

Taper Information Sheet

Required Vocabulary

1. Taper
2. Self-holding taper
3. Steep taper
4. Morse taper
5. Brown & Sharpe taper
6. Jarno taper
7. Taper pin
8. Compound tool rest method
9. Tailstock set over method
10. Offset
11. Taper attachment method

Taper

A taper may be defined as a uniform change in the diameter of a workpiece measured along its' axis. Tapers in the inch system are expressed in taper per foot, taper per inch, or in degrees. Metric tapers are expressed as a ratio of 1 mm per unit of length. Example, 1:20 taper would have a 1 mm change in diameter per 20 mm of length.

Tapers provide a rapid and accurate method of aligning machine parts and an easy method of holding tools such as twist drills lathe centers and reamers.

Machine tapers (those used on machines and tools) are classified by the American Standards Association as *self holding tapers* and *steep or self releasing tapers*.

Style of Taper	Taper per foot	Uses
Morse Taper	Approximately 5/8"	Drills, Reamers, lathe centers
Brown and Sharpe Taper	Approximately 1/2"	B&S machines and shanks
Jarno Taper	.600	Lathe and drill spindles
Taper pins	.250	Positioning and holding parts

Tail Stock Offset Formulas

To convert TPF to TPI divide by 12

To convert TPI to TPF multiply by 12

To calculate TPF use this formula: $\frac{(D - d) \times 12}{\text{length of taper}}$

OL = overall length of part

TL = length of the taper

D = diameter at large end of taper

d = diameter at small end of taper

To calculate tailstock offset use one of these formulas, depending on the information given on the drawing.

TPF GIVEN	TPI GIVEN	TPF OR TPI UNKNOWN
$\frac{\text{TPF} \times \text{OL}}{24}$	$\frac{\text{TPI} \times \text{OL}}{2}$	$\frac{(D - d) \times \text{OL}}{\text{TL} \times 2}$

Examples based on the drawings on page three of this handout.

1. .625 TPF Given	2. .052 TPI Given	3. No taper given
Offset = $\frac{\text{TPF} \times \text{OL}}{24}$	Offset = $\frac{\text{TPI} \times \text{OL}}{2}$	Offset = $\frac{(D-d) \times \text{OL}}{2 \times \text{TL}}$
Offset = $\frac{.625 \times 6}{24}$	Offset = $\frac{.052 \times 6}{2}$	Offset = $\frac{(1.000 - .844) \times 6}{3 \times 2}$
Offset = $\frac{3.750}{24}$	Offset = $\frac{.312}{2}$	Offset = $\frac{(.156) \times 6}{6}$
Offset = .156	Offset = .156	Offset = $\frac{.936}{6}$
		Offset = .156

