CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)

Raymond U. Gilmartin

Project Number

J0111

Project Title

Spare the Environment, Spoiler the Car: The Effect of Rear Spoilers on Drag and Lift

Abstract

Objectives/Goals

The experiment was to measure the effect of the size and the angle placement of a rear spoiler on the amount of drag and lift/downforce on a SUV-type automobile. It was hypothesized that a small level spoiler would increase drag and not affect lift; that angling a spoiler would decrease drag and increase lift; and that increasing a spoiler's size would increase drag and not affect lift.

Methods/Materials

A cardboard wind tunnel was built using a house fan. Two spoilers, one large and one small, were carved from balsa wood. Each was attached to a model SUV at two angles, 15 degrees downward and 0 degrees, level with the car's roof. Using a force sensor and the wind tunnel, the car's drag and lift were measured. Five drag and five lift measurements were taken for each configuration and for the control, the car without a spoiler.

Results

The small level spoiler decreased drag by 20% and did not affect lift. Angling spoilers decreased drag by 3% - 9% and was inconclusive for lift. Increasing spoiler size increased drag by 12% - 18% and was inconclusive for lift. The spoilers reduced drag by 8% - 29% and either did not affect lift or decreased lift by 29% - 55%.

Conclusions/Discussion

Rear spoilers on SUV-type automobiles reduce drag without increasing lift. They will improve gas mileage without decreasing handling or safety and will help stop global climate change.

Summary Statement

The effect of adding rear spoilers to cars was measured to determine if drag can be reduced without increasing lift, which would improve fuel efficiency and reduce carbon emissions.

Help Received

My mother helped me research aerodynamics on the web and proofread my writing. My father supervised the building of my wind tunnel. My teacher supported me and answered many questions.