



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> <b>Jackson T. Lundgren</b>	<b>Project Number</b> <b>S0210</b>
<b>Project Title</b> <b>The Effect of Surface Roughness on the Drag of a Rocket</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The objective of the project was to see how much of a role surface roughness played in the force of drag on an object moving through a fluid (air). I had always heard that rockets must be sanded until their surface is incredibly smooth in order to achieve the maximum altitude. I wanted to test if that was really true. <b>Methods/Materials</b> I built three identical rockets, one with a smooth finish, one with a coarse finish, and one with a very coarse finish. I then launched them, using the same type of engine for each launch and recorded the altitude. I found that the smooth rocket went the highest, the coarse rocket the second highest, and the very coarse rocket the least high. I also ran a simulation on a Rocket simulation program, and found that the rougher the surface, the lower the altitude reached by the rocket. The third part of the experiment was in a wind tunnel, where I measured the drag force created by each rocket. I found that the rougher the finish, the greater the drag, and inversely the smoother the finish, the less the force of drag acted upon the rocket. <b>Results</b> The hypothesis was supported. The rougher the surface of an object, the greater the force of drag. The smooth rocket went the highest, the coarse rocket the second highest, and the very coarse rocket the least high. I also found in the wind tunnel that the smooth rocket had the least drag, the coarse rocket the second least, and the very coarse rocket the most drag. <b>Conclusions/Discussion</b> From my project one can conclude that the rougher the surface of a moving object, the greater the force of drag on said object. One can conclude that the smoother the finish of an object moving through a fluid the less the force of drag on the object.	
<b>Summary Statement</b> finding the effect of surface roughness on drag	
<b>Help Received</b> Uncle helped build wind tunnel components, dad helped fiberglass rockets and supervise launch	