

Procedure For Manufacturing an Aluminum Pen

By: Jhanvi Shah

Procedure may differ depending on the design being used



Materials:

- Cylindrical piece of aluminum - $\frac{1}{2}$ -in diameter
 - Coolant
 - Lathe
 - $\frac{1}{8}$ drill bit
 - Center drill
 - 3 lathe cutting tools.
- 1st, carbide insert, used for trimming and indents/grooves
 - 2nd used for knurling
 - 3rd used to make an angled cut.
 - Bandsaw

Procedure:

1. Start with cutting a $\frac{1}{2}$ -in diameter cylindrical piece of aluminum using the bandsaw to 5.1-in in length. Trim and smooth the ends down to 5-in using the 1st cutting tool.
2. Center drill a small point onto the center of both ends using the lathe. Drill through the length of the aluminum cylinder using the lathe and a $\frac{1}{8}$ -in drill onto where it had been center drilled. Make sure to go in slowly and keep enough space on the drill for the aluminum waste to move out from. By using the drill on both sides of the pen, the hole should go through the whole way. Use coolant and brush off aluminum waste frequently.

3. Mark the 0.5 in point from the edge using a marker. After loosening the bolts, rotate the cutting tool 15 degrees to make the tip of the pen. Tighten the bolts again and, using only the z axis, cut the tip of the cylinder to make the tip of the pen. Stop cutting once the cutting tool touches the 0.5 mark. Make the cutting tool tool back to 0 degrees and trim the length of the pen so it is smooth and even.
4. Make two indents on the pen using the digital readout. The space in between the indents is where the knurling would take place. Knurl part of the pen using the knurling cutting tool. Set the lathe so that the z axis moves by itself.
5. Mark the beginning and ends of where the grooves/indents using the 1st cutting tool. Make the indents/grooves that are located in the middle of the pen design by cutting between the markings made previously. Smooth the end of the pen that is not knurled from the groove/indent to the very end.
6. Make the end of the pen. Rotate the 3rd cutting tool about 13 degrees to make the end of the pen. Draw a line 0.4-in from the edge and 0.2-in from the edge. Use digital read out to start 0.4-in from the end of the pen and push the cutter in until it reaches the angled part of the cutter touches the 0.2-in mark. Start to cut from that 0.2-in point until the angled part of the cutter touches the edge so that there are two angled edges, one on top another.

Extra Steps:

Only do this if there is time or if the pen needs add-ons to look nicer.

- ❖ On top empty part of the pen
 - CNC "Rocket Pen" onto the side of the pen
 - Make a third indent or groove onto the pen, right after the first two in the middle