AERO 3610 Minimum Weight
Structural Design Project

This lab project is designed to introduce you to the four basic operations necessary to complete an engineering project: conceptual design, analysis, fabrication and testing. You will perform all four of these operations as part of a small group during this academic semester. All of the various groups of students within the laboratory will work on the same design project and your group will be in competition with the other laboratory groups to produce the lightest structure that fails at the design load.

Problem Statement:
Design a minimum weight structure which fails under a 210 lb vertical load placed as shown in Figure 1.

Physical /Material Constraints:
A. The design envelope is a rectangular box, 48 inches in length, 10 inches in height and 3.5 inches in width (see Figure 1)

B. You are restricted to the construction materials provided by the instructor. These construction materials consist of
1) American basswood truss members which have initial cross section dimensions of 0.375 by 0.375 inches.
3) The American basswood main beam has cross section dimensions of 0.375 by 0.8 inches.
4) The aluminum gusset plate material is 0.032 inches thick.

You will have the freedom to modify the cross section of the truss members to minimize the structural weight within the constraints listed below

1) The design of the ends of the truss members (last 1.5 inches) is shown in Figure 2 and this design cannot be modified.
2) Joints must be at least 1.5 inches from the ends of the span.
3) The thickness of the aluminum gusset plate material is fixed and cannot be altered.
4) The cross-section of the “main beam” cannot be altered.
5) The width (dimension perpendicular to the paper) of all the members must be 0.375 inches
6) The thickness of the “reduced cross-section” of each of the truss members must be between 0.075 inches and 0.20 inches.
7) No member can be longer than 15 inches.
8) No two members can be parallel to each other.
9) Each truss joint must have a front and back gusset plate.
10) Truss design cannot have any embedded quadrilaterals.