Aligning Hidden Holes, Version 1.0

By R. G. Sparber

Recently I built a tool for my neighbor for use at a wastewater treatment plant. When assembled from four pieces, it is 20 feet long. Turn a handle on top, and a chamber closes at the bottom.

An aluminum rod turns relative to an outer PVC pipe to transmit the resulting torque. I used modified PVC unions at the junction between sections, which hold up well to repeated assembling.

The problem was that they slipped radially due to the torque.

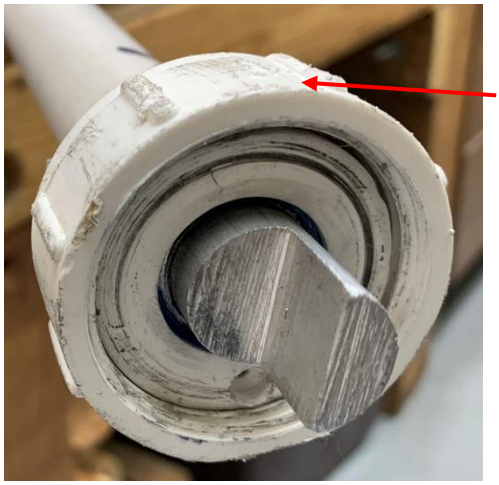
The solution was to add a pin to one side of each union and drill a matching hole on the other side. I drilled and tapped the first hole 6-32 and installed a Socket Head Cap Screw. The other hole was drilled large enough to easily accept the screw's head.

How do I drill these holes so they line up? I also didn't want to require specific ends to go together, so all holes had to be at the same distance from the center. And, of course, I didn't want to measure anything because that takes more time and introduces error.

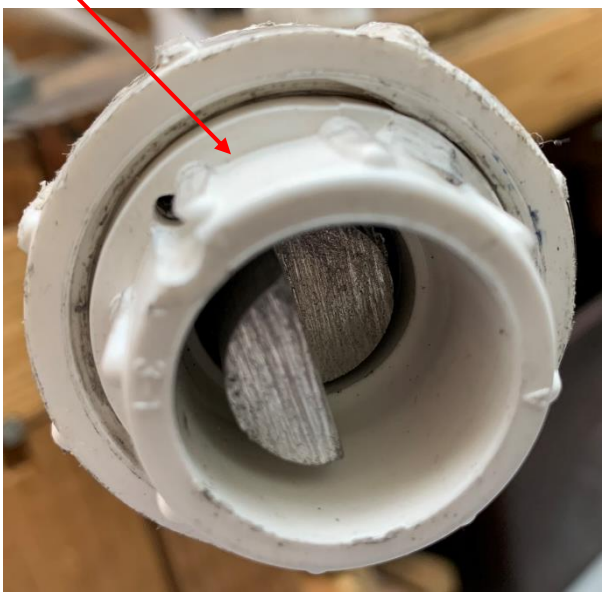
Time for a homemade tool! I needed to make a drill guide.

I took a spare PVC union and drilled a tap hole in the desired location.

Then I held the part in my lathe's 3-jaw chuck and removed the flutes, plus squared up this face.

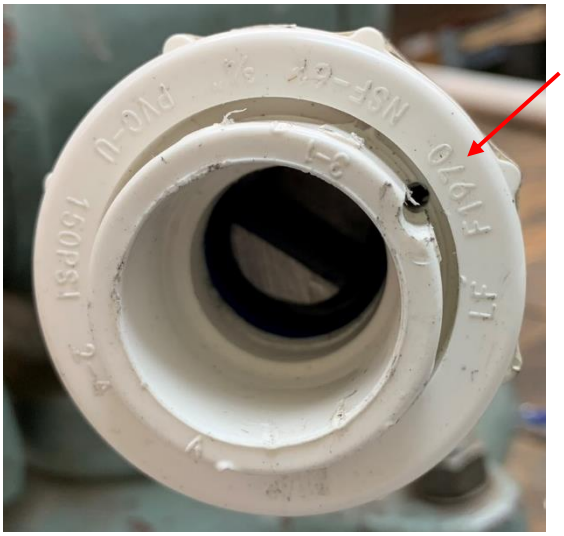


For the ends of the sections with threaded collars, I screwed in my drill guide.



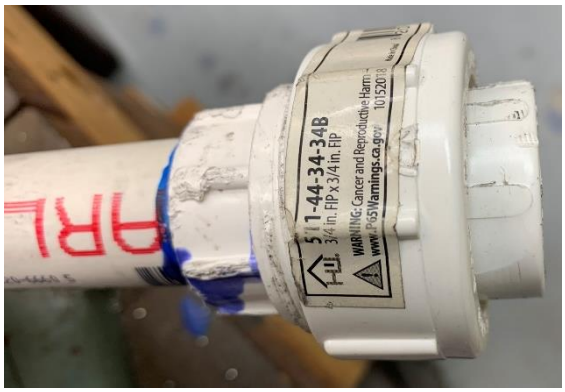
Then I drilled into the face with my tap drill going through my previously drilled hole.

I had to be careful not to tilt the drill since my guide was fragile. Commercial drill guides are hardened steel, not PVC!



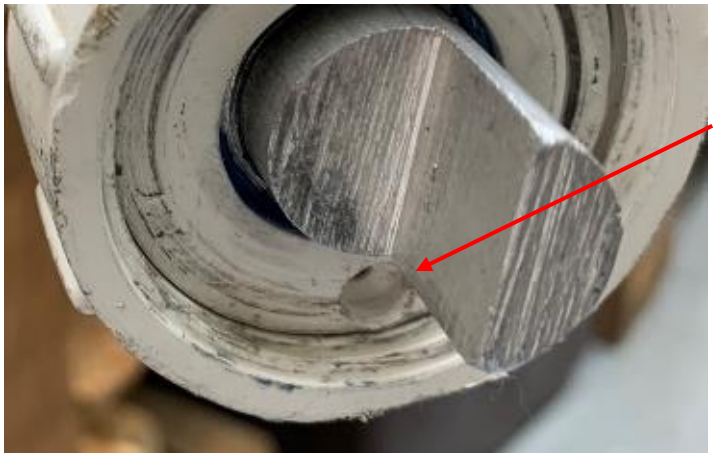
Then I screwed the drill guide into my spare threaded collar. My lathe work permitted the guide to screw in enough to expose some threads.

These threads engage with the ends that will hold the screw.



With the drill guide mounted in its threaded collar fitted on the end of the section, I drilled through with my tap drill.

Chucking up my 6-32 tap in my hand drill, I ran it through the holes in the faces with the recesses.



Then I took a drill that was a loose fit to the screw head and mounted it in my pin vise. I used it to open out the tap hole on the opposite side of each union. I had far better control of the drill with the pin vise than using my hand drill.

Using one drill guide for all sides of all unions, I ensured that all holes were the same distance from the center. *Ta-da!*

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