



# Update from the National Science Foundation Wire Pool

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# Wire Pool Discussion Topics

- Wire Testing
- Synthetic Rope Operational Guideline
- Wire Pool Database User's Guide
- New Wire Pool Website
- Results from the Enhanced Cable Maintenance Project



# Wire Testing

- Continue to test new tension members as well as those in use on R/Vs

**Periodically the Wire Pool focuses on a specific issue that requires additional testing capability:**

- RVOC Safety Committee receives waiver requests to use of 9/16” diameter wire rope with sheaves grooved for .681” power optic cable.
- To address the safety concern, the Wire Pool sought the services of Tension Member Technology to conduct BSORS (Breaking Strength Over Rotation Sheave) tests.
  - BSORS Tests with 9/16” wire rope on sheaves grooved for .681” diameter cable



# Wire Testing (continued)

**9/16" Wire Rope Straight Pull → 33,930 lbs.**

<b>Sheave Dia.</b>	<b>Groove Dia. (wire size)</b>	<b>9/16" BSORS Result</b>
22.3"	.58" (9/16")	26,015 lbs.
28"	.6" (9/16")	28,370 lbs.
28"	.72" (.681")	27,170 lbs.

**9/16" Wire Rope Straight Pull → 33,570 lbs.**

<b>Sheave Dia.</b>	<b>Groove Dia. (wire size)</b>	<b>9/16" BSORS Result</b>
48"	.71" (.681")	33,150 lbs.

# Possible Revision to RVSS Appendix A

## Table A.8.4

Possible Revision Allowing:

9/16" Wire Rope to be loaded to a factor of safety  $\geq 1.5$  using sheaves that are designed to be used with .681" cable at  $2.0 \leq$  Factor of Safety  $< 2.5$ .

# Synthetic Rope Operational Guideline



- Coring cruise on *R/V Neil Armstrong* using 9/16” Plasma HiCo line
- Cortland Engineering, Aaron Davis, RVOC safety committee
- Focused use:
  - Armstrong’s over-boarding configuration
    - D/d, no. of sheaves, anticipated loading
    - Cortland CBOS test results used to predict DB cycles to failure
- With each DB load cycle there is corresponding % of damage
- Under these specific conditions: F.S.  $\geq 2.5$ , Absolute lowest F.S. = 2.0 with added safety precautions

# Future Uses of Synthetic Rope

- Utilize the products of one manufacturer
  - Work with their engineering staff to develop safe operating practices
- Evaluate each proposed use:
  - Wire Pool will work with the manufacturer's engineering staff to establish safe working parameters on a case by case basis.
  - Requires sufficient lead time to evaluate prospective uses and FS
  - Establish a History
    - Track double bend cycles
    - Track tensions
    - Breaking Strength history
    - Develop retirement criteria
- No Review of pending operation? Then what? Limit  $FS \geq 5$ , Minimum  $D/d=40$ , require frequent break tests, documented visual inspections



# Wire Pool Database User's Guide

## What it includes

- Detailed explanations and instructions (e.g., requesting a break test or editing the safe workload information)
- Abbreviated instructions for each section

## Where to find it

- Login page (left side)
- Multiple ship list page (left side)
- UNOLS Wire Pool Ship Report page (upper right)
- Wire Pool Website under Resources




# Wire Pool Website Under Construction



NSF Wire Pool

ABOUT TENSION MEMBERS RESOURCES FACILITIES CONTACT Q




## Welcome to the NSF Wire Pool

Exploration of ocean depths can be achieved using cables and ropes that lower or tow scientific instrumentation. Vessels in the US academic research fleet utilize these tension members to support oceanographic research.

The National Science Foundation (NSF) Wire Pool maintains an inventory of tension members including wire ropes, cables and synthetic ropes that are commonly used by the US academic research fleet. With support from NSF, the Wire Pool oversees the distribution of tension members to the fleet.

Requests from University-National Oceanographic Laboratory System (UNOLS) vessels operators for new and used cable and wire rope should be directed to the Wire Pool. The Wire Pool will then assist with the assessment of available resources.



The NSF Wire Pool is funded by the National Science Foundation.



# Enhanced Cable Maintenance

## Purpose

To evaluate the benefits of lubricating .322 EM cable more frequently while at sea during haul-in

## Approach

- Two Groups of samples consisting of a total of (6) 10m lengths of .322” EM cable are submerged off the WHOI dock daily (M-F) for several hours.
- After submersion, each sample is coiled and hung outside in the weather. No fresh water rinse.
- Group 1 (Samples 1, 2, and 3) is lubricated **monthly** and Group 2 (Samples 4, 5, and 6) is lubricated **annually**. Lubricant/corrosion inhibitor is applied by CoreLube system using Grignard OLL-D2.
- Monthly lubrication of Group 1 (Samples 1, 2, and 3) is done as the samples come out of the water (no rinsing, no drying).
- Every six months a test article is taken from each group for a break test and close inspection under a microscope.
- We are currently 27 months into the 60-month project.

*Special Thanks to Barbara Callahan who has overseen the implementation of the Lubrication Study*

# Enhanced Cable Maintenance

## Results to Date

All Samples From NSF-19-C187



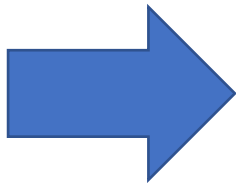
NSF Wire Pool

<b>Date</b>	<b>Group 1</b>	<b>Group 2</b>	<b>Group 1</b>	<b>Group 2</b>
	(Lubed Monthly)	(Lubed Annually)	(Lubed Monthly)	(Lubed Annually)
	<b>e-kink</b>	<b>e-kink</b>	<b>Break Test</b>	<b>Break Test</b>
	[Metallic Cross Sectional Area Failure]		[lbs.]	
August 2019 (New)	0%	0%	13,000	13,000
July 2020	0%	0%	12,275	12,400
January 2021	0%	0%	13,220	12,700
June 2021	0%	11%	11,520	10,980
January 2022	3%	53%	12,060	10,850
March 2022	5%	55%	11,920	10,880

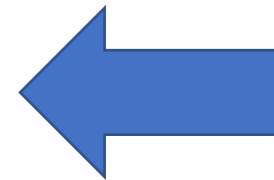


# Magnified View of Wire Condition

Group 1  
Lubricated Monthly



Group 2  
Lubricated Annually



# Questions?

