



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> <b>Loren J. Newton</b>	<b>Project Number</b> <b>J0119</b>
<b>Project Title</b> <b>Vexing Volant Vortices: How to Chart and Reduce Wingtip Vortices</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> To chart the vortices generated by different combinations of winglets and dihedral angles, and then determine the most effective configuration to minimize wingtip vortices.</p> <p><b>Methods/Materials</b> With help, I designed and built a wind tunnel test rig based on my hypothesis that if smoke was introduced to visualize the airflow over wingtips, then spray paint could print the wingtip vortices generated. Five test wings of varying winglet tilting angles, but equal area and airfoil shape were crafted. Vortices generated by each wing, set on seven different dihedral angles were recorded using 6 second test runs.</p> <p><b>Results</b> My test data showed that vortices were reduced with greater +ve winglet angles and smaller -ve winglet angles, while different dihedral angles caused no noticeable change in vortex size.</p> <p><b>Conclusions/Discussion</b> I concluded that wingtip vortices could be reduced with winglets of greater upward tilting angles. I could also conclude that wingtip vortices could be recorded; and that the paint coverage reflected the size of the vortices.</p>	
<b>Summary Statement</b> To investigate how to chart and reduce wingtip vortices.	
<b>Help Received</b> My dad helped construct the test rig. My mom advised on the display board.	