TRIAL 1:

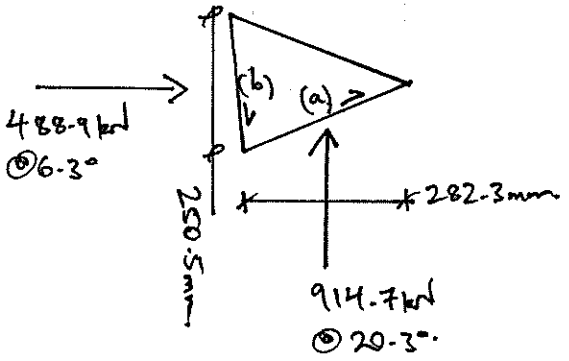
$\sigma_n = \frac{P\cos^2\theta}{t.w}$ ↺ τ

$\tau_t = \frac{P\sin\theta\cos\theta}{t.w}$

$\theta_0 = \frac{1}{2}\left[\frac{(\sigma_{an}^2 + \tau_{at}^2) - (\sigma_{bn}^2 + \tau_{bt}^2)}{\sigma_{an} - \sigma_{bn}}\right]$

$R^2 = (\sigma_{an} - \theta_0)^2 + \tau_{at}^2$

$t = 150mm$
$f'_c = 40MPa$

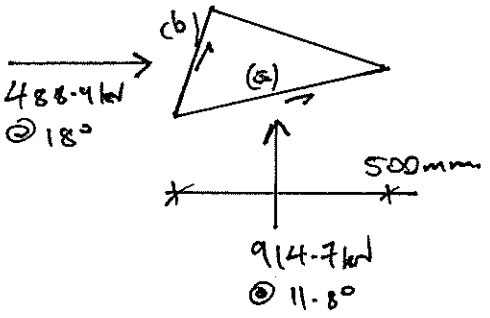


$\therefore \sigma_{a,n} = 19MPa$; $\tau_{a,t} = 7.03MPa$
$\sigma_{b,n} = 12.85MPa$; $\tau_{b,t} = 1.42MPa$

$\therefore \theta_0 = 20.1MPa$; $R = 7.12MPa$

$\therefore \theta_1 = \theta_0 + R = 27.2MPa$. N.B. $\sigma_{max} = 21.6MPa$ ∴ FAIL ×.

TRIAL 2: INCREASE FACE(b) to 500mm.



$\sigma_{a,n} = \frac{914.7\times10^3 \times \cos^2 11.8°}{150\times500} = 11.69MPa$

$\sigma_{b,n} = \frac{488.9\times10^3 \times \cos^2 18°}{150\times500} = 11.77MPa$

$\tau_{at} = \frac{914.7\times10^3 \cos 11.8° \sin 11.8°}{150\times500} = 2.44MPa$

$\tau_{bt} = -\frac{488.9\times10^3 \cos 11.8° \sin 11.8°}{150\times500} = -3.82MPa$

$\therefore \theta_0 = \frac{1}{2}\left[\frac{(11.69^2 + 2.44^2) - (11.77^2 + (-3.82)^2)}{11.69 - 11.77}\right] = 65.7MPa$

$R^2 = (11.69 - 65.7)^2 + 2.44^2$ ∴ $R = 54.1MPa$

$\therefore \sigma_1 = 119.8MPa$; $\sigma_3 = 11.6MPa$.

??? WHAT HAPPENS TO MOHR'S CIRCLE AS $\sigma_a \to \sigma_b$???