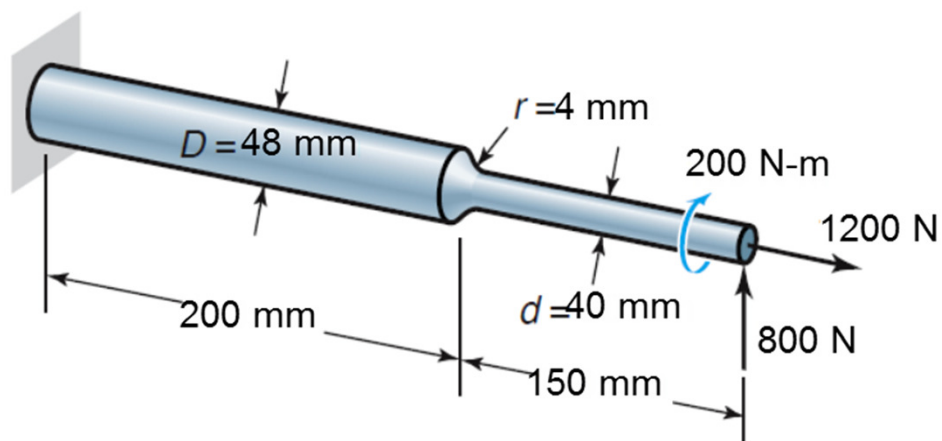


MEEG3311 Homework 4 – Chapter 6

4.1

The shaft shown here is subjected to tensile, torsional, and bending loads.



- Determine the stress concentration factors at the fillet where the shaft changes diameter.
- Determine the three stresses at the fillet.
- Combine the stresses at the fillet and calculate the maximum and minimum principal stresses there.

You don't have to draw a Mohr circle, but it might be a good idea.

4.2



A bolt is tightened, subjecting its shank to a tensile stress of 75 ksi and a torsional shear stress of 60 ksi at a critical point. All the other stresses are zero. The material is Titanium (Ti-6Al-4V Annealed).

A. Find the safety factor at the critical point by the DET and the MSST.

B. Will the bolt fail because of the static loading?

4.3

Use the MSST and the DET to determine the safety factor for 2024-T351 aluminum alloy for each of the following stress states. The yield strength for 2024-T351 is given in Table 6.1.

A. $\sigma_x = 15 \text{ MPa}$, $\sigma_y = -75 \text{ MPa}$.

B. $\sigma_x = -35 \text{ MPa}$, $\sigma_y = -35 \text{ MPa}$, $T_{xy} = -35 \text{ Mpa}$

C. $\sigma_x = 40 \text{ MPa}$, $\sigma_y = -40 \text{ MPa}$, $T_{xy} = 60 \text{ Mpa}$

D. $\sigma_x = -110 \text{ MPa}$, $\sigma_y = -55 \text{ MPa}$, $T_{xy} = 30 \text{ Mpa}$