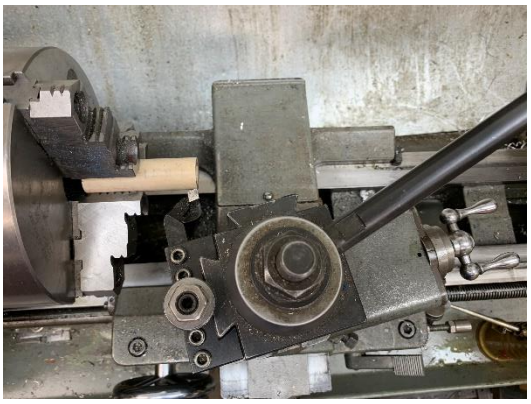
Turning Matching External/Internal Tapers, Version 1.0

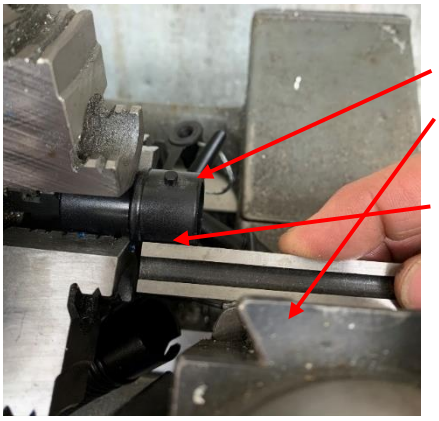
By R. G. Sparber

Recently I needed to cut matching tapers on my lathe. The green shape is the outline of my external taper. The tan shape is a cross section of the internal taper.

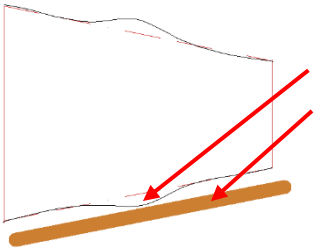


Standard practice is to adjust the compound to the desired angle and make the cut.

Since I was going to make these tapers anyway, why not document my procedure? Others will read it and suggest improvements which will be published. We all benefit.

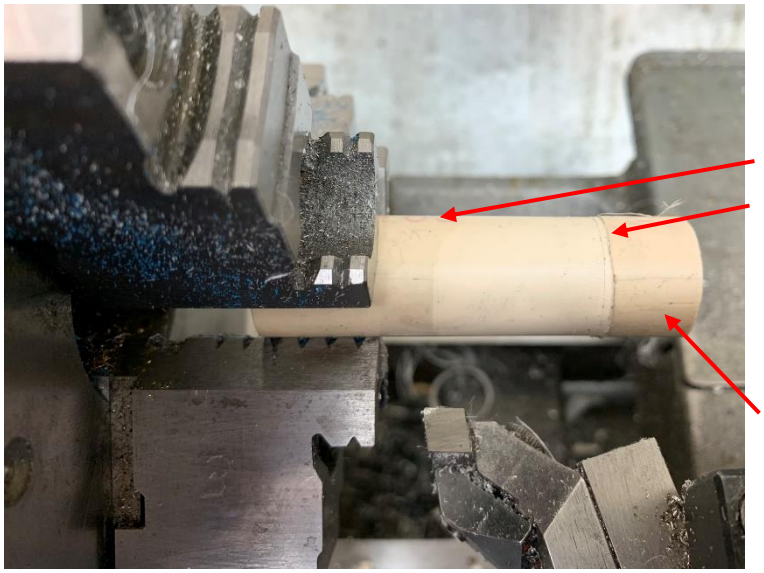


The first step was to set the external taper. The task was made far easier because I had a sample. With the Quick Change Tool Post aligned with the major axis of the compound, I used my
parallel to set the compound to be parallel to the taper. Then the compound was locked so it could not rotate.



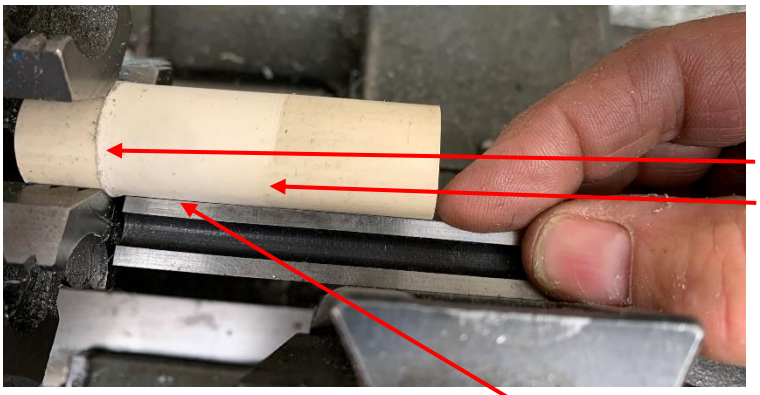
I saw that the plastic molded taper of my sample was not a straight line when compared to my parallel. It had a bump around its perimeter due to imperfections in the molding process. This meant that my best approximation was to sight the gap between sample and my parallel. By placing a strong light under this gap, it was possible to see extremely small misalignments. Trying to use a Dial Test Indicator to set the angle of the compound would not have given me the best approximation to this taper.

Before using the cutter, I verified that it was on the center of rotation of the chuck by using this tool. It contains a go/no go test with audible warning. See https://rick.sparber.org/lchg.pdf for details.



I chucked up a length of stock and cut my external taper starting about ½ inch from the right end. It had minimum depth on the left and maximum depth on the right.

I would later cut the right ½ inch off but first had one more use for it.



I removed the stock, flipped it end-for-end, and secured that ½ inch section in my 3 jaw chuck. This gave me a taper that was at maximum depth on the left and minimum depth on the right. In other words, this is the shape of the internal taper.

I loosened the compound and used the same procedure to align it to this new taper. The matching internal taper was set.

Then I changed to a small boring bar and cut the internal taper.

The final step was to cut the external taper from its stock.

The external and internal parts were a very tight fit. Since the sample had a bump in its taper, it was not as tight but was as good as it gets.

A notch was then cut axially in the internal taper part in order to pass the stud.

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