Habco - UConn, An Example of a Small Industrial Company's Support of Capstone Programs

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Author Background

Dr. Barber Professor in Residence in Mechanical Engineering at University of Connecticut, and has been running the ME Senior Design course there since 2000. Approximately 90% of the projects in Senior Design have an industrial connection.

Mr. Plis is Chief Engineer of Habco Inc. Habco staff frequently provide guest lectures at UConn, and has been sponsoring Senior Design projects at UConn for over five years.

Abstract

HABCO, Inc. is a small woman-owned company that provides ground support and testing equipment to the United States armed forces, commercial aerospace manufacturers, industrial and power generation providers and medical device manufacturers. Many of HABCO's Peculiar Ground Support Equipment (PGSE) and Commercial off-the-Shelf (COTS) products are used for servicing both rotary and fixed wing aircraft. HABCO became involved supporting the Mechanical engineering senior design program several years ago, when the Chief Engineer’s son was in the program. Since then HABCO has continued to support this program.

During the 2010-2011 academic year, HABCO supported a senior design team to improve a helicopter sonar unit load/upload fixture that Sikorsky Aircraft currently uses. The Senior Team, with design and manufacturing support from HABCO, designed and manufactured the 7933 HELRAS load/unload fixture. This hoist was to be capable of raising and lowering a 380lb Sonar Unit from the Sikorsky S70B aircraft reel mechanism. This load/unload fixture was to be designed to incorporate collapsing features to allow for compact storage and loading door clearance aboard the Singapore Navy RSS Formidable #68 frigate, on which it will be used. The scope of the project encompassed design, manufacturing, validation, and marketing of the hoist.

The student team worked directly with the Habco engineering team through the preliminary design and detailed design phases. The student team considered physical and environmental constraints in the design in order to ensure that no damage to the HELRAS unit or surrounding hardware on the ship would occur. The range of motion of the hoist boom, the deck angle of the #68 frigate, and the normal and tangential accelerations of the ship deck caused by sea state 3 conditions all affect the stress and strain in the hoist components and were calculated in the process of designing the hoist. Other dynamic assumptions due to sea-state 3 conditions aboard the vessel were used as design parameters. A material study was conducted to determine the best-suited material for the hoist, i.e. compatible with the rolling resistance, weight carrying capacity, ship deck surface, exposure to contaminants, and temperature as well as humidity range. Extensive hand calculations for deflection, stress, strain, and dynamic load were carried out to ensure the strength and safety of the hoist components. The students performed FEA analyses to verify their hand calculations. Preliminary designs as well as a fully dimensioned final design were presented in an engineering design review. Prototype testing and validation of the team’s analyses were performed, as well as a service manual and warning labels were developed and delivered to ensure safe-operation.

The results of the team’s design and development efforts were demonstrated at the annual end-of-the-academic year Demonstration Day event and HABCO was selling this product to their customer Sikorsky Aircraft. In addition, an independent group of industrial judges voted a first place [out of 41 projects] award to this project. This poster will address the industry collaboration approach for this project.

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