



# THE CRANE CORNER

## *Navy Crane Center Technical Bulletin*

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### A WORD FROM TOPSIDE

*Sam Bevins*

In early May, the Navy Crane Center hosted our second Navy-wide Weight Handling Conference. Approximately 300 people attended the three-day forum, including Navy representatives from across the country as well as from Navy activities as far away as Italy, Guam, Japan, and Diego Garcia. Also in attendance were contractor representatives who support Navy shipbuilding and base operations, and industry experts in the field of weight handling related equipment. This forum provided an excellent opportunity for networking and sharing challenges and solutions in the weight-handling arena.

The theme of the conference was Sharing Best Practices and Safety Initiatives, and there was a wide variety of excellent presentations addressing operations safety, equipment safety, training, new technologies, cost avoidance initiatives, crane acquisition, maintenance issues, oversight of contractor weight handling operations, mobile crane loading on waterfront structures, Lean Six Sigma in weight handling, and a preview of the upcoming revision to NAVFAC P-307. Safety topics included the Human Factors Causal Analysis System, controlling the many conditions that affect operation safety, and safely lifting potentially constrained loads. Technology applications included radio frequency identification (RFID) for rigging gear, high performance wire ropes, crane simulators, oil analysis techniques, biodegradable lubricants, and fatigue of welded cranes. Copies of all presentations, in PDF format, are available on the Navy Crane Center's website at <https://portal.navfac.navy.mil/ncc>. Just click on the link to the conference on our website main page for the agenda and slides of the presentations.

From the feedback provided by the attendees, the conference was a rousing success. Hopefully, all the attendees took away new ideas in weight handling safety, efficiency and effectiveness as they carry out their varied and vital missions in support of the Fleet. Whether it is work tempo, pressure to get the job done, summertime distractions, team members in unfamiliar roles, or a dozen other factors, the challenges will always exist. Being better equipped to safely handle these challenges is our goal. Taking the time to do the job safely will improve Fleet Readiness, help achieve our mutual goal of Zero accidents and give all of us the satisfaction of a job well done.

And let me be the first to invite you to attend the third Navy Weight Handling Conference, which we plan to hold in the next two to three years. If you have any further questions, comments, or future presentation ideas, please send an email to [nfsh\\_ncc\\_conference@navy.mil](mailto:nfsh_ncc_conference@navy.mil).

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## OVERLOAD PREVENTION AND USE OF LOAD INDICATING DEVICES

Those of us who follow NASCAR have seen innovative products that have improved the safety of this sport, such as the car of tomorrow, the Hans device to protect the driver, and improved safer barriers that minimize impact on the car and driver during significant wrecks. People are sometimes reluctant to change “because we have always done it this way”. As proven in NASCAR, change can also be beneficial in lifting and handling. One recently developed device now readily available is a load indicating device (LID) that is convenient to use and can help category 2 and 3 crane operators and riggers avoid overloading cranes and rigging gear. The LID can be easily added to the rigging configuration and will provide the operator an indication and confirmation of the weight of the load being lifted. The device can be programmed to send an alarm signal when a specific load is reached. This LID is particularly suited to category 3 crane operations where shop mechanics frequently rig the load and operate the crane alone.



For lifting operations involving constrained loads or lifts that are potentially obstructed, the LID used in combination with a manual hoist will help mitigate the risk of overload. NAVFAC P-307, paragraph 10.5 (Pre-lift Preparation) requires the operator/rigger to know the weight of the load to be lifted and where overloading is possible due to binding conditions, a LID 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.

Lifting a load that is suspended and pinned in a horizontal lathe requires more in-depth planning than just a crane and slings. For example, during a crane lift of a rotor from a horizontal lathe, a manual hoist and a LID can be attached to the crane hook. Pre-determined stop points can be established to mitigate the risk of overload to the crane and rigging gear. Once the crane’s hoist block is positioned over the rotor center of gravity, hoisting of the load can be performed “one click at a time” with the manual hoist in lieu of the crane while monitoring the LID for precise movement of the load. As the pre-determined load is reached, the machinist, upon visual observation of the rotor can release the rotor from the lathe and the load will maintain its present attitude on the crane. This is one example of change that can be instrumental to further reduce crane and rigging accidents throughout shore based Navy activities.




LIDs available for purchase today are smaller in size, weigh less, and have greater working load capacities making it easy for category 2 and 3 crane operators to use an LID in everyday operations. The digital LID with hand held display can be placed in the operator/rigger tool bag and carried from job to job. ■

## **DO'S AND DON'TS FOR WIRE ROPE**

**A**s you have read in preceding articles, the Navy-wide Weight Handling Conference provided a wealth of information from knowledgeable professionals. These presentations are available on the Navy Crane Center website. One item that has been addressed recently is the application of swaged sockets on rotation resistant wire rope, i.e., Crane Safety Advisory (CSA) 184 of 10 October 2008. In the presentation, "Wire Rope for Cranes," it was stated there are so many variables with high performance rotation resistant rope that it is difficult to make a blanket statement about terminal efficiency without specific detail on rope type, fitting type, and method of attachment. During his response to questions, the presenter shared that his organization has performed a significant amount of testing to confirm that not all diameters of all designs of high performance ropes will achieve 100 percent efficiency with a swaged end fitting.

This presentation also provided a wealth of information on wire rope selection, maintenance, and inspection, emphasizing that many factors affect rope life. Loss of lubrication and failure to inspect not only the rope but all related equipment can result in unsafe rope performance.

So, review the wire rope presentation on the NCC website and **do** the maintenance and inspections that will extend rope life.

**Don't** use swaged sockets on 34 (or more) strand rotation resistant wire rope (refer to CSA 184). 

## **CRANE SAFETY ADVISORIES AND EQUIPMENT DEFICIENCY MEMORANDA**

**W**e 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**

No CSAs have been issued since the March 2009 edition of the Crane Corner.

### **EQUIPMENT DEFICIENCY MEMORANDUM**

No EDMs have been issued since the December 2008 edition of the Crane Corner. 

## **CRANE SAFETY AWARENESS FOR THE SUMMER MONTHS**

**A**s we approach the summer months, I again ask weight handling managers and supervisors to place a special focus on safe crane and rigging operations. Overall, the Navy shore based crane accident statistics thus far this fiscal year have improved over the same period last year. Many thanks for all of your hard work in making these improvements possible. Historically, the summer months have brought us some real challenges in preventing crane accidents. Our thoughts can easily shift toward thinking about spending well deserved vacation time with our families. Even after returning from leave, we have a challenge to safely get re-engaged in our work. Maintaining an ever sharp focus on the critical job at hand during weight handling operations is challenging but we cannot expect anything less. We must strive to maintain focus and ensure that weight handling operations are adequately planned and staffed to perform the task at hand.

Good planning, teamwork, communication, situational awareness and operational risk management (ORM) are all good tools for use in reducing the risk of an accident. Management should consider and address the impact of the summer vacation season on your crane teams. The team make up is often changing to support vacation schedules. A consequence may be degradation in communications or process unfamiliarity among the team.

Almost all of the reported Navy shore activity crane accidents have been attributed to human error. Crane equipment damage has by far been the most common type of crane accident reported during the past two summers, followed by crane/load collisions and dropped loads. As you would expect, improper operation or improper rigging were the prominent causes of these accidents. Prior to moving a crane or the load, have a clear understanding of its travel path (including destination) and ensure that the crane and load are clear of any obstructions. While the summer heat may be a contributing factor in some of the accidents, our data show that inside shop cranes have been involved in approximately one-third of all summer month accidents. Make sure to include inside shop operations and personnel in your surveillance activities, preemptive safety stand downs, etc.

Ensure all personnel involved in the weight handling program understand our comprehensive crane and rigging gear accident definitions and report all events that meet those definitions. Our philosophy of reporting, and learning lessons from, the small events to help prevent more serious events has shown itself to be effective.

Each weight handling accident diminishes support to the fleet. A safe and reliable Navy weight handling program is an essential enabler for Fleet Readiness. 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. ■

## **SUMMARY OF WEIGHT HANDLING EQUIPMENT ACCIDENTS SECOND QUARTER FY09**

**T**he 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 P-307 requires commands to submit to the Navy Crane Center (NAVCRANECEN) a final accident report (including corrective/preventive actions) within 30 days of an accident, regardless of severity or type. This reporting requirement includes rigging gear accidents (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. In order to allow NAVCRANECEN adequate time to react to negative or undesirable accident trends, activities shall provide an initial notification of all crane and rigging gear accidents within 3 days of the occurrence with the facts known at that time. For accidents involving a fatality, in-patient hospitalization, overturned crane, collapsed boom, or other major damage to the crane, load, or adjacent property NAVCRANECEN should be notified as soon as practical but not later than 24 hours after the event. Forward all notifications and accident reports to: [nfsh\\_ncc\\_accident@navy.mil](mailto:nfsh_ncc_accident@navy.mil)

For the second quarter of FY09, 39 Navy WHE accidents (33 crane accidents and 6 rigging gear accidents) and 11 contractor crane accidents were reported. Nine of the 33 crane accidents were significant (overload, dropped load, two block, or injury). Some of the more significant crane accidents this quarter are discussed herein.

### **DROPPED LOAD**

**Accident:** During the installation of a component, two clasps in the rigging assembly failed and the component fell to the ground. A rigger was moving out of the way of the dropped load and suffered a bruised leg from a fall. It was later discovered that the straps of the lifting harness assembly were found to be threaded backwards in each buckle. This resulted in very little resistance and the straps pulled through.

**Lessons learned:** A primary cause of the dropped load was improper rigging of the load. A contributing factor was that the Navy rigger in charge did not inspect the rigging assembly after the contractor had installed the straps in buckles of the assembly. The contractor did not follow the correct procedure for their installation. As noted in NAVCRANECEN P 121451Z DEC 08, when using below-the-hook lifting devices strict compliance with applicable installation and assembly procedures is vital. Where procedures are unclear or unavailable, contact the engineering group for guidance.

### OVERLOAD ACCIDENT

**Accident:** During the lifting of a pallet from the deck of a barge to the pier the crane was rotated toward the pier and during lowering of the load the mobile crane tipped over. The rigger-in-charge did not determine or verify the weights to be lifted or consider the additional weight of the rigging gear or hook/block. The rigger-in-charge was not sufficiently knowledgeable in determining limits based on crane set-up, configuration, radius and angles.

**Lessons learned:** The rigger-in-charge and the crane operator did not follow procedures for determining load weight capacity and safe handling based on the crane set-up, configuration and radius to be used. It is vital to mobile crane operations to understand how the configuration and lift radius affect the load capacity of the crane.

### INJURY

**Accident:** While lifting a 380-pound DC pole with an uncertified and improvised lifting fixture, the fixture failed causing the pole to fall approximately four inches to the work bench. The lifting fixture subsequently cantilevered and struck the crane operator in the face. The lifting fixture was of the operator's design to lift the DC poles. The supervisor of the operator had failed to ensure a proper plan was in place to have the lifting fixture designed, reviewed and approved by the appropriate technical codes. The supervisor also did not have the lifting fixture tested and certified, nor did he provide the crane operator with clear limits on the use of the lifting fixture

**Lessons learned:** Changes in lift procedures and opportunities for possible improvements should always be reviewed by the appropriate technical codes. As is stated in NAVFAC P-307, Section 14, all rigging equipment must be inspected and tested before use.

**Accident:** A piece of equipment was damaged and two riggers were injured when a tagline that was being used to separate the rigging became detached from the rigging causing the riggers to fall backwards. The taglines were not secured properly to the rigging. The riggers also failed to follow the provided lift sketch of the rigging configuration. Adequate supervision was not provided, as the supervisor did not effectively identify the procedural violation.

**Lessons learned:** Lift sketches for rigging configurations should be followed verbatim unless the sketch specifically says that it is guidance. It is supervision's responsibility to ensure procedures are understood and followed. The employees as well have the responsibility to understand and follow established procedures. A proper brief of the lift would have identified possible problems with the lift and the corrective actions needed to ensure a safe lift.

### CONTRACTOR ACCIDENTS:

**Accident:** NAVCRANECEN has seen an increase in reported contractor crane accidents in the second quarter of FY09. There was a total of 11 reported with 6 of those considered significant (overload, dropped load, or injury). Almost 40% of the contractor crane accidents involved dropped loads. The main causes of these were improper rigging practices.

**Lessons learned:** Contractor crane oversight personnel need to stay vigilant to ensure contractors are performing crane operations in a safe manner. They must also make sure to report all possible crane accidents to NAVCRANECEN.

Effective planning, teamwork, communication, situational awareness, and operational risk management (ORM) as detailed in OPNAVINST 3500.39B are all good tools for reducing the risk of an accident. Good job planning and communication go hand in hand. A training video called "Take Two" that discusses the importance of good planning, communication, and ORM is now available on the Navy Crane Center website for your use.

Weight handling program managers 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 ORM. Our goal remains ZERO crane accidents. ■

### **CRANE ACCIDENT PREVENTION NEAR OVERHEAD TRANSMISSION LINES**

**R**ecently, a crane accident occurred at a Navy facility when rigging attached to a contractor's mobile crane contacted a high voltage overhead power transmission line during a load movement. No injuries resulted from this accident. However, it caused a significant power outage at the facility. The consequences could have been much worse.

According to the Bureau of Labor Statistics, power line contact is one of the most common causes of fatalities associated with cranes. The presence of power lines around a crane operating envelope poses a significant hazard to employees at the site. Power lines can be a hazard not only during the hoisting operation of cranes, but also during assembly and disassembly of the equipment and traveling the crane under power lines. Because of the voltages involved, overhead power lines present an extremely high risk of fatal electrical shock. The danger posed by overhead power lines is often compounded by other factors, such as uneven ground that could cause the crane to move into power lines, and windy conditions that can cause the power lines or a load to sway, reducing clearance.

Preventing power line contact begins with good planning. The best prevention is to avoid establishing laydown areas where overhead power lines may create a hazard during crane operations. Ensure the crane's travel route to a job site is clear of overhead power lines that could come into contact with the equipment. Check for the presence of power lines before setting up or operating cranes. Establish and maintain required clearances at all times.

Management shall ensure crane teams are aware of crane travel restrictions within the facility and emphasize special hazards associated with operating in the vicinity of overhead transmission lines. The preferred alternative when operating in the vicinity of overhead lines is to have the power line de-energized and visibly grounded. If this is not possible and if any part of the crane (including the fully extended boom of a telescoping boom crane) or load could approach the clearance distances noted in NAVFAC P-307, the following steps shall be taken:

- A. An operator supervisor or rigger supervisor shall visit the site, assess potential hazards, establish procedures to safely complete the operation, and properly brief the crane team on the procedures.
- B. The clearance distances noted in NAVFAC P-307 shall be maintained. For long span lines, lateral movement due to wind shall be considered in assessing whether the minimum clearance should be increased. Also assess the sail area of the load and the potential for drifting into the clearance zone.

C. A rigger whose sole responsibility is to ensure that the established minimum clearances are maintained shall be in constant contact with the operator.

D. No one shall be permitted to touch the crane or the load unless the above noted rigger indicates it is safe to do so. Personnel permitted to touch the crane shall use protective equipment rated for the voltage.

E. Tag lines for load control, when required, shall be of a non-conductive type. These rules shall be followed even when the crane is equipped with insulators or sensors for detecting high voltage.

Contracting officers must be alert to this particular hazard at construction sites where overhead power lines exist. For construction contracts, the requirements of 29CFR1926.550(a)(15) apply to lift operations in the vicinity of overhead power lines. Contracting officers should review these requirements with contractors; require notification by the contractor of any crane operations in the vicinity of power lines; and increase surveillance as required. To ensure adequate controls are in place for all contractor crane operations, activity commanders should assess compliance with the requirements of paragraph 1.7.2 of NAVFAC P-307. Specifically, ensure that all contracts include the minimum requirements of paragraph 1.7.2 for contractor cranes, concur with the contracting officer's oversight plan, ensure that the oversight plan is being carried out, and provide oversight of contractor crane accident investigations and corrective actions.

Each weight handling accident diminishes support to the fleet. Good planning, teamwork, communication, situational awareness and operational risk management (ORM) are all good tools for use in reducing the risk of an accident and harm to our workforce. A safe and reliable Navy weight handling program is an essential enabler for fleet readiness. As such, we must strive for the goal of ZERO weight handling accidents. ■

## **WEIGHT HANDLING EQUIPMENT PREPARATION FOR SEVERE WEATHER CONDITIONS**

**R**ecently, a Navy activity experienced a weather event that resulted in significant damage to several cranes and other property. During the evening, a line of severe thunderstorms moved into the area accompanied by high winds. The high winds pushed several unoccupied rail mounted cranes down the tracks in excess of 300 feet. One crane collided with another resulting in significant structural damage and derailment. An investigation is underway to determine the facts surrounding this incident and to identify lessons learned that may prevent a recurrence. Meanwhile, activities should be proactive in assessing vulnerabilities to weight handling equipment (WHE) and operations due to destructive weather.

NAVFAC P-307 requires activities to have adequate means for monitoring local weather conditions, to have contingency plans in place in the event of destructive weather, and to develop instructions for suspending operations and securing WHE in adverse weather conditions, including high winds. These instructions should include procedures to adequately secure WHE that is out of service or not in continued use. Additionally, the instructions should ensure OEM design parameters are followed. Activities should review local destructive weather plans to ensure the protection of WHE is adequately addressed. The review should include an evaluation of readily available supplies necessary to secure WHE, including the staging locations for these materials.

Protecting our weight handling assets through adequate planning and prevention is a prerequisite for ensuring that they remain an essential enabler to fleet readiness. ■

## **SHARE YOUR SUCCESS**

**W**e are always in need of articles from the field. Please share your sea stories with our editor [nfsh\\_ncc\\_crane\\_corner@navy.mil](mailto:nfsh_ncc_crane_corner@navy.mil). ■

## **Weight Handling Program 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 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.

*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.

*Load Testing Mobile Cranes at Naval Shore Activities* provides load test personnel guidance on properly testing mobile cranes per NAVFAC P-307.

*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 ensures interactive involvement of the crane team in addressing responsibilities, procedures, precautions and operational risk management associated with a planned crane operation.

All of the videos can be viewed on the Navy Crane Center website:

<https://portal.navfac.navy.mil/ncc>