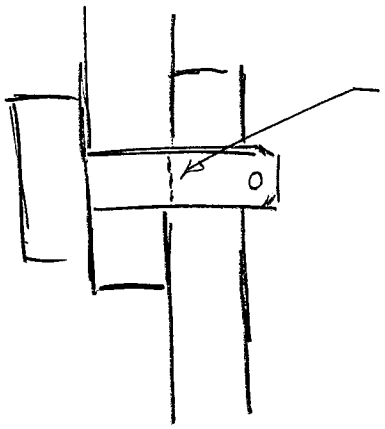
Exercice 1



$F = 10000\,N$

$R_e = 255\,Mpa$

$s = 3$

$d = ?$

$\tau = \frac{F}{S.n}$ avec $n = 1$ donc $\tau = \frac{F}{S}$

$S = \frac{\pi d^2}{4}$

Donc $\tau = \frac{4F}{\pi d^2}$

$d = \sqrt{\frac{4F}{\pi . \tau}}$

$\tau \leq R_{pg}$ et $R_{pg} = \frac{R_{eg}}{s}$

$\tau \leq \frac{R_{eg}}{s}$

$\tau_{max} = \frac{R_{eg}}{s}$

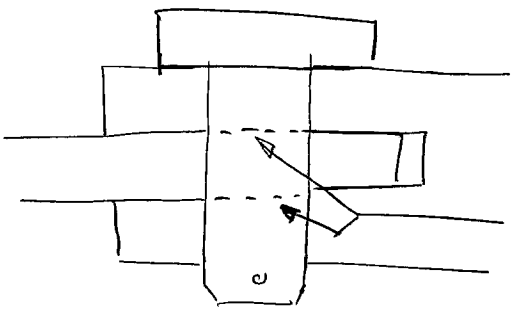
$d = \sqrt{\frac{4.F.s}{\pi . R_{eg}}}$

$d = \sqrt{\frac{N \times mm^2}{N}} = mm$

$d = \sqrt{\frac{4 \times 10000 . 3}{\pi \times 255}} = 12,24\,mm$

On choisira un axe de ϕ 14 mm

Exercice 2



$Re = 275$ Mpa

$F = 15000$ N

$s = 2$

$d = ?$

$\tau = \frac{F}{S_n}$ et $S = \frac{\pi d^2}{4}$

$\tau = \frac{4F}{\pi d^2 . n}$

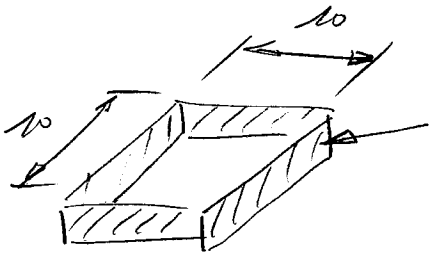
$d = \sqrt{\frac{4F}{\pi . \tau . n}}$ et $\tau_{max} = \frac{Reg}{s}$

$d = \sqrt{\frac{F . 4 . s}{\pi . Reg . n}}$ $\sqrt{\frac{N \times mm^2}{N}} = mm$

$d = \sqrt{\frac{15000 \times 4 \times 8}{\pi \times 275 \times 8}} = 8,3$ mm

On choisira un axe de diamètre = 10 mm

Exercice 3



$ep = 3mm$

$R_g = 200\ Mpa$

1/

$S = (4 \times 10) \times 3 = 120\ mm^2$

2/ $F = ?$

$\tau = \frac{F}{S \cdot n}$ avec $n = 1$

donc $\tau = \frac{F}{S}$

$F = \tau \times S$ et $\tau > R_g$

$F > R_g \times S$ $\quad \frac{N}{mm^2} \times mm^2 = N$

$F > 200 \times 120$

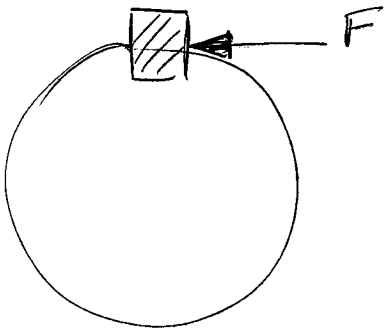
$F > 24\,000\ N$

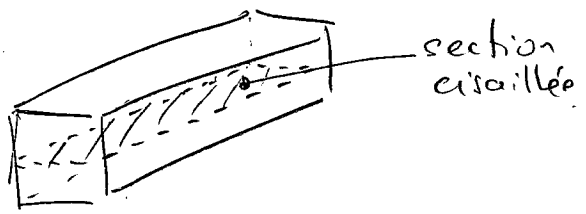
3/ $\sigma = ?$

$\sigma = \frac{F}{S}$

$\sigma = \frac{24000}{100} = 240\ Mpa$

Exercice 4





Arbre : $\phi 30$

$\mathcal{C} = 180\ N.m$

$Re = 295\ MPa$

3/ $\mathcal{C} = F \times L$ avec $L = \frac{d}{2}$

$F = \frac{\mathcal{C}}{L}$ $\qquad \frac{N}{m} \times \frac{mm}{1000} = N$

$F = \frac{180 \times 1000}{15} = 12\,000\ N$

4/ $\tau = \frac{F}{S.n}$ avec $n = 1$

$\tau = \frac{F}{S}$

$S = \frac{F}{\tau}$ avec $\tau \leq \frac{Re}{s}$

$S = \frac{F s}{Re}$ $\qquad \frac{N \times mm^2}{N} = mm^2$

$S = \frac{12\,000 \times s}{295} = 40,6\,s\ mm^2$ avec $s = 3 \Rightarrow S = 121,8\ mm^2$

5/ Pour ce diamètre d'arbre il faut une clavette de 8mm de large(a) x 7mm de hauteur(b)

6/ $S = a \times L$

$L = \frac{S}{a}$

$L = \frac{40,6\,s}{8} = 5\,s\ mm$ avec $s = 3 \Rightarrow L = 15\ mm$