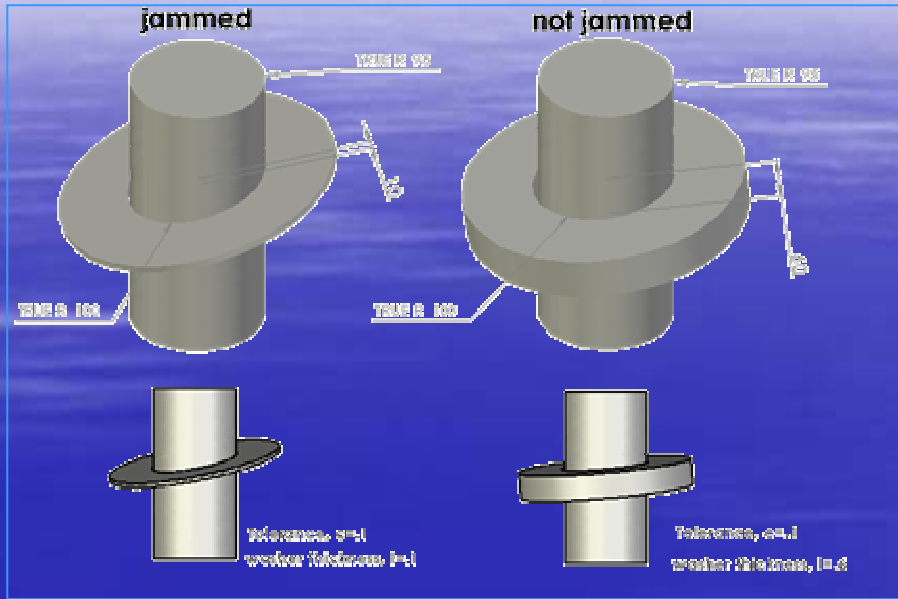# Lest Ye Jam

Problem: Bushings may jam when assembled on pegs, as a result of the two contact points creating more oppositional friction force than the assembly force applied.

Common Jam Scenarios

- Battery Lid Assembly
- Bushing/Washer being Assembled onto a Peg
- Piston Assembly in an Cylinder Sleeve
- Multiple Hole alignment
- Bolt-Action Rifle
- Changing Wheels on a Car

Part Assembled on a Peg
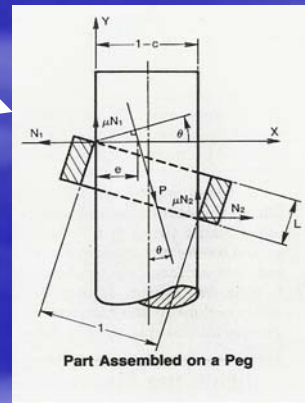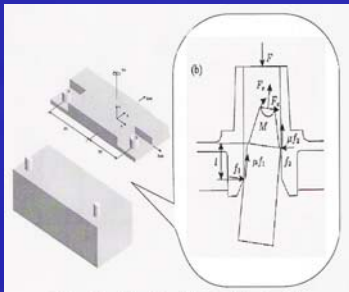
Design Equation for Preventing Jams

By summing forces and moments around the origin, this equation was derived to relate the dimensions of the assembly so a single calculation can be done to pick the correct size parts. As long as the inequality is satisfied the assembly will be jam free.

$$1+L^2>(1-C)^2(\mu^2+1)$$

L = Thickness of Part being assembled on Peg
C = Difference in the inside diameter of Part and outside diameter of Peg
μ = Coefficient of Friction between the Part and Peg

Example

Graphical representation of a washer jamming on a bolt with a coefficient of friction of 0.75. The line shows the case when the above equation is set equal (where c is at its minimum value for a given L to insure no jamming).

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