CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 PROJECT SUMMARY

Name(s)

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Project Number

38389

Project Title

Up, Up, and Away: The Effect of Substrate Type, Substrate Temperature, and Load on Hover Engines and Hovering Efficiency

Abstract

Objectives/Goals

The objective of this experiment was to determine the order of energy efficient conditions for hover engines by varying the type of substrate (surface below them), substrate temperature, and payload on the Whitebox (the box with the hover engines).

Methods/Materials

The Whitebox was tested with all combinations of substrate type (aluminum and copper), temperature (room and cold, the metals being frozen in a freezer), and payload (none, 500 g, and 1000 g). The Lithium Polymer battery was balance charged to 3.75 V, and the battery alarm was set to ring when the battery reached 3.4 V. These two materials were plugged into the Whitebox. A stopwatch recorded the duration of time between the start of the trial and the moment the alarm rang.

Results

The Whitebox was tested under all different conditions. The most efficient condition was room temperature copper with no weight, and the least efficient condition was cold aluminum with 1000 grams weight. Aluminum, cooler temperatures, and increasing load reduced hover engine efficiency. Copper, room temperature, and decreasing load increased hover engine efficiency.

Conclusions/Discussion

All conditions affected hover engine efficiency. Copper is more conductive than aluminum, room temperature metals are still less electrically conductive than cooler ones but work more efficiently with the hover engines than cooler metals, and increasing weight strains an object. Different conditions can increase the efficiency of magnetic levitation with eddy currents.

Summary Statement

This project served to determine the most efficient conditions with substrate type being copper, substrate temperature being room temperature metals, and load on hover engines being no weight for hovering.

Help Received

Mr. Greg Henderson from Arx Pax gave me the materials and advised me about the Whitebox.