CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)
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Project Number
J0120

Project Title
The Need for Speed: Optimum Angle of Attacks for a Race Car Rear Airfoil

Abstract

Objectives/Goals
The objective of this project is to determine what kind of airfoil or spoiler based on angle of attack provides the best turning performance with the best speed.

Methods/Materials
This experiment was conducted by creating a low speed wind tunnel built of cardboard, wood, Plexiglas, and used a house fan for wind generation. It was built to test the effects of changing angle of attack on a symmetrical airfoil. Dry ice was used for flow visualization. The airfoil is made of foam and cut using a hot wire cutter. The data was collected through photography at various fan speeds and angles of attack of the airfoil.

Results
The results of the images of the airflow over the airfoil or wing and the angle of attack where the flow started to separate correlated to the hypothesis of what was predicted for optimum down force.

Conclusions/Discussion
Despite limitations to the experiment using a home built wind tunnel, The hypothesis was validated through use of photography and analysis. The optimum airfoil for a race car needs to be designed with a -20 degree angle of attack to produce the best traction and braking performance.

Summary Statement
Flow visualization proved optimum down force occurred at -20 degrees angle of attack to due to initial flow separation

Help Received
My father helped me construct the wind tunnel I designed based on research. My father, teacher and neighbor who is an engineer reviewed my work.