CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
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Project Number
J0221

Project Title
IED Defense

Abstract

Objectives/Goals
My goal was to determine what shape undercarriage for an armed forces vehicle would deflect the greatest amount of energy if attacked by an IED.

Methods/Materials
I began by building a model car and multiple types of undercarriages. I built three different undercarriages: triangular, curved and flat. Putty was added to each undercarriage in order to insure that they all had the same mass. I then built a testing rig using two pulley systems. I placed the car on top of a box and fed the compressed air through the top of the box so that the blast would hit directly on the undercarriage of the car. Each blast of air lasted one half second. I measured the height risen in centimeters in order to determine how well each undercarriage deflected the energy.

Results
After completing all ten trials of each model the model with the triangular bottom most effectively deflected the explosion. When I tested the triangular bottom resting flat on the box it did not rise at all. This is because with the undercarriage shaped in this way it leaves very little room between the explosion and the bottom of the vehicle. The air nozzle was almost touching the bottom of the car. When the triangular model was set one centimeter above the box it still raised the least when compared to the control and the curved bottom. On average, there was a 10 centimeter difference in height between the control/curved and the triangular bottom. When comparing the curved and control, the curved out performed the control when lying flat on the box and they had the same results when placed one centimeter above the box. The average height raised for the control flat on the box was 23.5 centimeters, for the triangular bottom it was 0 centimeters and for the curved bottom it was 14 centimeters. For the second test, when the vehicle was raised one centimeter above the top of the box, the average height raised for the control was 33 centimeters, for the triangular bottom it was 24 centimeters and lastly, for the curved bottom it was 34 centimeters.

Conclusions/Discussion
My results proved that my hypothesis was correct. The triangular cap deflected the most energy and resulted in the least amount of movement by the vehicle. After competing at the Central Valley Regional Science Fair I decided it would be best to complete more testing and to test more undercarriages with varying shapes.

Summary Statement
My project is about determining what shaped undercarriage of an armed forces vehicle would deflect the most energy if attacked by an IED.

Help Received
Mr. Kinney, another science teacher, provided the materials and helped me determine the best way to conduct the experiment. Miss Kruser assisted me in designing the board and checked my written information to make sure it was appropriate.