



**Company Information**

<b>Company Name</b>	NAVAIR	<b>Date Submitted</b>	4/21/2021
<b>Project Title</b>	Design of an H-53 Blade Lifting Device (NAV_BLADE)	<b>Planned Starting Semester</b>	Fall 2021

**Senior Design Project Description**

**Personnel**

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project.

Please provide your estimate of staffing in the below table. The Senior Design Committee will adjust as appropriate based on scope and discipline skills:

<b>Discipline</b>	<b>Number</b>	<b>Discipline</b>	<b>Number</b>
Mechanical	5	Electrical	
Computer		Systems	
Other ( )			

**Company and Project Overview:**

For more than 60 years, Fleet Readiness Center East, at Marine Corps Air Station, Cherry Point, N.C., has played an integral role in our national defense. The facility's In-Service Support Center provides multi-disciplinary, engineering services in both design and maintenance. Our workforce has earned a reputation of excellence, providing worldwide support for Navy and Marine Corps aviation.

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.



UNC CHARLOTTE

The WILLIAM STATES LEE COLLEGE of ENGINEERING

Industrial Solutions Laboratory



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. This project will be associated with the Navy CH-53E:



This project will involve the design of a CH-53E Blade Lifting Device that is able to remove the blade from the blade cart, rotate it 90 degrees, and install the blade on the helicopter. Reverse sequence for blade removal from helicopter.







**Project Requirements:**

CH-53E blades are stored vertically (leading edge down) on the blade storage and transportation cart, but they are installed horizontally on the aircraft. Currently, artisans are required to pick the blade up and rotate it 90 degrees (picture 2 above) before installing the blade clamp (shown installed on blade in picture 1).

The goal is to design a lifting device that can be installed on the blade while it is still in the cart and then subsequently rotate it 90 degrees for install. The reverse sequence will be required for blade removal from the aircraft.

**Expected Deliverables/Results:**

- Conceptual design of the lifting device
- Scaled prototype for demonstration purposes – scale to be as close to Full as possible within the budget and transport constraints
- Drawing package for Design
- Manuals for operation
- Design to take into account ergonomics for technicians



**Disposition of Deliverables at the End of the Project:**

Hardware developed is the property of the Industry Supporter. The work product is displayed at the last Expo then immediately handed over to the supporter unless arrangements have been made to deliver at a future date.

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

- Mechanical Design
- Knowledge of Safety Factors, Safe Working Loads, and Proof Loads for lifting devices.
- 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