



# THE CRANE CORNER

## *Navy Crane Center Technical Bulletin*

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### WORD FROM TOPSIDE

*Sam Bevins*

Weight handling operations, by their nature, present significant risk. Gravity is constant and unforgiving. Safe weight handling requires safe equipment safely operated by trained and experienced personnel. This is true even when there are no external influences affecting operations. In this current environment of fiscal challenge, it is well to keep in mind that no weight handling operation is so important that it cannot be done safely.

Activity leadership and weight handling managers basically have two options: Comply with requirements, ensure the equipment is safe to operate, properly manage risk, maintain situational awareness, and practice effective teamwork; or do not make the lift. If funding is not available to perform required equipment maintenance or to make necessary repairs, remove the equipment from service and provide appropriate chain of command notification. 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 fiscal environment, but cutting corners on requirements, equipment, or operational safety is not acceptable. Operational risk management will be more important than ever in these challenging times.

As we know, most accidents are caused by human error. Particularly, in these challenging times of uncertainty, people can lose focus on the critical task at hand. For the inherently unforgiving, high-risk environment of weight handling operations, it is essential that people stay focused and practice ORM. In his recent naval message on ORM, the CNO emphasized safety as a critical element of mission execution as we all work to support Fleet Readiness with a strong sense of urgency. ■

### UPCOMING REVISION TO NAVFAC P-307

The Navy Crane Center is developing a revision to NAVFAC P-307, Managing of Weight Handling Equipment. The current changes will be incorporated and Requests for Clarification, Deviation, Revision (RCDR); Crane Safety Advisories (CSA); and Equipment Deficiency Memoranda (EDM) written since the last revision will be reviewed for incorporation. Known areas for improvement will be revised, and industry and consensus standards will be reviewed for updates. There will be an opportunity for activities to comment on the proposed revisions later in 2013; however, Navy activities are requested to send their specific suggestions for improvement and revision before this comment period by contacting the Navy Crane Center's webmaster. ■

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## 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): ESCO safety notice to users of ESCO 9/16 inch carbon steel sleeves product info P5009RIG0110408

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 Corporation issued a safety notice in 2005 (Ref 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 reference (b) 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 corporation website at <http://litlibrary.escocorp.com/dynamic/p5009rig011.pdf>

#### Direction:

A. Activities shall remove from service flemish eye slings fabricated with ESCO 9/16 inch carbon steel sleeves (part no. 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 weights 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).

## **EDM 100 - Proper Inspection of ESCO Corporation Stainless Steel Swage Sockets**

Ref (a): Safety notice to users of ESCO Corporation stainless steel swage sockets product information P5012RIG011040.

Ref (b): Safety notice to users of ESCO Corporation stainless steel swage sockets product info P5011RIG0110408.

Ref (c): Safety notice to users of ESCO Corporation stainless steel swage sockets product info P5010RIG0110408.

Ref (d): NAVFAC P-307, Management of Weight Handling Equipment.


### **Background:**

A. The purpose of this EDM is to notify activities of the importance of inspecting particular areas of ESCO Corporation's stainless steel swage sockets.

B. ESCO Corporation issued three safety notices in 2004, references (a), (b), and (c), informing users that ESCO stainless steel swage sockets sold prior to January 2003 may contain cracks. Reference (a) documented five specific part numbers affected and associated actions to take. References (b) and (c) revised the initial list to include all ESCO stainless steel swage sockets sold prior to January 2003.

C. References (a), (b), and (c) informed users to immediately inspect the area at the base of the socket (lugs or bail), where the base transitions to the shank, for visible cracks on any ESCO stainless steel swage socket delivered prior to January 2003 and to remove the socket from service and contact ESCO for a replacement if a crack was found.

D. NCC recognizes that these ESCO safety notices date back to 2004 and that activities perform detailed inspections of wire rope end fittings annually, and prior to use for slings, in accordance with reference (d), Appendix (c) or (d), and Section 14. Activities need not remove equipment from service to perform additional inspections. Activities are informed that while completing crane operator's daily checklists (ODCL), particular attention should be focused on wire rope end terminations (if these portions of the socket are accessible). During pre-use inspections of rigging gear, particular attention should be focused on areas at the base of the socket lugs or bails, where the base transitions to the shank for cracks. Additionally, these inspections should also be performed at annual inspections for rigging gear and cranes. NCC recommends that inspection attributes be updated accordingly to reflect the above discussion.

E. References (a), (b), and (c) are available for download from the ESCO Corporation website at <http://litlibrary.escocorp.com/dynamic/p5012rig011.pdf>, <http://litlibrary.escocorp.com/dynamic/p5011rig011.pdf>, <http://litlibrary.escocorp.com/dynamic/p5010rig011.pdf>. 

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

As we approach the spring/summer months, I again ask weight handling managers and supervisors to place a special focus on safe crane and rigging operations. Overall, the trend of Navy shore-based crane accidents thus far this fiscal year parallels that of the same period last year. We still have six months remaining in the fiscal year, and with proper risk management, we have the opportunity to make significant improvements from last year's totals.


Historically, the warmer months have brought unique challenges in preventing crane accidents. With the distractions associated with the warmer weather, vacations and leave, combined now with the current challenging fiscal uncertainties, maintaining a sharp focus on the critical job at hand during weight handling operations is most imperative. We must ensure that we appropriately address the challenges these circumstances may create as we assemble our weight handling maintenance and operations teams. We must strive to maintain focus and ensure that weight handling operations are properly planned and executed. As the Chief of Naval Operations recently reaffirmed, "we will only execute our missions with the proper training, resources, and safety measures." His words are especially important to reiterate to our weight handling teams during these difficult times. We must ensure that jobs are adequately staffed to guard against the possibility of "cutting corners" in an attempt to get the job done. Personnel should be reminded that no task is so important or urgent that it cannot be done safely.

I encourage all Navy weight handling managers to address this challenge with their personnel in order to maintain focus and reduce the risk of accidents. Nearly all of the reported Navy shore activity crane accidents are attributable to human error. By intensifying safety awareness in all weight handling operations, we can continue to strengthen and improve the Navy's weight handling safety performance. Good planning, teamwork, communication, and situational awareness are all valuable tools for use in reducing weight handling risks. Operational risk management (ORM) must be a fundamental element of any undertaking.

Independent observations of crane and rigging operations by experienced personnel is a highly encouraged and proactive method to validate compliance and to ensure that weight handling operations are being performed safely. During these observations, look for warning signs of complacency or taking shortcuts. Include operations where there is no load on the hook. Over 40 percent of all crane accidents during the past eighteen months occurred when the crane had no load on the hook.

Activities should consider a preemptive safety awareness briefing to reinforce management's expectations for adherence to safe weight handling requirements and practices. Recognize safe practices and achievements where warranted. As a reminder, there are seven crane accident prevention videos available to assist activities in raising the level of safety awareness among their personnel involved in weight handling operations. These videos provide a very useful mechanism for emphasizing the impact that the human element can have on safe weight handling operations. In addition to these lessons learned safety videos, other videos are available (safe rigging and operation of category 3 cranes, mobile crane safety, and weight handling program for commanding officers) to assist commands in crane safety awareness. All can be ordered from or viewed on the Navy crane center website <https://portal.navy.mil/ncc>.

In order to maintain an intense focus on safety, we have very rigorous crane and rigging gear accident definitions that include essentially any unplanned event in a weight handling evolution, whether or not injury or damage occurs. The basic strategy is that all accidents (regardless of severity) must be investigated and reported to ensure the command, as well as the Navy, benefit from the lessons learned. With this approach, along with a focused safety awareness by all personnel involved in weight handling operations and consistent application of ORM principles, significant crane accidents can be prevented.

As we are all aware, Navy shore weight handling operations are unforgiving high-risk operating environments that require continuous rigorous oversight and compliance with stringent program requirements. Additionally, under the current challenging fiscal environment, it is even more important that we emphasize the value of having people focus on the near misses and human behaviors that can lead to accidents. The efficiency of mission execution is significantly improved by preventing personnel injury, equipment damage, and schedule disruption that can result from weight handling accidents. Safe and reliable weight handling operations directly support fleet readiness...enabling overhauling, repairing, fueling, refueling, and arming ships and submarines. 

## WEIGHT HANDLING TRAINING BRIEF

The Weight Handling Training Brief (WHTB) is provided for communication to personnel associated with Navy Shore Weight Handling. The purpose of this brief is to remind personnel of the availability of our web-based weight handling courses on Navy Knowledge Online/Navy E-Learning. The web-based training curriculum provides an efficient and effective means of obtaining user-friendly weight handling training in a manner that does not require tuition and travel costs. By design, these courses reinforce and enhance existing knowledge and provide a base upon which to develop experienced, competent personnel through on-the-job training. This information is specifically applicable to all personnel who are involved in the supervision and/or training of weight handling personnel. Similar to the Navy Shore Weight Handling Safety Brief, the WHTB is intended to be a concise and informative discussion of a trend, concern, or requirement related to recent/real time issues that have the potential to affect our performance and efficiency. The WHTB is not command-specific and can be used by your activity to increase awareness of weight handling information in general, potential issues, or weaknesses that could result in problems for your weight handling program. The WHTB can be provided directly to personnel, posted in appropriate areas at your command as a reminder to those performing weight handling tasks, or provided as supplemental information for supervisory use during routine discussions with employees.

When Navy Shore Weight Handling Safety or Training Briefs are issued, they are also posted on the Navy Crane Center's website at:

[https://portal.navfac.navy.mil/portal/page/portal/navfac/navfac\\_ww\\_pp/navfac\\_ncc\\_pp/tab66035:whapi](https://portal.navfac.navy.mil/portal/page/portal/navfac/navfac_ww_pp/navfac_ncc_pp/tab66035:whapi)



### NAVFAC P-307 WEB-BASED COURSES

- General Crane Safety
- General Crane Safety Refresher
- Category 2 and cab-operated Category 3 Crane Safety
- Category 2 Crane Safety Refresher
- Category 3 non-cab operated Crane Safety
- Category 4 Crane Safety
- Crane Rigger
- Rigging Gear Inspection
- Load Test Director
- Certifying Official
- Contractor Crane Awareness
- Crane Mechanic
- Mobile Crane Mechanic
- Mechanical Crane Inspector
- Crane Electrician
- Electrical Crane Inspector

Log into NKO then click the following:

- Navy eLearning – Online Courses
- Browse Categories
- DON Training
- Navy Crane Training
- Course Title
- Enroll
- Proceed to Enrollments
- Launch

- NAVFAC P-307 Section 13 provides training and qualification requirements for military, civilian and contractor personnel involved in the operation, maintenance, inspection, and testing of Navy WHE.
  - Table 13-1 lists minimum course requirements
- All 16 courses are available, at no cost, via the internet at Navy Knowledge Online/Navy eLearning (NKO/NEL).
  - <https://wwwa.nko.navy.mil/portal/home/>
- These courses acquaint personnel with Navy requirements to safely perform WHE related tasks. By design, these courses reinforce and enhance existing knowledge and provide a base upon which to develop experienced, competent personnel through on-the-job training.
- The NCC Training web page provides course descriptions and other helpful training-related information. Go to the NCC home page and click on the training page link.
  - <https://portal.navfac.navy.mil/ncc/>
- NAVFAC P-307 courses do not provide hands-on training nor will they qualify personnel to perform a specific function, task or assignment.
- The command, activity or organization shall:
  - arrange additional training, as necessary, to develop safe, competent personnel
  - Ensure completion of all federal, state, local and Navy training, OJT, examination, and licensing requirements prior to qualifying/assigning personnel for WHE tasks and duties
- NAVFAC P-307 Appendix N lists knowledge and skill competencies.
- The NKO help desk and tutorials can assist with obtaining access.

13 March 2013


Training

Navy Crane Center 13-T-01



## ACQUISITION UPDATES

### 75-TON, TOP RUNNING, DOUBLE GIRDER, CAB OPERATED BRIDGE CRANE

***T***he Navy Crane Center accepted one 75-ton rated capacity, top running, double girder, cab operated crane. Unique features of this crane are two bridges, a primary and a secondary, and two 37.5-ton trolleys. The primary bridge spans an incoming railway while the secondary bridge aligns with the rail cars allowing the trolleys to operate in tandem to load and unload rail cars more efficiently. The electric powered crane has a 126-foot primary bridge span and a maximum hook height of 30 feet above the railway. The project also included new runway electrification, removal of the existing 60-ton crane, realignment of the crane runway rail, and reconditioning of the runway support structure. 



### THREE 4.5-TON, TOP RUNNING BRIDGE, UNDERHUNG TROLLEY CRANES

*The* Navy Crane Center accepted three 4.5-ton rated capacity, top running bridge, underhung trolley cranes. Each crane will serve one of the three storage bays in the structure. The electric powered pendant controlled cranes have spans of approximately 23 feet and a maximum hook height of 9 feet 8-5/8 inches above the finished floor. These cranes were designed to meet the stringent structural loading and clearance requirements of the structure. The crane supporting structure was designed to allow utilization of floor space to the maximum extent possible. Variable frequency drives enable operating speeds from 14 feet per minute down to 1 foot per minute for the hoist, 50 feet per minute down to 2 feet per minute for the bridge travel, and 30 feet per minute down to 2 feet per minute for the trolley travel. The project included the crane supporting structure and runway electrification. ■



## 65/6-TON GANTRY CRANE OVERHAUL

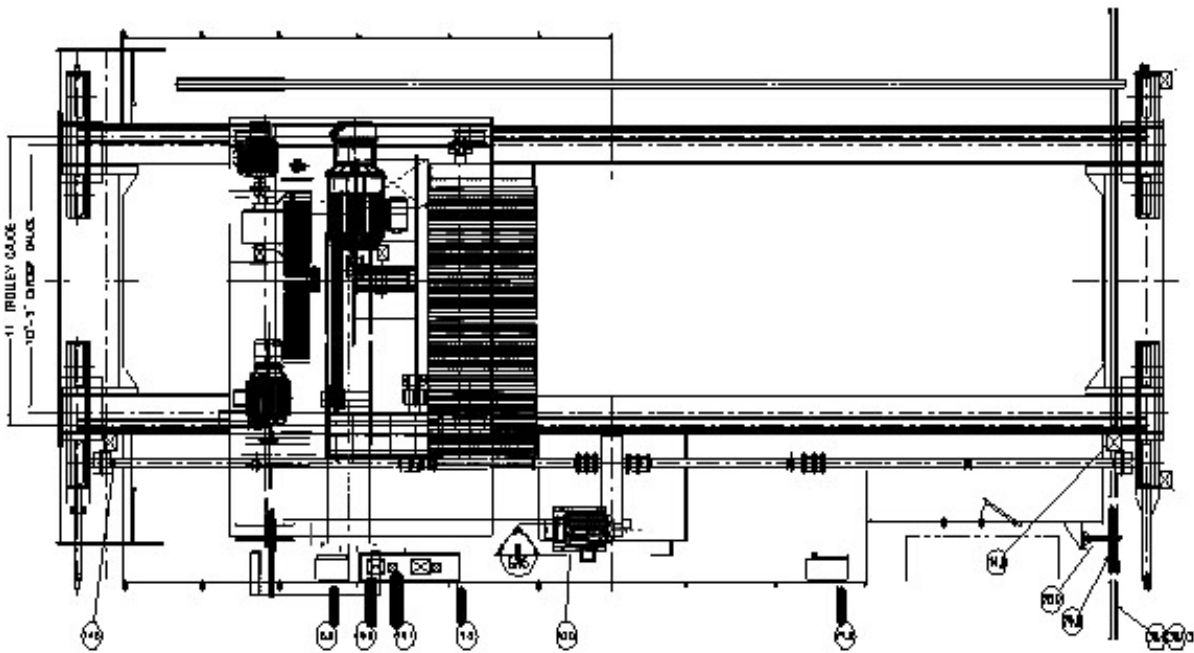
***T***he Navy Crane Center accepted the overhaul of a 65-ton main/6-ton auxiliary rated capacity ordnance handling gantry crane. The overhaul consisted of full replacement of the hoist/trolley, crane electrification, control drives, and control panels. The electric powered crane has a 100-foot span and a maximum hook height of 132 feet. Closed loop flux vector drives enable operating speeds of 8 feet per minute down to 1 foot per minute for the hoist, 50 feet per minute down to 2 feet per minute for the bridge travel, and 35 feet per minute down to 1 foot per minute for the trolley travel. The overhaul was performed without removing the crane structure from its runway. ■





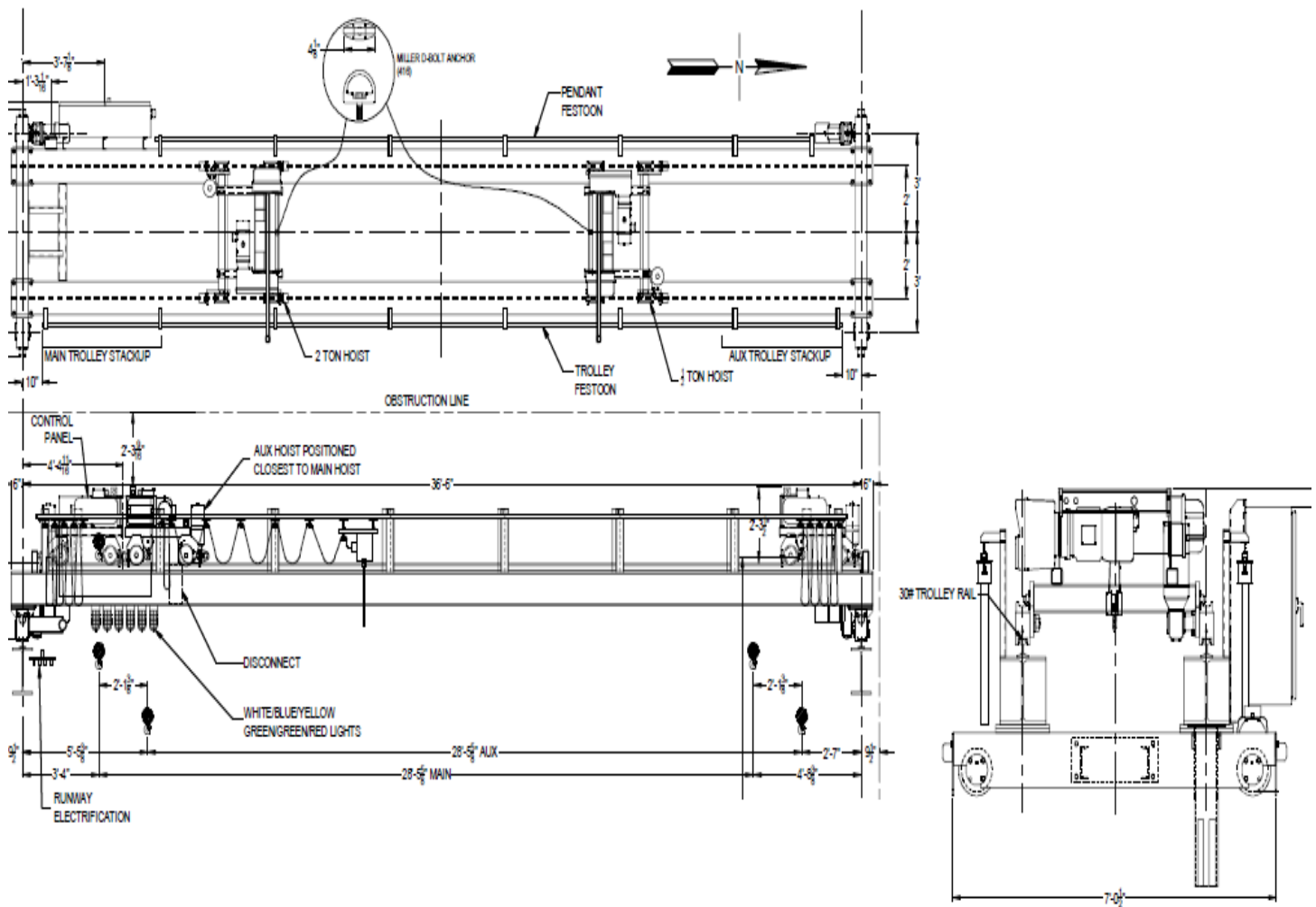
## 65/6-TON BRIDGE CRANE OVERHAUL

**T**he Navy Crane Center accepted the overhaul of a 65-ton main/6-ton auxiliary rated capacity ordnance handling bridge crane. The overhaul consisted of full replacement of the hoist/trolley, crane electrification, control drives, and control panels. The electric powered crane has a span of 53 feet 6 inches and a maximum hook height of 87 feet. Closed loop flux vector drives enable operating speeds of 8 feet per minute down to 1 foot per minute for the hoist, 50 feet per minute down to 2 feet per minute for the bridge travel, and 35 feet per minute down to 1 foot per minute for the trolley travel. The overhaul was performed without removing the crane from its runway.




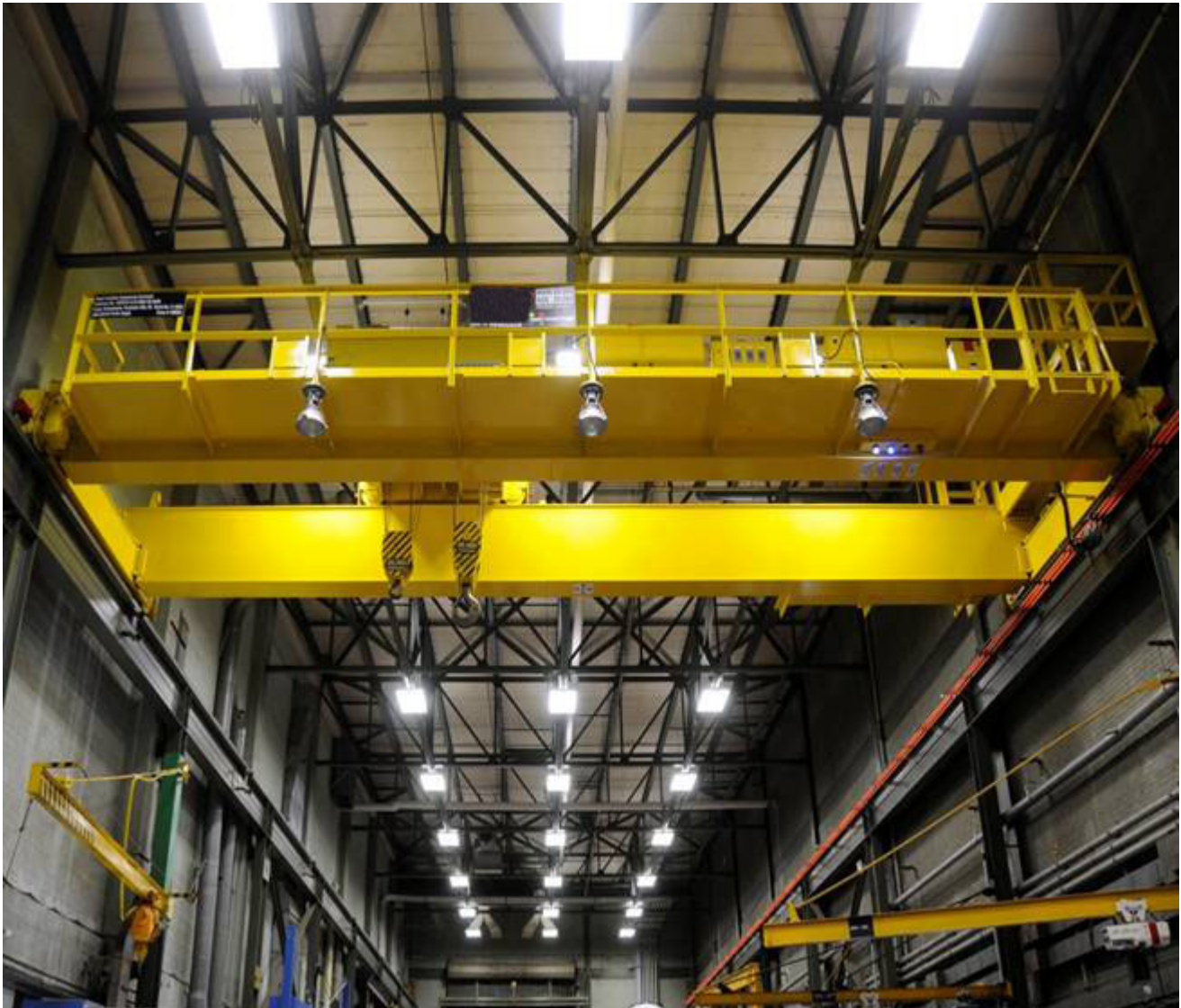
## 2-TON and 3-TON TOP RUNNING DOUBLE GIRDER BRIDGE CRANES

The Navy Crane Center accepted two pendant controlled top running, double girder, ordnance handling bridge cranes. Both of the cranes were contracted to meet the requirements of an existing facility which had a low crane rail compared to the required hook height. The cranes were designed to maximize lift height with the low crane rail. The project included new runway electrification for both cranes. One of the cranes is a 2-ton crane with a ½-ton hoist on a separate trolley that gives the crane the flexibility to upright objects using the hoists in combination. The 2-ton rated capacity crane has a span of 36.5 feet and a hook height of 15.5 feet. The second crane is a 3-ton rated capacity crane, which is designed to go outside over a partially enclosed loading bay. The 3-ton crane has a span of approximately 27 feet and a hook height of 15.5 feet. Variable speed drives on both cranes enable bridge speeds between 5 and 75 feet per minute, trolley speeds between 3.5 and 50 feet per minute, and hoist speeds between 1 and 15 feet per minute. ■



### 30/10-TON TOP RUNNING DOUBLE GIRDER BRIDGE CRANE

**T**he Navy Crane Center accepted a top running double girder crane for an electrical fabrication and repair shop. The electric powered crane has a span of approximately 44 feet and a maximum hook height of 27 feet above the finished floor and includes a radio control option. Variable frequency drives enable operating speeds of 20 feet per minute down to 2 foot per minute for the hoist, 150 feet per minute down to 15 feet per minute for the bridge travel, and 80 feet per minute down to 8 feet per minute for the trolley travel. This crane also has a remote readable load indicating device and new runway electrification. 



## **TIP OF THE SPEAR (Common Audit Items)**

**T**his 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**

Reviews of surveillance (oversight) programs identified several areas in need of improvement including the need for increased participation in the surveillance program by all personnel involved in the weight handling program. Additionally, the majority of personnel were not focusing on tangible deficiencies which are those that could potentially lead to a crane or rigging accident. Tangible deficiencies include such items as an operator making movement without direction, poor load control (insufficient tag line use), the rigger-in-charge (RIC) not in overall control of the evolution, the RIC out of place, inattentive crane team personnel, track walkers out of position, and poor rigging practices.

Reviews of internal audits identified that the focus of the audits had not progressed beyond compliance-based issues. Although compliance-based auditing is the foundation of a strong audit program, it will be difficult for the auditors to assist the activity in long-term improvement if they do not evaluate the areas being reviewed. For example, an internal crane maintenance audit identified a Level 1 finding where an electrician did not lock out the crane while performing an electrical frisk. Although this was a good finding, the audit report did not address or include an evaluation of the oversight being provided by the maintenance division, or whether or not surveillance findings were reviewed for similar problems.

### **Operations**

A category 3 crane operator was using a synthetic web sling at an angle less than 30 degrees from horizontal, contrary to NAVFAC P-307, paragraph 14.7.

A category 3 crane operator was lifting a component without using chafing gear, and when questioned by the audit team, the operator did not know the proper actions to take in the event that the rigging gear was damaged during use, contrary to NAVFAC P-307, paragraph 12.4.

A category 3 crane operator was using a machinery type eyebolt to lift a component but was not lifting in the plane of the eye, nor was the eyebolt fully seated, contrary to NAVFAC P-307, paragraph 14.8.4.

A category 3 crane operator left the crane energized and stowed in the upper limit switch, contrary to category 3 crane training.

In numerous instances, damage to equipment (primarily rigging gear) was found by the activity and removed from service, but an investigation was not performed to determine if an accident had occurred and if lessons learned could be shared.



While a ship's brow was being lifted, a crane rigger went under the brow to retrieve a tagline, contrary to NAVFAC P-307, paragraph 10.7.

Category 3 crane operators who operated cranes infrequently were unfamiliar with all of the requirements of the operator's pre-use check of the cranes.

### **Contractor Cranes**

NAVFAC P-307, paragraph 1.7.2.2 requires the contracting officer to conduct oversight of contractor crane operations based upon the risk to Government personnel and property. NCC audit team's review of oversight checklists (P-307 Fig. P-2) identified that the contracting officer had a form for each crane and/or multipurpose machine (used to lift suspended loads) on the construction site; however, when cranes were set up long-term (i.e. a month or greater), additional oversight forms were not completed. Although NAVFAC P-307 does not currently provide a minimum frequency for completion of checklists, the audit team highly recommends more frequent completion of the checklists for long-term projects to minimize risk to Government property and personnel. Note: Amplification of the P-2 intent will be addressed in the next revision of NAVFAC P-307 (currently in process).

While a contractor crane was setting up for a lift, the riggers did not provide any signals to the operator, contrary to NAVFAC P-307, paragraph 1.7.2.a and appendix P, Figure P-2 (item 17).

A shackle without any original equipment manufacturer markings or capacity was identified, contrary to NAVFAC P-307 paragraph 1.7.2.b.

### **Maintenance, Inspection, Test, and Certification**

During the period between the completion of the MISR and the performance of the crane condition inspection, newly identified deficiencies were listed on a separate shop repair order (SRO) for the shop to perform corrective action. However, the SRO was not included in the certification package. As a result, the certifying official was not able to review all deficiencies or all work completed during the maintenance availability.

Some category 1 crane equipment history files did not annotate whether the maintenance periodicity was based on an hour meter or calendar month basis, contrary to NAVFAC P-307, paragraph 2.4.1.

### **Engineering**

Examples were identified where technical evaluations did not clearly document what had actually taken place, the state of the equipment, the troubleshooting steps taken, and/or the corrective actions required.

Auditors found documentation of conditions evaluated or inspected that did not record the actual measured data in the evaluation. For example, a recent evaluation stated that an abnormal noise emanating from a piece of equipment was similar to the previous evaluation completed over two years earlier. Neither evaluation recorded any sound measurements to establish a baseline for the deficiency.

### **Rigging Gear**

An out-of-service lift rig was not segregated from tested and inspected rigging gear, contrary to NAVFAC P-307 paragraph 14.4.

Synthetic round slings failed a visual inspection (core exposed and paint on sling), contrary to NAVFAC P-307, paragraph 14.7.4.3.4. Additionally, a wire rope sling was secured to itself in a manner that prevented a full pre-use inspection as required by NAVFAC P-307 paragraph 14.4.2.

Test weights were identified with bent lifting attachments, contrary to NAVFAC P-307, paragraph 14.4.

Numerous activities had rigging gear that was not in a test and inspection program, contrary to NAVFAC P-307 paragraph 14.4.

Numerous safety hoist rings and eyebolts were stored together without any concern for potential damage to the threads. The audit team recommended the activity evaluate utilizing thread protection to minimize potential damage. Additionally, shackles were stored on top of synthetic round slings, contrary to ASME B30.9, paragraph 9-6.10.3(a).

### **Training**

Crane operator license records lacked written documentation to verify operation during the license period as required to waive the performance test, contrary to NAVFAC P-307, paragraph 8.5.3.1(d). 

## **NEW INSTRUCTION ON DESIGN OF NAVY SHORE WEIGHT HANDLING EQUIPMENT**


The Navy Crane Center recently announced the issuance of NAVCRANECEN Instruction 11450.2, Design of Navy Shore Weight Handling Equipment. This instruction supersedes and cancels Unified Facilities Criteria (UFC) 3-320-07N, Weight Handling Equipment. The instruction can be downloaded from the Navy Crane Center web site at <https://portal.navfac.navy.mil/ncc>.

SECNAVINST 11260.2A, Navy Weight Handling Program for Shore Activities, assigns responsibility for the direction and oversight of all matters pertaining to the Navy's weight handling program at Navy shore activities to the Commander, Naval Facilities Engineering Command, and further states that these responsibilities shall be accomplished through the Navy Crane Center. Included among these responsibilities is development and maintenance of criteria regarding weight handling equipment (WHE) design. Navy Crane Center's WHE design criteria have been revised and are now contained in NAVCRANECEN Instruction 11450.2.

The major changes to the instruction compared to the previous UFC 3-320-07N are as follows:

1. A wholesale revision incorporating changes in crane design and utilization that have occurred since the original revision of UFC 3-320-07N issued in January 2004 and changes 1 and 2 issued in May 2007 and August 2007 respectively.
2. Extensive renumbering and format change; this instruction no longer resembles the format of the previous UFC or Mil-Handbooks.
3. Consolidation of Special Purpose Service (SPS) crane design requirements from various NAVFAC and NAVSEA manuals into this instruction.

4. Update of technical specifications in all areas to match latest crane designs.
5. Revision of electrical specifications to incorporate latest variable frequency design requirements.
6. Clarified requirements for hoist brakes.
7. Clarified package hoist rules, allowing some components not previously permitted.
8. Addition of procurement specifications for rigging equipment.

NAVCRANECENINST 11450.2 is applicable to WHE at Navy shore activities and detachments and shore-based fleet activities and detachments. These design criteria shall be used as the basis for technical specifications for the procurement of new and overhauled shore based WHE. These criteria shall also be utilized as the technical basis for crane alterations. See NAVCRANECENINST 11450.1A for policy on acquisition of Navy shore based WHE. The processes for crane alterations are provided in NAVFAC P-307. 

## SUMMARY OF WEIGHT HANDLING EQUIPMENT ACCIDENTS FIRST QUARTER FY13

**The** purpose of this article is to disseminate and share lessons learned from select shore activity weight handling equipment (WHE) accidents, near misses, and other unplanned occurrences so that similar events can be avoided and overall Navy weight handling safety and performance can be improved.

For the 1st quarter of FY13, 60 Navy WHE accidents (41 crane and 19 rigging) and 25 crane and rigging gear near misses/other unplanned occurrences (20 crane and 5 rigging) were reported. A near miss/other unplanned occurrence is a situation where an accident was avoided by mere chance or where intervention prevented an ongoing sequence of events that would have resulted in an accident. Of the 60 Navy WHE accidents, 22 were considered significant (injury, dropped load, overload, or two block). Additionally, a total of nine contractor accidents were reported, six of which were significant. 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, large dollar-value damage, and significant delays to fleet operations. The occurrence of significant accidents can be reduced by identifying, reporting, and learning from lower level or minor weight handling accidents, unplanned occurrences, or worksite observations. Lessons which can be shared from the reported significant Navy crane and rigging gear accidents and other unplanned occurrences are discussed below.

### INJURIES

**Accidents:** A rigger was injured while rigging out a cylinder head when his hand was caught between the load and the ship's bulkhead. A shipwright suffered minor injuries when he was struck in the shoulder with a piece of timber while riggers were landing timbers on staging. An employee was injured when a component being unrigged shifted and pinched the employee's finger. An employee was injured when a small rotor dropped from its rigging and rolled onto the employee's hand.

**Lessons Learned:** Personnel should minimize or eliminate, when possible, the need to manually handle any component while it is suspended and ensure items are set on flat stable surfaces. Personnel must remain alert to pinch points during the entire weight handling evolution. Avoid placing 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.

## DROPPED LOADS

**Accidents:** Navy activities experienced a 28 percent increase in dropped load accidents this quarter as compared to the fourth quarter of FY12. During a load test of a monorail crane, the load brake ratchet pawl did not engage causing the test load to contact the ground. A piece of round stock being placed in a lathe slipped from the nylon rigging and hit the lathe's oil catch tray. A chain ratchet failed during load test, dropping the test load. A piece of timber fell 15 feet from a wood platform while being lifted from a trailer. While lifting a large wooden crate, the crate separated causing the bottom portion to drop to the deck. A test weight shifted while load testing a truck crane causing the weight to drop three feet to the ground. While lifting a 500-lb load, a chain fall malfunctioned, dropping the load one foot to the deck.

**Lessons Learned:** Prior to commencing any lift, personnel should carefully examine the load to ensure there is nothing loosely attached or compressed onto the load. Hoists must be visually and operationally inspected for damage and proper operation each day prior to use. Inspections shall include checking for evidence of loose, missing, or damaged parts and components, as well as proper reeving and alignment prior to attachment and lifting of loads. If the load line (chain or wire) is improperly reeved or twisted, it may cause damage or come off of the sheave during operation, causing it to potentially release and the load to fall. Loads should always be rigged to prevent the load from falling out of the rigging. When using slings in a sweeping or basket configuration under a load, the slings should be secured in place to prevent inadvertent shifting or movement of the load. Additional line or rope should be used to secure the load within the rigging configuration. This is extremely important when lifting loads with a high center of gravity.

## OVERLOADS

**Accidents:** Navy activities experienced a 20 percent increase in overloads from the previous quarter. Ten of the 22 significant crane and rigging gear accidents involved crane or rigging gear overloads. A 3/8-inch wire rope was overloaded and parted when it hung up while repositioning a weapons deck skid. Three shouldered eye bolts were overloaded and damaged when the maximum test load was exceeded during load test. A lift fixture for a propeller was overloaded and damaged during a crane lift. A monorail-mounted hoist was overloaded during a lift as the load was still secured to the work surface. A floor crane was overloaded when the wrong load chart was used to perform the load test.

**Lessons Learned:** NAVFAC P-307 section 10.5 provides detailed instructions that must be utilized to prevent overloads, damaged gear, and dropped loads. This information should be discussed during pre-lift preparation and should include the following: Know the weight of the load, utilize a portable load indicating device when binding conditions can possibly occur, and utilize chainfalls or other hoisting control means to avoid sudden overload of the crane or rigging gear. Additionally, rigging gear must be utilized the way it is intended. Activities should refer to NAVFAC P-307 section 14 and the equipment manufacturer for specific guidance. Lastly, ensure the load is free to lift and all tie downs and interferences have been removed.

## TWO-BLOCK

**Accidents:** An operator attempted to troubleshoot a monorail crane that had experienced a malfunction and would not lower. The hoist function did not stop at the upper limit when the operator engaged the hoist, resulting in a two-block condition.




**Lessons Learned:** When a crane experiences a malfunction, the operator must contact the supervisor in order to appropriately remove the crane from service. Only qualified maintenance personnel are authorized to perform troubleshooting due to the risks associated with operation of a malfunctioning crane.

Forty four percent of Navy crane accidents reported during the first quarter of FY13 involved collisions (11 crane collisions and 7 load collisions). Collisions continue to be the leading crane accident type. Personnel error was the primary cause. In most instances, personnel failed to perform properly due to inattention, poor judgment, overconfidence, or they were in a hurry to complete their work. Activities should train personnel on operational safety outlined in section 10 of NAVFAC P-307 and operational risk management discussed in OPNAVINST 3500.39. Safe crane operations are the result of the effective teamwork among operators, riggers, and supervision.

We encourage the reporting of near misses so we can share lessons learned. One quarter of the crane near misses reported this quarter involved mis-spooling of the wire rope on hoist drums. This common occurrence is easily preventable by centering the hook over the load prior to the lift, operating one crane motion at a time, and operating in a slow and deliberate manner, even with no load on the hook. Unfortunately, two similar events resulted in reportable accidents when the wire rope was damaged.

We strongly encourage a culture wherein people instinctively focus on 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 encourage this and not negatively focus solely on the total number of events reported, but rather focus on eliminating the significant and serious weight handling accidents. The identification, documentation, and correction of near misses and other unplanned occurrences significantly improves 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 their 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 done safely. Taking the time to be safe can increase your productive support to the fleet. Our goal remains zero weight handling accidents. 

### **POORLY WRITTEN WORK INSTRUCTIONS LEAD TO UNNECESSARY REWORK**

**T**he importance of proper technical direction for installation, maintenance, and inspection of crane components can never be overstated. It is imperative that technical work instructions clearly state the work to be performed, ensuring compliance with the appropriate codes, standards, and equipment manufacturer instructions. The result of not clearly stating the correct methodology can lead to equipment being pulled from service, unnecessary costs, wasted work hours, or a crane accident. The following “lessons learned” reported by an activity illustrates the importance of these fundamental principles.

An activity reported a series of missteps in the installation and inspection of elevated crane rails in one of its facilities. The existing crane rails were classified for restricted use due to critical defects per NAVFACINST 11230.1E. The activity realized the need to replace the rail sections and hired a contractor to replace the crane rail. The project is ongoing. New and existing rails have been secured using Gantrex Weldlock rail clips.

During a semi-annual inspection, an inspector noticed apparent contact between the crane rail sweeps and the crane rail. At this point, the inspector secured the crane to investigate the cause of the problem. During the investigation, the inspector determined the crane had “crabbed” north and the outboard edge of the rail sweep had made contact with the top edge of the outboard joint bar on the crane rail. Further investigation revealed that the source of the problem was the improper installation of the Gantrex Weldlock rail clips. The rail clips were installed in a manner that allowed lateral float of the rail contributing to the rail sweep contact. Lateral float of the crane rail is strictly prohibited by the clip manufacturer.

Although the activity provided installation procedures, the procedures did not follow the manufacturer’s instructions which led to the described problems. The technical work instruction for inspection also had flaws. The inspection procedures were very general, checking only for looseness and movement of the clip and not checking to ensure the clip was properly fitted to the base of the crane rail. If the inspection criteria matched the equipment manufacturer’s requirements, the problems would have been resolved prior to repair completion.

Understanding and complying with manufacturers’ requirements for installation and inspection have proven to be critically important. The activity was required to repair the problems caused by what should have been avoided in the first place. This cost the activity time, money, and resources. Having a skilled workforce and generalized work instructions are not enough to keep problems like this from happening. Weight Handling Equipment (WHE) work requires specialized instructions that meet all codes, standards, and manufacturers’ requirements. WHE inspection instructions should be specific enough to ensure inspectors clearly understand what is deemed acceptable. Through a good self-evaluation process, the activity is responding appropriately to the mistakes made in this instance. The activity has identified the underlying problem and is making the appropriate changes to its instruction writing process. This is a great opportunity to learn the importance of thorough and accurate work instructions. ■


## 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:** Please provide clarification on the documentation requirements for leased cranes operated by Navy personnel and Base Operating Service (BOS) contractor-owned and leased cranes, used for cargo transfer, when these cranes are third party certified by an OSHA accredited agency but the third party certification load test is not performed concurrently with the NAVFAC P-307 certification load test.

**Answer:** A third party certification performed by an OSHA accredited certification agency, that is not concurrent with the P-307 certification of the crane and involves a load test in excess of the P-307 certified capacity, does not void the certification. However, a crane condition inspection (including the before, during, and after portions) is required to be performed and signed by P-307 designated, trained, and qualified personnel. This clarification will be incorporated in the next revision of NAVFAC P-307. ■

## 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](mailto:nfsh_ncc_crane_corner@navy.mil). 


## 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.navy.mil/ncc>. 

## HOW ARE WE DOING?

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