



Deployable and Recoverable UUV Antenna System

Overview

Currently all unmanned underwater vehicles (UUVs) communicate with satellites via an antenna that is mounted to its hull. Since communication signals do not propagate clearly through water, the entire UUV must surface to transfer data. This costs energy, time, and can possibly expose the UUV to hostile action or violent waves.

NORTHROP GRUMMAN

Objectives

The UUV section needs to release an antenna 50ft to the water surface in less than 5 minutes and retract it in less than 10 minutes, assuming calm seas. The system also needs to be neutrally buoyant with +/- 2lbs of wet weight and contain a jettison mechanism in case the buoy needs to be released in an emergency.

Approach

- Started with patent search and a search for commercially available products for inspiration.
 - Here we learned that what we were attempting has not been done before.
- Obtained a refined and more thorough list of customer needs through conference calls.
- Underwent individual then collaborative concept generation, followed by concept selection.
- SolidWorks models were generated for visual assistance and to check space claim issues; then further refined as the project went on.
- Hand calculations were done for preliminary checks and validation against computer analysis.
- Site visitations were scheduled in order to talk in person about design before it is finalized.
- After idea for prototype was finalized, parts for major subsystems were ordered so prototype construction could begin immediately after spring break.
- ANSYS was used for finite element analysis to make sure the final recommendation would meet temperature and pressure requirements.
- Prototype construction began and design was continually updated based on manufacturing processes and testing results up until the senior design showcase.
- Final recommendation report was completed to provide possible solutions to problems that the design team did not have time or resources to thoroughly solve.

Outcomes

The prototype was completed on schedule and demonstrates a “proof of concept” for the finalized design.

- The project is completely new and original; no solutions for this problem are currently available in industry.
- It will provide a new dimension of application for UUVs and enhance current ones.
- The physical prototype that was completed will only need slight modifications in order to increase manufacturability and performance.

