



**CALIFORNIA STATE SCIENCE FAIR  
2007 PROJECT SUMMARY**

<b>Name(s)</b> <b>Robert C. Hollar</b>	<b>Project Number</b> <b>J0111</b>
<b>Project Title</b> <b>Hovercraft Engineering: Maximizing Engine Thrust</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The objective of the project was to measure the thrust generated by an electric model aircraft propeller engine and determine if the thrust could be increased by placing the propeller inside a duct. <b>Methods/Materials</b> A hovercraft was constructed from balsa wood and fiberglass. Three differently shaped ducts (conical, cylindrical, and Kort Nozzle) were constructed using fiberglass. A electric model aircraft propeller engine was mounted on the hovercraft. The speed of the engine was set at 5000, 7000, 9000, 11000, and 13000 rpm and the produce thrust was measured using a GeoExplorer stain gauge. The test was repeated with the engine inside each of the three ducts. <b>Results</b> The engine produced the most thrust at a specific speed when it was mounted inside a Kort Nozzle Duct, followed by no duct, and the cylindrical duct. The engine product the least thrust when it was inside the conical duct <b>Conclusions/Discussion</b> The thrust is equal to the mass tranport rate times the differenct in velocity measured at the outlet and inlet of the duct plus the pressure at the outlet times the area of the outlet minus the pressure at the inlet times the area of the inlet. To fully understand the performance of the ducts it would be necessary to measure each of the parameters.	
<b>Summary Statement</b> The purpose of the project is to determine if the effeciency of a propeller engine can be improved by placing it in a duct.	
<b>Help Received</b> My father assisted with constructing the hovercraft and ducts.	