



UNC CHARLOTTE

The WILLIAM STATES LEE COLLEGE of ENGINEERING

Senior Design Project Description

Company Name	NAVAIR	Date Submitted	May 16, 2018
Project Title	Development of new AV-8 Canopy Inspection System (NAV_AV8)	Planned Starting Semester	Fall 2018

Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project. 250 hours are expected per person.

Complete the following table if this information is known, otherwise the Senior Design Committee will develop based on the project scope:

Discipline	Number	Discipline	Number
Mechanical	6	Electrical	
Computer		Systems	
Other ()			

Company and Project Overview:

Naval Air Systems or “NAVAIR” is part of the Navy’s Fleet Readiness Center East. During its more than seven decades of operation, Fleet Readiness Center East has provided maintenance, repair, and overhaul support to virtually every weapons platform the Marine Corps has flown – from the inverted gull-winged F4U Corsair of World War II fame, to the Corps newest aircraft, the F-35B Lightning II. It is one of eight fleet readiness centers operated by the United States Navy. It is also the Department of Defense Vertical Lift Center of Excellence. FRC East has a workforce of about 3,800 civilian, military, and contractor personnel. It is North Carolina's largest industrial employer east of Interstate 95. NAVAIR is an active employer for UNC Charlotte grad’s and has many COE Alum’s on their staff.

FRC East artisans perform phased depot maintenance, planned maintenance intervals, integrated maintenance concepts, modernizations, conversions, overhaul or in-service repair on the AV- and TAV-8B Harriers, the V-22 Osprey, the AH-1W Super Cobra, the AH-1Z Viper, the UH-1N Huey, the UH-1Y Venom, the CH-53E Super Stallion, and MH-53E Sea Dragon, the F/A-18 Hornet, the F-35B Lightning II, the H-3 Sea King; the H-60 Seahawk; the EA-6B Prowler; and the C-130 Hercules. The depot is also the depot repair point for the drive and rotary systems of the MQ-8B Fire Scout.



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This project will deal with the AV-8 Harrier:



Specifically, the canopy inspection process. The T/AV-8B inspects the canopy transparency to search for cracks in the acrylic that could lead to transparency failure in flight. Cracks can occur when the canopy is not handled properly during opening/closing, damage sustained during service, i.e. scratches, nicks.



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Catastrophic canopy failure



The inspection occurs every 50 flight hours using a prism, flashlight and glycerol. The prism and glycerol are used to look into the transparency edge block to find horizontal/vertical cracks.

Project Requirements:

The inspection uses a cumbersome process and it can be subjective because it depends on the person's vision and know what to look for to be able to detect a crack while looking through the prism and may require several attempts which increase aircraft downtime. The rest of the transparency is inspected by just doing a visual inspection of the surface and there are areas of the transparency where cracks can initiate that cannot be inspected with the prism. In addition, the inspection needs to be performed in a dark room which requires the canopy to be removed from the aircraft.

The scope of this project is to think broadly and develop a better way to do this inspection. Students should be open minded and creative in terms of methods, tools, instrumentation, etc. to generate and test multiple ideas on how to do this better.



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Expected Deliverables/Results:

Deliver a new Canopy test procedure that does the following:

- Does not require removal of the canopy
- Does not have to be conducted in a dark room
- Requires 50% less training than current process
- Inspection time reduced by 50%
- Inspection can be carried out by any fleet technician and does not require any special skill
- Inspection identifies cracks better than present method.

Disposition of Deliverables at the End of the Project:

Provided to NAVAIR at the conclusion of the demo.

List here any specific skills, requirements, knowledge needed or suggested (If none please state none):

- Must be US Citizens (Students and Faculty Mentors)
- Must be willing (entire team, no exceptions) to travel to Cherry Point NC to gather data for project. Note mileage for travel will be reimbursed according to ISL procedures.