



At Northrop Grumman in Bethpage, NY are (l-r) Robert Wankmuller-Hauppauge H.S. Science Dept. Chairman, Meredith McLeod, Patrick Cloke, Chris Citro, Dan Puglisi, Karen Unger, Erin Johnston, Greg Bixon, Evan McLeod, Dan Moore, and Robotics Club Advisors Richard Plouffe and Mark McLeod

In-Flight Refueling, Students Collaborating with Professional Engineers

You'd think earning four competition trophies during the Spring and Fall of 2005 would satisfy anyone, but just days after winning the final FIRST (For Inspiration and Recognition of Science and Technology) competition of 2005 the Hauppauge High School Robotics Club robot was being refitted for a completely different kind of "competition." Hauppauge students collaborated with Northrop Grumman Corporation

engineers and pilots to research and test new in-flight refueling concepts. Our robot took the phrase “Soar like an eagle” literally as it mimicked the motion and controls of a real aircraft to simulate docking for refueling at 10,000 feet up in mid-air.

Students replaced the normal tip of our 13 foot robotic arm with a simulated refueling probe, then the controls and programming were modified so the robot movement of the nozzle reacts just like real flight controls. Pilot Ron Monroe said, “The robot handles just like the actual aircraft.” Move the rudder or add throttle power and the nozzle responds and turns and swoops just like the real thing. Sorry, it does not do barrel-rolls!

Northrop Grumman engineers conducted a number of different experiments with nozzle placement alternatives while test pilots "flew" the robot mounted nozzle into a refueling drogue simulating the final approach of an aircraft to an airborne refueling tanker aircraft under both daylight and nighttime conditions on both outdoor and indoor test ranges. The pilots both rode with the robot and also flew the robot while sitting in the normal aircraft cockpit.

The purpose of these experiments was to evaluate options for refueling an E-2C Hawkeye surveillance aircraft from an aircraft carrier based F18 Super Hornet fuel tanker. The tests were a success and explored and developed several alternatives to the way refueling is currently performed. This collaboration between robotics club members and engineers in the field was a unique opportunity for the students of Hauppauge.



E-2C Undergoing certification for in-flight refueling in December. The same pilot flew our robot in tests.



This is the pilot's view when docking with an F18 for refueling