THE CRANE CORNER

Navy Crane Center Technical Bulletin

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WORD FROM TOPSIDE

Sam Bevins

It is well known that most weight handling accidents are the result of human error and the most commonly cited cause is inattention. During the summer months, safe weight handling equipment operations become more challenging as the many distractions associated with the vacation season, graduations, sporting events, and increased outdoor activity compete with attention to the critical job at hand. As personnel return from vacation or extended leave, supervisors must also re-focus them to the necessity of safe weight handling operations. Potential furloughs will present an added challenge to weight handling managers this summer. As I noted in our March Crane Corner, if the crane team is not fully ready and prepared, do not make the lift. Say "No" when necessary. Efficiency and innovation will be called for in this challenging environment, but cutting corners on requirements, equipment, or operational safety is not acceptable.

There are a number of actions that are necessary to combat these challenges. Embracing and practicing operational risk management (ORM) helps the crane team to focus in advance on the risks associated with each weight handling operation and take the appropriate precautions to ensure a safe lift. ORM needs to be practiced even during operations when there is no load on the hook. Interactive crane team briefings will help ensure each member of the crane team knows the lift plan and their individual responsibilities. Effective teammates look out for all members of the team. They take time to be safe and stop operations when something is amiss.

More and more activities have established a program of regular observation of weight handling operations and documenting less than optimal performance. Documented observations by experienced operation and rigging personnel help identify potential unsafe practices. Activities should include observations of shop operations, where cranes are often operated by less experienced personnel, and rigging operations aboard ship, as rigging accidents account for one-quarter of the accidents reported to us. Lessons learned from observations should be shared with all hands. Many of the findings noted can and should be reported as near misses, as noted in Section 12 of NAVFAC P-307. One shipyard has already submitted 18 near-miss reports since January, while a public works department has submitted 14! These observations of accident precursors are effective and do prevent accidents from happening.

Management should also consider preemptive safety awareness briefings to ensure the crane team is aware of management's expectations and commitment to weight handling safety. Briefings should include the lessons learned from the observation program noted above. Weight Handling Safety/Training Briefs and crane safety videos distributed by the Navy Crane Center are also good starting points for further discussion on weight handling safety awareness. These are available on our website https://portal.navfac.navy.mil/ncc.

Inside This Issue

Management also needs to ensure all weight handling personnel are aware of our comprehensive definition of a weight handling equipment accident and know to report them when they occur. Our philosophy of reporting, and learning from, the small accidents has proven very successful in preventing more serious accidents from happening. The number of accidents reported to us is less important than reducing the number of significant accidents (injuries, dropped loads, overloads, and two-block accidents) and eliminating the truly serious accidents. An added benefit to safer weight handling operations is the improvement to mission execution efficiency that results. This can be significant under the current challenging fiscal environment. A safe and reliable Navy weight handling program is essential for Fleet Readiness. ■

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 nonload bearing or nonload controlling parts. A complete list of CSAs and EDMs can be found on the Navy Crane Center's web site.

CSA 203 - Improperly Marked ESCO 9/16-Inch Carbon Steel Swaging Sleeves

Ref (a): Safety Notice to Users of ESCO 9/1-Inch Carbon Steel Sleeves Product Info P5009RIG01l0408
Ref (b): ASME B30.9, Safety Standard for Slings

Background:

A. The purpose of this CSA is to inform activities of a safety notice issued by ESCO Corporation concerning improper marking of ESCO 9/16-inch carbon steel swaging sleeves manufactured in December 2004.

B. ESCO issued a safety notice in 2005, reference (a), alerting users that some 9/16-inch carbon steel sleeves with oversized internal diameters were improperly marked for 9/16-inch wire rope. The oversized sleeves may not develop the required design factor when swaged onto 9/16-inch wire rope.

C. Parts affected by reference (a) are ESCO 9/16-inch plain carbon steel sleeves (Part No. 4058011) and zinc chromate coated carbon steel sleeves (Part No. 4134039) with date of manufacture 12/04 (date is stamped on the sleeve). Sleeves with these part numbers are used in the fabrication of flemish eye slings.

D. Reference (a) is available for download from the ESCO website at http://litlibrary.escocorp.com/dynamic/p5009rig01l.pdf.

Direction:

A. Activities shall remove from service flemish eye slings fabricated with ESCO 9/16-inch carbon steel sleeves (Part No's 4058011 and 4134039) with date of manufacture 12/04. Where the date of manufacture is not legible or in question, ESCO flemish eye slings shall be removed from service until further evaluated by the activity engineering organization.

B. ESCO 9/16-inch carbon steel flemish eye sleeves in inventory shall be checked for date of manufacture 12/04 stamped on the sleeve. Sleeves found with the 12/04 date can be checked for proper sizing, either by verifying the internal diameter is less than or equal to 1.035 inches or by verifying the weight of the sleeve is greater than or equal to 10 ounces or 284 grams.

C. ESCO flemish eye sleeves found with internal diameters greater than 1.035 inches or weighing less than 10 ounces or 284 grams shall not be used and may be returned to ESCO for replacement. Directions for replacement are stated in reference (a).

CSA 204 - Updated Load Charts and Installation and Maintenance Procedures for Button-LOK Adjustable Beam and Angle Clamps

Background:

A. The purpose of this CSA is to inform activities of OEM-changed load charts and installation and maintenance procedures for Metal Products Specialist, Inc. Button-LOK adjustable beam clamps (Model No. BC-360-X), and adjustable angle clamp (Model No. AC-360-X). An activity reported discovering the updated information when requesting instructions from the OEM.

B. As discussed with the OEM, the beam and angle clamps had the potential to slide along the beam in the worst case scenario. The worst case scenario is defined as when the load is applied at a 45 degree angle directly "in line" with the beam. To alleviate this problem, the OEM changed to a variable load chart for the beam and angle clamps. Maintenance and installation procedures were also updated to improve the performance of the product.

Direction:

A. Activities shall update load charts and installation and maintenance procedures to ensure compliance with the OEM instructions for Metal Products Specialist, Inc. Button-LOK adjustable beam clamps (Model No. BC-360-X), and adjustable angle clamps (Model No. AC-360-X). Activities shall visually inspect beam and angle clamps prior to future use. The updated information for Button-LOK adjustable beam and angle clamps can be found at www.buttonlok.com or by contacting the manufacturer.

CSA 205 - Failures of 2-Ton Portable Floor Cranes During Load Testing

Ref (a): MSGID:CSA 172, NAVCRANECEN Portsmouth VA, YMD 20070614/141633Z
Ref (b): MSGID:CSA 172A NAVCRANECEN Portsmouth VA, YMD 20080428/241654Z
Ref (c): MSGID:ASME PALD 2009, Safety Standard for Portable Automotive Lifting Devices

Background:

A. The purpose of this CSA is to inform activities that four 2-ton portable floor cranes (engine lifts) have experienced structural failures during 125 percent capacity load testing in the past year. These four floor crane failures are in addition to the two failures that are addressed references (a) and (b). Two of the portable floor cranes were manufactured by Walter Meier Manufacturing. The other four were manufactured by Shin Fu Company of America.

B. Walter Meier Manufacturing stated there are two designs using the same model number. The older design does not meet reference (c). The OEM redesigned the crane to meet reference (c) but did not change the model number. There is no way to distinguish the difference between the models other than to disassemble and measure the thickness of structural steel members.

C. Shin Fu Company of America responded to the initial floor crane failures, refer to references (a) and (b), but have no additional response for the two most recent failures that occurred during load testing. Shin Fu Company of America states that the 2-ton portable floor cranes are designed in accordance with reference (c) despite the four reported structural failures at or below 125 percent capacity.

D. NAVFAC P-307 requires portable floor cranes to be in compliance with reference (c). Reference (c) requires portable floor cranes to meet the minimum overload capacity of 150% of rated capacity for the proof load.

E. The nature and number of failures that have occurred with 2-ton portable floor cranes manufactured by Walter Meier Manufacturing and Shin Fu Company of America, with no resolution from the OEM is unacceptable.

Direction:

A. Activities shall remove all Walter Meier Manufacturing and all of Shin Fu Company of America's 2-ton portable floor cranes from use immediately. The distributers of Walter Meier Manufacturing and Shin Fu Company of America's 2-ton portable floor cranes include Jet (Model No's JHC-200X and JHC-200X), Omega Lift Equipment (Model No. 44020), Mac Tools Inc. (Model No. EC3000), Matco Tools (Model No. MEC2T), and Pro-Lift (Model No. T-1481).

B. These portable floor cranes shall remain out of service until the manufacturers can provide a reasonable explanation and solution to the repeated structural failures. Navy Crane Center will provide further direction as additional information becomes available in a revision to this CSA.

EDM 101 – Telemechanique-Type XAC Pendant Pushbuttons

A. The purpose of this EDM is to alert activities of a possible problem involving telemechanique-type XAC pendants. There have been several instances where activities have reported a condition where pushbuttons have a delayed response in returning to the off position when released by the operator.

B. Investigation has shown that the sticking pushbuttons may be the result of the protective boots that surround the pushbutton. The protective boots are made of polychloropene (telemechanique P/N XAC B921) that may harden and lose flexibility over time. Telemechanique offers an alternate protective boot made of silicon that is more flexible and durable (telemechanique P/N XAC B922), which may be more appropriate for the application.

C. Activities are reminded that P-307, appendix D, item 25 specifies inspection attributes for pushbuttons to ensure proper condition. Additionally, pre-use checks of "control action" should include proper operation of pendant pushbuttons. Navy Crane Center recommends activities consider replacing problematic boots, when needed, with the silicon boot (telemechanique P/N XAC B922).

WEIGHT HANDLING SAFETY BRIEF

*T*he Weight Handling Safety Brief (WHSB) is provided for communication to personnel associated with Navy Shore Weight Handling. One of the most common "Near Miss" events reported to the Navy Crane Center involves the "improper spooling" of hoist wire rope onto the drum. In most instances, the condition was recognized before any damage to the wire rope occurred. However, there have been similar events that resulted in damage to the wire rope and were reported as crane accidents. Wire rope spooling deficiencies have been especially prevalent on category three wire rope hoists where the cause of improper spooling was primarily attributed to "side pulling" or lifting a load at an angle. Improper spooling also frequently occurred as a result of the crane/hoist being in hoist motion while the hook block was swinging due to crane movement. This WHSB reiterates precautionary measures used to avoid improper crane hoist wire rope spooling.

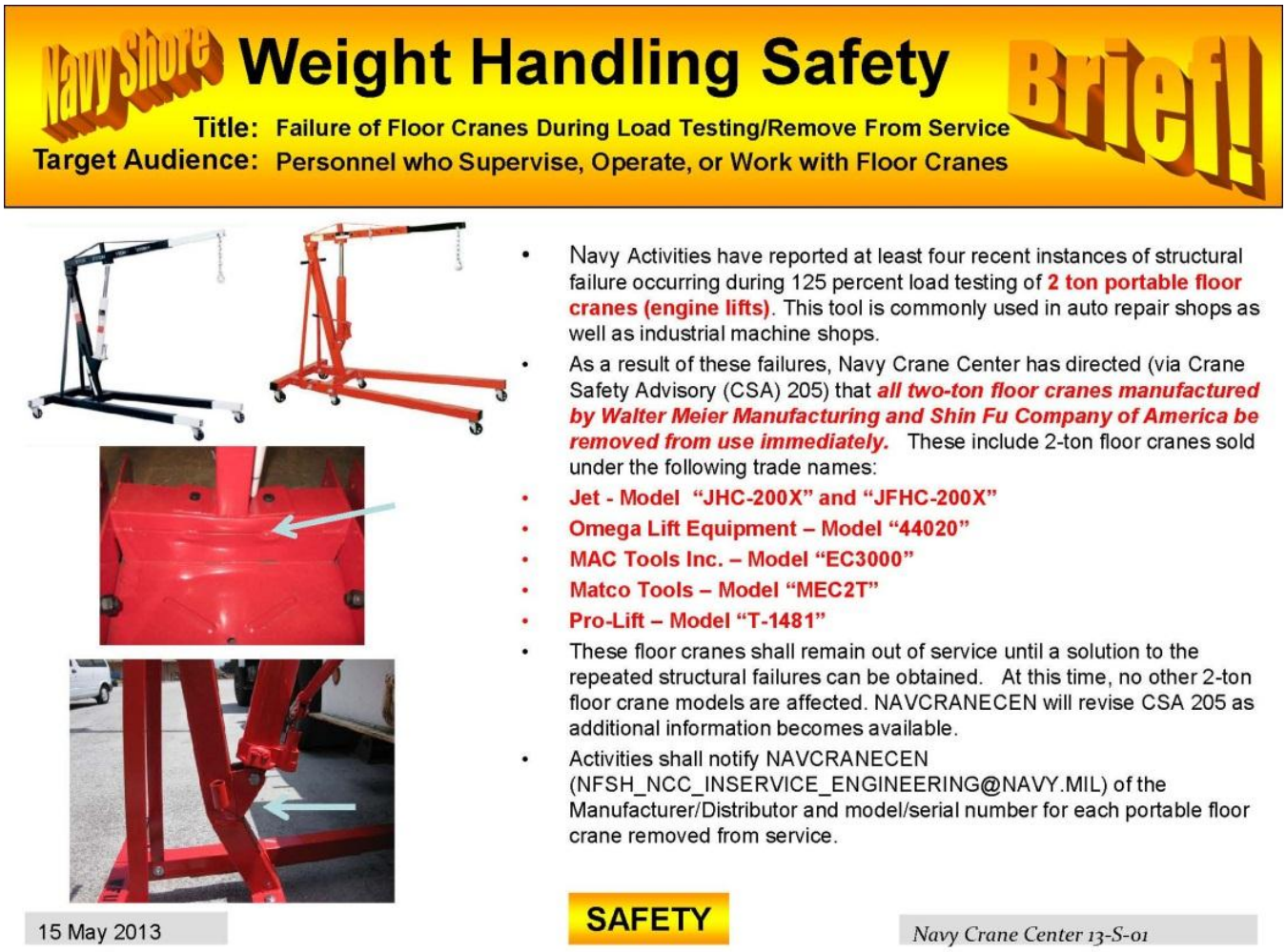
The Navy Shore WHSB is intended to be a concise and informative, data driven, one page snapshot of a trend, concern, or requirement related to recent/real time issues that have the potential to affect our performance and efficiency. The WHSB is not command specific and can be used by your activity to increase awareness of potential issues that could result in problems for your weight handling program. The WHSB can be provided directly to personnel, posted in appropriate areas at your command as a safety reminder to those performing weight handling tasks, or it can be used as supplemental information for supervisory use during routine safety meetings. Through data analysis of issues identified by accident and near miss reports, and taking appropriate actions on the information we gain from that analysis, in conjunction with effective communication to the proper personnel, we have the tools to reduce serious events from occurring. As we improve the Navy Weight Handling safety posture, we improve our performance, thereby improving our efficiency, resulting in improved Fleet Readiness!

When Navy Shore Weight Handling Safety Briefs are issued, they are also posted on the Navy Crane Center's web site at: (https://portal.navfac.navy.mil/portal/page/portal/navfac/navfac_ww_pp/navfac_ncc_pp/tab66035:whapi)

WEIGHT HANDLING SAFETY BRIEF

The Weight Handling Safety Brief (WHSB) is provided for communication to personnel associated with Navy Shore Weight Handling. This WHSB addresses concerns associated with certain two-ton capacity floor cranes (engine hoists) failing during load test. Navy activities have reported at least four recent instances of structural failure occurring during 125 percent load testing of two-ton portable floor cranes. As a result of these failures, Navy Crane Center's In-Service Engineering Division issued Crane Safety Advisory (CSA) 205, directing that certain make and model two-ton portable floor cranes be removed from service. The CSA further directs affected activities to notify Navy Crane Center of the manufacturer/distributer and model/serial number for each portable floor crane that it removes from service.

When Navy Shore Weight Handling Safety Briefs are issued, they are also posted on the NCC's web site at: (https://portal.navfac.navy.mil/portal/page/portal/navfac/navfac_ww_pp/navfac_ncc_pp/tab66035:whapi)



"Tip of the Spear"

(Common Audit Items)

This is a new section in the Crane Corner, which provides Navy activities a synopsis of audit items identified over the past quarter by our audit teams.

Program Management

A self-assessment identified concerns regarding mobile crane breakdowns. The audit team reviewed the availability of mobile cranes and downtime durations and identified no significant concerns. All cranes were in service during the audit. However, the audit team's discussions with activity personnel identified that although weight handling operational commitments are currently being met, in an increasing number of instances, the mobile cranes are occasionally not in service at the same time due to unforeseen breakdowns and annual maintenance, which decreases production efficiency (the preference is to have four cranes set-up for two ships). Of particular concern, current government manning in support of mobile crane maintenance is limited to one billet, creating a large workload for routine maintenance (the majority of the major repairs on the cranes are contracted out to local equipment dealers). Although the cranes and equipment are in good condition, the lack of depth in this area could be a contributing factor for the activity's mission. The unplanned loss of the lone individual could significantly impact the activity's mission. The audit team recommends that the activity review manning requirements, while conducting the review of needed cranes. As a minimum, an individual should be trained as a back-up, which would allow for training, mentoring and succession planning, even if the back-up position is performed as a collateral duty.

A contractor performs the maintenance, inspection, and testing services for the category 3 cranes at a naval activity. Government oversight of the category 3 weight handling program is performed by the certifying official and the performance assessment representative (PAR). However, the reviews of maintenance and certification documentation by the certifying official are not documented. The activity could benefit from implementing a surveillance program in crane certification to identify trends to foster long-term improvement. This program could also be used to document deficiencies, poor practices, and process improvements during oversight of work and provide information to feed the required PAR reports.

Operations

During the lift of a shipping container using a bridge crane, a four-leg wire rope sling was overloaded. The safe working load of the sling was marked with a total capacity of 200 pounds at a vertical sling angle and 100 pounds per leg, assuming two legs carried the load. The audit team inquired about the weight of the cover which was determined to weigh 172 pounds (86 pounds per leg in a vertical configuration). However, the sling was used at a 45 degree sling angle (1.414 sling angle stress) which created a load of 122 pound per leg overloading the legs of the sling.

A near miss occurred during off loading of canisters at a wharf. The operation includes repositioning the canister from vertical to horizontal utilizing a tilt fixture. During the operation, a slack condition in the rigging gear occurred allowing the canister to move abruptly from vertical before the slack was taken up, creating a

shock load and movement of the tilt fixture and crane. The audit team and activity personnel simultaneously stopped operations. No damage was noted and discussion with activity personnel regarding the severity of the shock load identified that, based on the maximum reading on the LID, an overload of the crane or rigging gear had not occurred.

The audit team identified a near miss that, if the lift was conducted as planned, could have resulted in a dropped load. A horizontal fan motor was to be lifted using a synthetic sling with chafing gear wrapped around motor supports in a choker configuration. The width and thickness of the chafing gear and sling, compared to the small surface area of the motor's supports, could have allowed the sling to come free when the load was rotated and lifted. When prompted, the team used a smaller sling with different attachment points in a more stable configuration.

Contractor Cranes

The audit team identified gaps in the process used by an activity to control and oversee contractor crane operations, which had resulted in contractor cranes conducting operations on the base without any oversight.

The OSHE and ASME regulations applicable for crane operations being performed were being pre-filled on the certificates of compliance (figure P-1) by the contracting official, not the contractor, contrary to NAVFAC P-307, paragraph 1.7.2.b.

Maintenance, Inspection, Test, and Certification

The audit team identified several instances where unnecessary load testing and no-load testing and recertification were occurring. Load testing, when it is not required to meet the requirements of NAVFAC P-307, is discouraged, as with any weight handling operation, especially overload testing, inherent risks are involved and the crane is subjected to unnecessary overloading. Additionally, unnecessary testing results in crane production downtime, causes end user commands to incur additional costs, and delays inspection and load test personnel support of other crane related required actions.

There is no formal process to track minor deficiencies that are identified, but not corrected, during scheduled maintenance or are identified during the crane operations. This lack of a process causes a reliance on inspectors to review open documents in each crane's equipment history file to identify outstanding work that still needs to be accomplished.

Engineering

Several oil analysis reports indicated severe wear in gear reducers; however, the results, including lab recommended actions, were not being properly evaluated for necessary remedial action. Oil analysis is performed in order to meet the requirement of the Maintenance, Inspection, Specification Record (Appendices C and D of NAVAC P-307); however, the benefits of trending the condition of the lubricant and implementing preemptive countermeasures were not being realized, which may lead to unnecessary breakdowns and lost production availability.

Pre-engineered work document for management of software and firmware did not meet the requirements of NAVFAC P-307, paragraph 2.7. While the documents did address some items, they did not fully address the

control of files, revision controls including naming/labeling of files, allowable crane design ranges of programmable parameters, procedures to upload/download files and/or change programmable parameters, and security procedures.

Rigging Gear

A swivel hoist ring did not contain the required torque value, contrary to NAVFAC P-307, paragraph 14.8.8. Another swivel hoist ring did not have the retaining ring installed properly. Additionally, there were two swivel hoist rings that had been modified by the activity and had two different working load limits labeled on each of them.

An aluminum lift ring comprised of two halves did not have the subordinate parts (the screws) identified to the body, contrary to NAVFAC P-307, paragraph 14.3.

None of the beam clamps inspected had the manufacturer's name, logo, or trademark, making it impossible to identify the manufacturer, contrary to NAVFAC P-307, paragraph 14.3.

Training

Part III of the application for crane license ("Action on Subject Application") was lined through and no information was provided on two category 2 crane operator applications, contrary to NAVFAC P-307, paragraph 8.1.2. In addition, the "examiner" column was missing on the crane operators' license records, contrary to NAVFAC P-307, figure 8-3. Finally, the "vision" blocks were marked true or false in lieu of specific restrictions, such as corrective lenses, contrary to NAVFAC P-307, paragraph 8.3.1.3.

There were no supplemental questions on the crane written test for category 2 cranes, contrary to NAVFAC P-307, paragraph 7.4.2.

SUMMARY OF WEIGHT HANDLING EQUIPMENT ACCIDENTS SECOND QUARTER FY13

During the second quarter, 64 Navy shore WHE accidents (53 crane and 11 rigging), were reported. Of those, 13 were considered significant (overload, dropped load, injury, or two block). Of particular note, the number of reported significant accidents decreased from first quarter's total by 48 percent and the number of near miss report submissions increased by 108 percent. Although the Navy's WHE program maintains a wide aperture for reporting virtually all unplanned events, the significant accidents have a greater potential to result in serious injury, significant cost, and potential delays to fleet operations. As suggested by the decrease in significant accidents and the increase in near miss reports, the occurrence of significant accidents can be reduced by identifying, reporting and learning from minor weight handling accidents, near misses or unplanned occurrences, and worksite surveillances. Lessons which can be shared from the reported significant Navy crane and rigging gear accidents and other unplanned occurrences are discussed herein.

OVERLOADS

Accidents: Crane and rigging gear overloads continue to be of concern. A bridge crane's rails were damaged due to the crane being overloaded/side loaded. In another case, a mobile crane was overloaded when a load being used to verify boom alignment was lifted outside of the maximum allowable radius. In two other events, rigging gear and/or the crane was overloaded due to load binding conditions. In one of these accidents, the crane operator became distracted and did not monitor the load indicating device (LID) during a lift of support equipment that was in a bound condition. In the other, a wire rope sling assembly was overloaded when it was being used to remove a bound up chain from a grinder system.

Lessons Learned: Pre-lift preparation is crucial to safe weight handling operations and prevention of overloads. Operators and riggers shall understand and comply with the load rating chart posted on the crane. Rigging gear must be properly sized and configured to handle the intended load. The rigger-in-charge shall know the weight to be lifted and the maximum radii at which the load will be picked and positioned. When a binding situation exists (this is a complex lift), a portable LID with readout readily visible to the signal person shall be used. When a LID is used, an appropriate stop point shall be established and the LID shall be carefully monitored to ensure the stop point is not exceeded. Chainfalls or other hoisting control means should be used to avoid sudden overload of the crane or rigging gear.

DROPPED LOADS

Accidents: Several dropped loads were reported during the quarter. A valve shifted in its lashing as it was being hoisted into the overhead and fell to the deck. During removal of a towed array cover, the cover slipped from the rigging gear (clamps) and fell into the water. While lifting a pallet loaded with unsecured material dollies, one of the dollies shifted and rolled off the pallet and fell two feet to the pier.

Lessons Learned: Loads should always be rigged to prevent the load from falling out of the rigging. When using slings in a sweeping configuration under a load, the slings should be secured in place to prevent inadvertent shifting or movement of the load. The load must be secured within the rigging configuration. This is extremely important when lifting loads with a high center of gravity. Prior to commencing any lift, personnel should carefully examine the load to ensure there is nothing loosely attached or compressed onto the load that could fall during the lift.

INJURIES

Accidents: During the repositioning of a load, part of the rigging configuration shifted slightly, resulting in a mechanic injuring his finger when it was caught in a pinch point around the rigging gear and load.

Lessons learned: Personnel must remain alert to pinch points during the entire weight handling evolution. Never place any part of the body (hand, fingers, arms, etc.) between a load or rigging gear and any stationary object. Maintain a safe distance between yourself and the load and utilize lashing and tag lines to assist in controlling the load whenever possible.

TWO-BLOCK

Accidents: During operational inspection of a hoist brake repair on a bridge crane, a crane was two-blocked when the hook traveled through the upper limit switch. In another instance, a Category 3 bridge crane was two-blocked when the crane operator operated the crane erratically while hoisting the unloaded hook block into the upper limit switch.

Lessons Learned: Operators shall be trained to approach limit switches (hoist, rotate, and travel) only in slow speed. During maintenance, personnel must ensure that appropriate precautions are in place when crane testing is in progress. Utilize approved maintenance procedures in order to conduct repairs and testing.

Forty-two percent of Navy crane accidents reported during the second quarter of FY13 involved collision (14 crane collisions and 8 load collisions). Crane and load collisions continue to be the most frequently occurring type of crane accidents. A recurring theme in collision related accidents is that personnel did not perform properly due to inattention, poor judgment, overconfidence, or were in a hurry to complete their work. Safe crane operations are the result of effective teamwork among operators, riggers, and supervision. Proper planning is an absolute must in weight handling operations. Even with the best plans, weight handling personnel must practice situational awareness by being vigilant of ever changing conditions in and around the operating envelope.

Many of the reported 52 near miss and other unplanned occurrence events during the quarter described anomalies which could have easily led to weight handling accidents. Unsafe conditions or practices were not observed immediately prior to an actual WHE operation. Events included, but were not limited to, improperly spooled hoist rope (no apparent damage) found on various types of cranes during pre-use inspections, loads found to be still anchored to a foundation just prior to making a lift, and various crane travel path obstructions were observed just prior to actual crane movement. These near miss and other unplanned occurrence observations reinforce the need and value to perform pre-operational inspections and checks of the equipment, load and anticipated operating envelope. In each of the reported near miss and other unplanned occurrence events, excellent situational awareness and proactive involvement of involved personnel contributed to improvements in weight handling safety by not accepting anything less than a safe weight handling work environment.

Navy Crane Center appreciates the strong efforts of the weight handling community to drive down the frequency and severity of weight handling accidents. Our metrics suggest that the community is embracing the value of gaining lessons learned from the reporting of all unusual events in a weight handling operation to prevent more serious events from occurring. Leadership should continue to encourage this and not negatively focus solely on the total number of events reported, but focus on eliminating the significant and serious weight handling accidents. The identification, documentation, and correction of near misses and other unplanned occurrences significantly improve safety and efficiency of weight handling operations.

Weight handling program managers and safety officials should review the above lessons learned with personnel performing weight handling functions and consider the potential risk of accidents occurring at your activity. Contracting officers should share this information with representatives who oversee contractor weight handling operations. Please remind your personnel that no task is so important or urgent that it cannot be performed safely. Taking the time to be safe can increase our productive support to the Fleet. Our goal remains zero weight handling accidents. 

COLLISION AVOIDANCE SYSTEMS ON CRANES

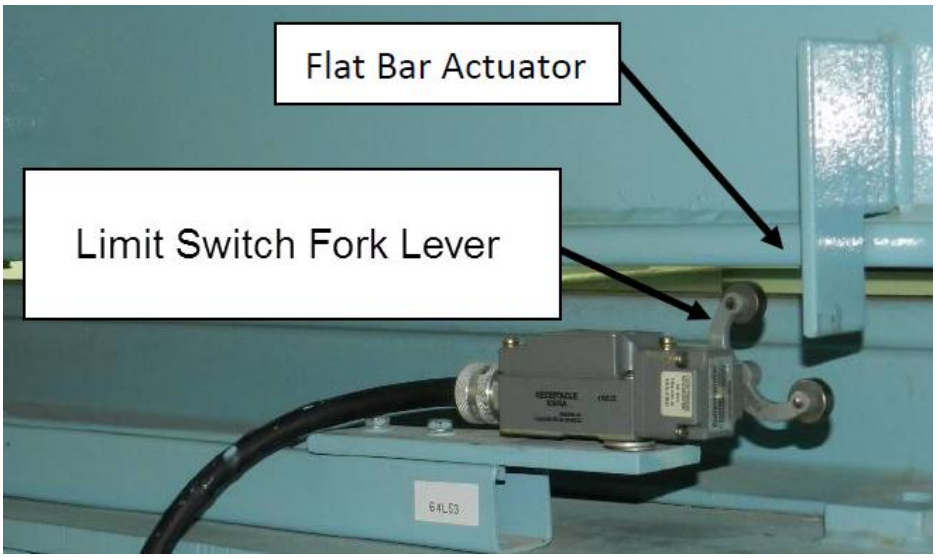
Effective planning, teamwork, communication, situational awareness, and operational risk management are all good tools in reducing the risk of crane collisions. With today's advancements in technology, another tool is a collision avoidance system. Collision avoidance systems are designed to provide crane users with a means to inhibit costly collisions between cranes and other objects. These systems often use sensors and proximity switches to provide an audible or visible alarm alerting the operator that an object is in the crane path. More sophisticated systems can be integrated with crane controls to slow and/or stop motion.

One common industry collision avoidance system uses limit switches that slow down or stop a travel function when the switch is actuated. Used near the end of a runway, this system can ensure that the end stops are not contacted. This system works for cranes with fixed known obstructions such as end stops.

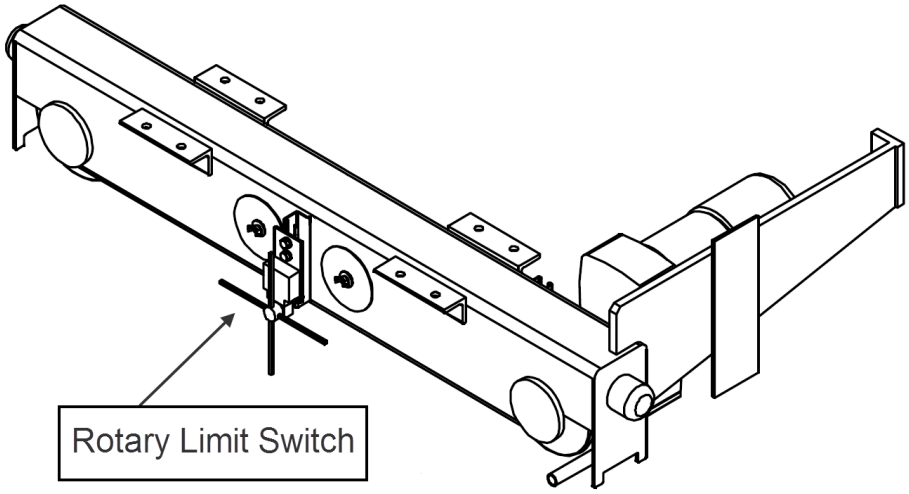
When the obstruction is not fixed there are two main types of collision avoidance systems for cranes – those with a transmitter/receiver and a fixed reflective target and those that only require a transmitter/receiver. The former system is more economical, but only works in an environment where there are known potential collisions (e.g. a crane end stop or second crane on the same runway system). The latter often is capable of detecting interferences within the sensing range utilizing ultrasonic or radar sensors.

A few examples where collision avoidance systems have been installed at Navy and private installations include:

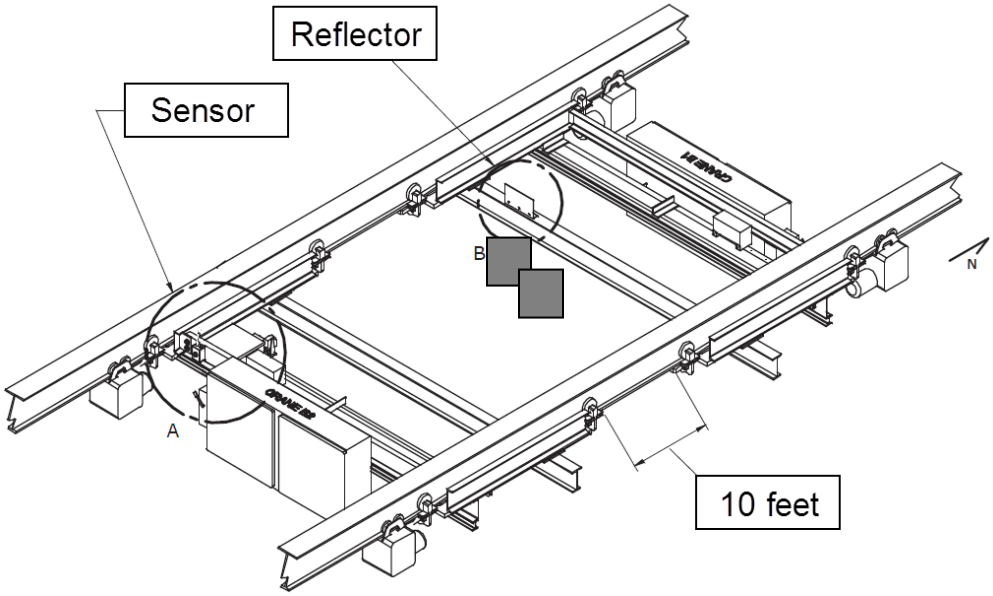
A private shipyard that uses a mechanical fork-style limit switch that prompts the bridge travel of a crane to switch to slow speed when the limit switch is actuated. The switch is activated when the flat bar actuator located on the bridge makes contact with the stationary limit switch fork lever, activating either a "normal" or "actuated" position. The "actuated" position changes the drive to slow speed.



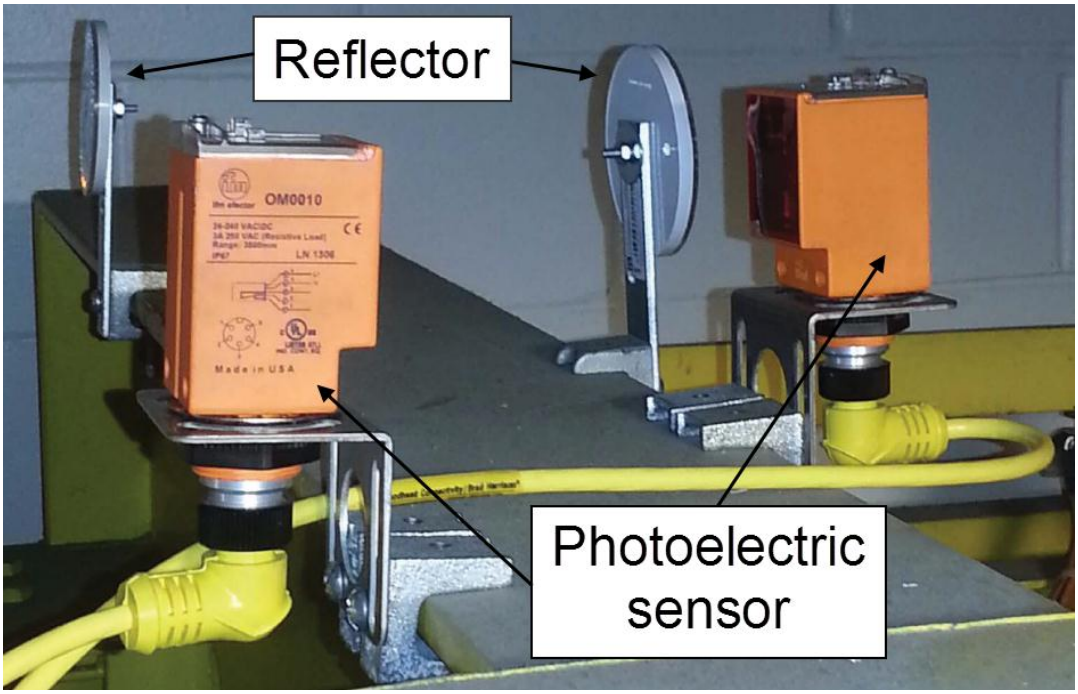
Similarly, at a Navy activity, a limit switch is used to slow the crane as it approaches the end stops. In this case, a rotary limit switch is located on the crane end truck, as shown below, and the actuator is mounted on the crane runway.



Another Navy activity added an anti-collision alarm system on two cranes that share a runway. A sensor was added on one crane and the reflector on the other. An audible alarm alerts the operator when the cranes reach a set distance apart, in this case 10 feet. The alarm allows the operator to assess the situation and will minimize the risk of unplanned crane contact.



Another Navy activity has a runway with four cranes. Several sets of sensors are installed to maintain a minimum distance of 15 feet between cranes to avoid rail over-loading. A photoelectric sensor is mounted to the top of the bridge beam and the reflector is located on the other crane's bridge beam. The picture below shows one of the interior cranes that has both sensor and reflector. If the cranes come within 15 feet of each other, the travel drives are shut down in that direction to prevent further travel.



To reemphasize, with today's advancements in technology, a collision avoidance system can be designed to provide crane users with a means to impede costly collisions between cranes and other objects. The Navy Crane Center continues to investigate potential applications involving collision avoidance systems. If you have a collision avoidance system installed on your crane, please share your application with us. Activity input or feedback on collision avoidance systems would be greatly appreciated. Please contact nfsh_ncc_crane_corner@navy.mil with any information or questions.

NAVFAC P-307 QUESTIONS & INTERPRETATIONS

The questions and interpretations listed below are based on crane program issues that arose and Requests for Clarification, Deviation, or Revision, P-307, figure 1-1.

Question: Can load indicating devices (LID's) that are integral to crane systems be used in lieu of portable LID's, as required by P-307, paragraph 10.5, provided the crane integral LID has an accuracy of at least 2% of full scale and the LID has a readout that is readily visible to the signal person or RIC?

Answer: LID's integral to crane systems may be utilized in lieu of portable LID's as required by P- 307, paragraph 10.5, provided the integral LID meets the requirements of NAVCRANECENINST 11450.2, paragraph 2-5.26.2 for required design factors, hardness levels and accuracy, is calibrated in accordance with OEM recommendations, and has a readout that is readily visible to the signal person or RIC. All other requirements of P-307, paragraph 10.5 apply.

Responsibility for monitoring the LID readout remains with the signal person or RIC during lifting operations that require the use of an LID to ensure stopping points are not exceeded. Monitoring of LID's by the crane operator during these operations is not allowed .

Additionally, the accuracy of the integral LID for the estimated weight to be lifted shall be such that the tolerance is acceptable and will not negate the benefits of using a LID (i.e. a 30,000-pound capacity hoist with a LID calibrated to two percent of full scale accuracy has a tolerance of 600 pounds which may not provide useful indication for loading in the lower range of crane capacity). Operations where the crane integral LID is calibrated for less accuracy than is required for the specific weight shall revert to using a portable LID in accordance with NAVFAC P-307 paragraph 10.5.

Navy Crane Center will make appropriate changes to P-307, as discussed above, as part of the next revision to P-307. 

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WEIGHT HANDLING PROGRAM SAFETY VIDEOS

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 audiences for these videos are 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.

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.

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.

"Take Two" Briefing Video provides an overview on how to conduct effective pre-job briefings that ensure interactive involvement of the crane team in addressing responsibilities, procedures, precautions and operational risk management associated with a planned crane operation.

"*Safe Rigging and Operation of Category 3 Cranes*" provides an overview of safe operating principles and rigging practices associated with category 3 crane operations. New and experienced operators may view this video to augment their training, improve their techniques, and to refresh themselves on the practices and principles for safely lifting equipment and materials with category 3 cranes. Topics include: Accident statistics, definitions and reporting procedures, pre-use inspections, load weight, center of gravity, selection and inspection of rigging gear, sling angle stress, chafing, D/d ratio, capacities and configurations, elements of safe operations, hand signals, and operational risk management (ORM). This video is also available in a stand alone, topic driven, DVD format upon request.

Note: ***"Load Testing Mobile Cranes at Naval Shore Activities"*** is currently being updated to address the revised load test procedures in the December 2009 edition of NAVFAC P-307.

All of the videos can be viewed on the Navy Crane Center website: https://portal.navfac.navy.mil/ncc.

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