



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

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| Name(s) Michael J. Shane | Project Number J0123 |
| Project Title How Do Flaps Affect Wing Lift? An Experiment on Aircraft Stall Speeds | |
| <p style="text-align: center;">Abstract</p> <p>Objectives/Goals Takeoff and landing are called the critical phases of flight. What does a pilot do during this time to help control the aircraft? My hypothesis is that the pilot uses flaps to decrease stall speed in order to slow the aircraft, and therefore has more control during critical phases of flight. For this experiment I will be testing the relationship of an aircraft wing's stall speed in different flap settings using flight simulator software. Extending the flaps should allow the airplane to fly slower during takeoff and landing.</p> <p>Methods/Materials For this experiment I used Microsoft's Flight Simulator X, using a variation of airplanes. I picked three small engine propeller airplanes, two twin engine propeller airplanes, a smaller business jet, a regional airliner, a small airliner, and a huge airliner. I then used the software to fly each plane and stall them with flaps up and also flaps down. While doing this, I recorded the speed that the stall occurred for later comparison. Once I had stalled each aircraft with both flaps up and down, I compared all the data and noted the results.</p> <p>Results As I conducted my experiment I kept track of the stall speeds, with flaps up and down. I also kept track of the percentage difference the speed resulted in with the flaps down. Please see table. In all cases, having flaps down decreased the stall speed. This makes it easier for pilots to land their airplanes at slower speeds. They can add a small margin of airspeed above the stall speed for safety but still fly at a much slower speed than if the flaps were up.</p> <p>Conclusions/Discussion My experiment proved that the stall speed can be lowered by extending flaps. As flaps are extended the total wing area increases and the top half of the wing becomes longer than the bottom half, known as the wing's camber. My hypothesis was proven correct. As the aircraft was larger rather than smaller, they stalled at a higher speed, but always stalled slower with the flaps extended than with no flaps. I concluded that stall speeds are always slower with flaps extended whatever the size/weight of aircraft. Flying at a slower speed without stalling improves flight safety no matter what type of airplane. I learned how simulator software is very precise which is very crucial in the training of pilots.</p> | |
| Summary Statement This project shows how a wing's lift increases when flaps are extended to allow a pilot to fly slower during takeoff and landing thereby reducing the wing's stall speed, making it safer during the critical phases of flight. | |
| Help Received | |