

Johann Kailey-Steiner

*Rocket Design Part 2 – Testing the Effects of Vortex Generators on Drag Coefficient*

After researching model rocket design, I wanted to find out if vortex generators affect a rocket's drag coefficient. I studied the design of airplane vortex generators to determine the vortex generator dimensions for my rockets. I built a large diameter rocket and a small diameter rocket and modified each to accommodate an altimeter. I created vortex generators for the base and nose cone of each rocket. My hypotheses were that the vortex generators on the large diameter rocket's base would reduce drag more than those on the nose cone and on the small diameter rocket, the nose cone vortex generators would reduce drag more than those on the base.

For each rocket, I launched three control trials without vortex generators, three trials with base vortex generators, and three trials with nose cone vortex generators. I downloaded data from the altimeter after each launch and recorded it on a spreadsheet. I used the G-forces and velocities to calculate the drag coefficients with the drag equation.

My data revealed that when the rocket is the fastest without the engine burning, vortex generators in either position added drag on both rockets. However, the rockets with vortex generators consistently gained more altitude between engine cutoff and apogee than the control rockets. I concluded that the vortex generators worked best at slower speeds, which I confirmed by calculating the drag coefficients at 50 mph. At this slower speed, my hypotheses about how the vortex generator's position would affect drag on the different rockets were correct.