

Colorado Science and Engineering Fair

2024 Individual Project Abstract Form

Please print 2 copies of the completed form. Sign both copies, keep 1 for your notebook and submit 1 copy to your Regional Fair Director with your other paperwork.

Title of Project: Dynamics of Flight: Testing airplane wings to demonstrate efficiency using a wind tunnel

Finalist's Name: Quinlan Childs

School and City: Summit Middle Charter School, Boulder

Sponsor's Name: Peter Teasdale

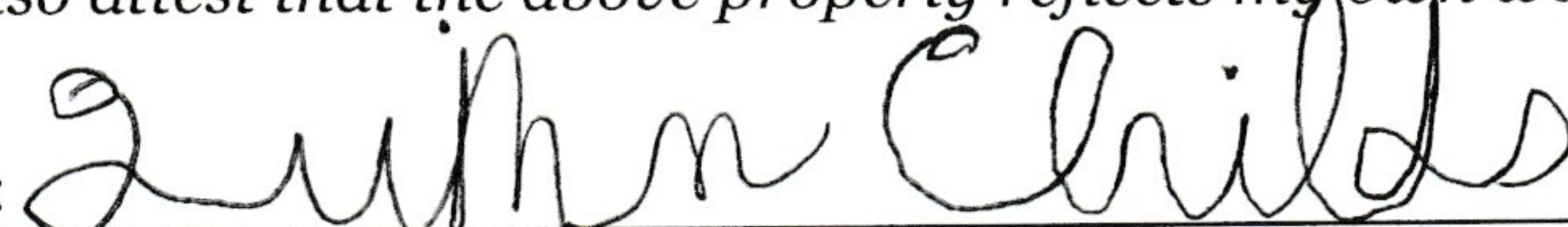
Category: Physics & Astronomy (PHYS)

Division: Junior (6th - 8th grades)

Abstract (250 words or less):

There is a classic wing that we all know: curved top, flat bottom. But there are many different wing profiles used on planes. Why is that? Is there a better way to fly? The purpose of my project was to evaluate three different wing profiles and a flat board for their aerodynamic efficiency. For this project, efficiency was defined as a balance of lift and drag. Using a wind tunnel three different wings were tested; flat-bottomed, semi-symmetrical and fully-symmetrical. A flat board was included in the test as a baseline; any wing should be better than a flat board. Measurements of lift and drag were taken on each wing for their properties of lift and drag across angles of attack ranging from -10 to 30 degrees. The classic Flat-Bottomed wing did the best because, over all angles of attack, it had an average lift value of 6.23 g of lift, and an average drag value of 3.53 g, which made the averaged Lift/Drag ratio to be 2.33. The other wings did not perform as well, having far lower lift/drag ratios. In fact they were not much better at all than the flat board. This might be due to the low air velocity of 7mph in the wind tunnel. The results of my testing show that the flat bottomed wing was the most effective shape under the test conditions. It would be interesting to run this test again at higher air velocities.

I hereby certify that the above statements are correct and the information provided in the Abstract is the result of one year's research. I also attest that the above properly reflects my own work.

Finalist's Signature: 

Date: 3/1/2024

In addition, all students must complete the ISEF Student Checklist (1A), Research Plan, Approval Form (1B), and Checklist for Adult Sponsor (1), and any other ISEF forms required for this type of project. See the International Rules and Guidelines for form requirements. Return COPIES of all of these forms to your Regional Fair Director with you Finalist Verification/Permission Form. A signed copy of this form must be included in your notebook.