



**CALIFORNIA STATE SCIENCE FAIR  
2013 PROJECT SUMMARY**

<b>Name(s)</b> <b>Sampson B. Reynolds</b>	<b>Project Number</b> <b>J0125</b>
<b>Project Title</b> <b>Winglets on the Water</b>	
<b>Abstract</b> <b>Objectives/Goals</b> To determine if attaching a winglet to a rigid wing sail on an Americas Cup 72 would affect the amount of drag on the rigid wing sail. I think that the winglet will decrease the amount of overall drag on the rigid wing sail. As far as i know this hypothesis has never been tested before. <b>Methods/Materials</b> <ol style="list-style-type: none"><li>1. Design and build a wind tunnel out of plywood.</li><li>2. Build an Americas Cup style rigid wing sail and a winglet out of Styrafoam</li><li>3. Mount the sail on a linear bearing and mount the bearing on the floor of the wind tunnel</li><li>4. Hold the winglet at the front of the bearing then time how long it takes to be blown the length of the bearing</li><li>5. Repeat this 49 more times and then put the winglet on and repeat it another 50 times</li></ol> <b>Results</b> <p>The final results of my experiment where that winglet wing had more drag than the regular wing. The winglet time ranged from 1.9 to 2.4 seconds with an average of 2.132 and the normal wing ranged from 2.1 to 2.5 seconds and had an average time of 2.332. The higher the number the lower the drag because it had less wind resistance so it took longer. This means that the winglet wing created more of a wind barrier the wind pushed it faster making it have the lower number</p> <b>Conclusions/Discussion</b> <p>The results did not support my hypothesis. In the future I would like to refined the method used to measure the amount of drag to create a more sensitive measure if possible. I would also like to try putting one winglet in the center of the wing and maybe change the shape of the winglet. I believe there is a strong possibility that this hypothesis could be proven true with the correct modifications. If winglets do actually decrease the drag on a rigid wing sail then they may appear on the next Americas cup boats.</p>	
<b>Summary Statement</b> To use a wind tunnel to determine if attaching a winglet to the rigid wing sail of an Americas cup 72 will affect the amount of drag on the wing.	
<b>Help Received</b> Dad helped use table saw and nail gun; Dad held other side of hot wire knife; Friend held smoke bomb	