CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
Christian H. Selby

Project Number
J0121

Project Title
Aerodynamic Lift: It's Not a Drag. Which Wing Design Will Create the Greatest Lift?

Abstract

Objectives/Goals
This project was done to discover which wing (airfoil) design would create the greatest aerodynamic lift.

Methods/Materials
Six wing (airfoil) designs were created to be of equal length. Three designs were conventional and three were experimental. Thin wooden supports of equal weight and length were created for each side of each wing and attatched to allow the wing to pivot on the side supports. A wind tunnel was created with a one speed motor. Within the tunnel a grid was created to produce a more smooth (laminar) air flow. Each wing was flown at both a level postion and at a 30 degree angle from a level position. Equal amounts of weight were added progressively to each side of the wing being tested until the wing could no longer hold a level or 30 degree above level position. After failure, the last successful amount lifted (wing, supports and weights were weighed) was recorded as grams.

Results
Wing number two with a high upper camber and a flat lower camber out-lifted all other designs with a lift at 30 degrees from a level position of 330.2 grams and at a level position of 257.8 grams. This exceeded all other designs by at least 37.4 grams for tests at 30 degrees and 75.6 grams for tests at a level position.

Conclusions/Discussion
I thought wings #3 #4 with the concaved underside (deep lower camber) would produce the greatest lift but they accually produced the least. The deep concaved surfaces must have created rough air flow (turbulence)under the wing which increased drag and reduced the wings' lift. Wing design number two proved to create the greatest lift. Now I can see why airplanes with this wing design are used for cargo and passenger planes. These planes need to carry extremely heavy loads.

Summary Statement
My project is about testing the aerodynamic lift of six different wing designs.

Help Received
My Father helped me design and build the wind tunnel used to test the six different wing designs. My mother helped me glue down materials to my presentation board.