M20

$$\frac{da}{dN} = 2.7\times10^{-12}(\Delta K)^{5.0}$$

$$= 2.7\times10^{-12}\left(Y\Delta\sigma\sqrt{\pi a}\right)^{5.0}$$

$$= 2.7\times10^{-12} Y^5 \Delta\sigma^5 \pi^{2.5} a^{2.5}$$

$$a_{cr.f} = \frac{1}{\pi}\left(\frac{K_c}{\sigma_{max}}\right)^2 \qquad K_c = 44\ MPa\sqrt{m}$$

$$\sigma_{max} = \sigma_{mean} + 100\ MPa = 250\ MPa$$

$$a_{cr.f} = \frac{1}{\pi}\left(\frac{44}{250}\right)^2 = 9.9\ mm$$

$$N_f = \int_{a_0}^{a_f} \frac{da}{2.7\times10^{-12} Y^5 \Delta\sigma^5 \pi^{2.5} a^{2.5}}$$

$$N_f = \frac{1}{2.7\times10^{-12}(1.2)^5(200)^5\pi^{2.5}}\left[\frac{a^{-1.5}}{1.5}\right]_{9.9\times10^{-3}}^{3.0\times10^{-3}}$$

$$N_f = 89.88 \text{ cycles}$$

Inspect at more frequent intervals → Maybe every 45 cycles