Inland Marine Transportation System (IMTS)

Welcome to IMTS On-line Seminar

Date and Time:

Monday, Nov 1
1 pm CENTRAL (2 pm EASTERN, 11 a.m. Pacific)

Topics and Speakers:

McAlpine Bushing Failures by Richard Nichols, LRL
Applications of Self-Lubricating Materials in Portland District by Ron Wridge, NWP

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Please Mute your phone unless you are asking a question or making a comment!

Regional Navigation Design Team

Chairman: Steve Stoltz, LRP

To get copies of today's presentations:

They will be posted on Navigation gateway: we will provide a link

You can request a copy from the speakers or by sending an e-mail to IMTS@usace.army.mil

McAlpine Greaseless Bushing Failures

Richard Nichols

Louisville District

Engineering Division

Navigation Design Section

1 November 2010

US Army Corps of Engineers

BUILDING STRONG®

Design Basis

- Goals:
  - Reduce environmental impacts
  - Reduce maintenance
  - Simplify
- Prototype installations
- Literature searches
- Manufacturer's Input and Data

Design Approach

- Contractor Design
- Specify:
  - Type (Self Lubricating)
  - Load Magnitude
  - Load Type
  - Operating Environment

Applications

- Miter Gate Pintle Bushings
- Miter Gate Gudgeon Bushings
- Miter Gate Hydraulic Cylinder
  - Trunnion & Pin Bushings
- Miter Gate Cylinder Connecting Pin Bushings
- Culvert Valve Trunnion Bushings
- Culvert Valve Machinery Bushings
  - Sheaves, Wheels, Thrust Washers

Service History

- McAlpine Lock, 1200 x 110, placed into service April 2009.
- Pre-acceptance inspection identified problems with lower middle wall pintle.
- Intermittent problems with operation of lower gates at low river stages.
- April 2010 – Lower MW Leaf noticed to have dropped ¼”
- Total lockages - 2500

Video

Run videos

Pintle Bushings

- Material – Tenmat T814

Pintle Bushings

Pintle Bushings

Pintle Bushings

Pintle Bushings

Gudgeon Pin Bushings

- Material – Tenmat T814

Gudgeon Pin Bushings

Gudgeon Pin Bushings

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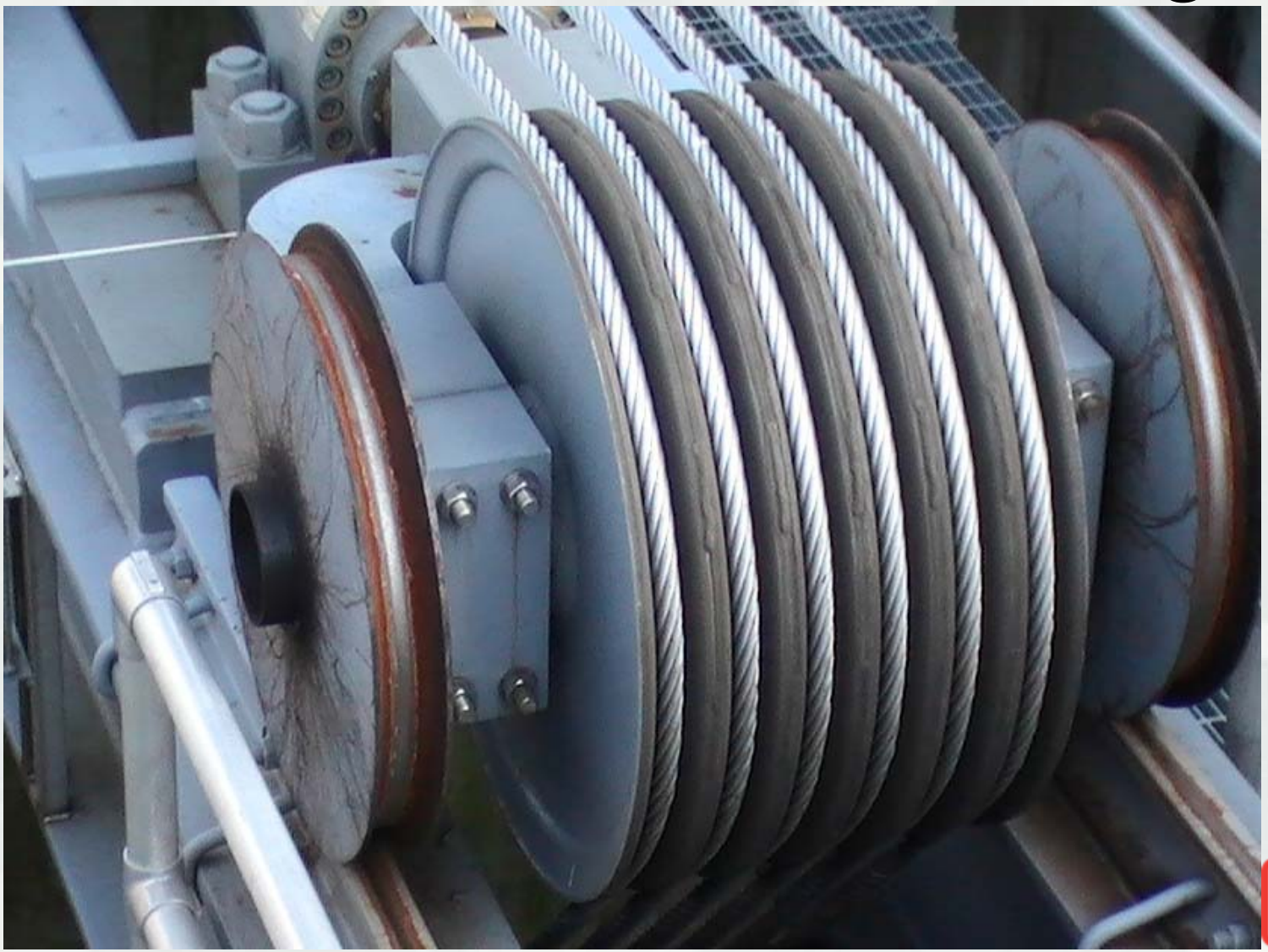
Gudgeon Pin Bushings

Hydraulic Controls

- Hydraulic controls programming
  - Ramp up and down of travel speed too fast
  - Automatic gate position synching
  - Adjustment of counterbalance valves
  - Help damage bushings?

Valve Trunnion Pin

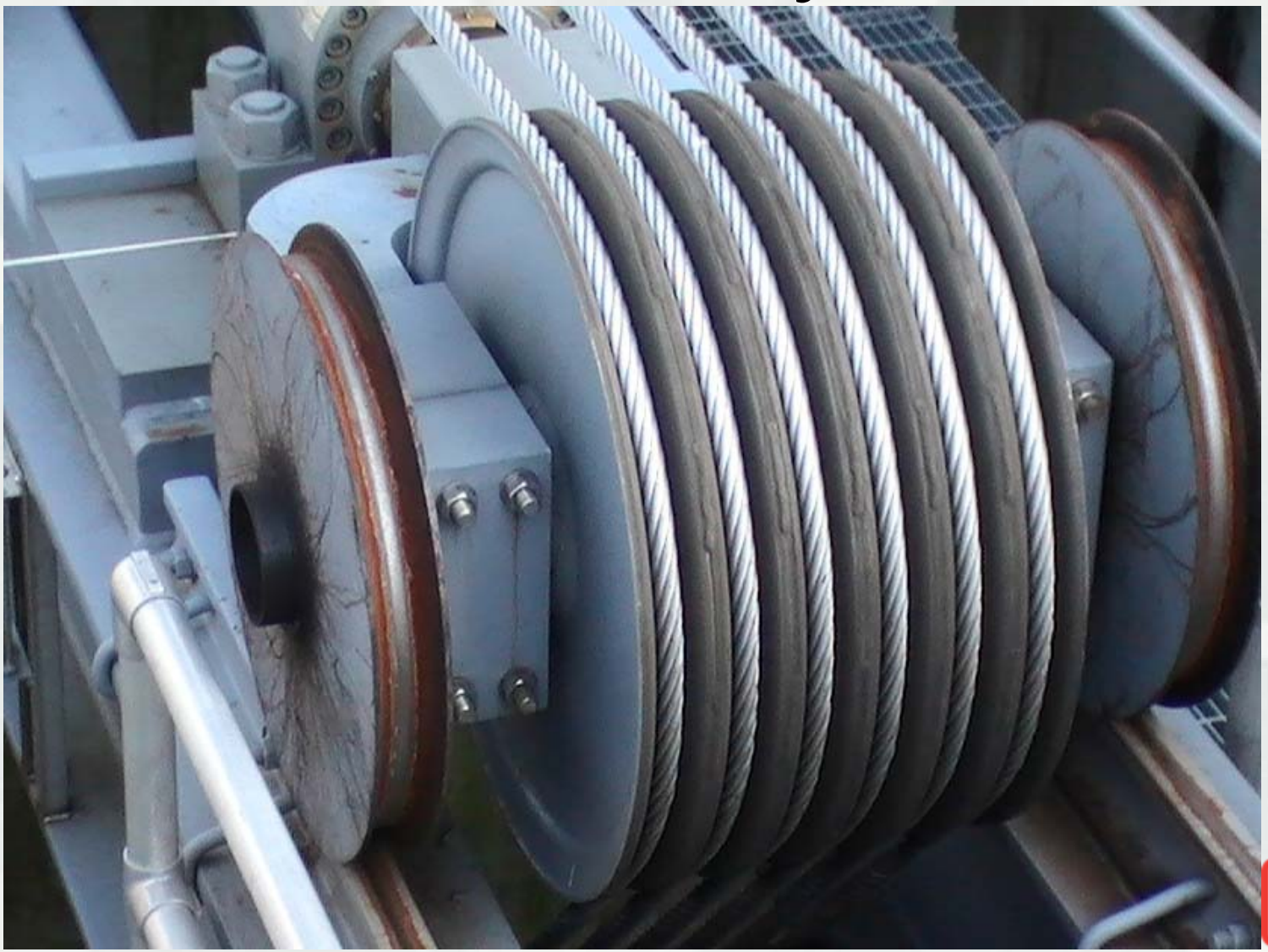
Valve Sheave Pin Bushings



Valve Sheave Pin Bushings

- Original Material – CIP 121
- Noise Noticed During Construction
- Replacement Material – CIP 151

Valve Machinery Wheels



Valve Machinery Wheels

- Material – CIP 121
- Displacement at Very Cold Temperatures
- Bushing Thermal Contraction Very Different from Metal Wheels
- Actual Temperature Range?

Valve Machinery Wheels

Valve Machinery Wheels

Repair Summary

- Work began 19 April 2010
- Work completed by LRS 5 August 2010
- Hydraulics completed 13 August 2010
- Work stopped due to high water 3 times
- Total cost of project - $2.7M

Other LRL Application

- Markland Lock: Tenmat T814
  - C.V. Trunnion Bushings, Success
  - Linkage Bushings, Replaced due to noise
- Cannelton Lock, M.G.: Thordon Traxl & SXL
  - Pintle Bushings, Failed, Delamination
  - Gudgeon
- Cannelton Lock, C.V.: Kamatics
  - Hydraulic Cylinders, Success
- Cannelton Lock, C.V.: Traxl
  - Trunnion, Delaminated

Other LRL Application, Cont.

- Cannelton Lock, C.V.: Tenmat & CIP
  - C.V. Linkage Bushings, Noise, Lubed with Oil As Needed
- Cannelton Lock, E.G.: Tenmat
  - Sheave Bushings, Failed, Delamination, Replaced with CIP
- JT Myers Lock, C.V.: Tenmat & CIP
  - C.V. Linkage Bushings, Noise, Lubed with Oil As Needed
- Smithland Lock, C.V.: Tenmat
  - Lower Strut Pin, Success

Questions?