CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
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Project Number
J0121

Project Title
Prop Job: The Efficiency of a Propeller

Abstract

Objectives/Goals
To determine the optimal combination of blades' design factors to achieve the maximum propeller efficiency at a given engine power level.

Methods/Materials
Based on the theory of propeller design, I applied algebra to adapt proven laws of physics and derive a formula with factors I could work with.
I then designed and assembled a test platform.
I also derived various propeller configurations, with different length, width, and number of blades.
I then crafted the blades from balsa wood.
After mounting each propeller configuration on the platform, I measured and recorded the distance traveled during a 20 second period.

Results
Long and wide blades had the best results overall.
Four blade propellers worked best with short blades, while 2 blade propellers worked best with long blades.
The best performing combination was the long and wide 2 blade propeller, and the worst performer was the short and narrow 6 blade propeller.

Conclusions/Discussion
The thrust power produced by the propeller is shown by overcoming the propeller weight (P*L*W*#)and produce a distance traveled.
Propeller design is deriving an optimal combination of blade design factors to match its functional purpose.

Summary Statement
To determine the optimal combination of length, width, and number of blades in a propeller combination that would generate the highest efficiency measured by distance traveled ; % = (P * L * W * # * D) / (E * T).

Help Received
My dad bought the material and helped build the test fixture. My mom helped me with the presentation board.