



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

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| Name(s) Jake D. Boring | Project Number J1303 |
| Project Title What Is the Best Adhesive to Attach Carbon Fiber Landing Gear onto a Foam Radio Controlled Airplane? | |
| <p style="text-align: center;">Abstract</p> <p>Objectives/Goals The goal was to determine which adhesive would be the best to attach carbon fiber landing gear to a foam radio controlled airplane.</p> <p>Methods/Materials Two common lightweight materials for radio controlled planes are carbon fiber and depron foam. Test specimens were made using rectangular shaped pieces of depron foam (to simulate a plane fuselage) and a strip of carbon fiber (to simulate the landing gear). These substrates were bonded together using four different adhesives forming a lap joint. Surface preparations and proper curing times were key factors in having uniform test specimens and successful results. A Materials Testing Systems (MTS) hydraulic machine was used to pull on each of the specimens to test the lap joint and to record the breaking point of all the samples.</p> <p>Results Cyanoacrylate super glue, or CA glue, withstood 4.21 kilograms or about 21% less force than the other three types of glues. Hot glue, gorilla glue, and 5 minute epoxy averaged 19.75 kilograms of force before breaking. This was determined to be the depron foam breaking point as these adhesives did not fail before the foam broke.</p> <p>Conclusions/Discussion It was concluded that the CA glue didn't withstand as many pounds of force as the other three adhesives because of the chemical, cyanoacrylate that was harmful to the depron foam (it dissolves and deforms the airy cell structure of the foam). Now that the breaking point of Depron Foam is known, Newton's formulas have determined that the foam plane must land from a height not to exceed 53cm.</p> | |
| Summary Statement Various adhesives used by hobby enthusiasts were tested precisely to find the pounds of force a foam airplane could withstand on a landing using that particular glue. | |
| Help Received President of San Diego Composites, Rob Kolosz-provided testing equipment, carbon fiber, aluminum and high speed camera. DW Foamies, Mike Morgan-Supplied Depron Foam. Mom-wrote a moving average formula to help summarize raw test data results from MTS machine. | |