EME 150A Fall 2016 Homework #08

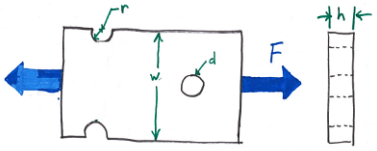
DUE: Wednesday, November 30, 2016 before class in Box B in the MAE department.

Problem 1

A steel tensile link with a circular cross section with no stress concentrations is subjected to a fluctuating load (1000 to 5000 lbs). Use $S_{ut} = 150$kpsi, $S_y = 120$kpsi. Assume a highly polished specimen and design factor of 2. Find the diameter for infinite life and for 10^3 cycles.

Problem 2

The element shown below is subjected to a fluctuating load that ranges between 4 kip in tension and 14 kip in compression. The dimensions are $r = 0.313$in, $d = 0.5$in, $h = 0.375$in, $w = 4$in. Determine the factor of safety if the material is cold drawn AISI 1018 steel.



Problem 3

The AISI hot rolled 1020 steel element shown is welded to the fixed plate with a 0.125" fillet weld. This fillet introduces stress concentration factors of $K_t = 1.8$ and $K_{ts} = 1.6$. The dimensions are $d = 0.875$in, $l_1 = 4$in, $l_2 = 3$in. The load F cycles from 50 lbs to 100 lbs. Using the Goodman criteria for fluctuating stress, find the factor of safety at point A with respect to infinite life or the number of cycles to failure for finite life.