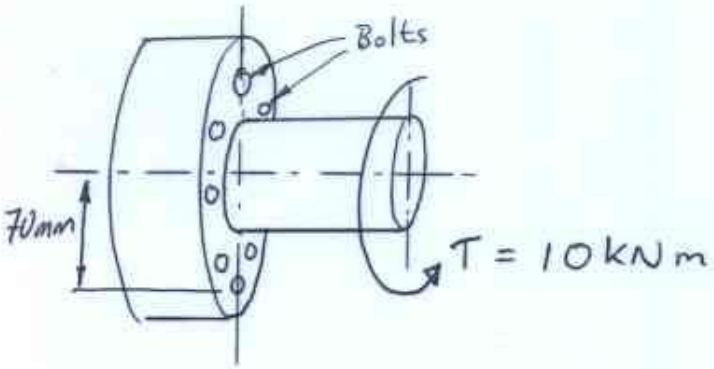
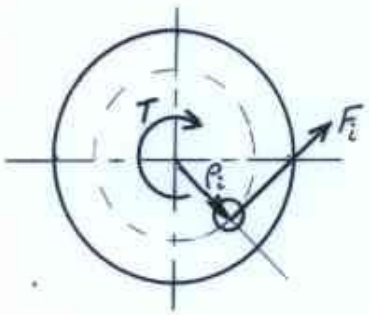


How many 20mm Bolts are required to transmit the torque of 10kNm Shear not to exceed 70MPa

Centre of rotation & Centroid of Joint are @ circle centre



$F_i = \tau_i A_i$

$\rho_i = 70mm$

$\Sigma M_o = \Sigma \rho_i F_i = 10\,000$

$\Sigma \rho_i F_i = \Sigma \rho_i \tau_i A_i$

$= n(\rho_i \tau_i A_i) = 1 \times 10^4$

$A_i = \frac{\pi}{4}(20 \times 10^{-3})^2 = 314.16 \times 10^{-6}\ m^2$

$\therefore\ n = \frac{1 \times 10^4}{(70 \times 10^{-3})(314.16 \times 10^{-6})(70 \times 10^6)}$ ← max shear stress allowed

$n = 6.5$

$\Rightarrow$ 7 bolts.

cannot have a half bolt & 6 bolts leads to stresses greater than allowable