



UNITED STATES COAST GUARD ACADEMY

Emergency Recovery Device



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Problem Statement

The mission of the ERD in the MH-60 Thunder Hawk is to provide a safe and reliable secondary method to retrieve the rescue swimmer in case of a primary winch failure. The current ERD cannot withstand the dynamic multi-axial load associated with the movement of a rescue swimmer on the line.

Design Requirements

1. Holds 600 lb static load
2. Load line must be able to move safely and freely
3. Simple to assemble and deploy (1 person; 30 seconds)
4. Self-arresting device
5. Ability to bypass self arresting device to lower line
6. Able to endure harsh environments

Proposed Design

Deck Plate



The deck plate is mounted onto the deck of the MH-60T. Components were repositioned to maximize efficiency. The new model consists of the original capstan and guide roller, with a Spinlock XTS. The clutch is rated for 2000 lbs and serves as an arresting system for the line. It is mounted onto an aluminum elevation distributor to redirect the line at the appropriate angle.

Mounting Apparatus



The original pulley was replaced by a DMM Impact Block, used in conjunction with a 6 in, 10 mm diameter Ocean Polyester Prusik sewn loop. The original carabiner attaches to the fixed eyelet on the aircraft boom. The DMM Impact block is rated for approximately 9,000 lbs. The Prusik loop is rated for approximately 6,500 lbs and increases the flexibility of the system to help decrease the magnitude of force applied along the horizontal axis of the Impact Block..

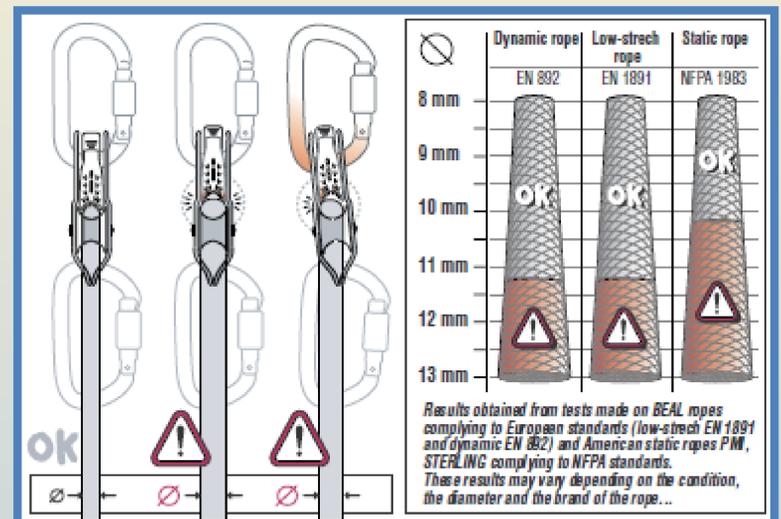
Current Design



The ERD is a gear driven manual crank consisting of a deck plate, capstan, and Pro-Traxion Petzl Pulley.

Analysis of Failure Modes

- Pulley is incorrectly used IAW manufacturer specifications
- Line is too large
- Self-arresting device is difficult to use



Pro-Traxion Petzl Pulley Instruction Specifications

Testing



Testing became a vital part of the design as the design must be rated for life support. The replacement ERD must be tested to comply with current Coast Guard standards. This test requires a static load of 600 pounds to be loaded and held for ten minutes. The ERD is also subject to dynamic forces unique to helicopter flight and hoisting a passenger above and in a maritime environment. A test to validate the theoretical results of an elastic reaction to a sudden loading. These results will be used to test if the proposed design could withstand a 6 foot drop of a rescue swimmer and gear weighing 300 pounds.