



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) Isabelle Pinto	Project Number J0120
Project Title Blown Away! How Does the Camber of a Wing Affect Turbulence with a Crosswind during Takeoff?	
<p style="text-align: center;">Abstract</p> <p>Objectives My objective was to find out if the camber of a wing affects turbulence with a crosswind during takeoff. My hypothesis was that the wing with the greatest camber would have the most turbulence with a side wind.</p> <p>Methods 3D printing database(found a design for a wing that had a changeable thickness and camber) found 3 NACA profiles, NACA 2412(low camber), NACA 4412(medium camber), NACA 8412(high camber), 3D printer, wind tunnel made from a foam board, front wind(3-foot tall Seville fan), crosswind(1.5-foot tall Seville fan)-that simulates rouge winds during takeoff, paper clips to hold the wing in the air and attached to a Jenga block, small scale(for weighing wing). Started the front wind fan on the highest setting and recorded the weight. Turned the crosswind on and recorded the highest, lowest, and average weight. Turned everything off and retook all the measurements two more times. Repeated entire process for all three wings.</p> <p>Results The wing with the medium amount of camber provided the best balance between lift and minimizing turbulence. The wing with the most camber provided the most lift, but the least reliability with a crosswind. The wing with the least camber provided the least lift, but the most reliability with a crosswind. On average, when I added the front wind, the weight of the wings went down, but when I added a crosswind, the weight went up.</p> <p>Conclusions I learned that my hypothesis was correct. I learned that the camber translates directly to the amount of turbulence as well as the amount of lift. The higher the camber, the higher the lift and the greater the fluctuation with a crosswind.</p>	
Summary Statement My experiment is about how high camber wings increase turbulence in takeoff scenarios that have a crosswind.	
Help Received My dad helped me 3D print the wing profiles. I made the wind tunnel and the wing holder myself. I also took all of the measurements myself.	