



Project Scope

Project Description

The objective of this project is to design, develop, and implement a tribometer that enables the simultaneous testing of multiple samples within a vacuum chamber. The project aims to supply one single scaled tribometer that could work jointly with five others. This system aims to increase testing throughput and enhance overall efficiency while maintaining prior accuracy and control.

Key Goals

The primary goal of this project is to enhance and expand the generation of big data concerning the tribology of materials. To achieve this, the tribometer will be designed to concurrently test multiple samples. The testing procedure will involve the precise application and control of a load on each sample to prevent material failure. Furthermore, the tribometer will be responsible for acquiring data related to wear measurements. In addition to these requirements, the tribometer must also operate under space-like conditions, function in high vacuum environments and withstand extreme temperatures.

Markets

The primary market for this tribometer are researchers who wish to run multiple experiments with varying control and system inputs. That is, researchers who wish to perform tests on free variables such as materials, applied loads, temperatures, and environmental pressures. Some examples of these entities are NASA, Defense Contractors (Boeing, Lockheed Martin, Raytheon), Academic Research Labs, etc.



The secondary market involves the use of the system beyond its initial development.

Once the system is operational, the secondary markets for this tool include aerospace companies, automotive industries, low friction coating companies, national laboratories, and any manufacturing and quality control companies. All these companies or industries would be able to benefit from the implementation of the system in their field.

The tertiary market, often referred to as the consumer market, would include individuals or organizations performing independent tribology studies on materials in space-like conditions for recreational purposes. These people or organizations operate downstream from the secondary markets.

Assumptions

Simplifications in the form of assumptions are required to complete the project in the allotted time. To begin, we assume that the materials that will be tested are polymers and coating materials. We assume that the vacuum chamber has preexisting electrical wiring, a cryogenic cooling system, and a means to produce and supply constant pressure and power. Also, we assume that applied loads and temperature settings will not exceed the minimum and maximum range. Furthermore, we assume that testing will be done with by individuals who have satisfied the necessary safety training.

Stakeholders

A stakeholder is a group or individual who possesses interest, control, or investment in each project. In Table 1, the left most column displays who the stakeholders are.



Table I
Stakeholders.

	Investor	Decision Maker	Advisors	Receivers
Sponsor 3M, AME	X			X
Manager Dr. Krick		X	X	X
Experts Dr. Krick, Dr. Ordonez, Dr. Vanderlaan			X	
Operators Graduate researchers, undergraduate students				X
General Readers Other educational institutions, materials companies, material hobbyists				X