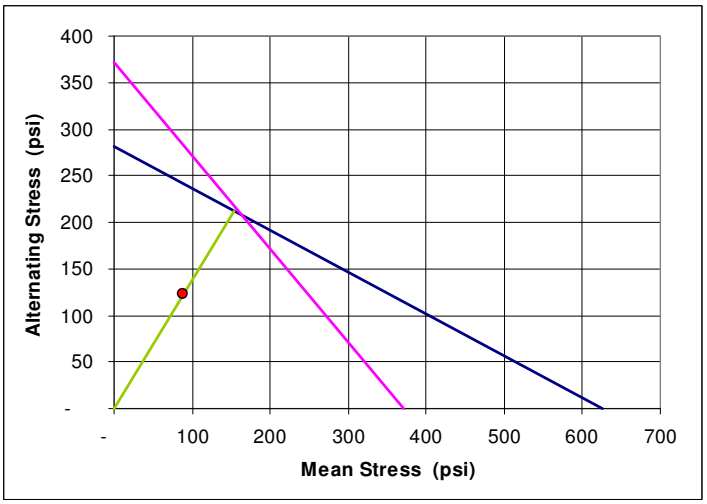
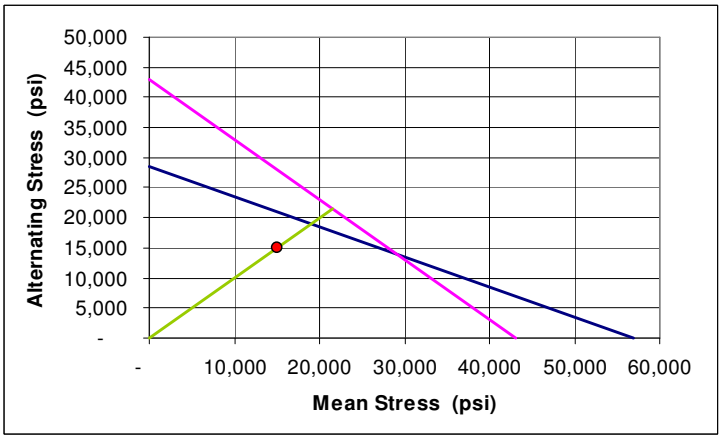
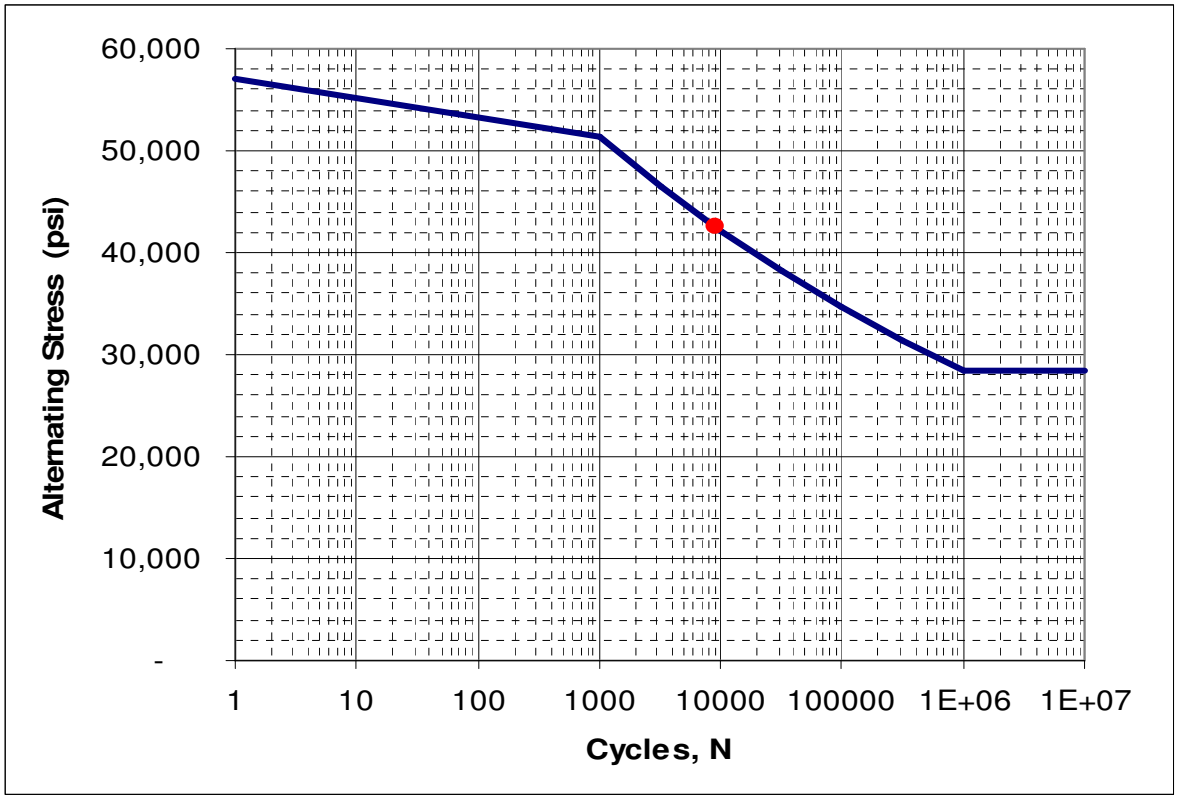
HW6.1
The P/A axial stress would go from a max of 211 MPa to a min of -33 MPa. From these, you'd get SigmaAlt = 122 MPa and SigmaMean = 89 MPa. For axial loading, Se =0.45 of the 626 MPa Sut = 282 MPa. The proportional factor of safety is then 1.74, =1/((SigmaAlt/Se)+(SigmaMean/Sut)). The Goodman diagram looks like this:



HW6.2
The Assembly Wrench sees a bending moment of 60 FtLb = 720 InLb when it applies the torque. The 1020 steel has a Sut = 57 KSI and this is bending so Se = 0.5 Sut = 28.5 KSI. The Moment of Inertia is 0.00749 in^4, so the max stress is 30.0 KSI. The min stress is zero. So this is fluctuating stress with SigmaAlt = SigmaMean = 15.0 KSI. The proportional FOS is 1.265.



The Repair Wrench sees a bending moment of 85 FtLb, resulting in a bending stress of 42.6 KSI in alternate directions as the bolts are first removed, then replaced. So this is fully reversing. The 1000 cycle stress level, SL = 0.9 Sut = 51.3 KSI. Se is as above. The curve parameters are a = SL^2/Se = 92.34 KSI, and b = -1/3 Log10(SL/Se) = -0.08509. The life at 42.6 KSI = (AltStress/a)^(1/b) = 8990 cycles.



HW6.3

The ball has a volume 4/3 Pi R^3 = 4.189 in^3. With a weight density of 0.282 Lb/in^3, it weighs 1.18 Lb. Delta Static = W/K = 0.00197 in. The Impact Factor Im = 1+SQRT(1+(2*Height/DeltaStatic)) = 332.2. So Delta Max = Im x Delta Static = 0.654 in, and Fmax = Im x W = 392.4 Lb.

Use Eqn. 7.62 to solve for the velocity = 289.66 in/sec.

$$\delta_{\max} = \sqrt{\frac{\delta_{st} V^2}{g}}$$