THE CRANE CORNER

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A WORD FROM TOPSIDE

Sam Bevins
MOBILE CRANE LOAD TEST VIDEO

In conjunction with the Naval Media Center, the Navy Crane Center produced the videotape, *Load Testing Mobile Cranes at Naval Shore Activities*, to provide load test personnel guidance on properly testing mobile cranes per NAVFAC P-307. The videotape will be distributed to naval shore activities with mobile cranes.

A frequent audit finding is that mobile cranes are not properly load tested. These are complex machines with great versatility. They can be operated in many different configurations. However, required load tests are frequently omitted or done improperly and test weights are frequently miscalculated. The crane in the videotape was selected for its complexity to illustrate the many considerations that go into testing such a crane. Load testing is an inherently hazardous evolution and cranes have overturned or been otherwise damaged from following improper load test procedures. This videotape will be of use to activity crane test teams (load test directors, inspectors, operators, and riggers), certifying officials, and instructors.

This is the third in our series of informational videotapes related to the Navy's weight handling program. We distributed seven crane accident "lessons learned" videotapes directed toward crane operators, riggers, 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. The safety messages contained in these videos are directly applicable to the weight handling safety challenges our Navy shore activities are facing today.

We also provided an introductory videotape of an activity's weight handling program for prospective commanding officers that is also of interest to certifying officials and program managers. This video covers NAVFAC P-307 requirements and activity responsibilities such as implementing procedures, crane certification, condition inspection and load tests, maintenance management, crane alterations, rigging gear management, operational safety, documentation, and contractor crane oversight.

Load Testing Mobile Cranes at Naval Shore Activities (PIN 806634) is available through http://dodimagery.afis.osd.mil/ (DAVIS/DITIS).

Inside This Issue

Our mission is "safe and reliable weight handling programs" throughout the Navy. This videotape will help ensure mobile cranes are properly and safely load tested and certified.

CRANE SAFETY ADVISORIES AND EQUIPMENT DEFICIENCY MEMORANDA

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

EQUIPMENT DEFIIENCY MEMORANDA

EDM-050: Wire Rope Follower Roller Adjustment.
EDM-051: Grove TM890 Outrigger Drag Link Assembly.

HAVE YOU HEARD ABOUT?

New versions of hoists, using a high strength synthetic strap rather than wire rope, for load handling are now available. In addition to being easier to handle, inspect, and install, straps eliminate load rotation problems associated with wire rope. Unlike wire rope, the strap winds smoothly in multiple wraps onto itself, which allows for a shorter drum. (See figure 1.) Straps do not require lubrication and they do not chip or spark.

Figure 1 - Winch and Hoist with Load Strap Drum Option.

All of the standard units are either AC electric or pneumatic drives. The units are adaptable to the needs of virtually any type of industry. The hoists have a factor of safety of at least 5:1. Hoist capacities of up to 5,600 pounds are available. Hoist speeds can be as high as 45 fpm and lifts can be as high as 30 feet. Attachments used for lifting are rings or crane hooks. Other custom attachments are available upon request.

The manufacturer offers more than 100 standard models of strap hoists. Special designs and custom modifications to meet the customer's needs are available.

Weight Handling Conference Success

The Navy Crane Center hosted a Weight Handling Conference 13-16 May 2002 at NAS Pensacola. About 300 representatives of weight handling programs from around the globe attended the conference. The conference was true to its theme, *Sharing Best Practices and Safety Initiatives*, and was a great success. The conference presentations were provided to the attendees on a CD. Look forward to another conference in about two years.

SECOND QUARTER FY02 ACCIDENT REPORT

The Navy Crane Center (NCC) disseminates crane accident lessons learned to prevent repeat accidents and improve overall crane safety. NAVFAC P-307 requires commands to submit to the Navy Crane Center (NCC) a final, complete accident report (including corrective/preventive actions) within 30 days of an accident involving Navy-owned weight handling equipment, regardless of severity or type. In addition, contracting officers are required to forward to NCC and the host activity reports of all contractor accidents regardless of severity.

For the second quarter of FY02, 45 Navy and 8 contractor weight handling equipment accidents were reported. Serious accidents included two injuries, two dropped loads, three overloads, and seven two-blockings (highest reported quarterly total of two-blockings in three years).

INJURIES

Accident: Two shipfitters were using a category 3 wall crane to move four pieces of angle iron stock from a shape blaster table to a cutting table. The angle irons were rigged with a chain sling in a choker hitch configuration. The shipfitter operating the crane was near the load's pick point and another shipfitter was at the end of the load to assist in steadying it. When the operator began to travel the crane, he placed his hand on the chain sling to help steady the load, not realizing that he had placed his finger inside the choke point of the chain sling. The sling tightened injuring the operator's finger.
Lessons Learned: Personnel should analyze each lifting and handling operation by first trying to mitigate the risk. One inherent risk in every lifting operation is possible pinch points. Prior to any lifting operation, personnel should anticipate the positioning of their bodies and the placement of their hands and other extremities to prevent injuries.

Accident: A bridge crane was lifting a freshly planed shoring timber with smooth surfaces from the coping deck of a drydock to the weather deck of a vessel. As the timber was being lowered, one of the shipwrights pulled the tagline that was attached to the timber and the timber came loose from the rigging (choker and one half hitch). The other shipwright caught the timber after it bounced on the weather deck. He tried to keep the timber from falling over the rail and dropping to the drydock floor below. While the shipwright was wrestling with the timber, the other shipwright, who was manning the tagline, was hit by the timber and suffered an injury to his leg.
Lessons Learned: The rigger-in-charge must always verify that the load is secure and the proper rigging hitches are used prior to hoisting. This becomes even more critical when loads with smooth surfaces are being hoisted.

DROPPED LOADS
(Also, see dropped timber accident above.)

Accident: A mobile crane was being used to open an emergency stoplog door (11,000-pound stainless steel plate) in a drydock when a weld securing a padeye to the door failed. Further investigation revealed that the padeye weld had inadequate penetration. After fabrication, padeye welds were not inspected prior to submerging the assembly.
Lessons Learned: Prior to installing any component in areas where frequent inspections are not feasible, the activity should verify that the lifting component's means of attachment meet all required specifications.

OVERLOADS

Accident: A second shift shop machinist was tasked to work on a shaft-handling device (SHD). Although he was unqualified to operate category 3 cranes, the machinist used a 2,000-pound capacity jib crane to lift the SHD onto a boring mill. Other workers in the area noticed the crane boom bending during the lift. The next morning, another machinist asked the shop rigger-in-charge to weigh the SHD using a higher capacity crane. The SHD weighed 2,370 pounds.
Lessons Learned: Only personnel who are trained and qualified should operate any weight handling equipment. When work tasks involving lifting are given, supervisors must ensure workers know what must be done to get the lift accomplished safely. Stop operations and report potential crane accidents as soon as they occur.

Accident: Inspectors discovered a 2000-pound fixed hoist, used to lift a test stand load bar prior to its being bolted to support columns, with the hoist under load and the load bar bolted and in the locked position. Because the force exerted on the hoist could not be determined, the hoist was taken out of service for a possible overload.
Lessons Learned: Test stand operators must strictly follow OEM and activity procedures whenever overhead hoists are used to lift items that subsequently get locked into place.

Accident: The whip hoist of a portal crane and the below-the-hook lifting devices were overloaded when a sand hopper was hoisted. The sand hopper and rigging weighed 60,684 pounds. The capacity of the crane's whip hook was 30,000 pounds. The equalizer plates were also overloaded by 100 percent. The major cause of the overload was that the sand hopper was stenciled with the empty weight only and not the full weight capacity as required by NAVFAC P-307.
Lessons Learned: NAVFAC P-307, paragraph 10.5.1, requires that sand hoppers, tubs, and other large containers that hold material be clearly marked with both the empty and full weights (or maximum capacity).

TWO BLOCK ACCIDENTS

Accident: A crane operator was operating a rail-mounted category 4 crane when another crane operator observing the operation advised him to halt the operation, based on the appearance that he lacked the necessary skills to operate the crane. The second operator completed the operation, unaware that the crane had already been two blocked. The two blocking condition was not detected until maintenance personnel performed a periodic maintenance inspection two days later. Further investigation revealed that neither operator had completed the required crane safety course, so both operators were improperly licensed. The operator's daily checklist was not properly completed. Neither operator recognized the lift, which was 93 percent of the crane's rated capacity, as a complex lift. The second operator operated the crane without the specific permission of the supervisor.
Lessons Learned: This situation lacked adequate supervision. Supervisors must know what their employees are doing. The lifts being performed were complex lifts requiring personal on-site supervision by a supervisor. Employees must not be allowed to operate cranes on their own determination. Supervisors must ensure their category 4 crane operators are properly licensed.

Accident: A mobile crane operator two blocked the whip hook while placing it in the stored position in preparation for travel. This procedure required that the operator bypass the crane's anti two blocking device.
Lesson Learned: Mobile crane operators should be extra alert whenever safety devices are bypassed. Sufficient clearance between the hook block and boom must be maintained.

Accident: A mobile crane operator was preparing a crane for transport by lowering the boom onto the boom rest. With the limit switch bypassed and while lowering the boom, he simultaneously raised the auxiliary hoist. As the boom stopped, a sudden surge of hydraulic pressure caused the auxiliary hoist to increase in speed and the hoist two blocked before the rigger could signal the operator to stop.
Lessons Learned: Simultaneous operation of two or more motions increases the risk for accident. Also, operators must be aware of the operating characteristics of their cranes.

Accident: A mobile crane was being set up to remove a motor from the fantail of a ship when the operator extended the boom without lowering the hook. This resulted in the hook being two blocked. The crane did not have an anti two block limit switch.
Lessons Learned: Special precautions apply when operating mobile cranes that are not equipped with two block protection. NAVFAC P-307, paragraph 10.2.2.3, applies. Activities must develop crane specific procedures to prevent the possibility of two blocking. Supervisors must brief operators on the procedures prior to assignment on such cranes.

Accident: An operator trainee was told by his instructor to cycle a crawler crane's tracks by traveling the crane short distances. First, the operator needed to raise the hook blocks a sufficient distance to prevent excessive swing of the hook blocks. The crane had two hooks. Upon being given the signal to raise the right hook, the trainee mistakenly pulled the lever for the left hook. The signal person's attention was on the right hook so he did not notice the left hook moving until it two blocked. The instructor was distracted during this time by another event going on. The crane is primarily used for pile driving and is not equipped with an anti two block limit switch.
Lesson Learned: Instructors must provide close supervision of operator trainees to ensure the safety of the operation is not jeopardized.

Accident: A shop operator had positioned a category 3 bridge crane in preparation to make a lift. He energized the controls to lower the hook when he heard a loud crash. He looked up and saw that the hook block had collided with the wire rope drum. The operator did not recall whether or not he had pushed the raise or lower button. Also, repairs had been completed that day to replace the trolley festoon wires, which may have resulted in a power phasing problem. The hoist upper limit switch failed to stop the hoist.
Lessons Learned: An operational check must be performed after repairs to load controlling components. In addition, a pre-use check must be performed prior to operation of a crane each day.

Accident: A maintenance mechanic was performing a quarterly operational evaluation and light maintenance on a bridge crane. While he was checking the upper limit switch, the hook continued to hoist up even after the controls were released. During normal operations, the release of the up button would have stopped the upward movement of the hook. The hoisting did not stop until the off button on the pendant control was activated.
Lesson Learned: During initial crane start-up, all controls (i.e., stop, down, and up buttons) on pendant controls should be tested for proper operation before proceeding with additional operational tests.

SERIOUS CONTRACTOR CRANE ACCIDENTS

Accident: A crawler crane was being used with an extractor vibratory hammer to remove temporary sheet piling. During this operation, the hydraulic hose to the vibratory hammer jaws was pierced by a permanent sheet pile, causing the hose to leak. The lead rigger directed the crane operator to boom up and the hammer jaws power pack operator to bring the hammer over the deck. When the boom was raised, the pressure in the hammer hose increased. When the jaws of the hammer were released, the force caused the load to swing toward the boom. When the load swung toward the boom, the hydraulic hoses feeding the hammer were dragged along the deck. The hoses snagged on a previously removed temporary sheet pile, dragging it into the back of the lead rigger's leg. The lead rigger suffered a broken ankle.

Lessons Learned: Prior to any operation a briefing should be held and procedures set forth for removal of all extraneous materials from the work site, along with identification of hazards and the mitigation of those hazards. Weight handling equipment should always be set-up in a manner that all personnel would have a clear view of operating equipment and other team members.

Accident: A floating dredge crane was raising the load bucket and pivoting the crane to dump the load into a dump scow. As this was occurring, a deck hand was stepping from the dredge platform deck onto a ladder to reach the hoist room to grease the fittings on the crane. The ladder is fixed to the rotating part of the crane and travels with it as it pivots about the tub on the floating platform. As the deck hand began to climb the ladder, the grease gun he was carrying got caught on the handrail causing him to lose balance. The deck hand's leg was broken while wedged between the ladder and the deck tie down.
Lessons Learned: Maintenance personnel should avoid any procedure that would put them in harm's way. Working around or trying to access moving equipment is extremely dangerous. Never attempt to access a crane without the knowledge of the operator.

Accident: A floating crane was transferring a stack of sheet piles weighting approximately 17,500 pounds from a flatbed located on the pier to a barge in preparation to repair a quay wall. During the transfer, the sharp edges of the sheet piles cut through the nylon slings. This caused the sheet piles to drop into the water.
Lessons Learned: When using nylon slings to lift a load with sharp edges a protective sleeve or other chafing protection should be used to prevent the slings from being cut or torn by the sharp edges.

Accident: A mobile crane on a barge was attempting to pull up the spuds before moving a barge when the crane became unstable due to icy conditions on the deck. The mobile crane slid when the crane rotated its boom. The operator tried to stop the crane from sliding but was unable to do so. The crane slid into the water. The operator jumped from the crane and was uninjured. The crane was not tied down as required by US Army Corps of Engineers EM 385-1-1.
Lessons Learned: Mobile cranes are inherently dangerous and complicated to operate. The hazards increase when a mobile crane is placed on a barge. It is extremely important that all safety and operational requirements are followed. One requirement of US Army Corps of Engineers EM 385-1-1 is to properly secure the crane to the barge. Another requirement is to set the crane up on a firm surface prior to commencing any crane operation. Operating on an icy surface increases the risk of an accident or mishap.

Accident: During a dry run of a planned lift with no load on the hook, a mobile crane momentarily tipped. The operator extended the boom beyond the stability point of the crane. This caused a momentary tipping of the crane.
Lessons Learned: Mobile crane operators must be aware of the operating limitations of the cranes they operate. Cranes can tip over with no load suspended from the hook. Operators should review the lifting requirements prior to set-up to make sure that the crane operates within its stability range annotated on the OEM's load chart.

Serious crane accidents are still occurring as noted above, with human error (e.g., inattention to detail) being the primary cause. Weight handling program managers and safety officials are encouraged to consider the potential risk of accidents similar to those highlighted above occurring at your activity and apply the lessons learned to prevent similar accidents. OPNAVINST 3500.39, *Operational Risk Management*, prescribes methods for assessing hazards and controlling and minimizing risks in hazardous operations. Activities should incorporate these principles into both training and day-to-day weight handling operations.

Submission of accident reports, unplanned occurrences, near misses, and photographs (where possible) via e-mail is encouraged. Attach a complete and concise situation description, corrective and preventive actions, probable cause and contributing factors, and an assessment of damage. For equipment malfunction or failure, include specific description of the component and the resulting effect or problem caused by malfunction or failure.

P-307 QUESTION & INTERPRETATION

The question and interpretation listed below is based on crane program issue that arose and Requests for Clarification, Deviation, or Revision, P-307, figure 1-1. It is also listed on our web page, http://ncc.navfac.navy.mil/. Click on P-307 and then on P-307 Questions and Interpretations. The issues are arranged by the applicable section or appendix to the P-307.

Question: Certification Requirements for Plug-In Components. One of our cranes can be operated via a remote control unit or pendant controller. The pendant controller is a plug-in unit that will be unplugged and stored while the remote is in use. In the event that the remote control unit does not operate, we will plug in the pendant controller and perform an operational test prior to use. Because the pendant controller was unplugged (electrically disconnected), is a chief engineer or certifying official signature or re-certification per NAVFAC P-307, paragraph 3.4.2.2 required?

Our position is that it does not require a chief engineer or certifying official signature per NAVFAC P-307. NAVFAC P-307, section 3, covers adjustment, repair, disassembly, alteration, or replacement of load controlling parts. Simple unplug and plug-in components are not discussed. Since the pendant controller is designed to be disconnected and reconnected, the inspection and operational test requirements of NAVFAC P-307, section 2, apply (i.e., similar to the work items listed in paragraph 3.4.3.c).

Request NCC concurrence that the certification of this crane remains valid after unplugging and plugging in the pendant controller. The requirements of NAVFAC P-307, section 2, apply. The requirements of NAVFAC P-307, paragraph 3.4.2.2 do not apply.

Answer: Concur. However, at the annual load test, the crane must be tested with the remote control unit as well as the pendant controller.

SHARE YOUR SUCCESS

We are always in need of articles from the field. Please share your sea stories with our editor, (610) 595-0905, or fax (610) 595-0747.

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NAVY CRANE CENTER

OFFICE HOURS: MON-FRI 0630-1730

PHONE: DSN 443-0505
COMMERCIAL (610) 595-0505

FAX: CONTRACTS/PROJECT MGMT 0747
DIRECTOR 0748
ENGINEERING 0749
FIELD SUPPORT 0812