

Undergraduate Thesis Prospectus

Determining Chloride Density in Real Environments
for Galvanic Corrosion Prevention

(technical research project in Materials Science and Engineering)

Spending and Secrecy: Military Contractors and
Public Image

(sociotechnical research project)

by

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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General Research Problem

How do U.S. military contractors adapt to pursue their business agenda?

Military contracting is a substantial industry in the United States: In the 2020 fiscal year, the Department of Defense obligated a sum equivalent to \$420 billion of today's money on federal contracts, "more... than all other government agencies combined" according to the Congressional Research Service (Peters, 2021). Private companies compete fiercely over these lucrative federal contracts resulting in a significant investment of resources to adapt their technologies and business strategies to gain an advantage.

Determining Chloride Density in Real Environments for Galvanic Corrosion Prevention

How can data from the Luna Labs Acuity Sensor be used to determine chloride loading density and other specific parameters of real environments?

My capstone project is provided by Luna Labs, a technology resource for many industries, and will be under the guidance of Richard Martukanitz in the Materials Science and Engineering Department. My group (myself, Spencer Blankenship, Trevor Eggleton, and John Emery) is to determine and experimentally confirm a relationship between laboratory test data and real environment data for galvanic corrosion. Corrosion is a large industry; the World Corrosion Organization estimates the cost of corrosion worldwide to be over 3% of the global GDP (Hayes, 2010). The ability to predict the corrosion resistance of materials and understand the effects of the operating environment is critical to developing reliable, high-performance products for many other industries, including defense.

Luna Labs has developed an Acuity Sensor which measures properties related to galvanic corrosion, a specific type of corrosion, to understand how corrosion advances overtime in a real

environment. However, the sensor measures different parameters than those used in lab testing. The goal of our project is to determine a relationship between these data through data analysis and an understanding of corrosion-related material properties. Such a relationship would allow for accelerated laboratory testing to be used accurately as a predictor of real environment corrosion, as opposed to performing long-term field testing for each environment.

Methods may include processing and analysis of large datasets, machine learning, and field testing to validate the relationship we establish; our next steps will be to synthesize these methods into a comprehensive plan. The result of our project will be a method of connecting the two types of data presented to us, as well as experimental proof that our model can be used for future datasets.

Spending and Secrecy: Defense Contractors and Public Image

How do U.S. military contractors influence their public image?

In his farewell address to the nation in 1961, President Eisenhower coined the term “military-industrial complex,” warning that its influence in government bore the “potential for the disastrous rise of misplaced power” (Eisenhower, 1961). In the United States, military contractors contribute to the national defense by supplying the armed forces with cutting-edge technology and support, but they have also exacerbated problems of wasteful spending and deficient quality, and have been implicated in disasters causing civilian fatalities (McGregor, 2021). How, given this record, have military contractors sought to manage public perceptions of their enterprise?

Researchers have studied how military contractors seek to influence public opinion. McGregor (2021) highlights secrecy as a means to conceal wasteful military procurement,

thereby preventing public demands for reform. Using the case of Blackwater USA and their part in the 2007 Nisour Square Massacre in Baghdad, Jung (2016) demonstrates the legal protections and loopholes that prevent the prosecution of such private military contractors. Gordon, Sokoloff, and D'Onofrio (1981) characterized mutually beneficial interdependencies between military contractors, members of Congress, and the Department of Defense as rigid “iron triangles” that exclude voters’ influence and resist reform efforts.

Lockheed Martin (2018) engages in extensive public relations efforts to manage its image, using immersive advertising campaigns to cultivate a shared mission with the public. As a trade association, the National Defense Industrial Association (NDIA, 2022) represents the business interests of military contractors. NDIA equates its members’ business interests with the national security needs of the United States. For example, in a September 2023 letter to Congress, it urged lawmakers to account for inflation in defense appropriations, warning that otherwise rising costs would “undermine our national security” (NDIA, 2022). NDIA presents awards to individuals involved in military contracting in order to humanize companies and create an inviting image of the industry (NDIA, 2021). Marketing and public relations firms help military contractors manage public perceptions. Sales Artillery advises military contractors to respond to criticism on social media, lest they be “defined by their critics,” and advises them how to do so (Burdette, 2014). Sales Artillery profits from coaching military contractors on marketing strategies and publishing marketing-related research. In 1986 the Association of the US Army (AUSA, 1986), a membership association representing career Army professionals, condemned “congressional micro-mismanagement” for wasteful spending that prevents cost-effective military procurement (AUSA, 1986).

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