

CVG 2140: Mechanics of Materials I

Midterm Exam / Examen de mi-session

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Time / Temps: **60 min.**

CLOSED BOOK. Attempt all three problems. Non-programmable calculators are allowed.
Marks are as shown for each question. Clearly indicate the **coordinates** you are using.

Name of the student / Nom de l'étudiant: _____

StudentNumber / Numéro d'étudiant: _____

1. For the shape illustrated in Fig. 1, determine:
 - a. The location of the centroid C ; (20 points)
 - b. The moment of inertias I_{xc} , I_{yc} with respect to its centroidal axes; and, (20 points)
 - c. The maximum and minimum moments of inertia with respect to its centroidal axes. (10 points)

2. A hollow structural steel ($E = 200$ GPa) tube A with an outside diameter of 60 mm and an inside diameter of 50 mm is fastened to a 2014-T4 aluminum ($E = 73$ GPa) bar B that has a 50-mm diameter over one-half of its length (500 mm) and a 25-mm diameter over the other half (500 mm). The bar is loaded and supported as shown in Fig. 2.
 - a. Draw the axial load diagram; (10 points)
 - b. Calculate the overall change in length of the member; and, (20 points)
 - c. Determine the maximum normal stress in the member. (20 points)

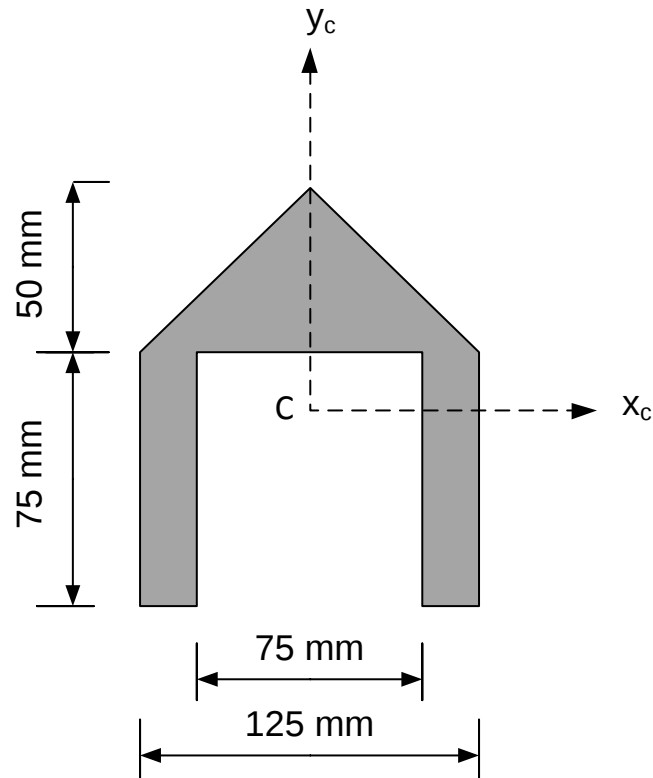


Figure 1

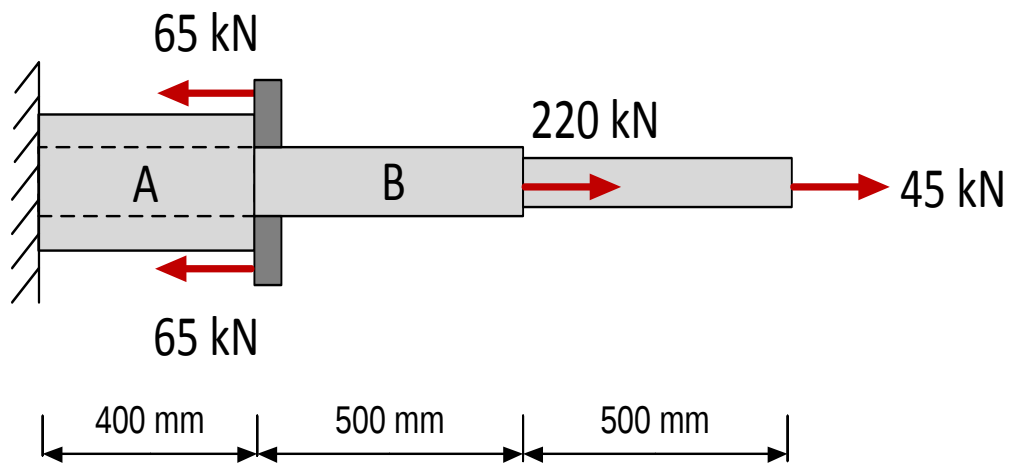


Figure 2