THE CRANE CORNER

Navy Crane Center Technical Bulletin

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A WORD FROM TOPSIDE

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In terms of crane accidents reported, fiscal year 2007 was our best year for Navy shore activities. There was a solid 11 percent reduction from the previous year. In reviewing FY07's accidents, we took a closer look for common causes to determine where attention should be focused to effect even better reductions in the coming years. Some of the more common causes follow.

Thirteen percent of the accidents reported resulted from the loss of control of the load. In many cases, the hook was not centered over the center of gravity (CG) of the load, and as the load was lifted, it shifted and collided with other objects in the vicinity. Determining the CGs of many loads (machinery, ship and aircraft parts, nonsymmetrical steel plates, etc.) can be difficult. Crane teams should be encouraged to seek technical assistance when in doubt, rather than attempting to determine the CG by trial and error. Load control was lost in some cases as loads were being manipulated or upended and the CG shifted. Again, technical assistance may be needed to determine the proper way to rig the load for changes in the CG during the lift. In a number of accidents, control was lost in windy conditions or due to wave action. Supervisors must always be on the alert for adverse weather conditions. When winds and/or waves are up, the crane team needs to anticipate the wind's potential effects on the load as it proceeds from its starting point to its landing point. Finally, in a few lifts of palletized loads, the loads were not adequately secured to the pallets and slipped off. Palletized loads should be adequately secured to prevent shifting during the lift.

There were a significant number of accidents where the load was bound, either because it was still secured to the ground, foundation, etc., or because there were obstructions in the lift path. In some of these events, the crane or the rigging gear were severely overloaded. For lifts in congested or tight tolerance areas, the crane team must examine the lift path and anticipate hang ups as well as the potential increase in load due to suction and frictional forces. In these situations, the use of load indicating devices and chainfalls may enable the crane team to prevent load spikes and equipment overloads.

Another common and preventable occurrence was the collision of bridge cranes with newly installed building components (light fixtures, electrical wiring, catwalks, etc.) that penetrated the crane operating envelope. Contractors and activity building maintenance personnel must be made aware of the crane clearance requirements and ensure adequate clearance is maintained. Work control processes should be developed for any work performed within the crane operating envelope. Maintenance managers and/or contracting officers must ensure the activity crane manager is made aware of work being done and must ensure a thorough review of the work is performed and verify adequate clearance is maintained.

There were at least 10 cases of wire rope mis-spooled on drums and jumped sheaves, resulting in damaged wire rope. Most of these were with small capacity hoists in production shops where the shop mechanics were side-loading the hoists. Shop personnel must understand and comply with safe lifting practices for the hoists they operate. These hoists are easy to operate but it is also easy to get into trouble if they are not operated correctly. The operator must ensure there is no side-loading or swinging of the load during lift off.

The above noted events were not unique to FY07. They occurred frequently in prior years and some of the same types have already been reported in FY08. If crane teams, supervisors, and managers can make significant dents in these types of accidents, Navy shore activities will be well on our way to our mutual goal of ZERO crane accidents!

Inside This Issue

OVERHEAD ELECTRIC TRAVELING CRANE INFORMATION FORM

The Navy Crane Center Acquisition Department has developed a new overhead electric traveling (OET) crane information form. The form is used by activities or construction project managers to communicate specific needs for planned OET crane procurements. The information provided in the form is used by Navy Crane Center Design Division as the basis for the technical specifications, and allows Navy Crane Center Project Managers to accurately estimate the cost of new equipment. The new form, NCC form 08-001, allows users to fill in all responses electronically. The form has been expanded to include additional options, more detailed choices for variable frequency drives and more information that will assist activities in determining what options they require. Additionally, an accompanying set of detailed instructions and guidance to assist with filling out the crane information form has been developed. The new form and instructions can be downloaded from the DOWNLOADS section of the Navy Crane Center public site at https://portal.navfac.navy.mil/NCC.

MOBILE CRANE BOOM HEEL PIN SEIZING PROBLEM

Recently, an activity discovered a deficient condition with the boom heel pin on a Grove RT 635C series mobile crane while removing the boom base section from the crane. The heel pin had become seized in the through hole due to corrosion. Removal of the pin in one particular case resulted in destruction of the heel pin by drill and tap method, as the pin could not be removed intact by any other means available.

Sporadic usage of the cranes and lack of a rust inhibitor lubricant is to blame for the condition. At the particular activity, mobile crane utilization is light in contrast to crane availability, resulting in mobile cranes sitting dormant for weeks at a time, often with pooling water at component interfaces. Prevention of this condition can be accomplished with application of a heavy rust inhibiting lubricant, in particular an anti-seize product or equivalent. Anti-seize products prevent galvanic corrosion by sacrificing small metal flakes contained within the lubricant in preference to the components it protects. Selection of a particular anti-seize type should be based on the material composition of the components being protected (e.g. zinc based anti-seize for aluminum and steel fit, nickel for brass against steel), and the application where elevated temperatures are a concern (e.g. do not use zinc based in environments exposed to temperatures greater than 750 degrees Fahrenheit).

Further deterrence of the described condition would involve elimination of pooling water around or near components susceptible to corrosion. Greater utilization of subject cranes, periodic exercising, or even excessing of unnecessary equipment, would aid in alleviating the formation of these corrosive environments.

CRANE SAFETY ADVISORIES AND EQUIPMENT DEFICIENCY MEMORANDA

We receive reports of equipment deficiencies, component failures, crane accidents, and other potentially unsafe conditions and practices. When applicable to other activities, we issue a Crane Safety Advisory (CSA) or an Equipment Deficiency Memorandum (EDM). A CSA is a directive and often requires feedback from the activities receiving the advisory. An EDM is provided for information and can include deficiencies to non-load bearing or non-load controlling parts.

CRANE SAFETY ADVISORY

Crane Safety Advisory (CSA) 174, Square D 30 and 60 Ampere General Duty Switches

The purpose of this CSA is to inform Navy activities of a deficiency in Square D 30 and 60 ampere, 240 volt, 1 phase and 3 phase NEMA 3R general duty safety switches, manufactured between September 11, 2006 and November 4, 2006.

A Square D company product safety notice reported the possibility for the switch handle to be placed in the off position when the switch is still in an on (closed) position. This may result in the potential for personal injury or property damage.

Direction:
A: By the next annual maintenance period, or before the switches are used for personnel lockout/tagout, activities shall locate the switches noted below and contact Square D for a replacement product. The recalled switches have the following date codes and catalog number printed on the bottom of the wiring label inside the front cover or on the bottom of the package label. Date codes: 06371 through 06446. Catalog numbers: D211NRB, D211NRBBP, D211NRBCP, D221NRB, D221NRBCP, D321NRB, D321NRBCP, DU221RB, DU222RB, DU321RB, DU322RB.

Crane Safety Advisory (CSA) 175, Cutler Hammer Type M Manual Brake Release Levers

Background: Cutler Hammer type M shoe brakes have a hooked rod with a handle that manually releases the brake. The hook shaped end of the rod aligns with a hole in the armature housing and can move freely in the housing when not being used to manually override the brake. An activity reported that during normal operations with the manual release rod stored on the brake, the rod shifted and bound such that it prevented a hoist brake from setting correctly.

Direction:
A. Within 30 days, the brake manual release levers shall be removed from all Cutler Hammer type M shoe brakes.

B. Other brake release levers that are that are easily removable and re-installable should be stored off the brake. This prevents the levers from interfering with normal brake operations and inadvertent override of the braking function.

Crane Safety Advisory (CSA) 176 /Shock Received While Operating Poorly Grounded Cranes

The purpose of this CSA is to inform activities of two separate incidents that recently occurred where crane operators received electrical shocks while operating cranes, and to direct corrective actions to prevent future incidents. In both incidents, there was a combination of a deficient condition providing a voltage source and a poorly grounded crane. The deficient conditions did not render the cranes inoperable and could not have been detected by the operator. The trolley frames were grounded through the wheels and the tracks they rode on, as permitted by the National Electrical Code (NEC), section 610.61 at the time of construction. However, due to the condition of the surfaces, the wheel to track connection no longer provided a reliable ground. If the trolleys had been provided with reliable grounds, regardless of the existence of a voltage source, crane operators would not have received electrical shocks. NEC section 610.61 was revised in the 2005 edition to no longer permit trolley and bridge frames to be considered electrically grounded through the trolley and bridge wheels to their respective tracks. A separate grounding conductor must now be provided for new installations.

Direction: At the next annual maintenance inspection, activities shall perform the following voltage and resistance checks for all cranes where the bridge and trolley frames are grounded through the bridge and trolley wheels and their respective rails. For cranes with metal pendants, the checks shall be performed between both the load block and ground and between the pendant and ground; for cab operated, remote operated or cranes with non-metallic pendant controllers, the checks shall be performed between the load block and ground.

A. Perform a voltage check to determine if there are deficient conditions on electrical components. Voltages above plus or minus two volts require corrective action and/or engineering evaluation.

B. Perform a resistance check to determine the reliability of the crane's ground in at least four areas of the trolley and/or runway. Resistances greater than five OHMs requires corrective action and/or engineering evaluation. Wheels and/or rails may require cleaning to reduce the resistances to less than five ohms.

C. New and recently procured cranes not in compliance with section 610.61 of the 2005 edition of the NEC (effective date of 5 August 2004), require the submittal of an alteration to correct the NEC non-compliance.

Crane Safety Advisory (CSA) 177, Hook Block Retaining Ring (Snap Ring) Failure on P&H Sigma Hoists

Background.
A. The purpose of this CSA is to alert activities of a potential failure of P&H Sigma hoist hook blocks utilizing retaining rings (snap rings) on sheave pins which hold the hook block together.

B. A Navy activity reported that a retaining ring disengaged from the sheave pin on a 5-ton P&H bridge crane. The sheave pin uses retaining rings on the outside of the sheave covers to hold the hook block together. A sheave cover fell approximately 20 feet to the floor as the hook block was being raised with no load on the hook. This is the second accident reported by the activity of a retaining ring disengaging that resulted in the hook block coming apart; both accidents occurred on 5-ton P&H bridge cranes utilizing P&H Sigma hoist.

C. The retaining ring was recovered and sent to a laboratory for analysis where it was determined that several factors led to the accident. The retaining ring thickness, 0.063" was found to be smaller than specified by OEM drawings, 0.079". The sheave pin groove for the retaining ring was found to have a beveled or damaged edge towards the outside of the pin. Grease and debris were contained within the groove which prevented the retaining ring from fully seating. These factors led to the retaining ring disengaging from the sheave pin groove.

Direction:
A. Within 90 days of issuance of this CSA, activities shall inspect all Sigma hoist blocks (P&H hoists utilizing a Sigma hook block have a serial number starting with a "S") to ensure the retaining rings on both ends of the sheave pin are the correct size and the retaining ring grooves are not damaged or beveled. The hoist OEM (now Morris Material Handling) or ANSI B27.7 shall be consulted to determine if retaining ring and groove dimensions are correct.

B. At the next annual or B inspection period for all other cranes that utilize retaining rings to secure the ends of the block sheave pins, perform an inspection as noted in paragraph A above.

EQUIPMENT DEFICIENCY MEMORANDUM

EDM 094, Interference on Ingersoll Rand Low Headroom Hoists

Background
A. Ingersoll Rand manufactures ultra low headroom manual chain hoists, model ULM2. An activity installed one of these hoists on a single girder bridge crane's manual trolley and discovered that when the hoist is raised to its extreme upper position, the hook bar and hook nut actually contact the bridge beam rather than the hoist frame. If the hook bar is in this upper position and the trolley is moved, an accident may occur with damage to the hook block, hook nut, or beam. Discussions with Ingersoll Rand determined that they consider this condition normal as it allows more lift height.

B. The activity designed and installed spacers that limit the upper travel of the hook bar such that the hook bar contacts the spacers and hoist frame rather than the beam. Activities with similar hoists should consider installing similar devices to prevent damage from occurring.

P-307 QUESTIONS & INTERPRETATIONS

The questions and interpretations listed below are based on crane program issues that arise and Requests for Clarification, Deviation, or Revisions (RCDR), P-307 figure 1-1 that have been answered and posted on Navy Crane Center's web site under P307 Questions and Interpretations.

Question: NAVFAC P-307, paragraph 10.7 and 14.8.7 requires that the hook shall have self closing latches or shall be "moused", i.e., the throat opening shall be secured with wire or rope, to prevent the attached item from coming free of the hook under a slack condition. Request concurrence to deviate from NAVFAC P-307 paragraphs 10.7 and 14.8.7 mousing requirements by using methods other than self-closing latches, wire, or rope such as: tape, latches remotely controlled, or dual opposed hooks.

Answer: The intent of NAVFAC P-307, paragraphs 10.7 and 14.8.6 is to ensure that all hook throat openings are latched or otherwise secured to prevent accidental load disengagement. The method of latching, if other than a self-closing latch, or the method of "mousing" used to secure the hook throat opening, shall be evaluated and approved by the activity engineering organization. Wire and rope are provided as two examples of acceptable mousing practices.

Question: Clarify requirement for two year periodicity for physical examination as required by NAVFAC P-307, paragraph 8.5.3.1.a. Our Medical System (MES) shows all physicals expiring the last day of the month that the physical was taken. Crane operator physicals are shown to expire two years from the last day of the month taken. Does this meet the intent of P-307, paragraph 8.5.3.1.a?

Answer: Navy Crane Center considers the process of physicals expiring on the last day of the month that the physical was taken to be a standard practice in the Navy medical system and to meet the intent of NAVFAC P-307, paragraph 8.5.3.1.a.

Question: Clarify whether a Mandatory-Delayed Crane Alteration can be performed before the type inspection period indicated on the Mandatory Alteration form, figure 4-2 of NAVFAC P-307. Figure 4-2 classification states Mandatory-Delayed: Alteration will be accomplished during the next ( ) Type A ( ) Type B ( ) Type C inspection per NAVFAC P-307. The wording, as written, requires an alteration to be performed "during" the specified inspection period.

Answer: The phrase Mandatory-Delayed is not intended to limit the accomplishment of the alteration to the specific time of the inspection; the Mandatory-Delayed Alteration may be accomplished before the specified inspection. In practice, this has not been occurring since the introduction of the Mandatory Alteration form.

CRANE SAFETY AWARENESS FOR WINTER MONTHS

As the end of the year approaches, I want to reflect on the safety improvements you and your activities have achieved over the past year. First, you achieved an 11 percent reduction in the overall number of crane accidents. Also, there were no reportable class A or B mishaps as defined by OPNAVINST 5102.1D, and for the third straight year, the number of reportable class C mishaps decreased to only three percent of the total number of crane accidents.

Over the past year, I also challenged you in several areas to take steps to reverse negative trends. With every challenge, you responded admirably. For example, in Crane Safety Awareness for the fall and winter and Crane

Awareness for the summer months, I expressed my concern with an unhealthy trend of complacency as evidenced by 40 percent of the accidents over the past year occurring with no load on the hook. I am very pleased to note that you responded admirably and only 27 percent of the accidents since April 2007 occurred with no load on the hook. Despite these accomplishments, we cannot afford to rest on our laurels. Two major challenges lie ahead in the coming months, which inherently pose great risk to our people: Harsh weather conditions and holiday work curtailment.

Perhaps the greatest challenge is avoiding complacency and a relaxation of standards during the holidays and upon return to work following the extended holiday shutdown period. Many of our people will be off on leave to be with their families during this holiday period and activities will be faced with a different make-up of crane teams, temporary supervisory assignments, and personnel being placed in unfamiliar job assignments presenting increased risk if not managed properly. I encourage you to practice strong ORM actions to mitigate these risks.

Frigid temperatures, icy conditions, and life threatening water temperatures pose significant challenges to you and your people as they support the Global War on Terror's increased weight handling demands. Operations in cold weather reduce personnel dexterity and induce additional physical challenges, which can lead to accidents. Cranes, barge decks, ground level rails and rail switches can become hazardous for slips, strains, and falls. Exterior working surfaces, platforms, walkways, and ladders are especially prone to icing conditions and appropriate precautions should be put into place to minimize this risk. Cranes and rigging gear are also affected by the cold weather. Crane sheaves and hoist blocks can become iced up or frozen which can result in mispooling conditions and cause damage to critical cranes and components.

I encourage you to continue your diligent efforts on safety with special attention given to adverse weather conditions and when returning to work from the holidays. My audit teams have observed a correlation between adverse weather conditions and the decline in the number and quality of surveillances and oversight conducted. It is important that your supervisory and management personnel make a concerted effort to get to job sites and shops, particularly during poor weather conditions and the periods immediately following the extended holiday shutdowns, where the risk to lifting and handling safety is greater.

Commanding Officers of Navy shore activities are strongly encouraged to intensify their efforts to raise the level of safety awareness in their weight handling operations and continue to strive for the goal of ZERO weight handling accidents. With the commitment to safety by all personnel involved in lifting and handling, we can make FY08 our best year on record. Director Navy Crane Center sends.

SHARE YOUR SUCCESS

We are always in need of articles from the field. Please share your sea stories with our editor *m_nfsh_ncc_crane_corner@navy.mil*.