CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

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Project Number

J0103

Project Title

How Wing Design Affects Lift across Different Angles of Attack

Abstract

Objectives/Goals

Objective:
The objective of the project was to see if a regular upper cambered wing (traditional wing) could produce more lift than the following six wings: Symmetrical Curved, Brick, Barn Door, Car-Foil, Right Triangle, and a Sideways Figure 8.

Methods/Materials

The methods and procedures we used were as follows:
We constructed a lift scale out of K#Nex that measured lift based on angle of attack.
We built 7 wings out of different materials like paper, Styrofoam, and balsawood. We attached a K#Nex rod to each of them so we could attach them vertically to the lift scale.
We tested all the wings by attaching each of them vertically to the measurement scale and using a fan to blow air on them. We set the angle of attack and observed the lift that was generated by each wing.
We recorded the wings# lift in 3 separate trials for each angle of attack.
We averaged the three trials.
We then increased the angle of attack by 10 degrees and repeated the experiment until we reached 60 degrees.
We did this procedure for each wing. Then we compared the lift results for each wing at each angle of attack.

Results

Results
The results show that the Car-Foil Wing achieved the highest lift.

Conclusions/Discussion

Conclusion

We conclude that the Traditional Wing didn#t produce the most lift after all. Instead two of our made up wings, the Car-Foil and the Sideways Figure-8 both got high lift at 10 to 30 degrees angle of attack. However the Traditional wing achieved consistent lift over all the angle of attacks, making this wing very suitable of passenger planes.

Summary Statement

We conducted this experiment to see which of the seven different airfoils, both standard designs and made-up designs, could produce the most lift at different angles of attack.

Help Received

Interview with Jeffrey Bass, President of Hiller Aviation Museum.