



THE CRANE CORNER

Navy Crane Center Technical Bulletin

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Editor: (757) 967-3857/DSN 387-3857 / nfsh_ncc_crane_corner@navy.mil

A WORD FROM TOPSIDE

Sam Bevins

Most crane accidents are the result of human error and the most commonly cited cause is inattention. During the summer months, safe weight handling equipment operations become more challenging as the many distractions associated with the vacation season, graduations, sporting events, and increased outdoor activity compete with attention to the critical job at hand. As personnel return from vacation or extended leave, supervisors must also re-focus them to the necessity of safe weight handling operations.

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

Documented observations of weight handling operations by experienced operation and rigging personnel help identify potential unsafe practices. Activities should also include shop operations, where cranes are often operated by personnel who may not be involved in crane operations as frequently as dedicated operators who operate cranes on the waterfront. Lessons learned from observations should be shared with all hands.

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

Management also needs to ensure all weight handling personnel are aware of our comprehensive definition of a weight handling equipment accident and know to report them when they occur. Our philosophy of reporting, and learning from, the small accidents has proven very successful in preventing more serious accidents from happening. In addition, identifying and reporting near misses and other unplanned events help communicate opportunities to prevent more serious events.

An added benefit to safer weight handling operations is the improvement to mission execution efficiency that results. This can be significant under the current challenging fiscal environment. As we know, the efficiency of mission execution is significantly improved by preventing personnel injury, equipment damage, and schedule disruption that can result from weight handling accidents. Each accident diminishes support to the Fleet. Our mutual overall goal is ZERO crane and rigging accidents. A safe and reliable Navy weight handling program is essential for Fleet Readiness.

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CHANGE 3 TO NAVFAC P-307 DECEMBER 2009 REVISION ISSUED

Change 3 to the December 2009 Revision of NAVFAC P-307 was issued on 22 June 2012. This change was issued to clarify requirements for complex lifts for cranes used in ordnance handling. Specifically, the requirements for Category 3 cranes used for lifting ordnance have been changed, and supervisors briefing requirements have been clarified. Additionally, an inadvertent error in Table 5-1 that resulted in a deletion of Item #9 from the Table has been corrected. The full text of Change 3 can be downloaded from the Navy Crane Center's web site.

This change is in agreement with Advance Change Notice 1/11 of 9 May 2012 to NAVSEA OP 5. The clarifications and correction in this change are in effect immediately. ■

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.

We have had no CSAs or EDMs this quarter. ■

CRANE SAFETY AWARENESS FOR THE SUMMER MONTHS

As 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 number of Navy shore based crane accidents thus far this fiscal year (FY) is slightly ahead of the totals for the same period last year. However, the number of reported accidents that have documented dropped loads, overloads, injuries, or two-block (those accidents that Navy Crane Center terms as significant) has been trending downward. We still have three months remaining in the FY, but with proper risk management, we have the ability to strengthen this pace of improved safety performance.

Historically, the summer months have brought us some real challenges in preventing crane accidents. With the distractions associated with the warmer weather, maintaining a sharp focus on the critical job at hand during weight handling operations is imperative. We must strive to maintain focus and ensure that weight handling operations are properly planned and staffed to perform the task at hand. Almost all of the reported Navy shore activity crane accidents have been attributed to human error. By intensifying safety awareness in all weight handling operations, we can continue to drive significant accidents down to our goal of zero.

Specific accident prevention emphasis should be given to prevent crane or load collisions and overloaded rigging gear. These accident types account for 48 percent of our total accidents thus far this FY. To avoid collisions, ensure a clear operating envelope and a clear path of travel for the crane and the load, proper rigging gear selection, and determining correct lifting points begins at the job planning stage. Appropriate use of load indicating devices can be an effective means of preventing overloads. In summary, assess the job, understand

the potential risks, and then identify and implement mitigation actions before proceeding. Take the time to appropriately plan the weight handling task. Once properly planned, apply situational awareness during the actual weight handling operation.

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. Good planning, teamwork, communication, situational awareness and operational risk management (ORM) are all good tools for use in reducing the risk of an accident.

Independent observations of crane and rigging operations by experienced personnel has proven to be an effective tool in accident prevention. During these observations, look for warning signs of complacency or taking shortcuts. Include operations where there is no load on the hook. Approximately 72 percent of the crane collisions this FY occurred when the crane had no load on the hook.

Consider a preemptive safety awareness briefing to reinforce management's expectations for adherence to safe lifting and 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.navfac.navy.mil/ncc>.

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 and more serious accidents are prevented from occurring. 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.

Each weight handling accident diminishes support to the Fleet. A safe and reliable Navy weight handling program is an essential enabler for Fleet readiness. With the approach of the summer months, 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. ■

HAS THAT CSA ACTION BEEN COMPLETED YET?

Crane safety advisories (CSAs) are important safety alerts that require action on the part of the activity responsible for executing the mandated work. Often they are issued as a result of reported serious accidents, significant near misses, and recognized safety hazards. Some CSAs require immediate action, while others must be completed within a specified timeframe (e.g., next annual inspection, within one year).

Our audit teams recently included compliance with CSA mandated actions as a special focus item and the results have been surprising. Audit results for the third quarter of this fiscal year show that the majority of activities audited this quarter who are responsible for executing the CSAs have been delinquent in their completion. More surprising is that some of the CSAs were issued as far back as 10 years ago. Some of the CSAs for which incomplete actions were cited include: CSA 102, Two-Block Accident Prevention (issued in 2001); CSA 121A, Safety Features for Microprocessor Controlled Cranes (2003); CSA 156, Grove Hydraulic Hoist Brake Deficiency (2006); CSA 176, Poorly Grounded Cranes (2007); and CSA 184, Swaged Sockets used on Rotation Resistant Wire Rope (2008). If an audit sample crane has a delinquent CSA associated with it, the audit team will consider the crane unsatisfactory for audit purposes, unless the activity has a plan in place and is progressing satisfactorily to complete the required action.

Some of the CSAs affect multiple cranes and it is important that the activity identify every crane affected by the CSA and track the corrective actions. This is required by NAVFAC P-307 paragraph 11.8. Some activities audited do not have a system to track the progress of CSA completion.

It is very important that CSAs be completed when required. Visit the Navy Crane Center website, <https://portal.navfac.navy.mil/ncc>, and review the list of CSAs. If you believe a particular CSA requires action, get it done. Your safety may depend on it. ■

WEIGHT HANDLING SAFETY BRIEF

The attached Weight Handling Safety Brief (WHSB) is provided for communication to personnel associated with Navy Shore Weight Handling. This WHSB provides information on the proper handling, protection, and inspection of crane pendant controllers. Pendant controllers that were improperly handled or protected from external damage have led to crane accidents and/or injury to personnel. This information is applicable to all personnel who operate or maintain pendant controlled cranes.

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

Title: Protection of Crane Pendant Controllers

Target Audience: Personnel Who Operate or Maintain Pendant Controlled Cranes



Damaged housing/
broken covers
create hazards!

Damaged controls
prevent proper
operation!



Improper handling or protection of pendant controllers can lead to conditions that cause accidents. In the left picture, a pendant control box housing was damaged due to impact with a fixed object. The event resulted in a worker being shocked. In the right picture, a crane accident occurred when a controller swung freely and contacted a fixed object. The travel button got stuck in the closed position due to an impact on the guard around the button's housing. Most crane controllers are designed for industrial applications. However, they are not indestructible. Users should consider the following to protect against malfunction or external damage:

- **Check** the controller **for damage** and proper operation prior to use of the crane each day or shift.
- **Check for wear or damage** to the **seals and guards** around buttons or joysticks and for damage to the casing that might allow dirt, water and other contaminants to enter. A damaged casing may create an electrical hazard!
- Ensure that all function controls are labeled and legible.
- **Report** any **damage** that may affect safe operation.
- **Avoid** uncontrolled **swinging** of the **controller**. Do not let go of the control box unless the pendant line is in a vertical position.
- **Avoid leaving controllers** stowed in a position **where** other moving **objects/vehicles may contact the controller**.

21 May 2012

SAFETY

Navy Crane Center 12-S-03

WEIGHT HANDLING TRAINING BRIEF

The attached Weight Handling Training Brief (WHTB) is provided for communication to personnel associated with Navy Shore Weight Handling. Recent weight handling audits have identified a potential weakness in the knowledge level relative to mechanical load brake inspection, testing and function. This brief conveys basic requirements and information on mechanical load brakes. This information is applicable to all personnel who are involved in the inspection, maintenance, or testing of cranes.

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 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 it can be used as supplemental information for supervisory use during routine discussions with their employees. ■



Weight Handling Training Brief!

Title: Mechanical Load Brake Knowledge

Target Audience: Crane Equipment Inspectors, Mechanics, and Load Test Directors

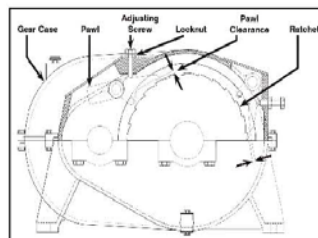
A MECHANICAL LOAD BRAKE IS ONE TYPE OF CONTROL AND SECONDARY BRAKING SYSTEM THAT PROVIDES AN INVALUABLE "FAIL SAFE" IN THE EVENT OF A HOIST MOTOR BRAKE FAILURE BY CONTROLLING AND STOPPING THE LOAD.

Recent weight handling audits have identified a potential weakness in the knowledge level relative to mechanical load brake inspection, testing and function. This Brief conveys basic requirements and information on mechanical load brakes.



Load Brake Testing

1. Raise load to a **safe height**.
2. **Carefully** release holding brake (the load brake shall hold the load).
3. Lower the load using hoist controller.
4. Return the controller to neutral (the load brake shall **STOP** the test load).
5. **Observe** behavior when motor brakes are **not accessible**.



- The mechanical load brake controls the load in the lowering direction between speed points. In the event of motor brake failure, the load brake will stop the load in most cases.
- The brake is a friction device and must have the correct type and level of lubricant.
- Adjustment and **repair must be performed** with the original equipment manufacturer's (OEM) processes and **with proper work authorization**.
- Poor performance can be indicated by lack of load control or by noise (grinding or friction sound) or a clicking noise (pawl or ratcheting sound in the lowering direction). Other indicators can include overheating or the presence of load brake material in the lubricant.
- Testing is performed by disabling the motor brake (NAVFAC P-307, Appendix E requires a written description of how the holding brake will be defeated or why the holding brake cannot be defeated) and performing two tests: (1) static (the load brake shall hold the load (there may be slight movement of the load until the ratchet engages the pawl) and (2) dynamic by lowering the load slowly. The load must never accelerate and shall slow to a stop without contacting the ground. **DO NOT ALLOW THE LOAD TO TOUCH THE GROUND.**
- Activities must notify the OEM in the event that the brake controls the load but does not stop on its own to ensure the brake is operating as designed. This communication shall be documented in the equipment history file.
- If the motor brake cannot be disabled, the load brake operation must be monitored during test (speed control between points, noise, etc.) and be disassembled every tenth annual inspection.
- Additional Information on Mechanical Load Brakes can be found in the **CRANE MECHANIC** Web Based training curriculum.

7 May 2012

Training

Navy Crane Center 12-T-01

ACQUISITION UPDATES

15-TON TOP RUNNING DOUBLE GIRDER CRANES

The Navy Crane Center accepted two 15-ton rated capacity, top running double girder cab operated cranes for a structural fabrication and plate shop. The electric-powered cranes have a 90+ foot span and a maximum hook height of 38'6" above the finished floor and include a radio control option. Variable frequency drives enable operating speeds of 25 feet per minute down to 1 foot per minute for the hoist, 300 feet per minute down to 10 feet per minute for the bridge travel, and 150 feet per minute down to 5 feet per minute for the trolley travel. Installation of the new cranes and removal of the replaced cranes was complicated by extremely low overhead requiring the use of special lifting fixtures. The project included new runway electrification and realignment of the crane runway rail. ■

9.75-TON TOP RUNNING DOUBLE GIRDER CRANE

The Navy Crane Center accepted the overhaul of a 15-ton rated capacity, top running double girder crane located in a laboratory environment. The overhaul consisted of full replacement of the hoist/trolley, crane electrification, control drives, control panels, floor level disconnect switches, conversion of the A-1 type bridge drive to A-4 type, and revision of the maintenance walkways to meet current safety requirements. The existing crane girders and end trucks were inspected to ensure adequate remaining service life and retained. The overhauled crane has a rated capacity of 19,500 pounds, the downrate being due to floor loading restrictions in the area of operation. The electric powered crane has a 43' span and a maximum hook height of 21'10" above a mezzanine deck. Closed loop flux vector drives enable operating speeds of 15 feet per minute down to 1 foot per minute for the hoist, 75 feet per minute down to 2 feet per minute for the bridge travel, and 50 feet per minute down to 2 feet per minute for the trolley travel. The overhaul was performed without removal of the crane from its runway. The overhaul work was complicated by the extremely low allowable floor loading of only 200 psf. The project included new runway electrification. ■

SUMMARY OF WEIGHT HANDLING EQUIPMENT ACCIDENTS SECOND QUARTER FY12

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 accidents can be avoided and the overall safety posture can be improved.

For the second quarter of fiscal year 2012 (FY12), 54 Navy WHE accidents (45 crane and 9 rigging) were reported. A total of 8 contractor crane and rigging accidents were also reported. Of the 54 Navy WHE accidents, 14 were considered significant (overload, dropped load, two-block, or injury). Lessons which can be shared from the significant Navy crane accidents are discussed herein.

The number of crane and rigging gear near miss and other unplanned occurrence reports increased during the second quarter. Near misses and other unplanned occurrences with lessons to be learned that do not fall under the crane and rigging gear accident definitions shall be reported. A near miss 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. 28 near misses (21 crane and 7 rigging) were reported this quarter. During this same

time frame in FY11, only 18 near misses were reported. The increase in reporting of near misses is not negative or indicative of a poor lifting and handling program. Typically, it is a sign of a safety-conscious activity with a maturing program. Our goal is to evolve a culture where 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. Weight handling managers and supervisors should not send the wrong message to deck plate personnel by focusing solely, and negatively, on just the total number of events reported but should encourage the reporting of all events where lessons can be learned and shared.

Collisions continue to be the leading crane accident type. 18 of 45, or 40 percent of Navy crane accidents reported during the second quarter involved collisions (10 load collisions and 8 crane collisions). Maintaining crane and load clearances should be stressed to all personnel involved in crane and rigging operations. Pre-job briefs, including discussion to ensure adequate clearances, are maintained during all crane operations, and the placement of additional personnel to monitor areas of restricted or poor visibility should be performed to aid in reducing collisions.

OVERLOAD

Accidents: Overloads comprised 5 of the 14 significant crane and rigging gear accidents (3 crane overloads and 2 rigging gear overloads). The 3 crane capacity overloads occurred during load testing and were discovered during NAVCRANECEN audit. During certification of a portal crane, the whip hoist system was overloaded. During an interim load test, the pre-test load calculations did not consider the limiting factor of the crane's four part reeving resulting in an overload. During load testing of a portable gantry structure, the test load tolerance was exceeded. During an annual NCC audit, a crane was found to be overloaded several times. In another accident, after completion of a lift, one of the lift fixtures was inadvertently left connected to the load and parted as the hoist was raised.

Lessons Learned: Load test directors have overall responsibility of the load tests and must perform and ensure load test calculations are correct and in accordance with NAVFAC P-307. The new mobile crane load test procedures must be fully understood. When in doubt, contact NAVCRANECEN. Personnel must monitor crane and rigging operations at all times and ensure the load and rigging gear are clear prior to movement. Additional personnel should be assigned to help monitor the load and rigging gear where necessary.

DROPPED LOADS

Accidents: Four dropped load accidents occurred during rigging and crane operations. During relocation of shipping containers, a container bound up, causing one of the containers to shift and fall to the deck. During load testing of an accommodation ladder port bail bracket, structural failure of the port bail bracket frame resulted in the test load dropping into the river. During placement of a part into a degreaser tank using a category 3 crane, the pendant controller was allowed to swing into the side of the degreaser tank. The contact caused the travel button to engage, moving the crane and dropping the load. During lowering of a pallet, the item on the pallet contacted a door jamb causing it to slide off the pallet and drop to the ground.

Lessons Learned: Luckily no personnel were injured during these accidents. Personnel must ensure safe rigging practices are followed and proper rigging attachment is made prior to lifting loads. Items or components placed on pallets or skids for lifting should be secured or tied down prior to lifting. Additional line or rope should be used to secure the load within the rigging configuration. Additional personnel should be appropriately placed to monitor and ensure clearance is maintained during lifting operations.

TWO-BLOCK

Accidents: Four two-block accidents occurred during crane and rigging operations. During no load operation of a category 3 bridge crane to verify the upper limit switch, the upper limit switch failed to function as designed and the crane was two-blocked. In a separate accident, a limit switch and the wire rope on a category 3 crane were damaged when the crane was hoisted through the limit switches during the ODCL check. During the pre-use inspection of an electric chain fall, the chain fall was two blocked.

Lessons Learned: Personnel must monitor hook clearances and ensure two-blocking, collision or contact does not occur during these operations. Limit switches should only be tested during the pre-use inspection of the crane and should never be used to stop operation or movement of the hoist during lifting operations. When testing the upper limit switch, the hoist should be raised at the slowest possible speed or inched into the upper limit switch. Operators should not stand directly under the hoist during this test and should be in a position to monitor the hoist movement and stop movement if the limit switch fails to function as planned or the hoist does not stop prior to contacting the crane drum or structure.


INJURY

Accident: One injury occurred during crane operations this quarter. While loading a component into a wooden crate, the load shifted in the rigging and pinched the rigger's finger against the crate.

Lessons Learned: Personnel should remain alert and aware of their surroundings at all times. Personnel should not place themselves between the load and other objects. In addition, parts of the body (i.e., hands, fingers, arms, etc.) should not be placed between the rigging gear and load during tensioning of rigging gear or lifting of the load.

Weight handling program managers and safety officials should review the above lessons learned with personnel performing weight handling functions and consider the potential risk of accidents occurring at your activity. Contracting officers should share this information with representatives who oversee contractor weight handling operations. This is also a good time to reinforce the principles of operational risk management. Our goal remains zero weight handling accidents. ■

SHARE YOUR SUCCESS

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

WEIGHT HANDLING PROGRAM 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 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.

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.

“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:

<http://portal.navy.mil/ncc> 

HOW ARE WE DOING?

We want your feedback on the Crane Corner.
Is it Informative?
Is it readily accessible?
Which types of articles do you prefer seeing?
What can we do to better meet your expectations?

Please email your comments and suggestions to nfsh_ncc_crane_corner@navy.mil