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Implementing Systems Engineering Practices to the Zips Aero Design Team

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Implementing Systems Engineering Practices to the Zips Aero

Design Team

Kaitlyn Bebb, Ariel Bryan

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1.0 Executive Summary

The Zips Aero Design Team is a college sponsored design team that competes each year through the American Institute of Aeronautics and Astronautics (AIAA) Design Build Fly (DBF) competition. The rules change each year, requiring a brand-new aircraft for every competition. The rules generally consist of 3 differing flight missions and a ground mission, with overarching requirements such as size, takeoff distance, and battery limitations. In the 2022-2023 season, the rules are entitled “Electronic Warfare” and simulate missions relating to payload capacity, endurance, speed, and structural capability. The aircraft must also be able to showcase extreme modularity. The Zips Aero Design Team generally aims to build and fly two aircraft each year: A prototype aircraft by the end of the fall semester, and a final competition aircraft to bring to the April competition.

A complex set of rules such as these is meant to be difficult for even the best of teams to master, especially without proper organization and project management. This senior design report outlines the benefits of implementing systems engineering to the Zips Aero Design Team, through multiple avenues such as requirements management, design reviews, model-based systems engineering, manufacturing optimization, and more. The primary goal of this senior design project is to improve the functionality and culture of the Zips Aero Design Team through systems engineering integration, with a secondary goal of improving upon the AIAA DBF technical report score and competition final score as compared to previous years.

Through implementation of these systems engineering practices, team members and the alumni pilot of 32 years have commented on the 2022-2023 season being the team’s most successful year in many seasons. Returning members are happier with team culture and feel more confident in their designs. New members are retained more and feel confident in taking initiative for leadership roles. Overall, systems engineering has made a very positive impact on the Zips Aero Design Team.