



L3HARRIS

Universal Adjustable Antenna Mounting System for Rotary Winged Aircraft

Project Description

L3Harris has a Roll-On, Roll-Off (RORO) kit for temporary non-intrusive installation of tactical radios onto aircraft. The kit consists of communications systems and accessories, but often the customer needs to provide a temporary method of installing antennas without modifying the aircraft. **The goal of the project is to create a sustainable, reliable, and user-friendly solution for temporary communications systems installation on helicopters.**

Requirements

- Withstand windspeeds up to 150 mph
- Ability to hold 4-10lbs
- No damage or permanent modification to the helicopter (Fig. 1)
- Ability to withstand weather conditions at maximum altitude of 25,000 ft
- Be user-friendly to a non-technically trained individual for installation and removal
- Ability to hold a variety of antenna shapes and sizes
- Attach to rods of varying diameters (1 – 5-inch)
- Primarily orienting the antenna vertically downward, perpendicular to the mounting surface
- Contain enough metal to act as a counterpoise



Fig. 1: Example of helicopter RORO kit is used on.

What We've Worked On

- Researched possible designs from automotive, farm, and wristwatch applications
- Defined and explored four possible solutions, with feedback from company and faculty mentors

Design Concept: Metal strap with removable links, inspiration taken from an adjustable wristwatch (Fig. 2)

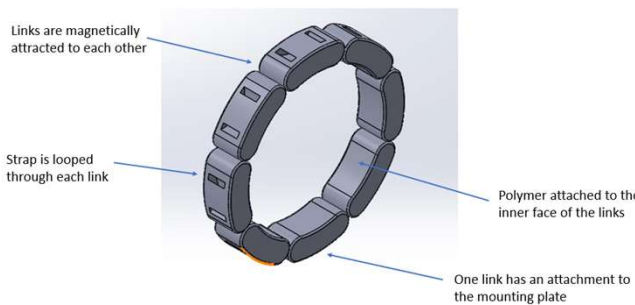


Fig. 2: Sketch of promising design idea – removable connector links.

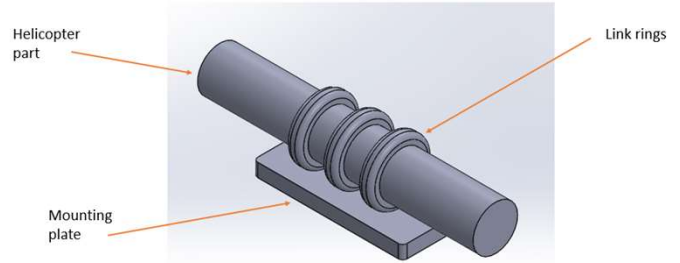


Fig. 3: Sketch of design idea – mounting system

Pros:

- Squishy material inside to conform to irregular shapes
- Increased customization due to modular link approach

Cons:

- Small parts that will need to be kept with the RORO kit
- Joints cause increased potential for failure

Possible Alternate Solutions

Magnetic Attachment, Suction Cup Attachment, Ratchet Strap System

Testing Analysis and Evaluation

Theoretical Calculations

- Sizing
- Failure Analysis
- Materials

ANSYS Test Simulations

- Finite Element Analysis (Fig. 4)
- Computational Fluid Dynamics (Fig. 5)

Wind Tunnel for Experimental Failure Testing

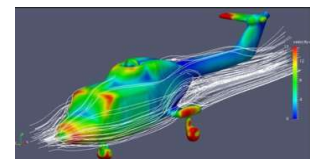


Fig. 4: Example of CFD helicopter simulation

Deliverables:

1. Initial design addressing all major requirements as indicated by L3Harris
2. Analysis of stresses acting on the mounting system identifying potential failures
3. Working mounting system prototype
4. Accessible installation and removal instruction manual



Fig. 5: Example of FEA helicopter simulation

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