CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
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Project Number
S0221

Project Title
Comparing the Drag Coefficient of Four Popular Sports Cars

Abstract

Objectives/Goals
This experiment was to show the relationship between sports car design and aerodynamic drag coefficient.

Methods/Materials
Four 1/24th scale plastic sports car models were used: Ford GT, Chevrolet Corvette, Ferrari Spider and a Dodge Viper. To eliminate the variable of rolling fiction a free rolling platform was created on which the cars were attached. All the cars were balanced to the common weight,open windows taped closed. Testing was completed in a wind tunnel originally created to test the importance of angle of attack to the flight of an airplane. The tunnels wind speed was 24 mph or 10.73 m/s produced by a single speed motor. A wire lever and electronic balance was used to measure drag force. I tested each car five times disregarding the highest and lowest measurements and then calculated their averages, adjusting each measurement due to the length of the measurement lever.

Results
The aerodynamic drag and drag coefficient were as follows: Ford GT 21.63 gm or .36, Chevrolet Corvette 22.50gm or .36, Ferrari Spider 21.92 gm or .36, and the Dodge Viper 20.80gm or .33.

Conclusions/Discussion
Drag coefficient is a number that is used to compare one cars design to another. It is equal to two times the aerodynamic drag divided by the density of air times the cars frontal area times the square of the velocity of the air. I was surprised to discover that the Viper created the lowest aerodynamic drag of all the cars I tested. I believe the Vipers low roof height as well as smooth body transition from front to back created a more streamline flow over the car. Low drag means better gas mileage, but for sports cars, low aerodynamic drag and high horsepower means a greater top speed. Sixty percent of the horsepower needed to drive at freeway speed is used to overcome aerodynamic drag. Though the wedge shaped design of sports cars makes them appealling, their wedge shape is neccessary to create a down force to keep the wheels on the ground. The wedge shape does not necessarily result in better aerodynamics. As a comparison, the drag coefficient of a Volkswagen Beatle .38 is two tenth better than the famous Lamborghini Countach at .42. This is possible because one of the key variables in the drag coefficient calculation in a cars frontal area (forward area exposed to the oncoming air).

Summary Statement
This experiment showed the relationship between sports car design and aerodynamic drag coefficient.

Help Received
My father helped redesign the windtunnel, mother helped with display board, Dr. Jim Selgrath approved project, Mr. Dan Halbur helped explain conversions and calculations.