Department of Mechanical and Materials Engineering

SENIOR DESIGN ORGANIZATION SYNOPSIS – SPRING 2013

DreamLifters: SAE Aero Design East 2014

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The SAE Aero Design series provides engineering students with the opportunity to face a real-life engineering challenge by designing an aircraft based on a set of requirements. This competition not only focuses on technical knowledge in the aeronautics field, but also emphasizes in interpersonal communication, oral communication, and written skills by making a percentage of the score based in the design report and the oral presentation. Seventy- five university teams from different parts of the world will compete against each other putting their engineering, communication, and writing skills to the test. The competition will be held in Marietta, Georgia on April 11-13, 2014. The SAE Aero Design features three classes of competition; Regular, Advanced, and Micro. Our team will participate in the regular class. The objective of the regular class competition will be to design a remote controlled cargo aircraft and predict the aircraft's payload capacity while complying with the requirements of the competition. The aircraft's wings, fuselage, and empennage are to be constructed and designed entirely. Components such as the motor, propeller, and landing gear are allowed to be purchased from suppliers.

For the design of the aircraft, the team researched different design alternatives to select the best option based on cost, manufacturing time, loads, etc. To engage in current research in aerodynamics and to create a design that will have global acceptance, the design of the aircraft is to be done using current technology available. Design techniques used include computational fluid dynamic (CFD) analysis to optimize the airplane's design to obtain optimal lift and reduce drag, and structural optimization using finite element analysis through software such as SolidWorks and ANSYS. Experimental validation of obtained CFD analysis is done by using wind tunnel testing. Other testing concepts include a test stand to analyze thrust of different motor and propeller combinations. Through the research performed in this project, we wish to obtain results that can be used in future design of aircrafts to optimize efficiency.