THE CRANE CORNER

Navy Crane Center Technical Bulletin

http://portal.navfac.navy.mil/ncc ***57th Edition –March 2008***

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A WORD FROM TOPSIDE

Sam Bevins

In the coming year, the Navy Crane Center will be involved in a number of initiatives to improve the safety, efficiency, and effectiveness of the weight handling programs at the Navy shore activities as we strive for our mutual goal of Zero accidents.

Although the Navy's overall weight handling safety record is commendable and most reported accidents resulted in only minor injury or damage (on average for the past four years, only five accidents per year met the OPNAV reporting threshold, and almost all were Class C), there is still considerable room for improvement. Collisions and unplanned contact account for more than 40 percent of all reported accidents, and virtually all reported accidents (97 percent) were the result of human error. In April, we will host a Crane Accident Prevention symposium to investigate ways to further reduce crane accident occurrence. We will investigate technology, processes, human behavior, training, and other factors that might contribute to improved weight handling safety and accident reduction.

We are continuing to convert our NAVFAC P-307 training courses to a web-based format for posting on Navy Knowledge Online. Three additional courses will be posted in the next few weeks and we plan to have the conversion effort for three additional courses substantially complete by the end of the year. This effort will greatly increase the availability of the training while resulting in significant cost avoidance to the Navy.

We have initiated a crane hook fatigue testing project to determine if the current hook NDT periodicity can be further extended beyond the current six certification cycles. A series of crane hooks will be fatigue tested at various loads to failure, which is intended to provide data to justify increasing the NDT periodicity and thus allow further cost avoidance for the Navy shore activities.

Operational Risk Management 5-Step Process

- Identify Hazards
- Assess Hazards
- Make Risk Decisions
- Implement Controls
- Supervise (Watch for Changes)

We are planning to initiate another safety video. This video will focus on basic rigging safety for users of category 3 cranes. Category 3 crane accidents account for one-quarter of all reported accidents. These cranes are frequently operated by shop mechanics and electricians, who are less familiar with crane and rigging operations than full-time crane teams. Common accidents include damage from improperly rigged loads and damaged wire rope from side loading the hoists. This video will provide another tool to strengthen the knowledge and awareness of category 3 crane operators. We plan to have the video ready for distribution by early next year.

These are some of the efforts intended to help the Navy shore activities continue improving the safety and reliability of their weight handling programs, "an essential enabler for Fleet Readiness!"

Inside This Issue

ARE YOU GETTING THE MOST FROM YOUR OIL ANALYSIS PROGRAM?

A quality oil analysis program can provide an early indication of equipment failure and determine the remaining life expectancy of the lubricating oil. A successful oil analysis program requires an organized and sustained effort.

One of the most important components of any oil analysis program is answering a simple question, what does your organization want out of an oil analysis program? Begin with the end in mind. If you do oil analysis just to meet the NAVFAC P-307 requirements, you are missing opportunities to further enhance your weight handling equipment program. Oil analysis can tell you a lot about the health of your system, but only if you do the right tests, in the right locations, listen to the results, and take the appropriate action.

It is important to determine what you are looking for before you look for it. What level of cleanliness is acceptable? What level of contamination should send up the red flag? What types of contamination are worse than others? How clean is new oil coming into your facility? All of these questions should be answered before taking any samples or running any tests.

NAVFAC P-307 requires oil analysis on mobile crane hydraulic systems in appendix C, item 35a and allows oil analysis on hoist gearboxes in appendix C, item 29c and appendix D, item 8b as an alternative to disassembly. The intent is to look for small contaminants in hydraulic systems and gear wear in gearboxes. While these are the specific inspection items NAVFAC P-307 intends, a more complete oil analysis program can provide much more information, one being how much life does the oil have left before it needs to be changed.

This is the first in a series of articles that will discuss topics such as how to take an oil sample, what tests should be completed on the sample, what the test results tell you about the equipment and the oil, and what should be done if a test report indicates problems. There is also information available from multiple sources such as the internet, books and trade publications, training (both on-line and classroom) from various companies, and oil analysis experts who can come to out your facility.

QUALITY ASSURANCE

Navy Crane Center recently provided quality assurance on a 150-ton capacity mobile boatlift for Amphibious Construction Battalion One (ACB-1) in Coronado, San Diego, California. This diesel powered, rubber tired, hydraulic gantry crane is designed to lift and carry portable bridge sections over extended distances. This crane was the final unit of a Naval Facilities Engineering Command contract that replaced outdated equipment with five 150-metric ton mobile boat hoists for the Navy Lighterage Program. One unit was delivered to Blount Island, FL, two units to Little Creek, VA, and two units to Coronado, CA. Similar to the previous four units, the delivery of components, assembly, and testing of the mobile boat hoist in Coronado went smoothly.

AVAILABILITY OF FLOATING CRANE

YD-246
This is a 100-long ton Westmont floating crane. It was built in the late 1980's and has recently been certified (Expired in January 2008).

YD-246 lifting capabilities			**YD-246 Barge Dimensions**	
Hoist	Radius	Capacity	Length	175'
Main	80'	224,000 lbs	Beam	75'
	100'	195,000 lbs	Depth	12' 6"
	120'	155,000 lbs	Design Draft	5'
	160'	94,000 lbs		
	175'	80,000 lbs		
Aux	63'-190'	38,000 lbs		
Whip	80'-217'	10,000 lbs		

Interested parties can contact Crane Corner Editor at (757) 967-3816/DSN 387-3816 or email nfsh_ncc_crane_corner@navy.mil

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

CSA 178, Slings Using ESCO One-Half Inch Stainless Steel One-Piece Duplex Sleeves Not Meeting Required Design

The purpose of this CSA is to alert activities of the potential for one-half inch diameter slings using ESCO one-half inch one-piece duplex sleeves not developing the required design factor. This sleeve is utilized to form a return loop or turnback eye. An activity reported where a one-half inch diameter wire rope sling failed at a value less than required to achieve a minimum 5:1 design factor. Subsequent destructive testing of slings showed that ESCO one-half inch stainless steel one-piece duplex sleeves (sleeve stock number 5103261) may not achieve efficiency ratings of 95 percent or greater leading to sling design factors of less than 5:1.

ESCO has stated that a design change for the one-half inch size one-piece duplex sleeve was introduced to production in October 2006. The subject sleeves will have thinner wall thicknesses and be lighter in weight that the heavier prior to design change sleeves (approximately 115 grams vs. 135 grams).

Direction:
A. Activities with wire rope slings fabricated using ESCO one-half inch stainless steel one-piece duplex sleeves manufactured after October 2006 (new designed sleeve) shall down rate the sling capacity to 4000 pounds or less. This down rating also applies to slings where the manufacture date of the subject sleeve can not be determined.

B. This down rating is based upon slings fabricated using one-half inch diameter, 6 x 19 or 6 x 36, right regular lay, bright, EIP, IWRC wire rope. Slings fabricated with the subject sleeve using other constructions, lay, or grade of wire rope shall be removed from service or have documentation proving (by destructive test) the adequacy of the sling assembly to achieve a 5:1 design factor.

C. Navy Crane Center will provide additional direction as information becomes available.

CSA 179, Eaton-Cutler Hammer Rotary and Toggle Disconnect Switches

The purpose of this CSA is to inform Navy activities of a product deficiency on Eaton-Cutler Hammer brand labeled rotary and toggle disconnect switches manufactured from Week 1 of 2007 to Week 50 of 2007. This CSA affects the 60A, 80A, 100A, and 125A switches or enclosures containing these switches.

Eaton Product Safety Bulletin, 15-Jan-08, reported that a plastic plunger internal to the switch may fracture over time. There is a potential that a fractured plunger will no longer open one of the poles of the switch, thus leaving the pole energized, when the switch is placed in the open/off position. Thus, the load side of a defective switch could remain energized despite the visual indication that the switch is in the open/off position.

Direction:
By the next annual or B maintenance period, or before the switches are used for personnel lockout/tagout, activities shall determine if each crane is equipped with an Eaton-Cutler Hammer labeled rotary and toggle disconnect switch and/or enclosed switch noted below.

Rotary and toggle switch catalog numbers:

C362NW60, C362NW60MD, C362NW80, C362NW100, C362NW125, C362NW80MD, C362TW60, C362TW80, C362TW125, C362TW60MD, C362TW80MD

Enclosed switch assembly catalog numbers:

ECH1621AAA, ECH1621AAE, ECH1621CAE, ECH1621TAA, ECH1622AAE, ECH1801CJC-A29R50/G85, ECH1821AJE-H5/D14Z99, ECH1821CAE, ECH1821CHA, ECH1821CHE, ECH1821CHE-H5/D13, ECH1821CJA-H5/D12, ECH1821CJE, ECH1821CJE-A29R50/G88, ECH1821CJE-R50/G88, ECH1821EHD-H5/D14, ECH1821EJD-H5/D6, ECH1821EJE-H5/D15, ECP5422BAD, ECP5422BAD-R52/G108, ECP5422BAD-R52/G108 47-36540, ECP5422BAF-R50/G88, ECP5422CAE, ECP5422CAE-R50/G88, ECP5422CAE-R52/G107, ECP5422CAE-R52/G108, ECP5422CAER52G108, ECP5422CAG-R50/G87, ECP5422CAG-R50/G88, ECP5432AAG-R50/G89, ECP5432BAF, ECP5432BAF-R50/G88, ECP5432BAF-R52/G109, ECP5432BAJ-R50/G89, ECP5432CAG, ECP5432CAG-R50/G89, ECP5432CAG-R50/G89 F47-36548, ECP5432CAG-R52/G109, ECP5432CAG-R52/G109 47-36548, ECP5432CAGR52G109, ECP5432CAJ-R50/G89, ECX20C1CBC-C1S16S40C11, SDR3060UIP65RY, SDR3060UIP65BW, DPU362R, DR3060UD, DR3060UG, DR3060UW, DR3060UX, DR3080UD, DR3080UG, DR3080UW, DR3080UX, DR3100UD, DR3100UG, DR3100UW, DR3100UX, DR3125UW, DR3125UX, 3GAC362NF, 3GAC3680NF

For each suspect switch and/or suspect enclosed switch present, the activity will do the following to determine whether or not it is from the suspect batch.

A. Using appropriate lockout/tagout protocol, de-energize the circuit, move device to “OFF” position and verify circuit is de-energized.

B. Remove switch.

C. The date code is listed on the bottom of the switch. If the date code falls between Week 1 of 2007 and Week 50 of 2007, then the unit must be replaced. Date codes are printed in the following format: Week-Year (i.e. 28-07 corresponds to Week 28, Year 2007).

CSA 180, Square D Counterfeit Circuit Breakers

All references are documents from the Consumer Product Safety Commission (CPSC).

Reference A: CPSC Product Safety Recall, 27-Dec-07, Release No. 08-151
Reference B: CPSC Product Safety Recall, 30-Oct-07, Release No. 08-854
Reference C: CPSC Product Safety Recall, 16-Nov-06, Release No. 07-036

The purpose of this CSA is to inform Navy activities of counterfeit Square D circuit breakers, sold by North American Breaker Company Incorporated (NABCO), Scotts Electric Co. Inc., Connecticut Electric & Switch Mfg. Co., Electrical Distributors, and retailers nationwide between March 2003 and August 2006. The counterfeit circuit breakers may fail to trip when overloaded, posing a fire hazard.

References A, B and C reported that "the counterfeit circuit breakers are black and labeled as Square D QO-Series Models 110, 115, 120, 130, 140, 160, 210, 215, 220, 225, 230, 235, 240, 250, 260, 280, 1515, 1520, 2020, 2125, 315, 320, 330, 340, 350, 360, 3100, B120, B130, B220, B230, B250, B330 and B360. Actual Square D circuit breakers have (A) the amp rating written on the handle in white paint on the front of the breaker; (B) the Square D insignia molded onto the breaker side, and; (C) a yellow chromate mounting clip with half of the top of the clip visible. If your breaker, labeled as Square D, does not match this description, it could be counterfeit."

Direction:
By the next annual or B maintenance period for each crane, activities shall replace all counterfeit circuit breakers based upon the criteria provided above. Report any counterfeit circuit breakers as discussed above to the Navy Crane Center.

P-307 QUESTIONS & INTERPRETATIONS

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

Question: NAVFAC P-307, paragraph 8.6.d states that each operator's license file shall contain the "current certificate of medical examination and results of any specialized tests." An activity requested deviation from paragraph 8.6.d to allow storage of medical records at locations other than in the operator's license file. They stated it was understood the medical records would need to be readily available for Government.

Answer: Navy Crane Center concurred with this request. For convenience, the relevant forms and supporting data required in the operator license files may be located separately so long as they are available upon request. Additionally, electronic versions are acceptable.

SUMMARY OF FIRST QUARTER FY08 WEIGHT HANDLING EQUIPMENT ACCIDENTS

The purpose of this message is to disseminate Shore Activity Weight Handling Equipment (WHE) accident and near miss lessons learned to prevent repeat accidents and improve overall safety.

NAVFAC P307 requires commands to submit to the Navy Crane Center (NAVCRANECEN) a final, complete accident report (including corrective/ preventive actions) within 30 days of an accident, regardless of severity or type. This reporting requirement includes rigging gear accidents, i.e., gear covered by section 14 of NAVFAC P-307 used by itself in a weight handling operation and other unplanned occurrences with lessons to be learned. In addition, contracting officers are required to forward to NAVCRANECEN reports of all contractor accidents, including contractor caused accidents with Navy owned cranes. To ensure adequate time to react to negative or undesirable accident trends, NAVCRANECEN requests initial notification of any crane or rigging gear accident within 3 days of its occurrence. Accidents involving a fatality, in-patient hospitalization, overturned crane, collapsed boom, or other major damage to the crane, load, or adjacent property continue to require a NAVCRANECEN notification as soon as practical but not later than 24 hours of the event.

For the first quarter of FY08, 34 Navy WHE accidents (32 crane accidents and 2 rigging gear accidents) were reported. Four of the 32 crane accidents were significant (crane overload, rigging overload, two-block, and an injury). An 18% reduction in crane accidents was realized when compared to the previous quarter. Approximately 38% of the crane accidents this quarter were crane or load collisions. Some of the more significant crane accidents this quarter are discussed herein.

COLLISION RELATED

Accidents. (1) While traveling a bridge crane, the hoist block came into contact with a jib crane festoon draw bar resulting in damage to the jib crane and mislaying the bridge crane wire rope. (2) During rotation of a mobile crane, the counterweight struck a ballast can located within the swing radius. (3) During travel of a portal crane, the side of the crane contacted a brow that positioned in the travel path. (4) While lifting a cofferdam with a mobile crane, the load rotated unexpectedly and struck a cofferdam.

Lesson learned. A common theme in each of these accidents is a lack of situational awareness by crane team personnel. Situational awareness is the ability to maintain awareness of what is happening around you as well as your primary task. There is a certain amount of risk involved in every lifting and handling operation. Our challenge is to reduce or eliminate this risk to avoid undesired consequences. Every movement of the crane must be planned and coordinated well in advance of performing the operation. Planning includes the identification of sources of hazards or problems. Identify actions to mitigate the undesired condition. Consider the travel path of the crane and the load. A clear operating envelope is always desired but conditions may not always allow it. Where close tolerances exist, mitigate the potential by considering alternate routes, removal of obstructions, additional manning, etc. When operating in congested or in tight areas, operate the crane at a pace conducive for the conditions. Proper planning, good communication and situational awareness are effective methods to mitigate the risk involved in these accidents. OPNAVINST 3500.39b prescribes methods for assessing hazardous operations, which should be used in the planning and preparations of all WHE lifts.

IMPROPER RIGGING/PERSONAL INJURY

Accident. An aerial work platform (AWP) was being hoisted onto the flight deck of an aircraft carrier. During the lift, the AWP became unbalanced and slowly rotated vertically within the sling configuration until the basket came into contact with the equalizing thimbles of the sling configuration and the hook. As the load started to shift, the rigger tending the tagline, tried to unsuccessfully keep the man lift level by pulling the tagline. This action caused the tagline to cause minor burns to his hands as the tagline slid through his hands.

The main cause of this accident was improper use of the equalizer slings. The wire rope rendered through the equalizing thimble allowing the man lift to rotate. Had the equalizer slings been rigged perpendicular to the man lift boom, the man lift would not have rotated. One contributing factor for this crane accident was the lack of a rigging diagram as required by NAVFAC P307.

Lesson learned. This accident reinforces the importance of training employees on the proper use of equipment. Training should be provided on all equipment that might be used for weight handling purposes. The knowledge gained from training could have prevented this accident because the crane team would have known to place the equalizer slings perpendicular to the sling, allowing the slings to equalize the load. Lifting points and/or lifting configurations for man lifts, aerial platform vehicles, forklifts, mobile cranes, and similar equipment that may be lifted by crane, shall be identified in accordance with paragraph 10.5.1 of NAVFAC P307.

RIGGING OVERLOAD

Accident. While attempting to remove a wooden piling with a floating crane, a sling parted. The sling was wrapped around the pile in a choker hitch. While applying hoist tension to extract the piling, the sling parted in the choke area. The parted sling was ¾" diameter ten foot long eye to eye sling. Based on the size and construction of the sling, as well as the choker hitch angle of the sling at the time it was severed, a load of approximately 33,000 lbs would have been required to break the sling.

Lessons learned. When extracting piles or other potential binding lifts, there is an expectation of load resistance but the amount of resistance is unknown. Had a load indicating device been utilized, it would have helped to prevent the overload of the rigging gear and/or the crane. When a load indicating device is used, an appropriate stop point shall be established and the load indicating device shall be carefully monitored to ensure the stop point is not exceeded. Adequate job planning would have also helped to identify any other areas of concern that might cause problems during the lift.

Weight handling program managers program and safety officials are to review the above lessons learned with personnel performing lifting and handling functions and consider the potential risk of accidents occurring at your activity. This is also a good time to reinforce the principles of operational risk management.

E-mail submission of reports of accidents, unplanned occurrences and near misses is desired. The e-mail address is nfsh_ncc_accident@navy.mil. Per chapter 12 of NAVFAC P-307, the report must include a complete and concise situation description, corrective and preventive actions, probable cause and contributing factors, and an assessment of damage. For equipment malfunction or failure include the specific description of the component and the resulting effect or problem caused by the malfunction or failure.

SHARE YOUR SUCCESS

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

Weight Handling Program Films

Accident Prevention, seven crane accident prevention lessons learned videos are available to assist activities in raising the level of safety awareness among their personnel involved in weight handling operations. The target audience for these videos is crane operations and rigging personnel and their supervisors. These videos provide a very useful mechanism for emphasizing the impact that the human element can have on safe weight handling operations. Send requests to ***nfsh_ncc_crane_corner@navy.mil*** for these videos.

Weight Handling Program for Commanding Officers provides an executive summary of the salient program requirements and critical command responsibilities associated with shore activity weight handling programs. The video covers NAVFAC P-307 requirements and activity responsibilities. The video is available at http://dodimagery.afis.osd.mil/ (DAVIS/DITIS) (PIN 806467) in VHS, CD-ROM, and DVD.

Load Testing Mobile Cranes at Naval Shore Activities provides load test personnel guidance on properly testing mobile cranes per NAVFAC P-307. The video is available at http://dodimagery.afis.osd.mil/ (DAVIS/DITIS) (PIN 806634) in VHS, CD-ROM, and DVD.

Mobile Crane Safety covers seven topics: laying a foundation for safety, teamwork, crane setup, understanding crane capacities, rigging considerations, safe operating procedures, and traveling and securing mobile cranes. The video is available at http://dodimagery.afis.osd.mil/ (DAVIS/DITIS) (PIN 806721) in VHS, CD-ROM, and DVD.