

Machine Elements

HW 4

Feb. 14, 2020

Given: $\sigma_1 = 23 \text{ ksi}$, $\sigma_2 = 0$, $\sigma_3 = -13 \text{ ksi}$ $S_y = S_{yc} = 58 \text{ ksi}$

1. a. $\tau_{max} = \frac{1}{2} |23 - -13| = 18 \text{ ksi}$

b. $\sigma_c = \frac{\sqrt{2}}{2} \left[(-23)^2 + (-13 - 23)^2 + (-13)^2 \right]^{1/2} = 31.6 \text{ ksi}$

c. $N = \frac{S_y}{\sigma_{max}} = \frac{58}{23} = 2.52$

d. $N = \frac{S_{sy}}{\tau_{max}} = \frac{58}{18} = 3.22$

e. $N = \frac{S_y}{\sigma_c} = \frac{58}{31.6} = 1.83$

f. The Distortion Theory is the most realistic and agree most closely with an actual test.

2. $S_u = 160 \text{ ksi}$

$S_y = 130 \text{ ksi}$

HOT ROLLED $\rightarrow C_s = 0.42$

$L \leq 1 \text{ in} \rightarrow$

$C_T = 1$

Reliability = .95 \rightarrow Bending = .968

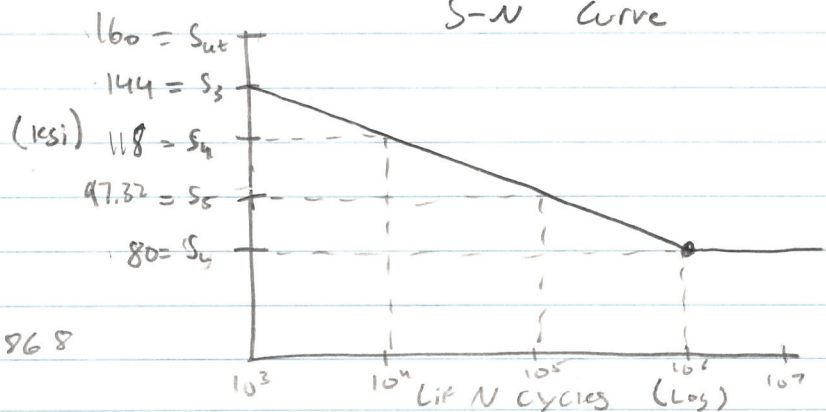
$S_n = C_L C_G C_S C_T C_R S'_n$

$C_L =$ $C_S =$ $C_R =$

$C_G =$ $C_T = 1$ $S'_n = (.5) S_u = 80 \text{ ksi}$

$\log(S) = \frac{1}{3} \log \frac{S_n}{S_3} \log(N) + \log \left(\frac{S_3^2}{S_n} \right)$

S-N Curve



5. a. Not its not just m.g b/c you not centered over the pedal and you can also generate more force from your legs.

b. i. Video : Bottom Bracket Service: one - Piece Crank.

made by: Park Tool

url: [ParkTool.com / blog / repair - help / bottom - bracket - service - one - piece](http://ParkTool.com/blog/repair-help/bottom-bracket-service-one-piece)

ii. The larger spindle diameter is required because it helps support the frame.

