



# THE CRANE CORNER

## *Navy Crane Center Technical Bulletin*

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

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67th Edition – September 2010

### A WORD FROM TOPSIDE

*Sam Bevins*

As Fiscal Year 2010 comes to a close, we are guardedly hopeful that your increased attention to weight handling safety will result in a record low number of crane accidents for Navy shore activities. Although we will not know for sure until the end of October, the numbers look encouraging. Added to this is a very positive reduction in accident severity as measured by the extent of injuries and property damage. As of this writing, there has been only one accident, a Class C that met the OPNAV Instruction 5102.1 classification threshold (Class A, B, or C). This is a great accomplishment on the part of our shore weight handling community. Our focus on reporting and learning from the small events is paying off in minimizing the serious accidents. Our challenge will be to carry this positive effort into the new fiscal year. Our ultimate goal must be ZERO weight handling accidents.

In line with our longstanding philosophy of continuous improvement that has resulted in significant cost avoidance for Navy shore activities over the years, we plan to issue two changes to NAVFAC P-307 in the near future that will provide additional cost avoidance opportunities.

We are finalizing a revised policy on the periodicity of nondestructive testing (NDT) of crane hooks. The results of our recently completed hook fatigue study, which included fatigue testing a series of crane hooks, indicate we should be able to extend hook NDT periodicities for the majority of hooks on cranes in our program.

As part of another cost avoidance initiative, we are working to simplify and improve our mobile crane test procedure. The revised procedure, which is currently under review, should be significantly more understandable and at the same time more efficient, eliminating some tests and steps.

As a result of the recently issued OSHA standard for cranes used in construction work, a third significant change to NAVFAC P-307 is under review. This is a comprehensive standard with many new requirements. A number of our Navy shore activities perform construction and facility repair work and will be affected by this new standard. Some changes to NAVFAC P-307 will be required to be in full compliance with the final OSHA standard, which is required this year. Due to the strength of our Navy weight handling program and our participation in the regulatory policy process, we were able to influence a number of requirements and achieve some significant exemptions for the Navy.

As further explained in the following pages, the Navy Crane Center recently introduced the Navy Shore Weight Handling Safety Brief, an informative but compact communication tool with information that increases awareness of potential issues/concerns noted within the program. This implements our basic vision to have a succinct key message vehicle that can be a practical tool for deck plate personnel (supervisors, foremen, operators, riggers, etc.) to help raise their level of safety awareness in our journey toward our mutual goal of ZERO accidents.

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Finally, as we issue this 67th edition of the Crane Corner, we want your opinion on how we can make this a better publication for the Navy shore establishment. We are planning to conduct a survey of our readers to get your opinions on how we can improve format and content to provide a publication that is meaningful to you. Each of your recommendations will receive our serious consideration. Our goal is a publication that continues to be informative, timely, and easy to read. Of course, we always welcome interesting articles from our shore activities. Please take the opportunity to respond to the forthcoming survey. ■

## RECOGNIZING OPPORTUNITIES THAT REDUCE MAINTENANCE COSTS

All good maintenance organizations work to recognize and alleviate factors that increase equipment maintenance. Here is one example:

A Navy shore activity was replacing intake filters on several mobile cranes every 150 hours – an unusually frequent rate. Investigation determined the likely cause to be the wind blowing engine exhaust into the air intake. The activity personnel did not accept the prospect of instituting an operational limitation or accepting the higher maintenance costs. They changed the orientation of the exhaust by replacing the straight exhaust pipe with a 90 degree pipe. A terrific low-cost solution to the problem!

Several good practices can be taken away from this solution:

1. Environmental conditions affect maintenance expectations. Know how local ambient conditions affect your equipment and its use.
2. Look for simple solutions to resolve problems instead of accepting operational limitations or higher maintenance costs.

If you know a good idea that reduces maintenance effort, pass it along! We will post it in a future Crane Corner. Email [nfsh\\_ncc\\_crane\\_corner@navy.mil](mailto:nfsh_ncc_crane_corner@navy.mil). ■



## INSPECTING POLYURETHANE BUMPERS

A non-Navy activity reported a polyurethane bumper fell from a crane to the floor. The bumper failed near the mounting base, leaving material still bonded to the base. The molded lug to which the safety cable was attached also failed. The bumper was installed in the 1987-1988 timeframe and the crane has been out of service since 2002. The bumper manufacturer determined the polyurethane had experienced hydrolysis from the warm and humid surrounding air. Hydrolysis is a chemical breakdown of carbon based plastics and rubbers due to oxidation of the material in the presence of water. This natural deterioration process is inherently slow and normally does not occur over the life of the bumper. The rate of deterioration varies with the specific chemical make-up of the bumper. Newer materials generally have greater resistance to this type of deterioration.

Hydrolysis results in loss of elastic capacity of the bumper. The bumper should be replaced when deterioration becomes evident. A simple test can be made to determine when to replace a bumper due to hydrolysis: press a fingernail or the tip of a flat head screwdriver into the bumper. The bumper should rebound back to original shape. If it does not rebound, the bumper is showing material degradation and should be replaced. Inspection

should be made to ensure the safety cable eye and cable are intact. Activities are reminded that NAVFAC P-307, Appendices C and D require periodic inspection of crane bumpers for evidence of deterioration or damage. ■

## **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.

### **CRANE SAFETY ADVISORIES (CSA)**

#### **CSA 193 - Inspection of Ingersoll Rand Manual Chain Hoist Guide Rollers**

##### **Background**

A. CSA 155, Improper Use of Chain Hoists, was issued in September of 2005 in response to several reported incidents of equipment damage due to improper use. A number of incidents have occurred since CSA 155 was issued, with similar circumstances that have made it necessary to reiterate the importance of proper maintenance, inspection, and operation of manual chain hoists.

B. There have been additional incidents involving 3 and 6-ton Ingersoll Rand MCH5 manual chain hoists where the guide rollers were dislodged allowing the load chain to disengage from the load sprocket causing a loss of load control. The investigation concluded that a twist or kink in the load chain may have jammed into the guide roller causing it to dislodge and allowing the load chain to become disengaged from the load sprocket. All of the hoists involved showed signs of spreading of the side plates that retain the guide rollers. The guide rollers are more prone to dislodge if the side plates are spread from their normal position (see Ingersoll Rand MCH5 parts diagram below). Subsequent inspection of additional Ingersoll Rand chain hoists found similar signs of spread side plates. This type of side plate construction and guide roller design may also be common on other chain hoists manufactured by different OEM's.

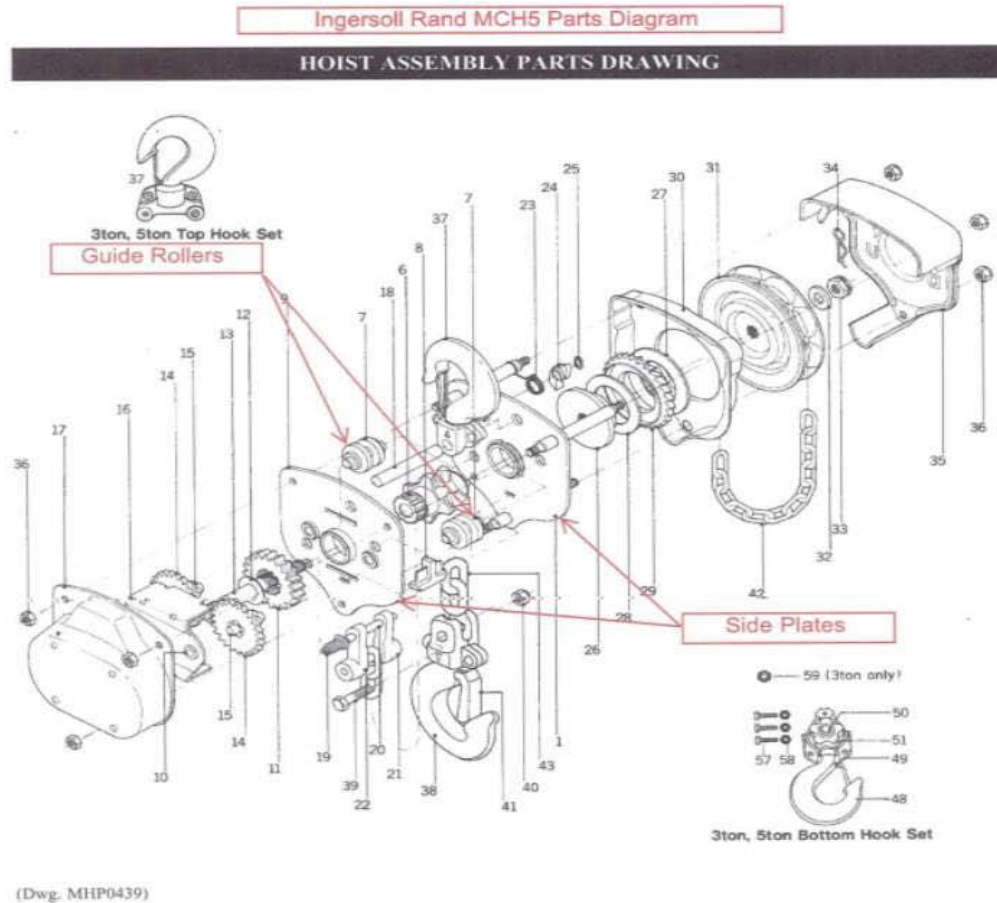
C. It is imperative that users and maintenance personnel pay close attention to the condition of chain hoists at pre-use inspections, during use, and at maintenance inspections. During pre-use inspections, personnel shall pay attention to the condition of the hoist in the area of the load chain sprocket and guide rollers. Chain hoists showing signs of spread side plates or questionable fitting guide rollers shall not be used. After transporting chain hoists, the load chain shall be freely suspended and carefully checked to ensure that the load block has not flipped through the chain falls and that the load chain is not twisted or kinked (including the dead-end portion of load chain). During use, check to ensure that slack load chain does not become twisted or kinked and that the load chain is feeding properly into the guide rollers. Extra caution shall be used when operating near the hoists upper limit of travel to avoid two blocking or contact with the hoist side plates. During maintenance inspections, load chains shall be lubricated as recommended by the OEM. The load chain shall be carefully inspected and chain stretch and wear measurements taken to ensure the chain is within acceptable limits. This ensures proper operation over load sprockets and chain sheaves.

Direction

A. Activities shall inspect all Ingersoll Rand manual chain hoists for evidence of spreading of side plates and for proper engagement of the guide rollers within 30 days of issuance of this CSA. Suspect hoists shall be removed from service for evaluation and/or repair/replacement.

B. Users, inspectors, and maintenance personnel of chain hoists (manual and powered) shall be briefed on the specifics of this CSA with regard to the safe operation, maintenance and inspection of chain hoists as discussed in background paragraphs 1.B and 1.C above within 30 days of issuance of this CSA.

C. Activities are reminded that NAVFAC P-307, paragraphs 9.2, 14.4.2, 14.10, and Appendix D provide pre-use, operation, and maintenance requirements for chain hoists.



**CSA 193  
Attachment (1)**

## CSA 194 - Failure of Johnson Industries SMAA 16 Drum Brake Magnet Base Pivot Pin

CSA 194  
Attachment 1

### Background

A. The purpose of the CSA is to alert activities of the failure of the magnet base pivot pin (part number JSMPMP400) on the Johnson Industries SMAA 16 drum brake as shown on Johnson Industries SMAA 16 Drum Brake Magnet Base Pivot Pin Location drawing. An activity servicing a hoist brake removed the brake coil for replacement. The magnet base pivot pin broke during brake reassembly. Laboratory analysis concluded the pin failed due to fatigue. Laboratory analysis also concluded the fatigue cracks most likely started inside the pin along a lubrication port where a crack cannot be easily detected by visual or other inspection methods. Johnson Industries has confirmed that the pin material is Type 303 stainless steel.

B. Johnson Industries has evaluated the pivot pin design and has recommended replacing pins having lubrication ports, and that have been subjected to over 225,000 brake cycles. Johnson Industries also recommends future replacement of pivot pins with non-lubricated (solid) pins.

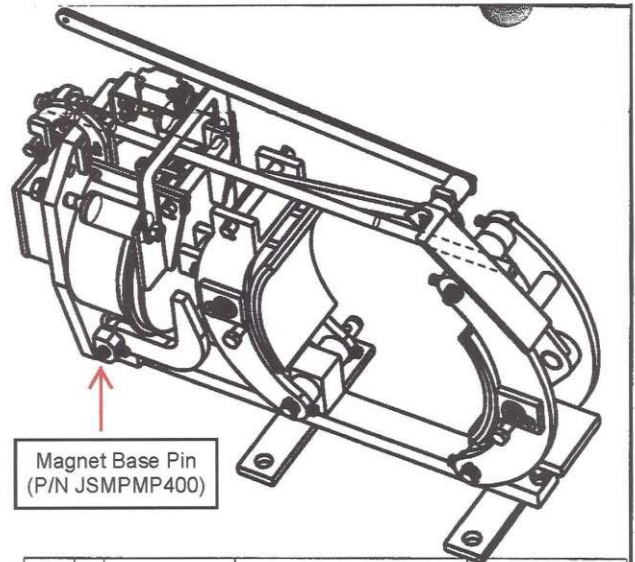
### Direction:

A. Activities shall immediately remove from service all hoists with Johnson Industries SMAA 16 drum brakes that have magnet base pivot pins with lubrication ports (part number JSMPMP400), and that have been subjected to over 225,000 cycles of operation. Hoists with SMAA 16 brakes where the number of brake cycles cannot be determined and the magnet base pivot pin has a lubrication port shall also be removed from service.

B. Activities shall install new magnet base pivot pins on hoist brakes removed from service identified above prior to returning the hoist to service. Replacement of pivot pins with like replacements (pins with lubrication port) is acceptable for near term corrective action.

C. For long term corrective action, activities shall install new non-lubricated (solid) pins for all hoists using SMAA 16 brakes before or during the next scheduled annual or type B inspection or if the brake is subjected to over 225,000 cycles, whichever comes first. Submit a CAR for NAVCRANECEN approval for replacing the magnet base pivot pins with non-lubricating (solid) pins.

JOHNSON INDUSTRIES SMAA 16 DRUM BRAKE MAGNET BASE PIN  
LOCATION



## **EQUIPMENT DEFICIENCY MEMORANDUM (EDM)**

No EDMs have been issued since the September 2009 edition of The Crane Corner. ■



## 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 (RCDR), NAVFAC P-307, Figure 1-1. For the official RCDR, please visit the Navy Crane Center website <https://portal.navfac.navy.mil/ncc> and navigate to the P-307 Questions and Interpretations section of interest. Please note, the NAVFAC P-307, December 2009 revision, paragraph 1-12 contains specific guidance on the use of previously approved RCDRs.

### **P-307 Reference Section 14**

**Question:** Are wire rope slings fabricated since October 2006 using ESCO swage sleeves determined through procurement records to be manufactured prior to October 2006 required to be down rated?

**Answer:** Not as long as the manufacture date of the sleeve has been validated through procurement records as being prior to October 2006.

**Question:** If the date of the ESCO swage sleeve can be determined by procurement records as being manufactured before October 2006, does the weight of each individual sleeve need to be verified?

**Answer:** The weight of each individual sleeve does not need to be verified if the manufacture date of the sleeve can be validated as being manufactured prior to the October 2006 re-tooling.

### **P-307 Reference Section 5**

**Background:** Load test periodicity for Category 2 and Category 3 cranes changed from 2 years to 4 years in Section 3.4.1 of the 2009 revision of NAVFAC P-307. The Certification of Load Test and Extensions requirement in Table 5-1, Item 6 was not updated during the 2009 revision. This was an oversight and will be corrected during the next change or revision to P-307.

**Question:** The equipment history file requirements in Table 5-1, Item 6 could be interpreted as only having to retain the current load test certification (including interims and extension) plus an annual certification, which may not include a load test. Is this correct?

**Answer:** The intent is to have the current and previous "CERTIFICATION OF LOAD TEST AND CONDITION INSPECTION" when a load test was performed (in addition to any interim load tests, extensions, and current "no load" annual certification) in the history file at all times. ■

## **SUMMARY OF WEIGHT HANDLING EQUIPMENT ACCIDENTS THIRD QUARTER FY10**

For the 3rd quarter of FY10, 45 Navy WHE accidents (34 crane and 11 rigging), 9 near miss accidents (7 crane and 2 rigging), and 9 contractor crane accidents were reported. Eight of the Navy WHE accidents were significant (overload, dropped load, two block, or injury). Some of the more significant accidents are discussed herein.

### **DROPPED LOADS**

**Accident:** A scaffold base was not properly attached and fell 10 ft while the scaffold assembly was being lifted. The pre-job brief included a past problem that had occurred while lifting scaffolding in which a "foot" came loose and fell to the ground. In another instance, scaffolding material was lifted from the pier to the ships mast. After the load was landed, but before the rigging gear was disconnected, a rigger attempted to remove a

piece of staging from the bundle. A piece of pipe was "dragged" out with the piece of staging, and fell from the ship's mast to the 01 level deck. In yet another instance, the crane team was lifting a 750 lb component using a lifting fixture when the fixture failed at the welds. The component dropped 5.5 ft. No injuries were sustained.

**Lessons Learned:** Even the smallest item weighing only 1 to 2 lbs can cause a serious injury to those below. The first two accidents involved lifting multiple components at one time and having one of the items, or even a piece of the item, fall. The third accident involved deteriorated welds that resulted in rigging equipment failure. Always ensure the load is adequately secured and is being lifted with properly inspected and satisfactory gear.

## OVERLOAD EQUIPMENT

**Accident:** A piece of equipment had been lifted in a cradle for several years using any two hoists at a time (out of 6 electric hoists in the shop). While investigating potential problems in the lift, it was discovered that the weight of the cradle was more than assumed and that all 6 hoists had been previously overloaded.

**Lessons Learned:** The 'status quo' can be dangerous. Having performed a lift multiple times without incident is not a guarantee that it is being done correctly or safely. All skids, tubs, cradles, etc., are required to be marked with their actual weight and the rigger/operator is required to verify the weight of the load prior to the lift.

## PERSONAL INJURY

**Accident:** A crew was preparing the crane to offload trailers and vehicles. The crew had put spreader bars on the crane hook. The rigger in charge saw he needed to adjust a sling so he had the crane lower the spreader bars down to the ground. As the operator boomed the crane down, the spreader bars fell over and struck the rigger on his leg.

**Lessons Learned:** The lift is not complete until the load is stable and on the ground. Most load handling crane accidents occur during "take off and landing."

## CONTRACTOR ACCIDENTS

**Accident:** A contractor was removing a light tower from a pier using a 60 ton mobile hydraulic crane. As the contractor operator rotated the crane, the force of the tipping tower pulled the crane and caused it to tip over. There were no injuries.

**Accident:** A construction contractor utilized a Navy bridge crane (without authorization) and attempted to extract a 4x4 wooden post with attached threaded rod from recently poured concrete. This resulted in a significant overloading of the crane and the supporting structure.

**Accident:** A contractor was installing facility equipment (9,000 lbs). The load was lifted 5 to 8 feet when it became unbalanced and rolled approximately 180 degrees striking the truck bed from which it was being lifted.

**Lessons Learned:** Contracting officer responsibilities are outlined in paragraph 1.7.2.2 of NAVFAC P-307 and include oversight of contractor weight handling operations. Critical lifts, such as the noted tower demolition, require a complete understanding of the potential hazards by the contracting officer. If assistance is required with review of rigging plans or oversight of critical operations, contact the Navy Crane Center. Ensure contractors are prohibited from using Navy cranes without authorization in the execution of their contracts.

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. ■

## **WEIGHT HANDLING SAFETY AWARENESS**

As Fiscal Year (FY) 2010 closes, the Navy shore activity crane accident totals are on track for a record FY performance.

The cumulative reported accident count for FY10 as of the close of August was 139 as compared to 169 for all of FY09.

Crane safety awareness for the summer months message was issued to influence special focus on safe crane and rigging operations in the summer months noting that most of the reported navy shore activity crane accidents have been attributed to human error. The months of June, July, and August for FY10 recorded fewer Navy shore weight handling crane accidents than the same months of FY09. Bravo Zulu for your efforts thus far.

As the typical vacation season draws to an end and we experience the changes in personal activity with the start of a new education cycle, the potential to lose focus or be distracted from the job rises. Navy shore activity weight handling personnel are encouraged to take advantage of their tools for success: good planning, teamwork, communication, situational awareness and operational risk management (ORM). Using these tools will enable the focus that is required to safely, and efficiently, accomplish the work associated with Navy shore weight handling.

Surveillance of crane and rigging operations by personnel has proven to be an effective tool in accident prevention. Personnel should look for signs of complacency, or short cutting a process / requirement. As a focus point, historically a high number of crane accidents are reported where there is no load on the hook. Monitoring of crane movements in a no load condition is advised.

Communication of management's expectation for adherence to safe weight handling requirements and practices is also a key element. Seven crane accident prevention videos are available to raise the level of safety awareness among weight handling personnel. These videos emphasize the impact of the human element on safe weight handling operations. In addition to these lessons learned safety videos, other videos are available (Mobile Crane Safety, Weight Handling Program for Commanding Officers, and Mobile Crane Load Test) to assist commands in crane safety awareness. All can be viewed on or ordered from the Navy Crane Center website: <https://portal.navfac.navy.mil/ncc>.

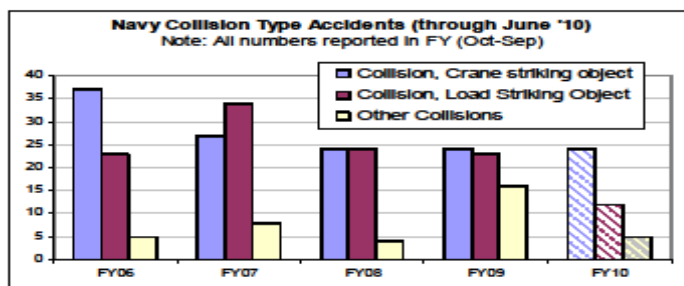
The Navy Crane Center recently introduced the "Navy Shore Weight Handling Safety Brief", an informative but concise communication tool designed to reach personnel in the Navy's shore weight handling program with information that increases awareness of potential issues/concerns noted within the program. When Navy shore weight handling safety briefs are issued, review by 'deck plate' personnel is recommended. During this quarter, three Weight Handling Safety Briefs were issued.



## Weight Handling Safety

Title: Collision Type Accidents

Target Audience: Riggers, Operators and Building Maintenance Personnel



- 39% of all crane accidents reported in FY10 have been collision related accidents. Crane collision accidents (cranes striking objects) reported through June are already equal to all of the crane collisions in FY09!
- Bridge Crane collisions are 27% greater than the equivalent FY09 reporting period (Oct-June) and represent more than 1/3 of all of the reported collisions thus far in FY10.
- Bridge Crane contact with obstructions left/placed in the travel path were common. Items large and small have been struck (roll up doors, scissors lift, small parts, etc).
- Causes have been attributed mostly to operator error. However, contributing factors include not employing energy control procedures (LO/TO) when personnel were performing work in the operating envelope, inadequate clean up following maintenance, and improper placement of materials that increased congestion in the travel path.
- Look for unexpected objects in the envelope. Find them before they find you!

16 July 2010

**SAFETY**

Navy Crane Center 10-S-01

## Weight Handling Safety

Title: Crane Hook Safety Latches For Personnel Lifting

Target Audience: Riggers, Operators and Crane Maintenance Personnel



Self Locking



Locking Latch



Spring Loaded /Non Locking



- For cranes utilized to lift personnel, NAVFAC P-307 refers to 29 CFR 1926.550(g) for the crane, rigging gear, and the personnel platform. Hooks used in the connection between the hoist line and the personnel platform **shall be closed and locked**, eliminating the throat opening, and remain **closed and locked** when attached."
- There are various types of hooks and safety latches available on cranes that may be used for making personnel lifts. Some have the ability for the safety latch to be pinned in the closed position. Others are designed to be self locking. See those in the upper illustrations.
- Requirements for personnel lifting are more stringent than that of P-307 paragraph 10.7, which only requires hooks used on cranes and hoists to be secured to prevent the attached item from coming free of the hook under a slack condition.
- A crane with a hook safety latch that cannot be positively **closed and locked** cannot be used for making personnel lifts. "Mousing" is not an acceptable method of closing the hook throat opening when lifting personnel.

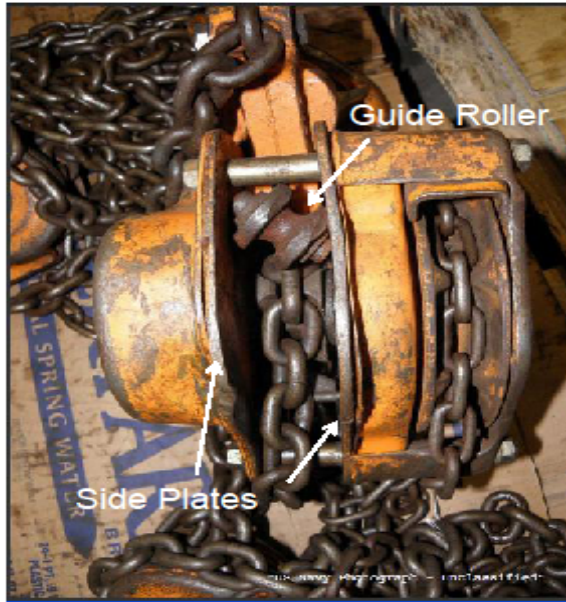
09 August 2010

**SAFETY**

Navy Crane Center 10-S-02

Title: CHAINFALL GUIDE ROLLER PRECAUTIONS

Target Audience: WEIGHT HANDLING PERSONNEL UTILIZING CHAINFALLS



- Several manual chainfall users have experienced rigging gear accidents when the load chain guide roller became dislodged as a result of **improper use or inadequate maintenance / inspection**. In some cases chainfalls have been inspected, tested, and returned to service with the guide roller dislodged. Misuse included two-blocking, side loading and "bunching" of load chain.
- Users of manual chainfalls should ensure guide rollers are in good working order and chainfalls are properly oriented during load movement. Always follow the appropriate manufacturer guidelines and training requirements for use.
- During the pre-use inspection, inspect chainfall side plates for spreading, the guide roller for correct orientation and verify guide roller turns freely by hand. Ensure that the load chain is properly lubricated per the OEM requirements.
- **BE ALERT!** Report any rigging gear related problems to your supervisor. Additional information is contained in Crane Safety Advisory #193.

16 September  
2010**SAFETY**

Navy Crane Center 10-S-3

The safety briefs are posted on the Navy Crane Center's web site at: [https://portal.navfac.navy.mil/portal/page/portal/navfac/navfac\\_ww\\_pp/navfac\\_ncc\\_pp/tab66035:whapi](https://portal.navfac.navy.mil/portal/page/portal/navfac/navfac_ww_pp/navfac_ncc_pp/tab66035:whapi)). Navy Crane Center point of contact for requests to be added to the safety brief distribution list is [nfsh\\_ncc\\_crane\\_corner@navy.mil](mailto:nfsh_ncc_crane_corner@navy.mil).

Each weight handling accident diminishes support to the fleet. A safe and reliable Navy weight handling program is an essential enabler for fleet readiness. I encourage you to raise the level of safety awareness in your weight handling operations and continue to strive for the goal of 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](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 audience for these videos is crane operations and rigging personnel and their supervisors. These videos provide a very useful mechanism for emphasizing the impact that the human element can have on safe weight handling operations.

***Weight Handling Program for Commanding Officers*** provides an executive summary of the salient program requirements and critical command responsibilities associated with shore activity weight handling programs. The video covers NAVFAC P-307 requirements and activity responsibilities.

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

***Mobile Crane Safety*** covers seven topics: laying a foundation for safety, teamwork, crane setup, understanding crane capacities, rigging considerations, safe operating procedures, and traveling and securing mobile cranes.

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

***“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.

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