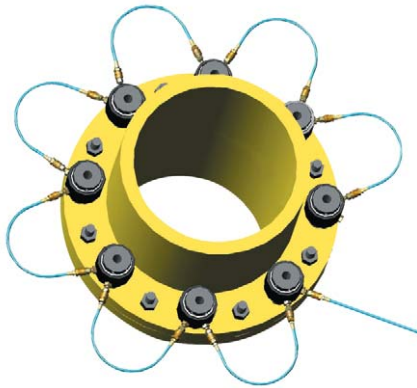


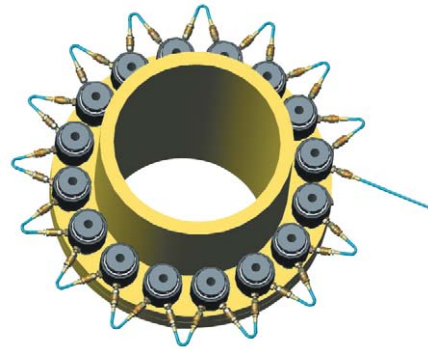
# BOLT TENSIONER APPLICATION

## Important formula :

- (A) **Residual Bolt Load** = Bolt Stress x Bolt Tensile Stress Area  
 = (Bolt Stretch x Modulus of Elasticity x Bolt Tensile stress area) ÷ Effective Length.
- (B) **Bolt Tensile Stress Area** =  $(3.14 \times D \times D) \div 4$  (D is smallest Stress Dia of Bolt)
- (C) **% of Yield Strength** = (Bolt Stress Required / Yield Strength of bolt) x 100
- (D) **Hydraulic Pressure** = (Residual Bolt Load x Load Relaxation Factor) ÷ Hydraulic Area of Load Cell.
- (E) **Load Relaxation Factor** =  $1.01 + (\text{Bolt Size (Dia.)} \div \text{Effective Length})$  or 1.1 which ever is greater.



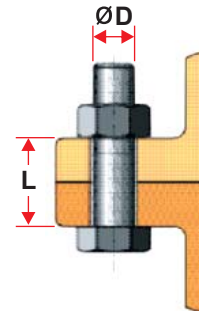
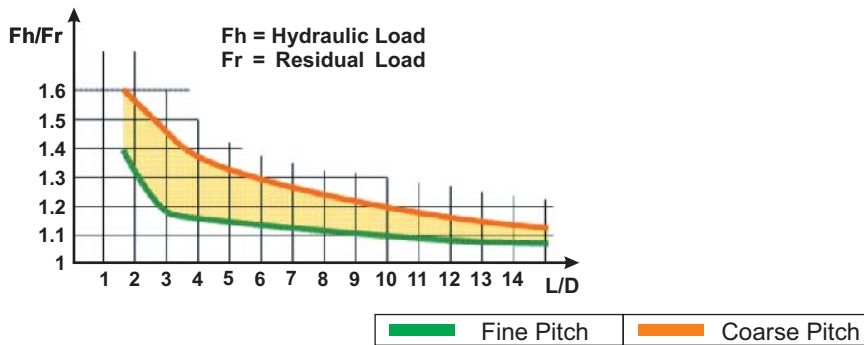
50% Tool Coverage



100% Tool Coverage

## Basic Calculation and Working :

- a. Calculate Bolt Residual Load: Residual Load can be calculated from known stress or bolt stretch requirement.
- b. Calculate Load Relaxation factor using Bolt Dia and Effective Length. It can be calculated from below formula / Chart.



- c. Calculate application hydraulic load.
- d. Calculate hydraulic pressure for required hydraulic load.
- e. Select Tensioning Procedure. (25%, 50%, 100%...etc.)
- f. Calculate pass load as applicable. (Max applied load should never exceed 95% bolt yield strength).

## Useful Conversions :

<b>Area</b>	: 1 millimeter <sup>2</sup> (mm <sup>2</sup> ) = 0.00155 inch <sup>2</sup> : 1 centimeter <sup>2</sup> (cm <sup>2</sup> ) = 0.155 inch <sup>2</sup>	1 inch <sup>2</sup> = 645.16 mm <sup>2</sup> 1 inch <sup>2</sup> = 6.4516 cm <sup>2</sup>
<b>Load (Force)</b>	: 1 Metric Ton (mt) = 1.10231 Short Ton (US) : 1 Kilo Niwton, kN = 224.8089 lb : 1 Metric Ton (mt) = 9.8066 kN	
<b>Pressure</b>	: 1 Megapascal (MPa) = 10 Bar : 1 Kg per cm <sup>2</sup> (Kg/cm <sup>2</sup> ) = 0.98066 Bar	1 bar = 14.5037 psi 1 bar = 1.0197 Kg/cm <sup>2</sup>