CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
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Project Number
S0108

Project Title
Flight, the Fulfillment of an Ancient Dream: The Effects of Wing Design on Lift

Abstract

Objectives/Goals
What kind of wing design will prove to have the most effective flight, under a constant wind velocity? How will the changes in the angle of attack, weight to area ratio, and velocity affect the lift of the wing?

Methods/Materials
In order to carry out my experiment, I first collected all my necessary materials. Then, I constructed my wind tunnel and connected it with a fan. Afterwards, I tested the lift of each wing using a dual-range force sensor that was hooked up to a computer program that read the results. Based on my results for the first round of the experimentation, I then took 5 wings and made duplicates with different angles of attack: 5 degrees, 10 degrees 15 degrees; I also tested each one for its lift.

Results
I discovered that the wings that had the smoothest, most linear shape proved to produce the most lift. However, the weight to area ratio also was a major factor in determining the results. I also learned that the more the angle of attack was raised, the lift increased as well. The wings that were at an angle of 15 degrees had the most lift.

Conclusions/Discussion
I conclude that the most effective wing design is a standard, tapered airfoil, but the weight to area ratio and the velocity are important factors that need to be considered along with the design of the wing. Also, the best angle of attack is about 15 degrees.

Summary Statement
To investigate the different factors (e.g. shape, weight to area ratio, etc.) in wing design that affect its performance in flight.

Help Received
Father helped to build the wind tunnel