# CRAFTSMAN'S CRIBSHEET

NUMBER
78

Miles Free – Interim Director

☐ Technical ☐ Regulatory ☒ Quality ☐ Management

Straightness of Cold Finished Steel Bars

The straightness of cold finished steel bars, and all other barstock for our machines, is of critical importance. The controlling standard is ASTM A 108, Table A1.4. However, the standard errs in claiming the tolerances are measured by placing the bars on a level table and the depth of the arc then measured with a feeler gage and straight edge. While that will give a value for the maximum departure from straightness, it does not actually describe the true geometric relationship.
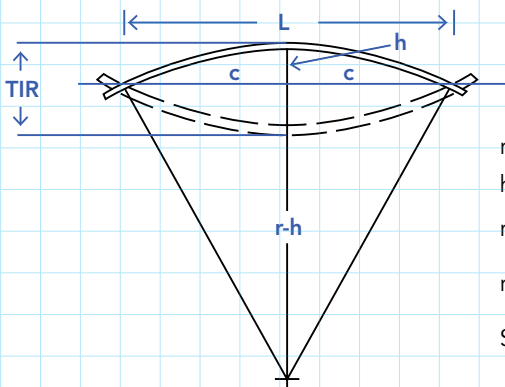
$$r-h = \sqrt{r^2-c^2}$$

$$h^2-2rh+r^2 = r^2-c^2$$

$$r = \frac{c^2+h^2}{2h} = \frac{c^2}{2h} + \frac{h}{2}$$

$$r \cong \frac{c^2}{2h} \rightarrow h = \frac{c^2}{2r}$$

Since $c = \frac{L}{2}$ $h = \frac{L^2}{2(4)r}$

h = camber of bar
c = ½ distance between bearings
r = radius of arc
TIR = 2h

h and TIR are in inches

L_m Feet	$\frac{L^2}{1600}$		$\frac{L^2}{800}$		$\frac{L^2}{533.33}$		$\frac{L^2}{400}$		$\frac{L^2}{320}$		$\frac{L^2}{266.67}$	
L in Feet	**1/16" in 10 ft**		**1/8" in 10 ft**		**3/16" in 10 ft**		**1/4" in 10 ft**		**5/16" in 10 ft**		**3/8" in 10 ft**	
	h	TIR	h	TIR	h	TIR	h	TIR	h	TIR	h	TIR
1	0.000625	0.00125	0.00125	0.0025	0.00187	0.00375	0.0025	0.0050	0.003125	0.00625	0.00375	0.0075
2	0.0025	0.0050	0.005	0.010	0.0075	0.0150	0.0100	0.020	0.0125	0.025	0.01499	0.02999
5	0.015625	0.03125	0.03125	0.0625	0.04688	0.09376	0.0625	0.1250	0.078125	0.15625	0.09376	0.18752
10	0.0625	0.1250	0.1250	0.2500	0.1875	0.375	0.2500	0.5000	0.3125	0.6250	0.3750	0.7500
12	0.0900	0.1800	0.1800	0.3600	0.2700	0.5400	0.3600	0.7200	0.4500	0.9000	0.5400	1.08
15	0.140625	0.28125	0.28125	0.5625	0.4219	0.8438	0.5625	1.125	0.703125	1.40625	0.8438	1.6876

All Craftsman's Cribsheets are available for viewing and download at **pmpa.org/knowledge-tools/craftsmans-cribsheets.**