



Friday, April 24, 2009

RE: Airworthiness Statement for SPAARO UAVs used at Virginia Tech

The purpose of this memo is to document the process used to certify the airworthiness of the SPAARO unmanned aerial vehicle (UAV), which is the subject of this COA application. These UAVs are to be used solely for research purposes and operated in uninhabited areas at Virginia Tech's Kentland Farm. Each UAV platform is carefully inspected for airworthiness at multiple stages during the construction and assembly phases, immediately before flight, and immediately following flight. The SPAARO UAV platform is a custom-design, developed by undergraduate and graduate students under the close supervision of faculty advisors at Virginia Tech. The wings and tail surfaces are custom built using a fiberglass wrapped vacuum bagging technique with carbon fiber spars. The fuselage frame is built from aluminum angle iron. Where suitable, commercial off-the-shelf (COTS) R/C parts have been used (e.g. the landing gear, common quick-connects, and servo-actuators.) Before each airframe's first flight, every component is extensively inspected and tested. These inspections are conducted by an R/C pilot with over five years experience in building and flying R/C aircraft. Each servo is individually tested for performance and range of motion, and the pushrods and control surfaces are individually tested and calibrated in the laboratory prior to and during installation. Propellers are balanced to performance standards and each engine is broken-in on the ground with one 128 oz tank of fuel. Immediately prior to flight, the UAV undergoes a thorough pre-flight check, which includes a detailed airworthiness inspection of control surfaces, battery power level and function, engine and fuel level inspection, and a radio check for range and potential interference issues. For each flight, a detailed log is maintained including the flight time, duration, repairs, and regular performance and structural evaluations. Associated documents in this COA application further describe the hazard analysis, safety guidelines, and standard operating procedure for the SPAARO UAVs.

This new platform was designed as a research device to overcome deficiencies in available COTS R/C airframes (such as structural integrity, robustness, maintainability, internal volume, etc.). Since this is a new airframe, we have committed substantial time, effort, and resources to gain essential experience and flight hours, both in simulation and in practice. In addition to developing a realistic FlightGear simulation for pilot training and mission rehearsal, we have scheduled a two-week period for intensive "shakedown" flights during the latter half of May 2009, to take place within restricted airspace at a nearby military installation. The requested start date for this COA follows this scheduled period of intense flight testing in restricted airspace.

Very respectfully,

Craig A. Woolsey, Ph.D.

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