

## Turning a Father Sing Pencil

### Supplies Needed

- 7mm Drill Bit
- 3/4" x 3/4" x 5" Pen Blank
- Pen Mandrel
- Father Sing Pencil Bushings
- Glue (Thick CA or Epoxy)
- Sandpaper/Finish
- Drill or Drill Press
- Barrel Trimmer/Disc Sander
- Pen Press or Clamp
- Eye and Ear Protection

### Cutting and Drilling the Pencil Blank

1. Draw a 1" line lengthwise across the center of the blank to help maintain proper grain alignment when turning.
2. Cut each blank 1/4" longer than the brass tube.
3. Using a drill press with the blank secured in a vise or clamp, drill a hole through the center of the blank stopping an 1/8" short of the bit exiting the blank. Drill at 2,000–3,000 rpm backing the drill bit partially out of the hole every 1/2" to clear chips. When using larger bits or drilling plastics drill at 250–500 rpm.
4. Trim away a small amount of wood from the end of the blank to expose the hole. The blank should be slightly longer than the brass tube. This technique prevents cracking caused when the bit exits the blank.

### Gluing the Brass Tubes Into the Blanks

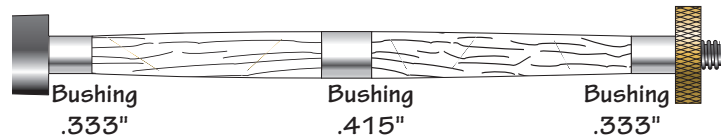
1. Lightly scuff the exterior of the brass tube with 220 grit sand paper to prepare it for gluing.
2. For a fast bond, use thick cyanoacrylate adhesive (super glue) or 5 minute epoxy. For additional working time and more thorough bond, use expanding polyurethane (Gorilla or Sumo Glue). Apply a thin layer of glue to the tube and inside the wood blank. Insert the tube into the blank rotating it as you go to spread the glue evenly. Position the brass tube in the blank so that the wood extends beyond the tube on both ends to allow for trimming.

### Trimming/Truing the Blanks

1. Square the ends of the wood blank with the tube using either a barrel trimmer or disc sander. This step is critical for the pencil components to fit together properly. **Do Not** trim the brass tube as this may result in an improper fit when the pencil is assembled.

### Mandrel Setup and Turning

1. Assemble the bushings and blanks on the pen mandrel as shown below. Be sure that the ends of the blanks with the reference mark meet together at the center of the mandrel.



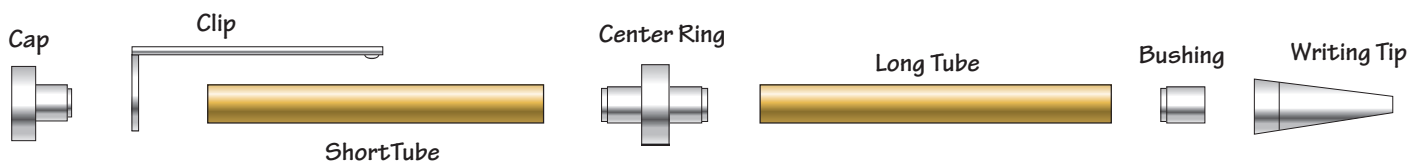
2. Advance a 60° revolving cone center into the dimpled end of the mandrel and tighten using light pressure. **Do Not** over tighten the tailstock or mandrel nut as this may cause the mandrel to flex resulting in off-center barrels.
3. Turn both blanks to the desired shape leaving the blanks slightly larger than the bushings.
4. Sand the blanks using progressively finer grits of sand paper, then apply the finish.

### Assemble the Parts

Layout the parts as shown paying careful attention to keep the pencil tubes in the same orientation as when on the mandrel. Use a vise or clamp with wood or plastic jaws to prevent damaging parts during assembly.

*Hint: While removing the tubes from the mandrel, mark the inside of each brass tube where they join to maintain grain alignment during assembly.*

1. Press the bushing, stepped end first, into the end of the long tube.
2. Slide the clip onto the cap (do not force).
3. Press the clip/cap assembly into the small end of the short tube.
4. Press the center ring into the other end of the short tube.
5. Press the long tube onto the center ring. Be careful not to apply excessive pressure as this may cause the pencil to buckle in the middle.
6. Slide the pencil transmission through the cap until it bottoms out.
7. Screw the tip onto the threaded end of the pencil transmission until finger tight.



Pencil Transmission (0.7mm Lead)

