Text Problem:

8-20 (40 pts) Wording is a bit confusing with the pressure vessel part. Essentially, the internal pressure acts over a circular area represented by the effective sealing diameter (150 mm). Ignore the gaskets in computing the part stiffness, use the procedure we used in class. Also, bolts are coarse threads and the connection is reusable.

***In addition to what is asked, also compute the factor of safety for a fatigue load varying between the static pressure and 50% of the static pressure.

Answers: \( n_{\text{stat}} = 4.42, n_{\text{sep}} = 4.90, n_f = 4.74 \)

Non-Text Problem (Matlab or Mathcad): (60 pts)

Given the joint in figure 1, perform a fine threaded (UNF) bolt design for the two fasteners. Make sure to design for:

1. Maximum static load (\( P = 7 \) kip), \( n = 2.0 \)
2. Separation, \( n_{\text{sep}} = 3.0 \)
3. Fatigue loading (force goes between \( P = 7 \) kip and 0), \( n_f = 2.5 \)

The nut is hexagonal.
The bolts are SAE grade 5 (Table 8-9).
The joint is permanent.

This would be extremely tedious and error prone to do by hand. I think Matlab is more efficient for programming this, but Mathcad is acceptable. Email me your file, as per the rules from HW 3. **Groups of 2 are acceptable**

**Bonus:** 50% Reduction in deductions for doing non-text problem in Matlab
Figure 1: The four posts are welded to the steel plate, which is bolted to the aluminum plate. The four posts are fixed above. The \textbf{total force} acting is $P$. The dashed circles represent the bolts that are used to attach the steel and aluminum plates.