

Thesis Project Portfolio

Hybrid-Electric Turboprop

(Technical Report)

Aviation and Avarice

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

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Sociotechnical Synthesis

The work for my technical project and my STS research paper are related through the field of aviation. Aviation is a broad field involving anything that has to do with aircrafts, flight, and operating aircraft. It is a constantly evolving field with many new emerging technologies and new parts of the field that need regulating. My STS research paper details the importance of regulation and performing ethical work in the field, while my technical project involves using many of these principles to implement new technology in a more sustainable fashion.

The technical project focuses on the priority of increasing sustainability in the aviation industry, and it is based on a challenge by the AIAA. My group is given a goal to design a hybrid electric aircraft, using technology that is feasible by the year 2035, that can reduce fuel consumption by 20% over a competing aircraft, and carry around 50 passengers. This compels us to research the technologies and systems that are currently in development by the aviation industry and use the design process to develop a culmination of the many technologies into a concept that fulfills the requirements laid out by the AIAA Hybrid Turboprop Design Challenge. While in the early stages of design we are required to rank the many aspects of the plane to determine what we should focus on. By developing a more sustainable aircraft that utilizes technology accessible in the future, we are hoping to encourage an increase in the use of sustainable innovation practices as well as increase efforts to use said advanced technology in other fields.

My STS research paper involves looking at how the commercial aviation industry has become motivated by profits and has sacrificed safety, comfort, and sustainability. This will be done through a case study of the Boeing 737 MAX scandal, which involved two crashes caused by faulty software resulted from a rushed production cycle. I will also be analyzing other actions

done by the aviation industry that compromised comfort and sustainability of the industry. The sociotechnical structure of Actor Network Theory will be used to give an in-depth analysis of the Boeing 737 MAX scandal. The overall goal of this paper is to illustrate the importance of performing ethical work in the aviation industry as well as almost every industry, and how easy it is to fall down a slippery slope if one compromises morals.

Completing both projects simultaneously greatly improved the value of both projects, mainly because my STS project is about the importance of acting ethically while developing an engineering project, and my technical project is such an engineering project. Doing both of these simultaneously showed me the ease at which one can cut corners during development, while also showing me the importance of not cutting such corners. I think a lot of the long-lasting impact of both projects would be lost if they weren't done simultaneously since they both highlighted important parts of each other. Therefore, I think that it is important for future graduates to perform a capstone project concurrently with a STS class and project.