CALIFORNIA SCIENCE & ENGINEERING FAIR
2019 PROJECT SUMMARY

Name(s)

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Project Number

J0106

Project Title

Which Nose Cone Is the Best when Flown?

Abstract

Objectives

The objective of this study was to evaluate which nose cone design would be the most efficient for a slow moving projectile. I predict that the nose cone in an elliptical shape will be the most efficient for a slow moving rocket because it will allow fluids to flow around the body and used to their advantage rather than reflecting fluids which will consume a lot of energy.

Methods

Produced a waterproof ramp made of gutter splash guards and cardboard and a container with straws that would produce laminar flow. The fluid with reduced turbulence would come out of the container onto the ramp where it would come into contact with one of the eight foam nose cone designs and a rocket body. There, I could visualize how much fluid displacement was caused by the nosecone designs in centimeters. Also, get mass of the nose cones and the distance of its outer mold line.

Results

The predicted most efficient elliptical nose cone had an average fluid displacement of 1 centimeter on each side and weighed 1.5 grams. The nose cone design with the least mass was the spire cone weighing 0.5 grams but having an average fluid displacement of 1.25 centimeters on each side. The true most efficient nose cone design was the conical nose cone which has a mass of only 0.9 grams and an average fluid displacement of 1 centimeter on each side.

Conclusions

In conclusion, my hypothesis was incorrect, and the nose cone in a conical shape had the least average fluid displacement for the least mass which proved the conical design to be the most efficient for slow-moving projectiles. I discovered that for slow-moving projectiles, even though the nose cone may be able to use the moving fluids around to its advantage, the best nose cone is one that can separate the flow by being in a cone shape. This is important since it can expand a students knowledge in school activities like building the most aerodynamic bottle rockets.

Summary Statement

I measured fluid displacement and mass of different nose cone designs to observe which nose cone design was the most efficient for slow-moving projectiles.

Help Received

I designed a safer, more compact way to test and observe the properties of fluid dynamics when in contact with different objects in a two-dimensional form. I received verbal support from my parents throughout the journey of my project.