CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
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Project Number
J0114

Project Title
Factors That Affect a Hovercraft's Speed

Abstract

Objectives/Goals
The objective of this project is to learn about how a hovercraft works, determine the factors that affect performance, and improve design. This project studies a number of forces acting on a homemade hovercraft such as weight, gravity, friction, and lift.

Methods/Materials
The 4-foot (1.22 m) diameter hovercraft was constructed out of a 3/8 inch (9.5 mm) plywood platform and a skirt made from visqueen plastic sheeting. A leaf blower was used to provide lift and duct tape was used to prevent air to escape at interface of the platform with the skirt and engine.

A surface test, skirt test, weight test were performed. The surface test analyzed concrete, artificial turf, and natural grass. The skirt test analyzed a six-foot (1.83 m) and a seven-foot (2.13 m) skirt. The weight test examined three different payloads, 39.91 kg, 28.57 kg and 0 kg. The engine test was conducted using three different engine settings with varying flow rates/air velocities.

Results
The four hypotheses tested included 1) surface roughness slows a hovercraft's speed; 2) the larger the skirt, the faster the hovercraft will go; 3) the more weight applied onto the hovercraft, the faster it will go; 4) the more powerful the blower, the faster the hovercraft will go. Only hypothesis 1 on surface roughness was found to be true. The 3 other hypotheses were found to be false. Many forces are at work on the hovercraft like gravity, friction, and the lift (air cushion) of the hovercraft. For example, during the weight test with no weight added, there was less momentum to force it faster down the hill, than the test with 39.91 kg, the heaviest payload. However, when the medium sized payload (28.57 kg) was tested, the craft travelled fastest. It is likely that the medium-sized payload achieved an optimum balance of high momentum and low friction.

Conclusions/Discussion
The study concluded that skirt shape, which can be affected by payload weight, skirt size, and engine power seemed to be a key factor in hovercraft performance. The best performance may be accomplished by balancing these three design modifications to achieve the fastest hovercraft possible. Finding the right balance would require much more study, design modifications and additional experiments.

Summary Statement
This project studies the effects of a number of forces acting on a homemade hovercraft such as weight, gravity, friction, and lift.

Help Received
Father was a timer and assisted with graphing; Sister was the pilot for the medium weight test.