is very sharp.

During roughing the Acrylic will tend to come off in pieces. Care should be taken when cutting towards the blanks end as the Acrylic can chip away if excessive force is applied to the chisel.
Stop the lathe regularly to clear any acrylic cuttings and to check progress. Keep turning until the blanks are round.

Start to shape the blanks.
I change to a smaller ½" Skew chisel and start to shape the pen. Is it good practice to always turn toward the ends of the blanks. This way any chipping at the blank end from starting the chisel can be avoided.

A good method for doing this is to turn a shallow taper at the end of each blank, always working toward the blank end. Once the tapers are cut the Acrylic between can be quickly removed without worrying about cutting toward the ends. At this point, if you are going to have any shape in the pen, you should stop turning close to your final desired diameter.

Note: The Acrylic should now be coming off in ribbons. These will wind themselves around the mandrel. Stop the lathe regularly to clear them from the work area.

Final Shaping.
Start to create the final shape for your pen, again taking care to turn toward the ends of the pen blanks. As you get close to the bushing diameter take care as a chip at the blank end could drop below the bush diameter. It may be necessary to reduce the sideways travel speed of your cut near the ends.

Once again turn the tapers on the blank ends, leaving the end diameter of the blank about 1-0.5mm larger than the bushing.

Again remove the Acrylic from between the tapers. Taking care to make shallow cuts. A good method for removing very small amounts of Acrylic is to use the Skew as a shear scraper.
Turn the pen until your basic shape is reached and the blanks are generally 0.5mm larger than the bushings. This way there is some Acrylic left for sanding.

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Sanding the Pen.

1. For sanding Acrylics I will typically do them wet with Wet and Dry sand paper. This is mainly to keep the heat generated by sanding to a minimum. Start from a grit suitable removing any turning marks; typically 120grit is a good starting point. If you start to fine the turning marks will just get smoothed out and not removed. Ensure the sandpaper is always moving both side to side and up and down. If the sandpaper is still for even a moment it can leave sanding rings around the pen, which can be very difficult to remove.

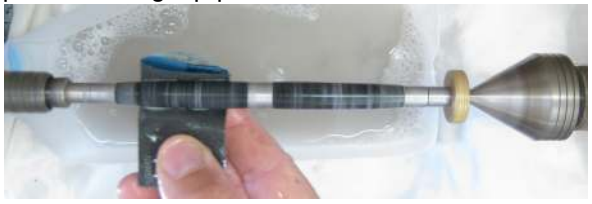
As this is a wet process, it pays to protect your lathe from the water. Lay a cloth over the lathe bed and a milk bottle cut in half, length wise, and placed under the mandrel is great for catching most of the water.

I also add a couple of drops of detergent to the water to lubricate the paper.

2. To start sanding, use a fairly hard foam block to finish the shaping of the pen if required.

3. Then, between each grit, use a soft cotton cloth to wipe away the sanding sludge from the previous grit paper.

4. Continue sanding through all the grits to your desired surface level. I normally sand from 120grit then 150, 180, 220, 240, 280, 320 through to 600grit. Cleaning the pen after each grit paper.



5. At this stage your pen is ready polishing.

6. For polishing I use the Micro Mesh polishing pads again using a wet process. At this point it pays to refresh your water supply with clean water, again with a few drops of detergent in it.

7. Start with the 1500 pad and give the pen a good sand.

8. Then work your way through the pads through to 12000. Remember to clean the pen between pads.

9. Once the 12000 pad sanding is complete, your blanks should have a nice high gloss and be ready for assembly.

NOTE: Remember to clean and dry your lathe bed after the mandrel is removed.

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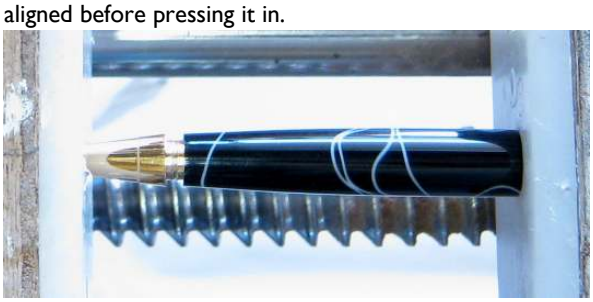
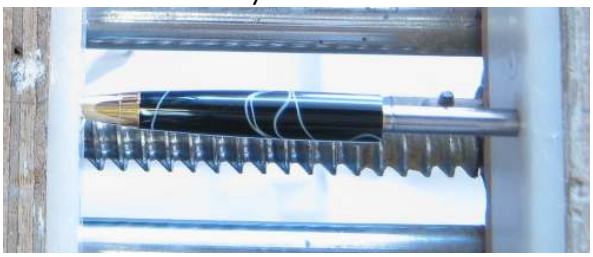
Finishing the Pen.

1. With the finishing is complete, remove the pen from the mandrel and lay the pen barrels and pen parts out on a soft surface. Arrange them, as the pen will be assembled. Be sure to keep the matching ends of the barrels correctly aligned.

2. Using a press or bench vice, press the writing tip into the lower barrel. Take care to ensure the tip is correctly aligned before pressing it in.

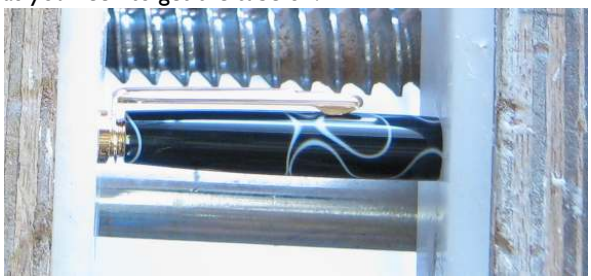


3. Then press the twist mechanism into the lower barrel. Be careful not to push this in to far. Again, ensure the twist mechanism is correctly aligned before pressing. If you do push it in to far, the 7mm Pen Disassembly Tool can be used to remove the writing tip and twist mechanism so you can re-set the mechanism.



4. Remove from the press and insert the refill. Ensure it extends enough for comfortable writing. If not, press the twist mechanism in a little further and re-check.

5. Next, slip the clip over the cap then press the cap into the upper barrel. The clip can at times be quite tight on the cap, it may be necessary to press it on using a suitable piece of tube. Note: don't use a brass pen tube as you need to get the tube off.



6. Finally, slip the centre band over the twist mechanism, and then push the upper barrel on with a twisting motion. Your pen is now complete.