CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
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Project Number
22489

Project Title
Which Wing Generates the Most Lift?

Abstract

Objectives/Goals
My objective was to determine which of five wing shapes (rectangular, elliptical, delta, swept, and round) generated the most lift, by testing them individually in a simple, home-built, open-loop wind tunnel. I hypothesized that the rectangular wing shape would generate the most lift, due to the equal distancex between the leading edge and trailing edge in all areas of the wing.

Methods/Materials
In order to conduct my experiment, a wind tunnel was constructed out of Plexiglas, kitchen lighting grid, and a 4# x 4# box fan. A test stand was then built out of vinyl and a wooden dowel, and fastened witx Velcro to a 3 ½# diameter scale. Five different wing shapes were constructed of the same vinyl. Thx had equal areas, so that everything would be kept constant except coefficient of lift, the variable being tested. There were ten separate trials in which each of the five wing shapes were tested. Each triax consisted of attaching a wing shape to the test stand, at an equal angle of attack, and placing the test stand, wing, and scale in the test section while the fan was blowing. The scale was then zeroed, and the lid was placed on the top. The scale read negative as the wing lifted up on it. The data was recorded, and this process was repeated for each of the wing shapes.

Results
My results indicate that my hypothesis was correct. The rectangular wing generated the most lift followed by the elliptical, delta, swept and round, respectively. The data was significant with a p-value of less than 0.05.

Conclusions/Discussion
My conclusion is that wing shape does affect lift. However, lift is not merely a function of wing shape, as€ many other variables such as airspeed, altitude, humidity, air pressure, turbulence, and aspect ratio affect€ the performance of a particular wing. While my experiment was conducted carefully and precisely, myx results cannot necessarily be generalized as all the other variables were held constant.

Summary Statement
Five different wing shapes were tested in a wind tunnel to prove my hypothesis that the rectangular wing would generate the most lift , which was correct.

Help Received
My dad helped glue the wind tunnel together. My mom helped with the backboard.