

**DESIGN OF USER-FRIENDLY ELECTRODES FOR REAL-TIME COATING
CONDITION MONITORING**

**THE STORY OF THE JOLLY GREEN II: A SOCIOTECHNICAL ANALYSIS OF AIR
FORCE TECHNOLOGY ACQUISITION STRATEGIES**

An Undergraduate Thesis Portfolio
Presented to the Faculty of the
School of Engineering and Applied Science
In Partial Fulfillment of the Requirements for the Degree
Bachelor of Science in Materials Science and Engineering

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May 12, 2023

SOCIOTECHNICAL SYNTHESIS

The relationships that the United States Air Force, or USAF, creates with the companies that produce its technology are vital to its ability to function. The goal of the technical research project is the production of technology that will help preserve Air Force helicopters. The electrodes that will be produced will make the maintenance of the protective coatings on aircrafts easier. The science, technology, and society, or STS, research paper investigates the process by which the USAF obtains its technology. It accomplishes this by identifying the entities that affect the Air Force procurement process and examining how they are socially and technically connected. The STS project is tightly coupled to the technical project because it will use the production of the HH-60W Jolly Green II helicopter as the center of its discussion, which is the same aircraft that the implements produced in the technical project will be designed for.

The technical report describes the design and production of electrodes using different materials and shapes. These electrodes will eventually be used by USAF personnel to monitor the corrosion protective coating on the HH-60W helicopter. Four materials were tested to determine their corrosion resistance and wettability in order to evaluate their survivability and testing capability after repeated uses. Electrodes were produced and evaluated for their ability to detect defects in a protective coating and assessed for ease of production and user-friendliness.

Nickel proved to be the most corrosion resistant material and was the most consistent in its wettability, while copper became more wettable over time. Brass, copper, and nickel electrodes were able to be produced easily, while stainless steel electrodes were not able to be produced using the methodology that was chosen. Due to its corrosion resistance, ease of production, and sensitivity to defects, nickel electrodes in the Band-Aid and Scythe shapes were determined to be the most useful for corrosion protective coating monitoring.

The STS project will construct a model of the sociotechnical relationships that the Air Force forms, and this model will illuminate the actors that affect USAF procurement strategies. This project will use the production history of the HH-60W combat rescue helicopter to build a model in line Actor Network Theory, a sociotechnical framework that was created by researchers at the Centre de Sociologie de l'Innovation. Actor Network Theory, or ANT, defines pieces of technology as actors that exist in a network of sociotechnical relationships with other actors such as people, organizations, and nonhuman elements. Focusing on a specific aircraft allows for an understanding of a general network around the USAF while also allowing for an in-depth analysis of how this network can affect technology.

Throughout the STS research project, the timeline of the Jolly Green II was discussed extensively. Relevant actors that appeared in the timeline were identified, and their connections within the network were explored. The network around the HH-60W includes the USAF, the company that designed and produced it, other companies in the defense industry, the US federal government, the international environment, and other military aircrafts. All of these actors could be connected not only with the Jolly Green II, but with each other.

Everything that the USAF procures is connected to several other entities both socially and technically. Understanding the types of products that the Air Force requests and uses gives insight into the organization's practices and future goals, and looking at these innovations from a social context gives a similar opportunity for comprehension. Air Force technology is not separable from the social environment that it is created in, and a true appreciation of USAF operations cannot be complete without a sociotechnical lens.

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PROSPECTUS

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