



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Andrew D. Durkee	Project Number S0208
Project Title Low Aspect Ratio Rotor Blades for Application to Helicopter Noise Reduction	
Abstract Objectives/Goals The purpose of this project is to determine if the noise produced by helicopter rotor blades can be reduced by using low aspect ratio rotor blades with winglets. It was hypothesized that low aspect ratio rotor blades with winglets would produce less noise than that of high aspect ratio rotor blades. Further it was hypothesized that the 5:1 aspect ratio rotor blade would be the quietest and that a slight upward trend would be observed in the 2:1 aspect ratio rotor blade. Methods/Materials In order to test this hypothesis, a test chamber was built that would spin polyurethane foam rotor blades in a circle. The test used a sound level meter to measure the sound level and a photogate to measure the rotational speed of the rotors. A lift equation and several assumptions based on basic wing theory were used to calculate the relative noise level of each rotor size. Results After testing, it was shown that the 10:1 aspect ratio rotor was quietest with a source sound level of 46.5 Db. The 2:1 aspect ratio rotor was the loudest with a source sound level of 52.9 Db. Conclusions/Discussion It was concluded that the general hypothesis was correct in that low aspect ratio rotor blades can be quieter than high aspect ratio rotor blades, and that as the aspect ratio gets very low the rotor blade starts to get louder. It was also noted that the specific hypothesis was wrong in that the 10:1 aspect ratio rotor blade was quieter, not the 5:1.	
Summary Statement This project investigates the possibility of using low aspect ratio rotor blades with winglets as a means of reducing a helicopters noise signature.	
Help Received Mother proofread report, Father helped in construction of testbed	