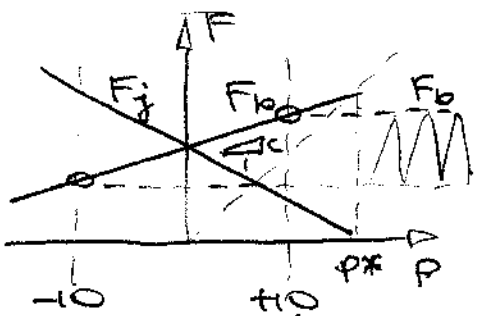
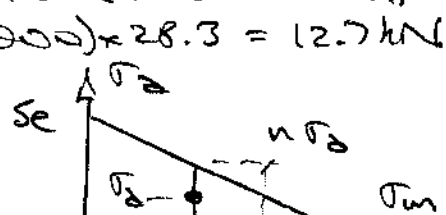
The external load per bolt varies from -6.0/6 i.e. 10 kN compression to 10 kN tension. Although the bolt itself cannot withstand compression, the compressive external effect on the joint assembly as a whole leads to the bolt being off-loaded as graphed. That is:



$$F_m = F_i \qquad F_b = CF$$

where $F = 10$ kN, and, since $A_{shrank} < A_s$, the shrank will be more highly stressed in the static situation, i.e. $F_i = \sigma_i A_{shrank} = (0.5 \times 900) \times 28.3 = 12.7$ kN

Since the external load does not contribute to σ_m, the load line is vertical on the Goodman diagram, from which we have:



$$\frac{n\sigma_a}{S_e} = \frac{S_u - \sigma_i}{S_u}$$

or $$n = (A - F_i/S_u)\, S_e / K_f C$$

Applying this to the rolled thread

$$n = \frac{(36.6 - 12.7e3/1000)\,462}{3 \times 0.40 \times 10e3} = \underline{0.92}$$

Applying it to the reduced shrank

$$n = \frac{(28.3 - 12.7e3/1000)\,462}{K_f \Rightarrow 1.5 \times 0.40 \times 10e3} = \underline{1.20}$$

Thus the thread stress limit safety factor for 0.9 — that is infinite life with 50% reliability will not be attained.