

# Suggested Ways to Cut a Taper

**Edited By R. G. Sparber**

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A few experienced machinists have given me techniques and insights about cutting a taper on a lathe. I have collected these emails together and offer them with minimal editing.

## **Ron Thompson**

There is a simple and effective method for turning tapers. I was taught this in my machine shop college course.

In your lathe, drill the root diameter. Set your compound as near as you can by eye and start cutting with an appropriate boring bar. Use a mating taper to gauge your progress. When it becomes difficult to tell by eye, use dye. As you test the taper, adjust the compound by loosening it a bit and tapping it with a dead blow hammer. The idea is to just nudge it a bit each time.

You will come to a position where the dye is rubbed off for the entire length and the taper will lock. Continue cutting to depth. You need a real good surface finish for a solid lock.

Rubber mounted collets are hard to use with this method, but it can be done. You may need to put a shank in the collet to keep it from deforming.

We were taught to repair or lengthen shafts with this method. The two pieces were machined with a locking taper and once joined were welded and the weld turned or ground flush.

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# Malcolm Parker-Lisberg

For a locking taper the fit should be:

"Air gaging is an excellent means of measuring the taper angle and the diameters, because both of these are very tightly controlled. Diameter tolerances typically are  $\pm 0.001$  inch or better, while a taper tolerance—typically specified as a taper per distance—is usually 0.001 inch/12 inches. While 0.001 inch may not be that difficult with today's high performance gaging equipment, the problem is that often there is not a full 12 inches to measure the taper change-over. Thus, the taper gage has to measure over a small portion of the taper—sometimes 1 inch or less. Now, that 0.001 inch/12 inches specification becomes 0.000083 inch/1 inch which is more suited to the precision of an air gaging tool."

From: <<http://www.qcinspect.com/article/taperfit.htm>>

So if you need a locking taper you need a 12 times better match.

Machinery's handbook list 0.002" per foot tolerance for a Morse taper, so you would need to be six times better.

## Bob Sanders

One method I prefer to use when making a known taper:

Set the compound to Approximately the required angle. Using the outside diameter of your chuck, make sure it is true to the ways by running a one inch travel indicator on the chuck as you travers the saddle along the z axis.

Now, if you travers one inch using the lead screw of the compound, the dial indicator will read in thousands a number equal to the sine of the angle. Bump to get required sine value.

It's harder to explain than to just do it.