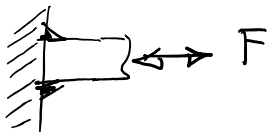
Midterm exam #2 – Study guide

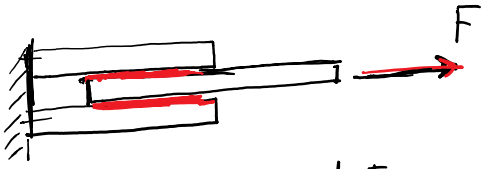
Weld Analysis – Must be able to

1) Calculate weld bead stresses in

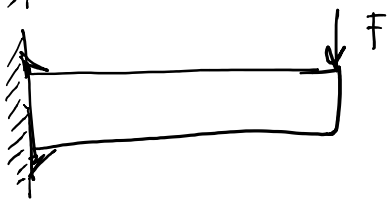
a) direct tension / Compression



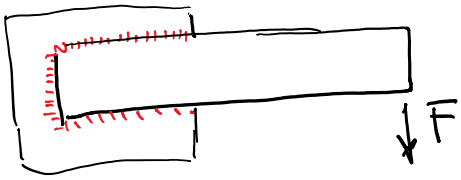
b) direct shear



c) bending



d) Torsion



e) Combination of loads

2) Calculate weld metal strength in Shear

3) Calculate factor of safety against yielding in static loading

4) Calculate endurance limit of weld metal

5) Calculate magnitude of alternating stresses in

weld metal when load is fully reversed

6) Calculate factor of safety against weld metal fatigue failure

Spring Analysis – must be able to:

7) Calculate spring constant from F_{min}, F_{max}, $L_{F_{min}}$, $L_{F_{max}}$

8) Calculate spring constant from spring geometry

9) Calculate spring free length

10) Calculate spring solid length

11) Calculate solid force

12) Calculate & Fractional overrun to closure

13) Calculate shear stress in a spring

14) Calculate shear strength of spring metal

15) Calculate Factor of safety against yielding (set)

16) Calculate S_{ut} for spring wire

17) Calculate whether a spring can buckle (steel)

18) Calculate endurance limit of spring material using Zimerelli data and Goodman method

19) Calculate spring alternating and mean shear stresses in cyclic loading

20) Calculate factor of safety against fatigue failure of spring metal

Bearing Analysis - must be able to..

21) Calculate bearing (deep groove / angular / roller) minimum required load capacity given applied radial load, bearing life, and bearing required reliability.

22) Look up suitable bearing from a catalog with L_{10} life of 1000,000 or 90,000,000 cycles

23) Determine whether a bearing required capacity is determined by C_{10} or C_0

24) Given three of the F_R, L, R, and C_{10}, find the fourth value. For example, given F_R, L, and C_{10} find bearing reliability

25) Given a bearing, required life, radial load, and axial load, calculate bearing reliability.

26) Given a bearing, F_R, F_a, and R, calculate life (max number of cycles)

27) Given a shaft with a radial load that is supported by two bearings, find the radial load for each bearing (statics problem)

28) Given a gearbox with n bearings reliabilites of $R_1, R_2, \ldots R_n$, find the reliability of the gearbox.

29) Given the reliability of a gearbox, calculate the reliability of the individual

bearings

30) Be able to do some bearing problems for ball bearings as well as Roller bearings