You are to idealize a four-cell wing rib structure that is subjected to the loading conditions as shown on the attached sketch. Each group is assigned a section, as indicated by the value of the coordinate "Z" that is listed with the group's members.

You are to:

1) Idealize the four-cell section with a detailed identification (type, dimensions, moments and products of inertia) of the types of cross sections to develop the Area-Skin configuration.
2) The section should be designed such that the stringer skin idealization will be subjected to the ultimate stress with a zero margin of safety.
3) The skin thicknesses are constrained as follows

**USEFUL INFORMATION:**
- All external skin thicknesses = 0.032 in
- Front and rear web thicknesses = 0.051 in.
- Intermediate web thicknesses = 0.025 in.

4) The design presentation should include, at minimum:
   a. A determination of the shear flows, shear stresses, and shear strains in the skin.
      *note: you must superpose the shear flows that result from the open section analysis with those that result from the circulating shear flows of the closed section.*
   b. The angle of twist per unit length.
   c. Can the section withstand an additional torque load of 80,000 in-lbs in combination with the shear loads.
   d. Each group should find:
      i. The axial stringer (boom) stresses and loads due to the bending moments. Check to see that these loads are self-equilibrating.
      ii. The equation of the neutral axis: locate the neutral axis in the plane of the rib.

5) Each group has been assigned to study and report on a design study. This will be presented immediately the group's wing-rib design is presented.
GROUPS:

A  
Barhorst  
Eglet  
Steinberger  
Reed  
Z = 0

B  
Brown  
Lane  
Saunders  
Urbaniak  
Z = 25

C  
Altherr  
Chalk  
Dehmer  
Miller  
Z = 50

D  
Coppess  
Curtner  
Harsley  
Myers  
Schoger  
Z = 75

PROTOCOL: EACH GROUP TURNS IN ITS WORK ON 7 MARCH, BEFORE CLASS.

MARCH 7  GROUP A PRESENTS ITS RIB DESIGN AND DESIGN REPORT
MARCH 10  GROUP B PRESENTS ITS RIB DESIGN AND DESIGN REPORT
MARCH 12  GROUP C PRESENTS ITS RIB DESIGN AND DESIGN REPORT
MARCH 14  GROUP D PRESENTS ITS RIB DESIGN AND DESIGN REPORT

EACH PRESENTATION WILL BE FOR THE ENTIRE PERIOD DURING REGULAR CLASS TIME.

ALL AIAA DESIGN REPORTS ARE TO BE RETURNED AFTER THE GROUP MAKES ITS PRESENTATION.

INTASIW3(COMMENT DISK)
\[ p_y(z) = 1000 \sqrt{1 - \frac{(z/100)^2}{1}} \text{ lb/in.} \]

\[ p_x(z) = 250 \sqrt{1 - \frac{(z/100)^2}{1}} \text{ lb/in.} \]