CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
Colleen Loree F. Avila

Project Number
S0101

Project Title
Aerodynamic Shapes

Abstract

Objectives/Goals
The purpose of my experiment was to determine and compare the aerodynamics of custom made plaster shapes when tested within a wind tunnel for drag.

Methods/Materials
The shapes to be tested were made out of Plaster of Paris poured into Dixie Cups, and then custom shaped by hand. A cart apparatus was created out of circuit board material, nylon spacers, screws, and a welding rod in order to suspend the shapes in air. The suspension of the shapes in air provided more accurate data to be formulated from the testing. The shapes were then connected to the cart and placed within the wind tunnel, where the drag and wind speeds could be calculated. The data was then recorded and analyzed.

Results
Shape #2 had the least drag of the eight shapes with a drag of 23 grams at the maximum wind speed of 3,300 ft/min. In second, Shape #6 had a drag of 24 grams, and closely following was Shape #7 with an average drag of 26.5 grams. Shapes #1 and #4 came in fifth with a drag of 27 grams, while Shape #5 had 29 grams. In last place, Shape #3 had the greatest drag at 32 grams at the maximum wind speed. The drag of Shape #8 could not be determined due to unforeseen circumstances. The situation that occurred was caused by the fact that whenever the eighth shape was tested at exactly the maximum wind speed (3,300 ft/min), the cart, in which it was connected, would tilt upwards. This then caused the drag of the shape to remain undetermined. Four additional trials were made for this specific shape in order to guarantee the accuracy of the event; however the cart constantly tilted causing the drag calculations to undetermined.

Conclusions/Discussion
In conclusion, Shape #2 was the most aerodynamic and contained the least drag. This is due to the small amount of surface area and mass that the shape had compared to the others. The simple conic shape of Shape #2 was hypothesized to overcome drag the best, thus the hypothesis was proven correct.

Summary Statement
To determine and compare the aerodynamics of custom designed plaster shapes when tested with a wind tunnel for drag.

Help Received
Mr. Kaura helped setting up appointments to use the wind tunnel; Mr. Schultz and Mr.Gallaway helped provide, assemble, and instruct the use of the wind tunnel; Used equipment at Centennial High in the Industrial Arts Department under the supervision of Mr. Kaura and Mr. Schultz