

Senior Design Project: Orbital MACH Redesign

Orbital Sciences Corporation (OSC), Launch Systems Group (LSG) develops space launch vehicles, interceptor boost vehicles, and target vehicles/threat simulators for low earth orbit satellites and the missile defense system. An important component of such systems is the avionics assembly responsible for guidance, navigation, and control of the vehicle. An example of a design supporting avionics is Orbital's Modular Avionics Control Hardware (MACH).

MACH consists of numerous modules containing boards performing different functions linked together to help fly the vehicle. Orbital like to redesign the mach to meet the form factor for a particular vehicle. The mechanical aspects of this redesign include design of a new module assembly and a new module housing, as well as analysis and/or testing to determine if the new design will be able to survive flight environments. These flight environments include random vibration, shock, sine vibration, thermal vacuum and thermal cycling.

Orbital will provide the selected senior design group with board outlines to design housings around, as well as envelopes for module assembly volume. Also, Orbital will specify module linking options, required environments, and other specifications necessary for the design. The design should consist of environments analysis and testing to support the integrity of the design. This should include an FEA dynamic analysis, vibration analysis, thermal analysis, tolerance stackups, vibration, shock, and/or thermal testing, and building of a prototype. Weight is a critical design parameter. The new design should be less than or equal to the weight of the old design.

Orbital can provide support for environments testing and may be able to provide support for the machining of prototype parts.