Marshall Problem/Project Statement - Senior Design Topic

Problem/Project Title: Simulated Avionics Box Structural Design

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Indicate which discipline(s) is/are most appropriate to work on this problem (e.g., aerospace, mechanical, electrical, chemical, industrial, civil, computer, physics, materials, test, nuclear, earth science, other)

Aerospace, mechanical, or civil

Marshall Problem Statement

Background: The big picture with references to previous work (Why would a senior design student be excited about this work?)

The objective of this project is to design a Simulated Avionics Box (SAB) using a described typical methodology, building the box, and then subjecting it to random vibration testing. The structure is to be sized to a specified random vibration environment. This SAB will be used as a baseline in near term efforts to develop engineering methodologies to design lighter structures.

Recent/on-going research on the problem (What resources, if any, are available to the senior design team, such as equipment, software, facility utilization)

The product of this project will facilitate on-going research efforts focused on mitigation of unnecessary mass in NASA structural designs. It will play a key role in that story. However, to complete this task, no research or results of research are needed. The students will need to become familiar with NASA engineering standards and methods. Pertinent materials will be provided.

Details of the problem; design constraints, requirements (if any), outcome expected. One semester Senior Design course lasts 15 weeks; two semester course lasts 30 weeks. (What do you expect the senior design team to accomplish?)

The team will be provided with design requirements such as allowable size/dimensions and simulated internal components. The material will also be specified so that it is consistent with our described on-going efforts. A random vibration environment will be provided as the design load. They would design and analyze the box (create CAD then FEM), build the box and then test to provided random vibration levels

Final products: (1) CAD model (2) FEM (3) stress analysis results (4) built box (5) test results including measured acceleration responses and strain

Senior Design Project Rules:

1. Weekly telecons will be scheduled to maintain proper progress and prevent dead-end ventures.

2. Deliverable(s) required (e.g., one semester course – a written final report; two semester course – written final report and a prototype/model (if practical))