



AMERICAN CRANE

& EQUIPMENT CORPORATION

“The Importance of Crane Maintenance”

Presented by: Jami Rubendall - ACECO

www.americancrane.com

What is a Crane ??

- We all know that a crane is a very useful and valuable piece of equipment in a Nuclear Power Station.
- We count on it to make many critical lifts.
- Yet until we need it, too often it is thought of as a “Screwdriver” and forgotten in Standby.
- We then question why, all of a sudden, this important piece of equipment is not working.
- A crane may seem to be almost indestructible but it still needs some well placed TLC.

Cranes Need TLC

- A crane depends on many items to do its function: structural components, bearings, bumpers, lubrication system, hooks, wire rope reeving systems, gears, brakes, electrical controls, limit switches, etc.
- All of these items need to be inspected and maintained by “TRAINED” and “QUALIFIED” professionals.

Who Performs Your PM's

- Who is performing the PM's and inspections of your cranes?
 - In-house personnel?
 - Subcontracted Crane Vendor?
 - What are qualifications and experience of the personnel performing the PM's.
- A PM is not just a lubrication and a quick operational check.

Qualifications of Personnel

- Any person that is performing repair or maintenance work on a crane must have a good knowledge of how the components on a crane function. This requires experience AND training.
- **CRANES ARE COMPLEX – THEY ARE NOT A SCREWDRIVER.**
- Because of this, the knowledge and technical expertise required is much greater.
- Therefore, it is important to have a plan to utilize qualified personnel. It should not just be assigned to the next available person from the maintenance manager!

Training

- Technicians must have training opportunities that are specific to cranes.
- Just like auto technicians are trained specific to the make of automobiles they work on, crane technicians must have specific training also.
- 9% of all overhead crane incidents can be attributed to maintenance shortcomings.

How Effective is your PM?

- Is the PM appropriate for the type, complexity and service for the equipment?
- Has an independent review been performed of the PM by a qualified crane vendor to ascertain the quality and effectiveness of the PM.
- Many PM's are general and not prescriptive.

Do you Exercise Your Cranes?

- How effective is your teenager after sitting on the couch watching TV and playing video games for an extended period?
- Cranes like to be exercised – The more you use them the more reliable they are!
- Exercise your cranes at least monthly!
- Exercise should include traversing bridge and trolley and hoists over full range of travel

Do you Stock Critical Spares?

- Some crane components are safety related/ specialty and have long lead times (on the order of 4-6 months for some).
- Critical Spares including wire ropes, motors, brakes, electrical control items should be procured and stocked
- What is the cost of downtime compared to procuring the parts?

OE from Improper Maintenance

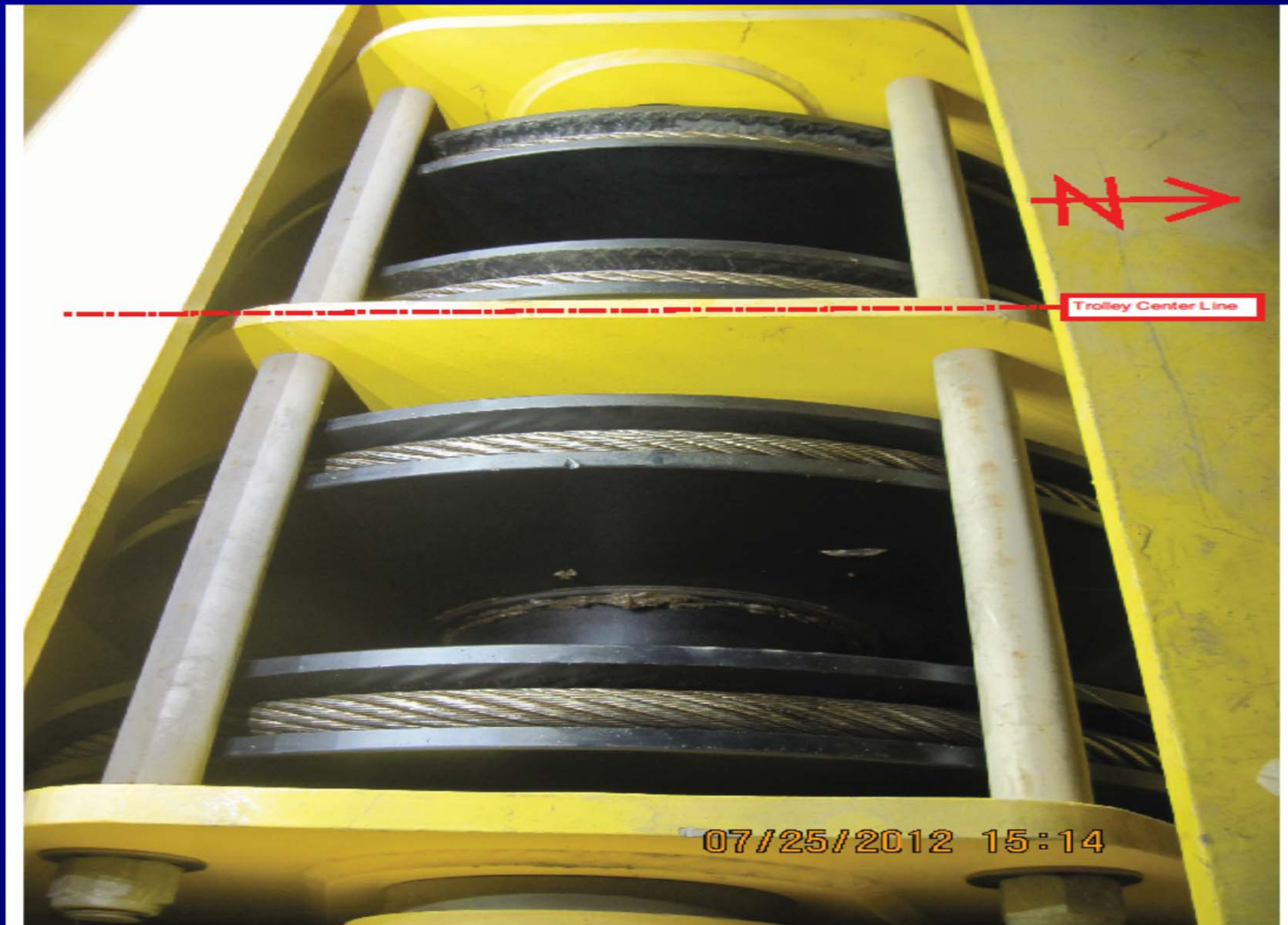
OE #1 Hoist Cable Unlaid



OE #1 - Root Cause and Result

- The type and frequency of lubrication implemented by site was not suitable for outdoor salt laden environment.
- Lack of lubrication resulted in additional friction and caused wire rope to unlay.
- Wire rope was replaced with new rope. Utility did not have spare, but ACECO had one for another identical crane so customer was only down for 1 week.

OE #2 – Frozen Sheaves



OE #2 - Root Cause and Result

- Inspections did not adequately address lubrication of bearings and wire ropes and proper rotation of sheaves.
- Resulted in damage to sheave grooves from rope sawing over sheave and also caused wire rope to unlay.
- Utility had to replace wire ropes and sheaves. Customer did not have spares. Required 6 month lead time for supply of replacement materials and utility had to reschedule cask loading campaigns (Shuffle Units).

OE #3 – Improper Environmental Conditions

- Utility reported that bridge traversed at a slower rate than normal.
- Inspection revealed a failed Bridge Slow Down Limit Switch due to an intrusion of water.
- The crane was designed for controlled indoor environmental conditions specified; however the HVAC system in the building was inoperable for an extended period creating an “outdoor like environment”. Crane had standing water and many limit switches were full of water.
- Lesson Learned – Utility must maintain environmental conditions specified for the design of the equipment including minimum and maximum temperatures, humidity, pressure, etc.

OE28485

Reactor Building Overhead Crane Main Hoist Brake out of adjustment when lifting the Reactor Vessel Head (Browns Ferry)

During the BFN U1C7 refueling outage, the Reactor Pressure Vessel head was being removed from the reactor vessel by the 125 ton Refuel Floor Overhead Crane main hoist. At Approximately 4" above the vessel flange, as the crane operator paused the lift as part of the normal safety checks of the crane and lift rig, the RPV head slowly drifted back down onto the vessel flange. Another attempt to lift the head was made with the same results. It was discovered that the crane's main hoist brake magnetic air gap was out of adjustment and did not agree with the brake nameplate. Following adjustment of the main hoist brake air gap use of the crane continued without incident. No personnel safety issues occurred during this incident. There was no damage to the crane, lift device, or the RPV head/flange and this event was not classified as a load drop event.

Lesson Learned – ALWAYS CHECK THE BRAKES!

OE26860

Reactor Building Crane Malfunctioned during 1st Dry Fuel Storage Campaign Cask Removal (Vermont Yankee)

While lowering the Reactor Building Crane the brakes failed to engage as designed. This resulted in a Dry Fuel Storage cask slowly lowering about 4 inches on to the refuel floor.

Root Cause - There were not effective maintenance activities that perform adjustments or check settings of the normal crane controls and Max-Speed control system. Specifically, the crane preventive maintenance activities did not include adequate inspections or verifications to ensure the setpoint remains acceptable for the 1VR-H or 2VR-H relays.

Lesson Learned – ALWAYS CHECK THE BRAKES!

Conclusions

- Maintenance Technicians need to be well TRAINED.
- Knowledgeable and Qualified Personnel need to inspect the cranes.
- PM's must be effective
- Exercise your cranes
- Critical Spares
- CRANES ARE NOT A SCREWDRIVER AND THEY DO MAKE POWER!

???? Questions ???? ?

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