

# M\_009 Overhead Crane Safety Lecture



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# Qualification for the use of overhead cranes requires completion of the following

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- **Attend the Overhead Crane Safety Lecture and pass the associated test with a minimum score of 80%**
- **Learn the use of an overhead crane under the supervision of an overhead crane instructor (Shoup, Romanofsky, Rodas, Neyland)**
- **Completing an Overhead Performance Evaluation (A test that demonstrates proficiency and safe operation of an overhead crane)**

# **This lecture covers the information necessary to safely execute the overhead crane process shown below**



- 1. Acquire remote control**
- 2. Energize the crane**
- 3. Inspect the crane**
- 4. Test the controls**
- 5. Test the upper limit switch**
- 6. Inspect the load block, hook, and wire rope**
- 7. Designate a signalman**
- 8. Review the lift path**
- 9. Attach the payload**
- 10. Test lift the payload and adjust as the rigging as necessary**
- 11. Lower the payload and test the load brake**
- 12. Move the payload**
- 13. Lower the payload**
- 14. Secure the payload**
- 15. Detach the payload**
- 16. Park the crane**
- 17. Deenergize the crane**
- 18. Put the remote control away**

# Key to understanding the material in this presentation



- (a) Many of the rules in this presentation are directly quoted from ANSI standards. Many are easily recognized by a letter or number in parenthesis like this statement.**
- (b) Some ANSI rules are not applicable at LLE (but shown for completeness) and are shown grayed like this statement.**

**LLE policies are shown in a yellow box like this statement. LLE policies that are shown immediately following an ANSI rule are always more restrictive (safer) than the ANSI rule.**

**LLE policies are shown in a yellow box like this statement. LLE policies that are shown at the bottom of a slide summarize the policy for that slide.**

# Safety is everyone's business and compliance with safety procedures is **MANDATORY**



- If an activity or practice seems unsafe, “Stop Work” and take the time to address concerns
- Only designated and qualified personnel may operate an overhead crane
- No suspended load is ever to be left unattended by the overhead crane operator
- Operators are required to visually examine overhead crane equipment before using it
- No LLE personnel are permitted to make any repairs on an overhead crane
- Only approved rigging gear shall be attached to a load hook
- All engineered lifts must be coordinated through ME
- LLE overhead crane operators shall not carry loads over people
- Any overhead crane found to have a deficiency shall be de-energized and tagged out in accordance with LLE procedure

- **The Overhead crane safety course consists of six sections**
  - I. Introduction**
  - II. The hardware**
  - III. Wire rope**
  - IV. Testing and maintenance**
  - V. Operation**
  - VI. Site specific procedures**

# Section I

## Introduction

# Within LLE there is often a need to move sizeable pieces of equipment or materials

- Rigging/Material Handling is accomplished using jib, gantry, bridge cranes, and other specially designed equipment using overhead hoists



- Overhead bridge cranes in the OMEGA facilities can lift up to 10 tons
- Personnel must be trained and become qualified in the use of overhead bridge cranes before being permitted to lift any loads

**Personnel must stay clear of overhead crane operations**

# There are two specific roles in moving materials overhead, hoist operators and riggers

- The definitions for hoist operators and riggers are as follows;
  - ***hoist operator:*** an employee who generally uses an overhead hoist as a tool to assist in the performance of their regular job
  - ***rigger:*** At LLE a rigger is responsible for safely attaching payloads to the load hook of a hoist.



# For hoist operators and riggers there are multiple classes of qualification

- There are 2 classes of training for Hoist operators
  - Hoist operator (M\_003) – for overhead vertical lifting with unpowered horizontal motion
  -  — Overhead Crane operator (M\_009) – for overhead vertical lifting with powered horizontal motion
- There are 3 classes of training for riggers
  - No training is required for payloads <120 lbs
  - Basic rigger (M\_004) – for personnel attaching any loads from 120-500 lbs to any hoist
  - Advanced rigger (M\_005) – for personnel attaching any load >500 lbs to any hoist

**Overhead rigging of material or equipment must be performed only by designated personnel**

# OSHA Department of Labor (DOL) establishes the rules for overhead hoists



- **The rules for Overhead Hoists are established in 29 CFR 1910.179 Overhead and gantry cranes**
- **The DOL incorporates additional rules by reference by citing additional standards within the regulations**
- **ASME B30 pertains to lifting and material-handling related equipment**
  - **There are 28 subparts to ASME B30**
  - **For Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist) ASME B30.2 is specified**

# Definitions

- ***designated person:*** a person selected or assigned by the employer or the employer's representative as being competent to perform specific duties

**Only designated personnel may operate an overhead crane**

- ***qualified person:*** a person who, by possession of a recognized degree in an applicable field, or certificate of professional standing, or who, by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter and work.
- ***unattended:*** a condition in which the operator of a crane is not at the operating control devices. However, on a floor-operated crane, if the control devices are within sight of the operator and within a distance equal to the span of the crane, the crane should be considered attended.

**No suspended load is ever to be left unattended by the hoist operator**

# Purpose of the ASME B30 standard

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- **The B30 Standard is intended to**
  - (a) prevent or minimize injury to workers, and otherwise provide for the protection of life, limb, and property by prescribing safety requirements**
  - (b) provide direction to manufacturers, owners, employers, users, and others concerned with, or responsible for, its application**
  - (c) guide governments and other regulatory bodies in the development, promulgation, and enforcement of appropriate safety directives**

# Scope

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- **Volume B30.2 includes provisions that apply to the construction, installation, operation, inspection, and maintenance of hand-operated and power-driven overhead and gantry cranes that have a top-running single girder or multiple-girder bridge, with one or more toprunning trolley hoists used for vertical lifting and lowering of freely suspended, unguided loads consisting of equipment and materials. The requirements included in this Volume also apply to cranes having the same fundamental characteristics such as cantilever gantry cranes, semi-gantry cranes, and wall cranes.**

# Section II

## Overhead crane hardware

**This section covers the ASME requirements for and the site specific information for LLE overhead cranes**

# Overhead crane types – Wall Crane

- **Crane, wall:** a crane having a cantilever frame with or without trolley, and supported from a side wall or line of columns of a building. It is a traveling type and operates on a runway attached to the side wall or columns
- **Jib cranes (a type of wall crane)** can also be post (mast) mounted to create a free standing crane



# Overhead crane types – Gantry Crane

- ***crane, gantry:*** a crane similar to an overhead crane except that the bridge for carrying the trolley or trolleys is rigidly supported on two or more legs running on fixed rails or other runway

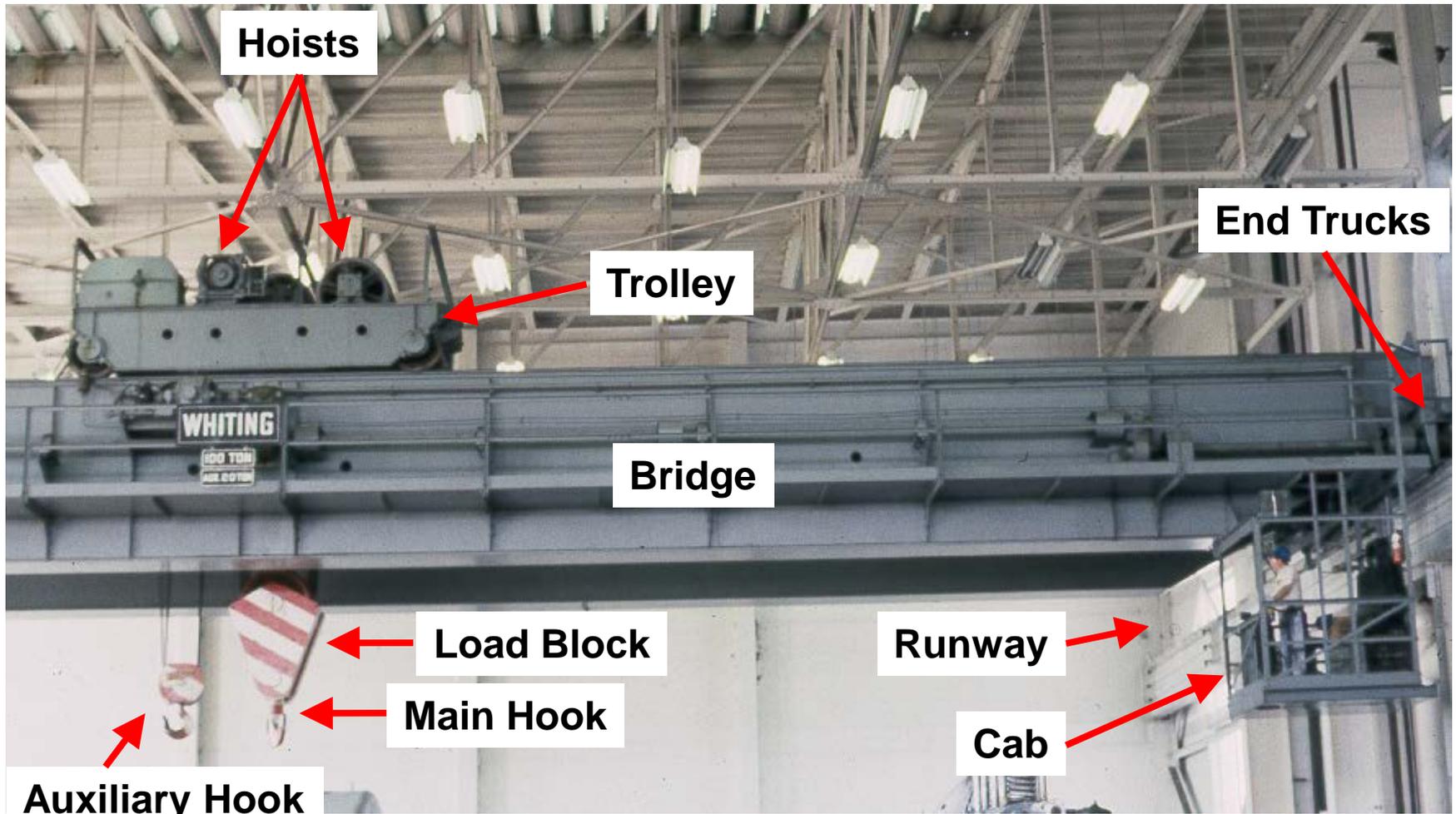


# Overhead crane types – Overhead Bridge Crane

- **Crane, overhead:** a crane with a single or multiple girder movable bridge carrying a movable or fixed hoisting mechanism and traveling on an overhead fixed runway Structure
- This overhead bridge crane is specifically – a Double Girder Overhead Underhung Bridge Crane
  - Underhung means the trolley rides below the top of the bridge



# Overhead bridge crane basic components



# Important terms for overhead bridge cranes

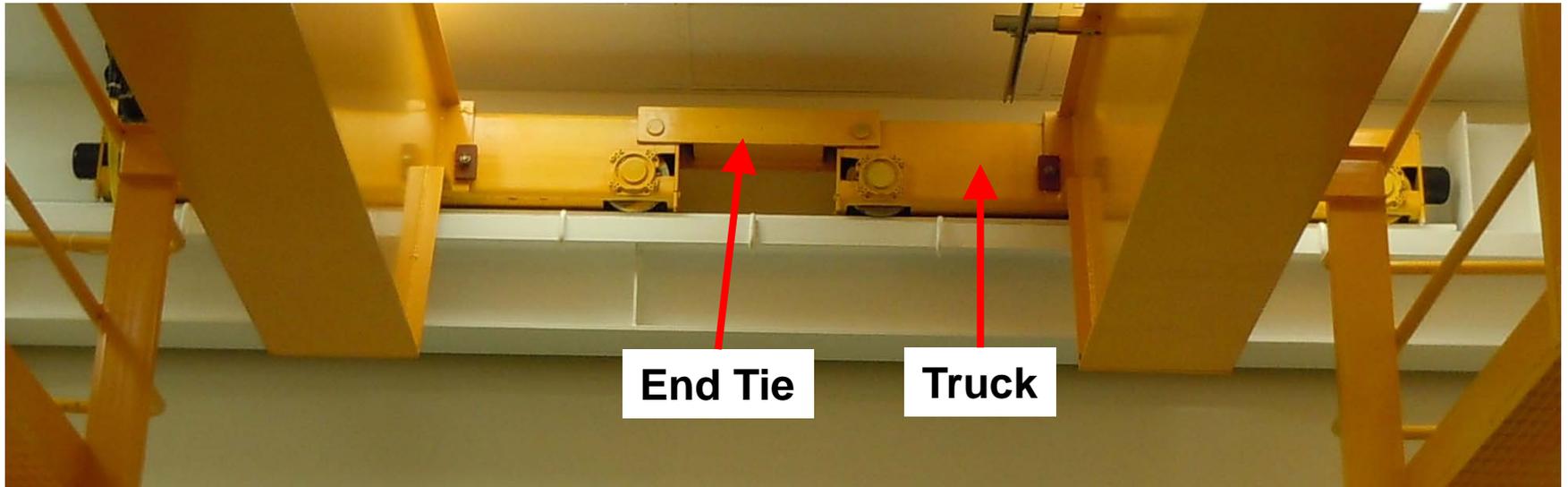
- **bridge:** that part of a crane consisting of one or more girders, trucks, end ties, footwalks, and drive mechanism, which carries the trolley or trolleys



- **span:** the horizontal distance, center to center, between runway rails
- **runway:** an assembly of rails, beams, girders, brackets, and framework on which the crane travels

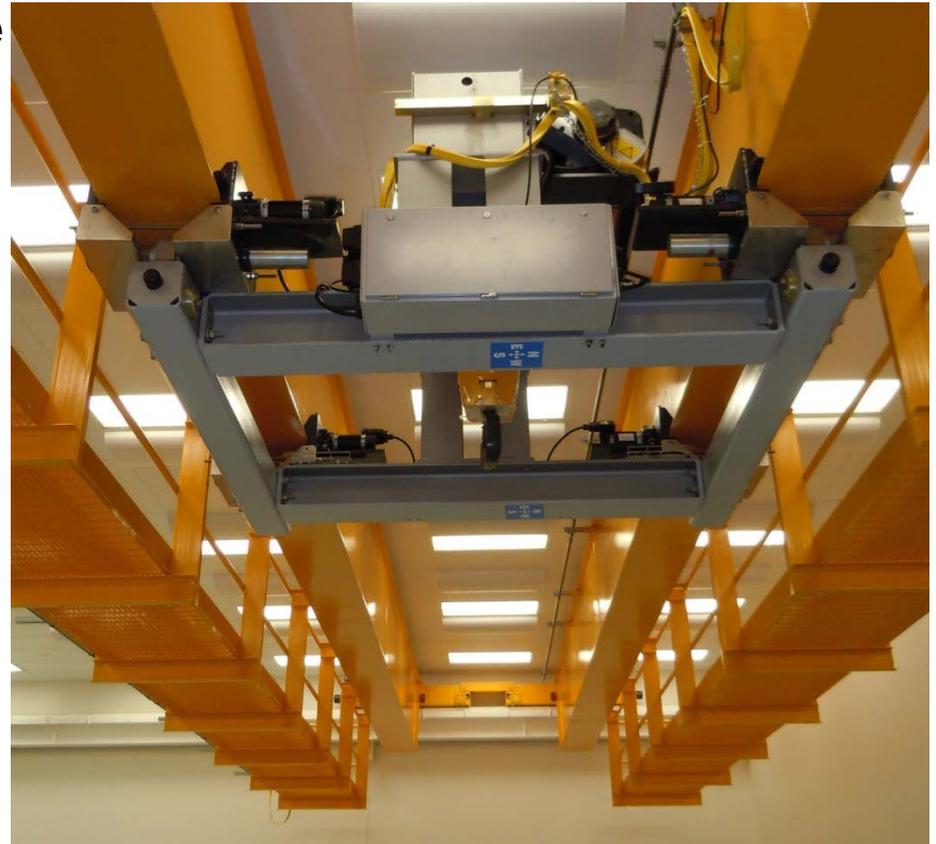
# Trucks

- ***truck***: a unit consisting of a frame, wheels, bearings, and axles that supports the bridge girders, the end ties of an overhead crane, or the sill of a gantry crane
- ***end tie***: a structural member that connects the ends of the bridge girders to maintain squareness of the bridge



# The trolley

- ***trolley***: the unit that travels on the bridge rails and supports the load block
- ***trolley travel***: the trolley movement



# Multiple hoists are permitted on a single support structure

If two hoists are used simultaneously,

- the combined rated load of hoists shall not exceed the rated load of the support structure



# Markings

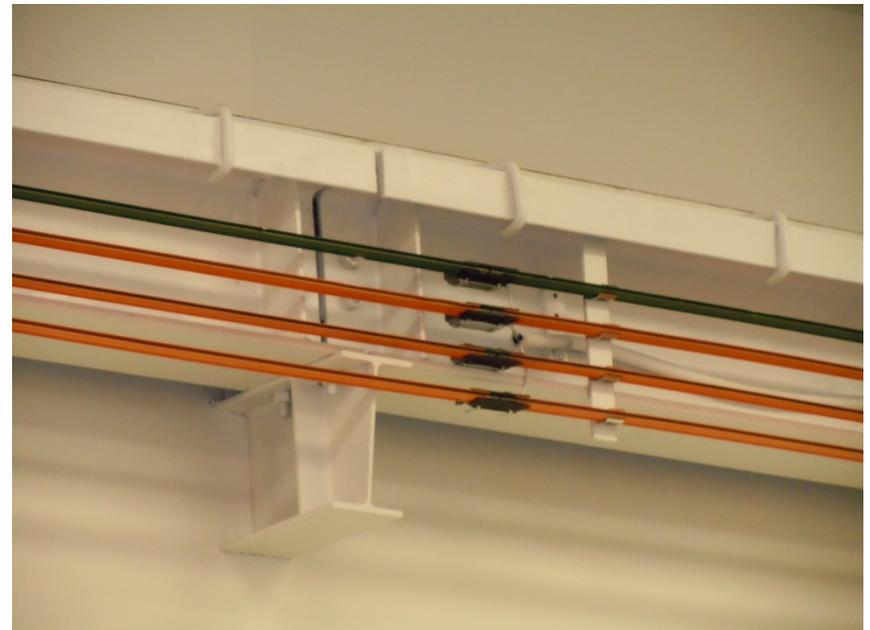
- All load blocks must display a load rating
- All support structures (the bridge) must display a load rating



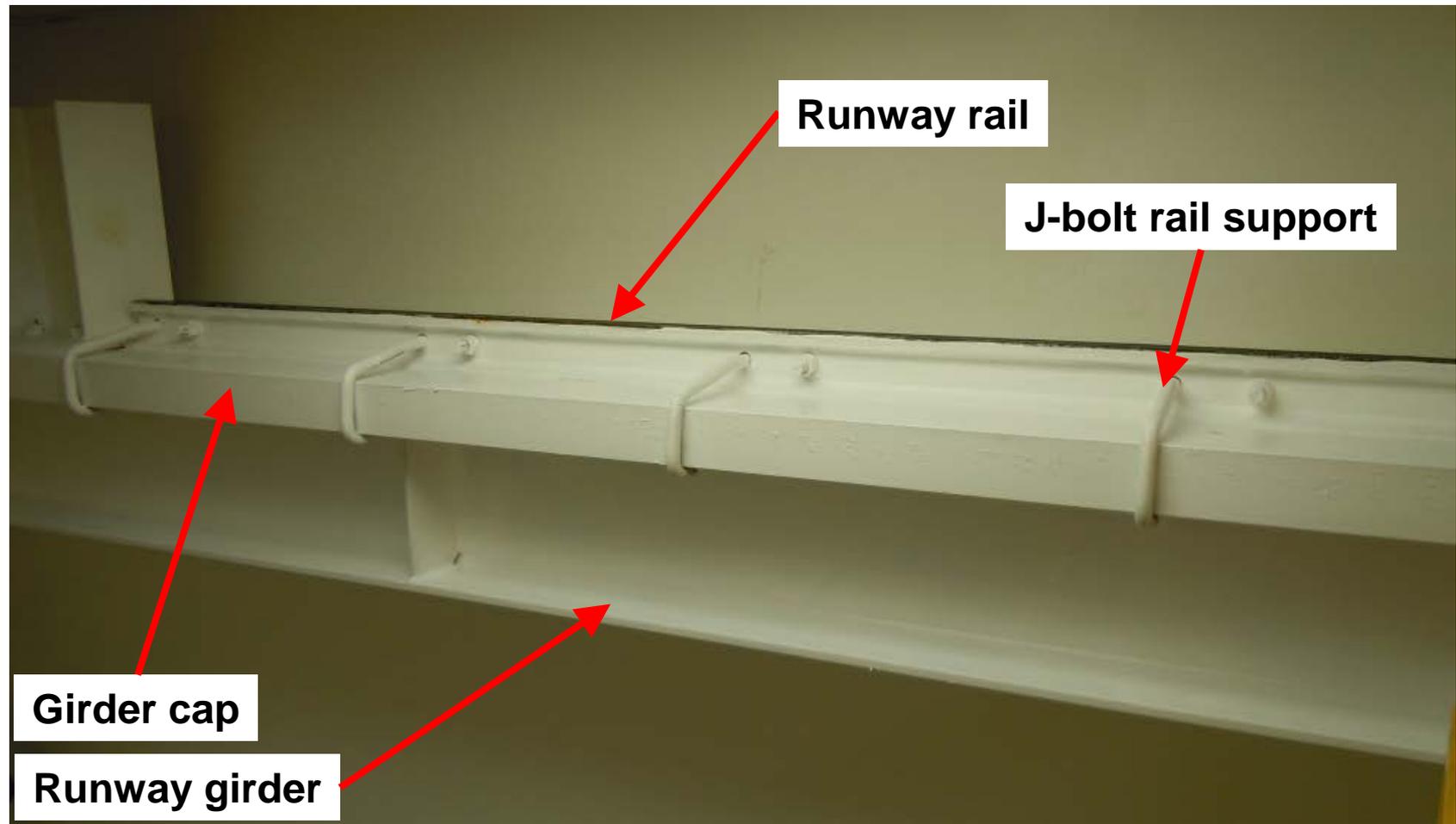
# Support for the overhead cranes are integrated into the building structural steel



- ***runway***: an assembly of rails, beams, girders, brackets, and framework on which the crane travels

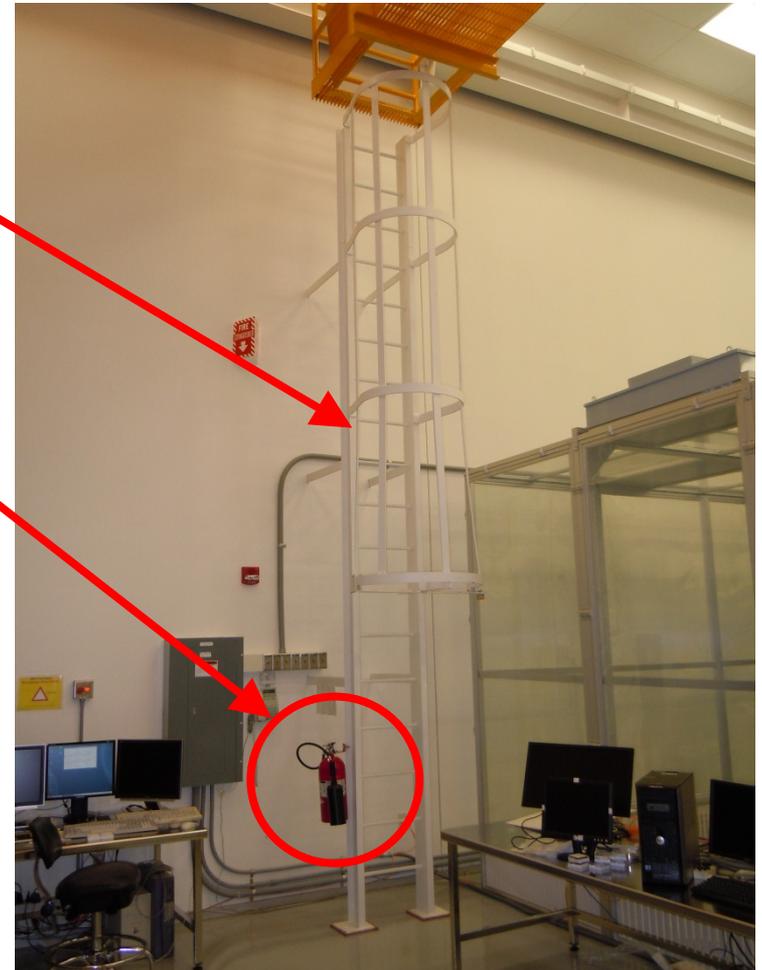


# Runway and rail components



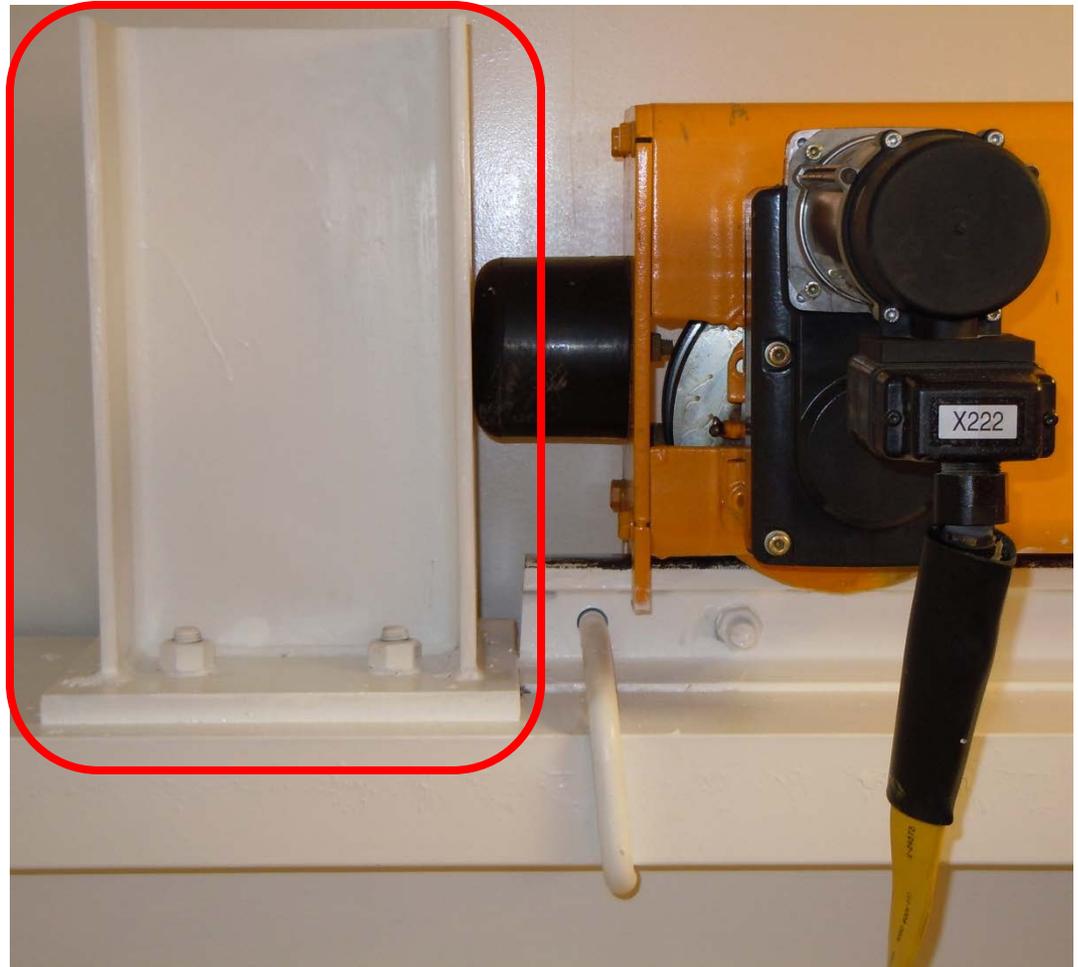
# Access to Crane

- **OMEGA and OMEGA EP overhead cranes are accessed by vertical ladders**
- **All ladders incorporate a cage to eliminate the need for fall protection**
- **Fire extinguishers are located at the base of ladders**



# Runway stops

- (1) Stops shall be provided at the limits of travel of the bridge**
- (2) Stops shall engage the bumpers or bumper pads mounted on the bridge**
- (3) Stops shall be designed to withstand the forces applied to the bumpers**

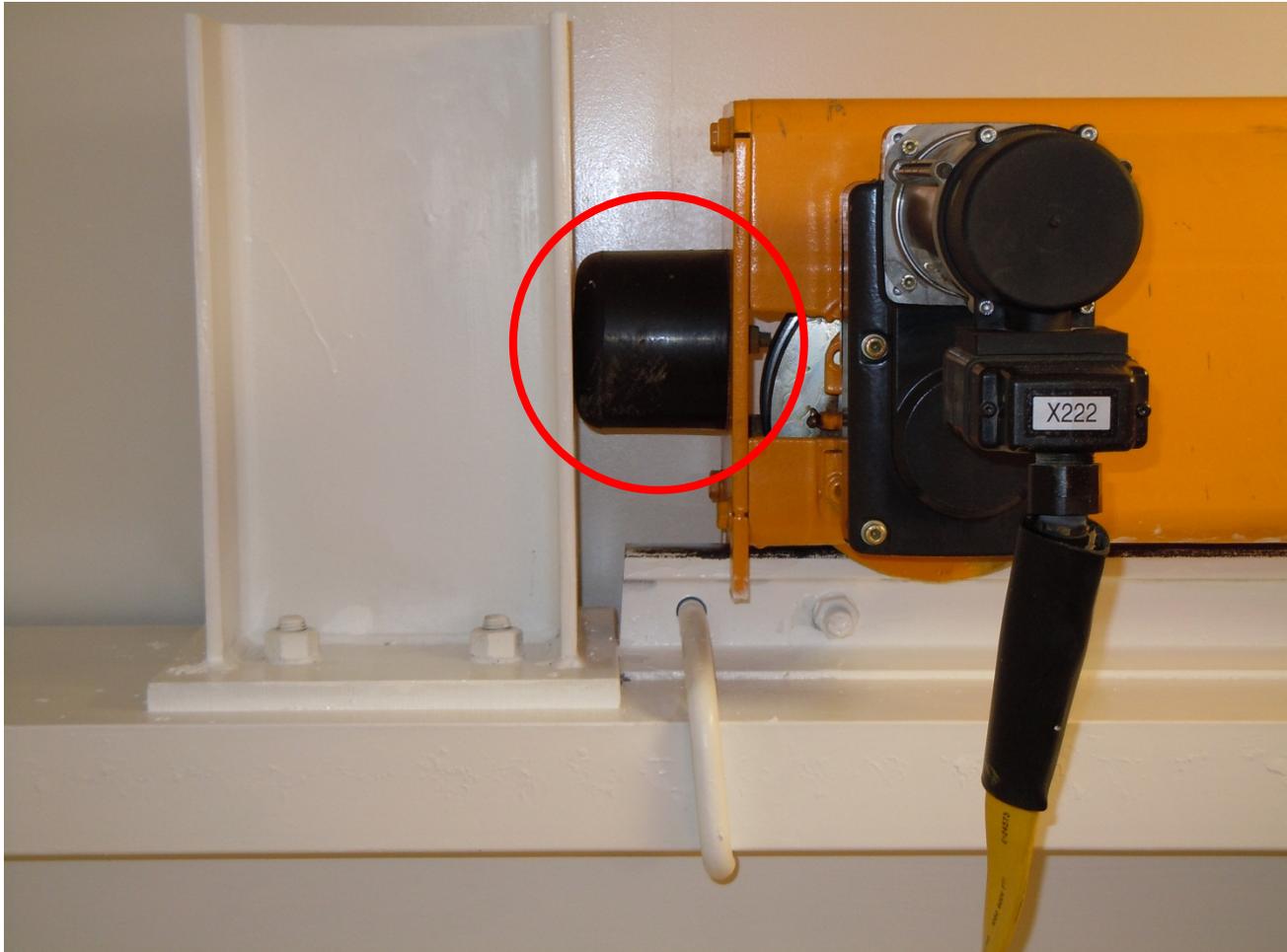


# Trolley stops

- (a) Stops shall be provided at the limits of travel of the trolley**
- (b) Stops shall engage the bumpers or bumper pads mounted on the trolley**
- (c) Stops shall be designed to withstand the forces applied by the bumpers**

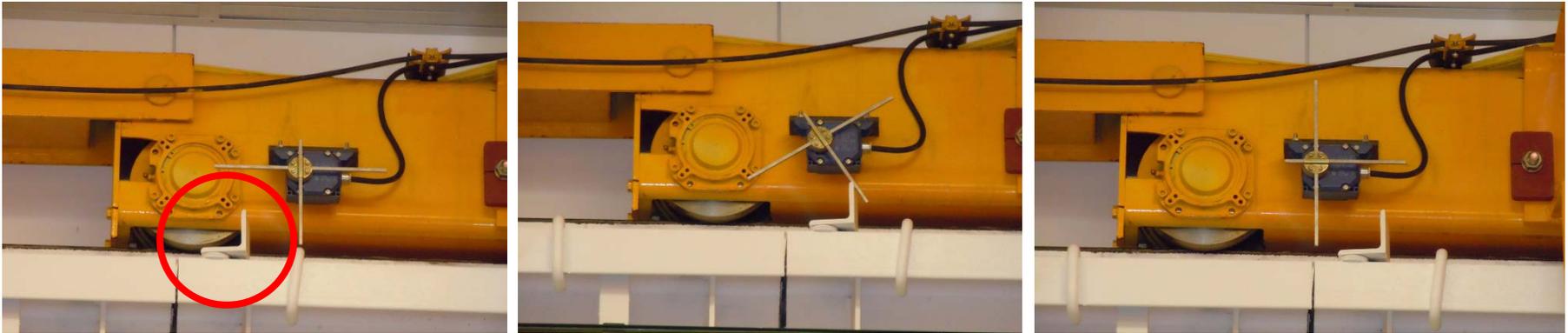


# Bridge bumpers have the capability of stopping the bridge when traveling with power off in either direction at 20% of rated load speed



# What keeps the crane from running into the runway stops at full speed?

- Near the ends of all runways is a dog that trips a switch on the end truck
- The switch reduces the maximum speed that the crane can travel near the ends of the runways

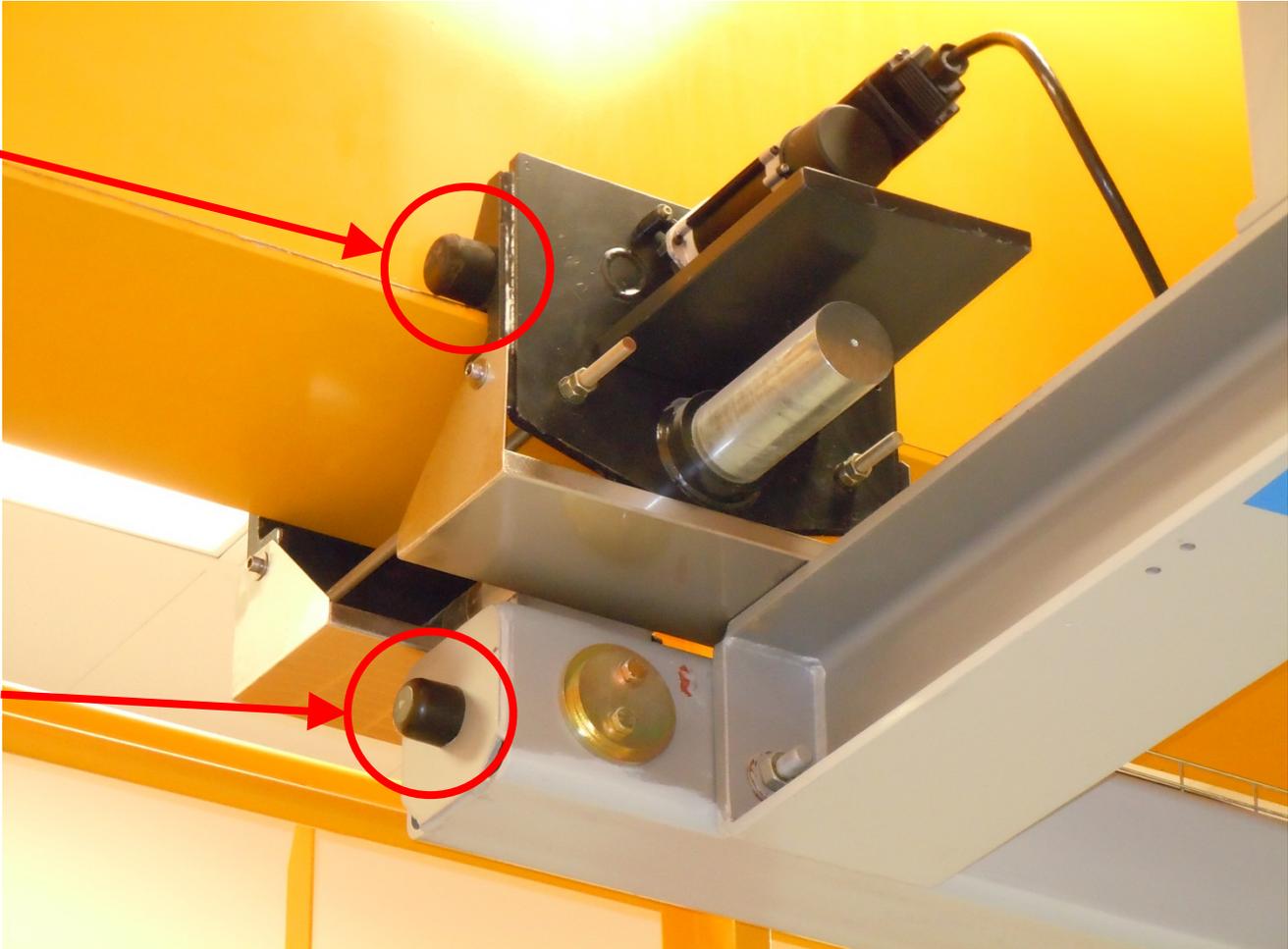


- Operators must be aware of where they are relative to the switch and not be surprised by a change in speed.

# Trolley bumpers have the capability of stopping the trolley when traveling with power off in either direction at one-third of rated load speed



Trolley bumper



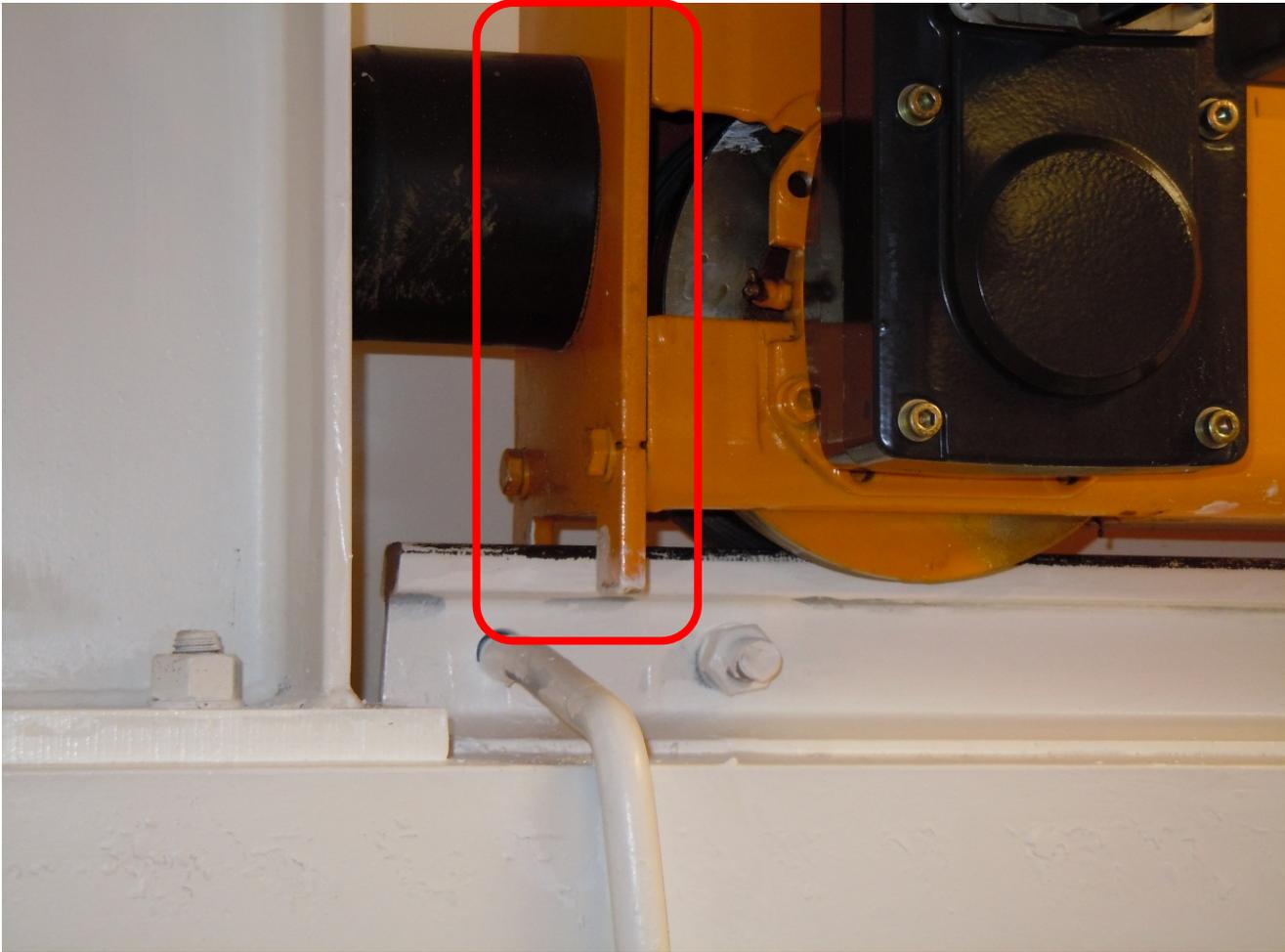
Carriage bumper

# Bridge rail sweeps



- (a) Bridge truck rail sweeps shall be provided in front of the leading wheels on both ends of the bridge end truck.**
- (b) The rail sweep shall clear the rail of objects on the runway which, if they came into contact between the wheel and rail, could cause damage to the wheel or derail the wheel.**
  - (1) Clearance between the top surface of the rail head and the bottom of the sweep should not exceed 3/16 in. (5 mm).**
  - (2) On overhead crane end trucks, the sweep shall extend below the top surface of the rail head, for a distance not less than 50% of the thickness of the rail head, on both sides of the rail head.**

# The bridge rail sweep shall clear the rail of objects on the runway which could cause damage to the wheel or derail the wheel

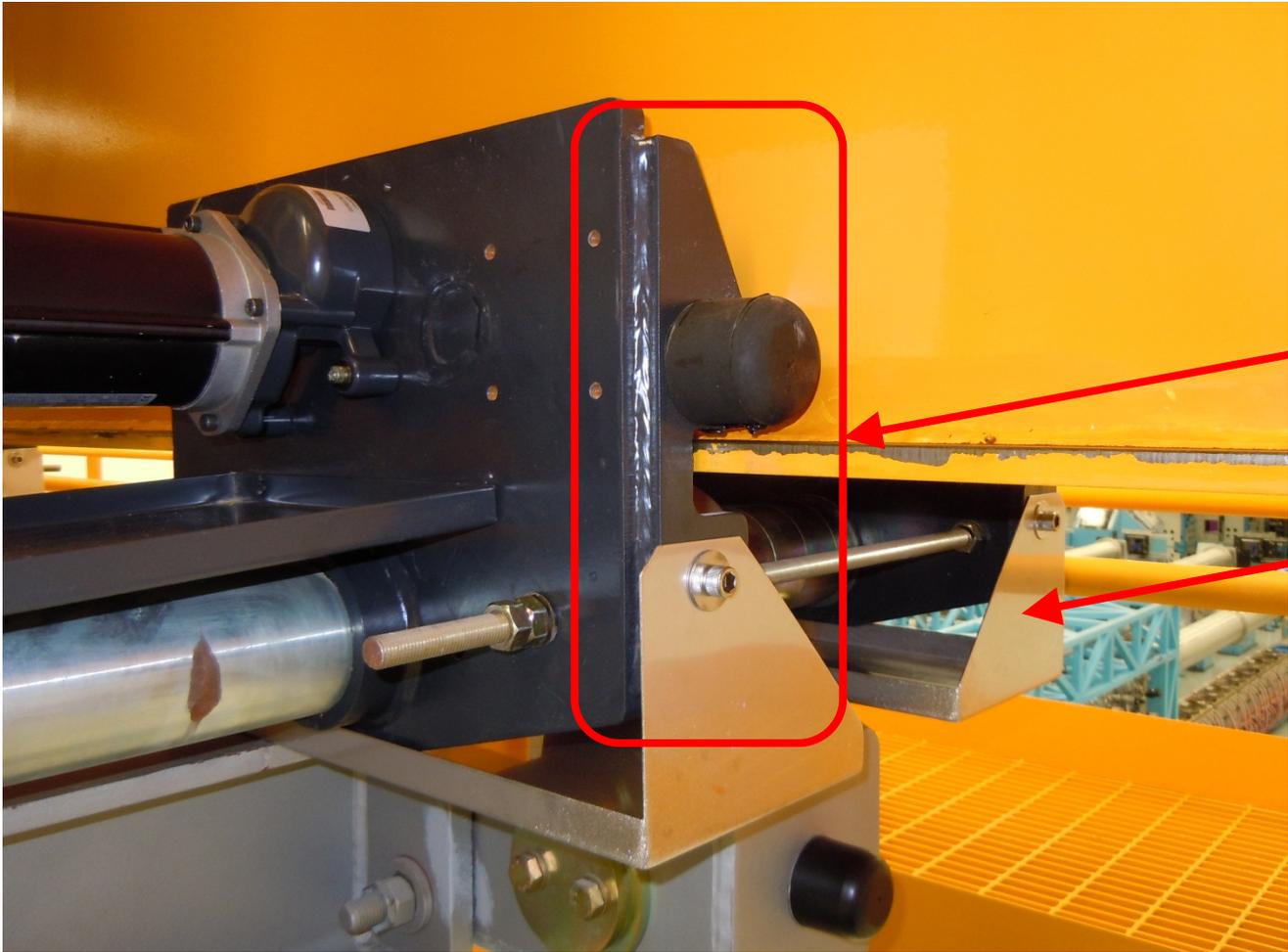


# Trolley rail sweeps



- (a) Trolley truck rail sweeps should be provided in front of the leading wheels on both ends of the trolley end truck.**
- (b) The rail sweep shall clear the rail of objects on the bridge which, if they came into contact between the wheel and rail, could cause damage to the wheel or derail the wheel.**
  - (1) Clearance between the top surface of the rail head and the bottom of the sweep should not exceed 3/16 in. (5 mm).**
  - (2) The sweep shall extend below the top surface of the rail head, for a distance not less than 50% of the thickness of the rail head, on both sides of the rail head.**
  - (3) Clearance between the side surface of the rail head and the side of the sweep which extends below the top surface of the rail head should be equal to crane float plus 3/16 in. (5 mm).**

# The trolley rail sweep shall clear the rail of objects on the runway which could cause damage to the wheel or derail the wheel



Rail sweep

LLE catch pan

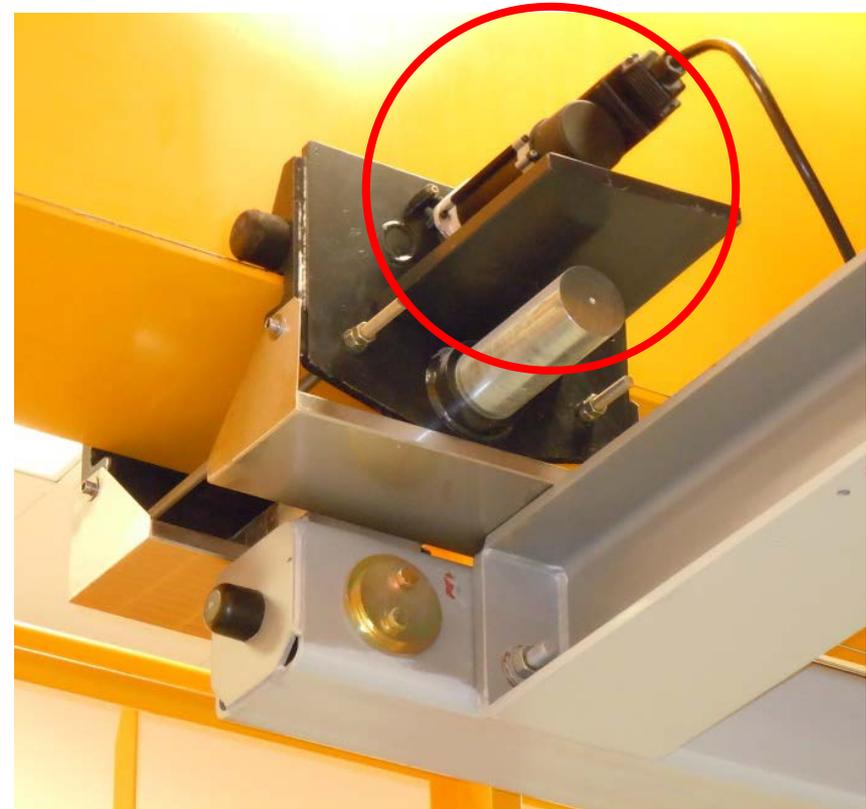
# Guards for moving parts

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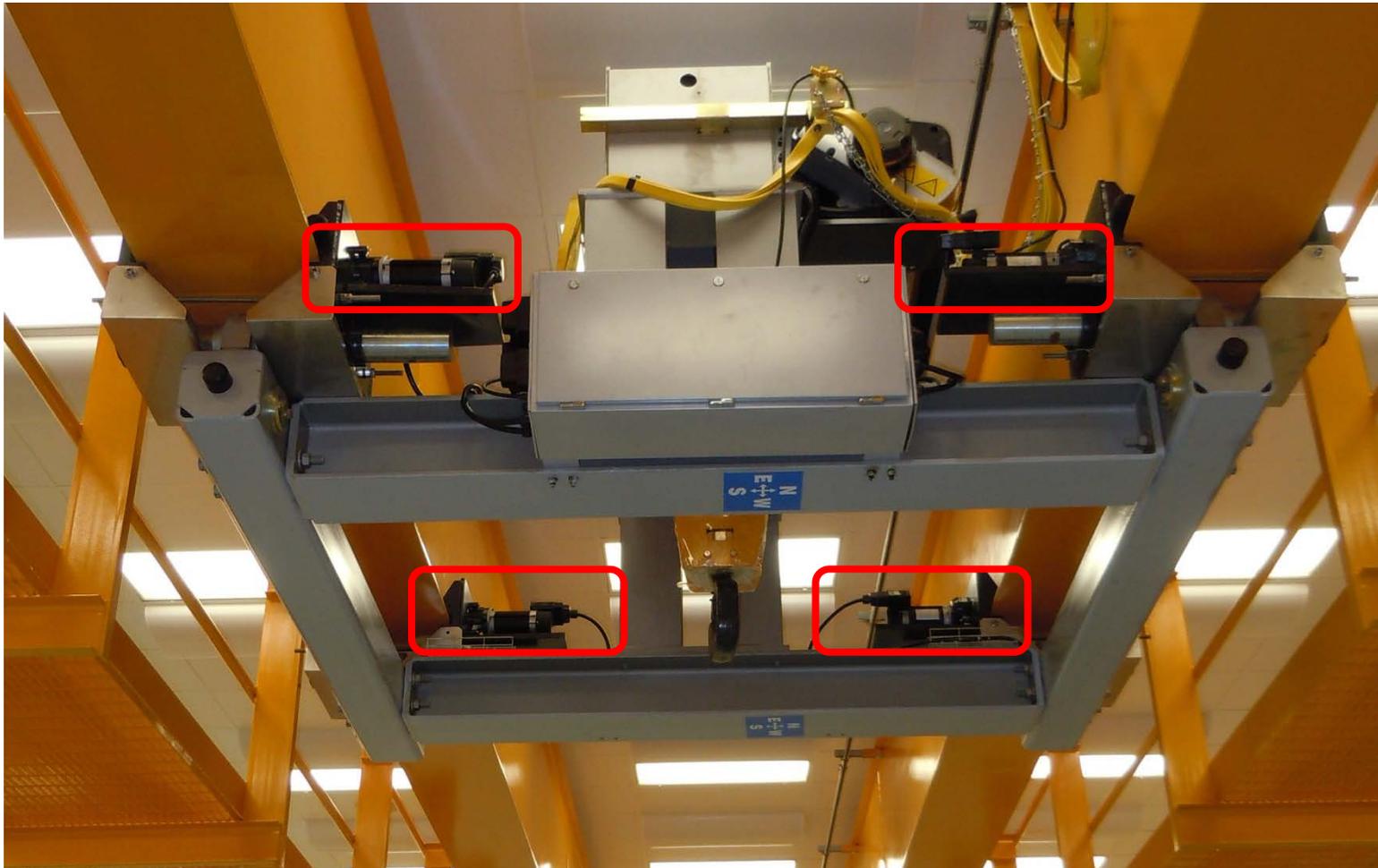
- (a) Exposed moving parts, such as gears, set screws, projecting keys, and drive chain and sprockets, which constitute a hazard under normal operating conditions, shall be guarded.**
- (b) Each guard shall be capable of supporting, without permanent deformation, the weight of a 200 lb (90 kg) person, unless the guard is located where it is not probable that a person will step on it (see ASME B15.1).**

# How is trolley and bridge braking accomplished?

- Each drive wheel has a motor with an integrated brake.
- Power must be applied to the brake to “disengage” the brake and allow drive to rotate.
  - In the event of a power failure or fault the brake is automatically engaged mechanically via a spring. This feature makes the drive fail safe. The easiest way to remember this is; spring set, power released.



# There are 4 trolley brakes, one at each drive wheel



# There are 4 bridge brakes, one on each drive wheel



# Electrical equipment general requirements



- (a) Wiring and equipment shall comply with Article 610 of ANSI/NFPA No. 70, National Electrical Code.**
- (b) The control circuit voltage shall not exceed 600V for AC or DC.**
- (c) The control circuit voltage in pendant push buttons shall not exceed 150V for AC or 300V for DC.**
- (d) Where multiple conductor cable is used with a suspended push-button station, the station shall be supported so that the electrical conductors are protected from strain.**
- (e) Pendant control stations shall be constructed to prevent electrical shock. The push-button enclosure shall be at ground potential and marked for identification of functions.**

# Electrical equipment

(a) The power supply to the runway conductors shall be controlled by a switch or circuit breaker located on a fixed structure, accessible from the floor, and arranged to be locked in the open position.

- The electrical disconnects for all LLE bridge cranes are clearly labeled on the cover.



# Crane electrical equipment and controls

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- (a) Electrical equipment shall be located or enclosed so that, under normal operating conditions, energized parts will not be exposed to inadvertent contact.**
- (b) Energized parts of electrical equipment shall be protected from direct exposure to grease, oil, and moisture, and they should be protected from dirt.**
- (c) If guards are provided for energized parts, the guards shall be constructed or located so that they cannot be deformed, under normal operating conditions, to make inadvertent contact with energized parts.**

# Crane electrical equipment and controls are located directly on the bridge

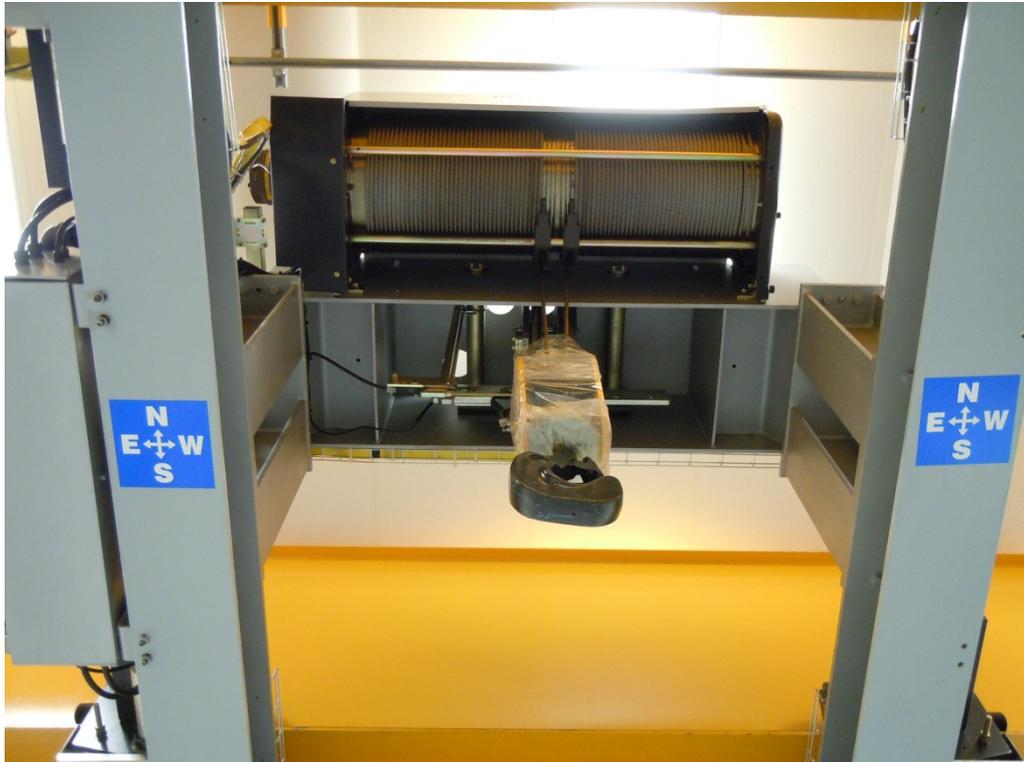


# Controllers

- (h) Push buttons in pendant stations shall return to the off position when pressure is released by the crane operator.**
- (j) Remote-operated cranes shall function so that if the control signal for any crane motion becomes ineffective, that crane motion shall stop, and, conversely, signals received from any source other than the operating station (transmitter) shall not result in operation of any motion of the crane.**
- (k) The arrangement of pendant push-button stations and radio-control transmitters should conform to Figs. 8 and 9 of ASME B30.2, respectively. Compass directions may be substituted for "right-left" and "forward-reverse".**
- (l) Master switches shall be labeled to indicate their functions.**

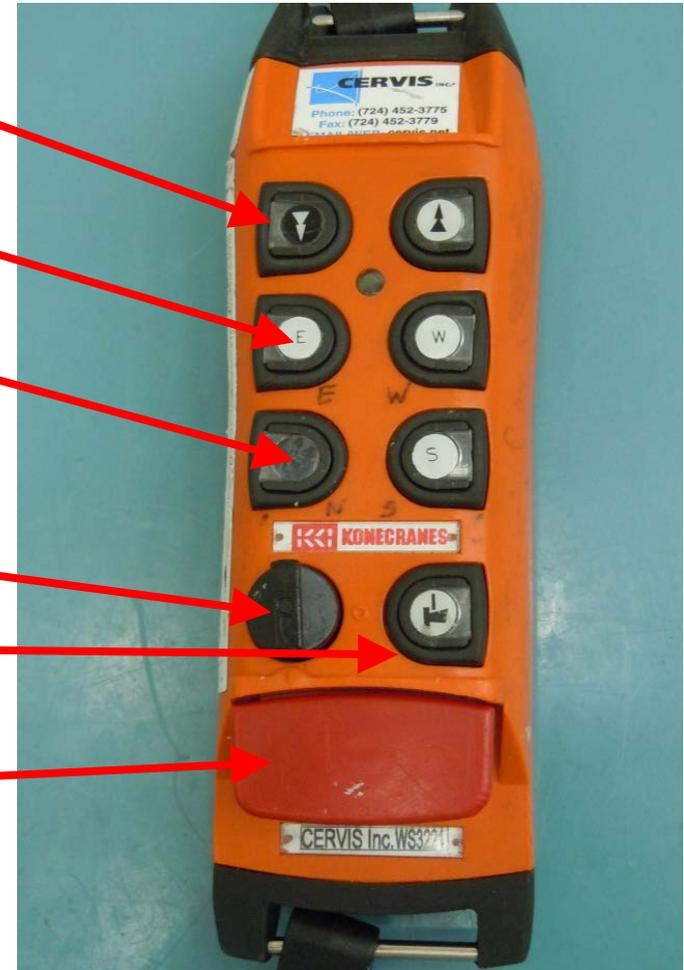
# Controllers

- The bottom of each trolley is labeled with the compass points



# Example of a remote controller labeled with the compass points

- Move hoist up and down
- Move trolley east and west
- Move bridge north and south
- On/off
- Horn
- Emergency stop



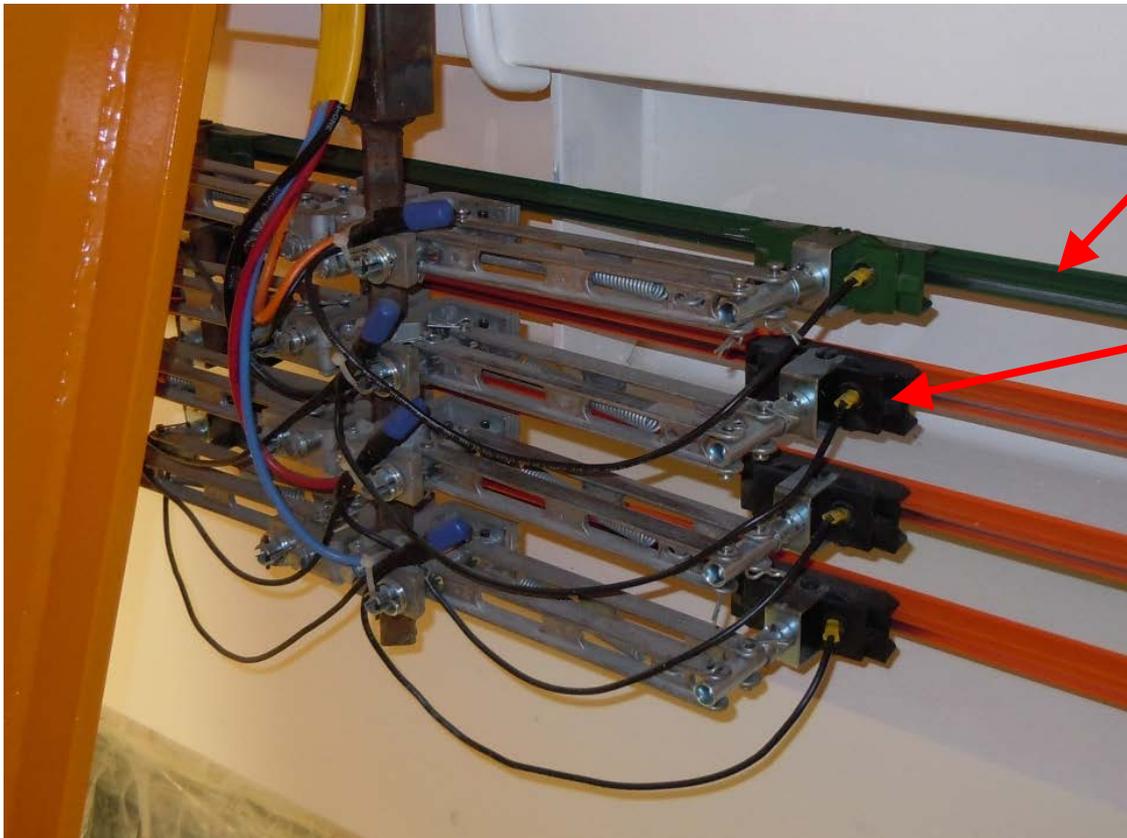
# Runway conductors



- **Conductors, runway (main):** the electrical conductors located along a crane runway that transmit control signals and power to the crane
- **Conductors of the open type,** mounted on the crane runway beams or overhead, shall be so located or guarded that persons cannot inadvertently come into contact with the energized conductors under normal operating conditions or under maintenance procedures

# Runway conductors

- **Collectors, current:** contacting devices for collecting current (power) from runway or bridge conductors (buss)



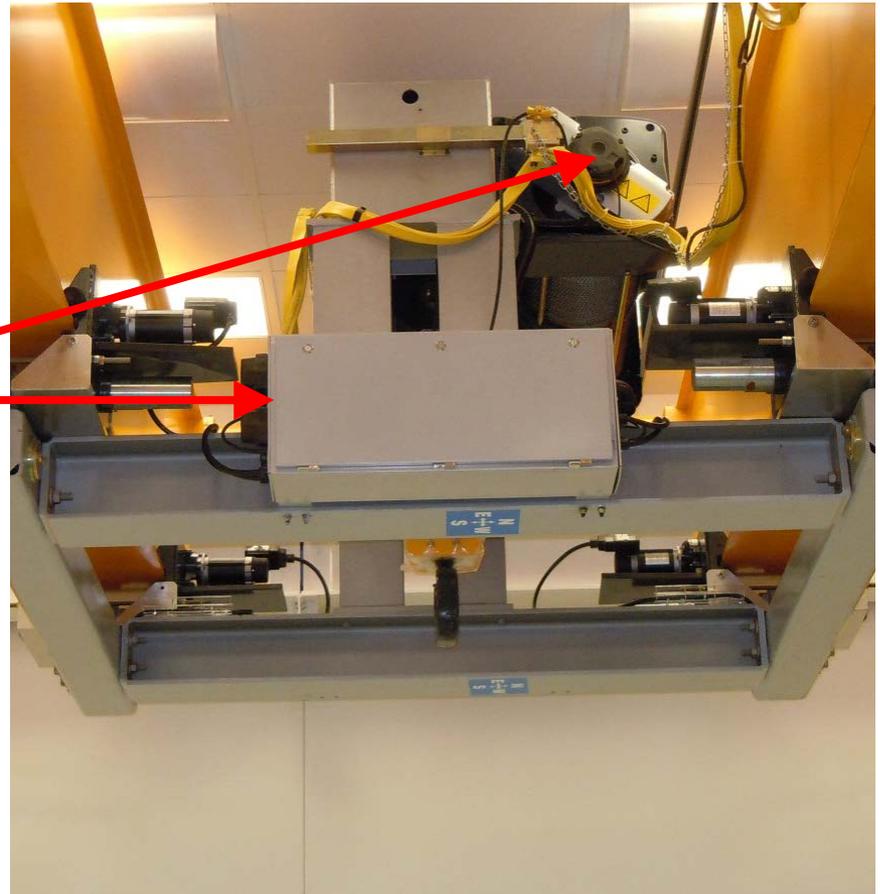
Conductor with outer insulation (orange and green)

Collector (shoe)

 **Warning!!!** 480V may be present on the conductors

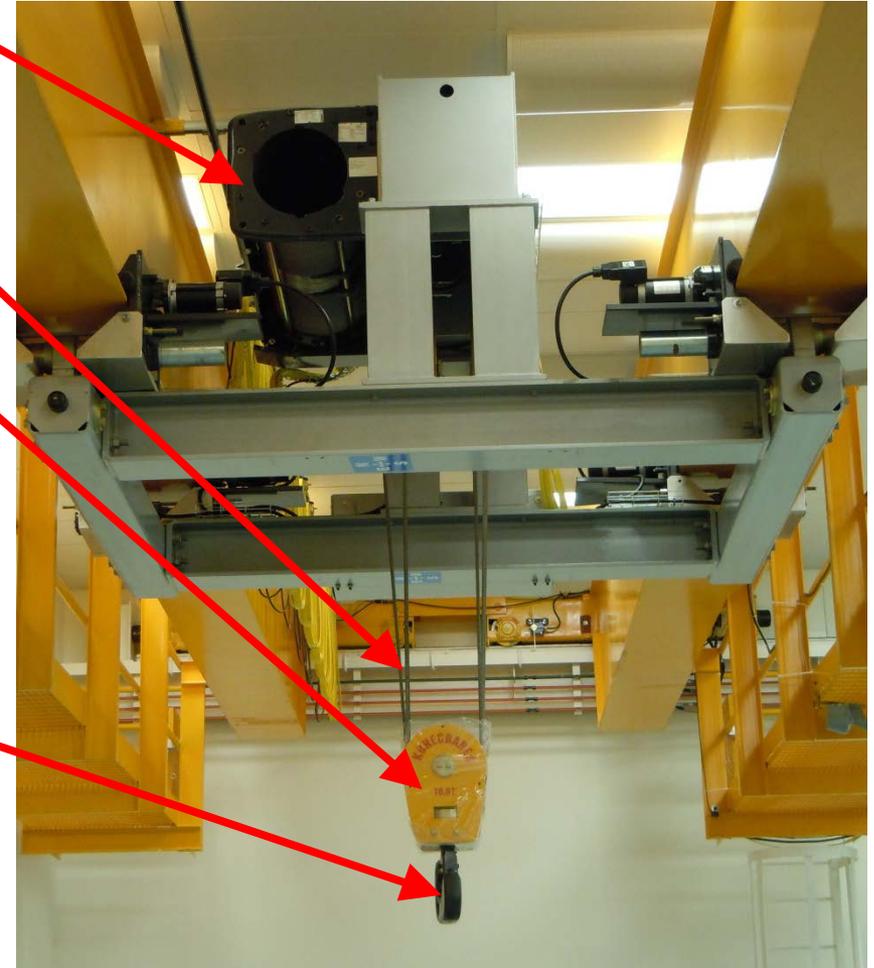
# Hoisting equipment

- **Hoist:** a machinery unit that is used for lifting or lowering a freely suspended (unguided) load
- Hoisting equipment consists of;
  - Motor with integrated brake
  - Controls
  - Hoist drum
  - Wire rope
  - Load block
  - Load hook



# Hoisting equipment definitions

- ***Drum***: the cylindrical member around which the ropes are wound for lifting or lowering the load
- ***Rope***: refers to wire rope unless otherwise specified
- ***Load block***: assembly of hook or shackle, swivel, bearing, sheaves, pins, and frame suspended by the hoisting rope or load chain. This shall include any appurtenances reeved in the hoisting ropes
- ***Hook, latch equipped***: a type of hook with a mechanical device to close the throat opening of the hook



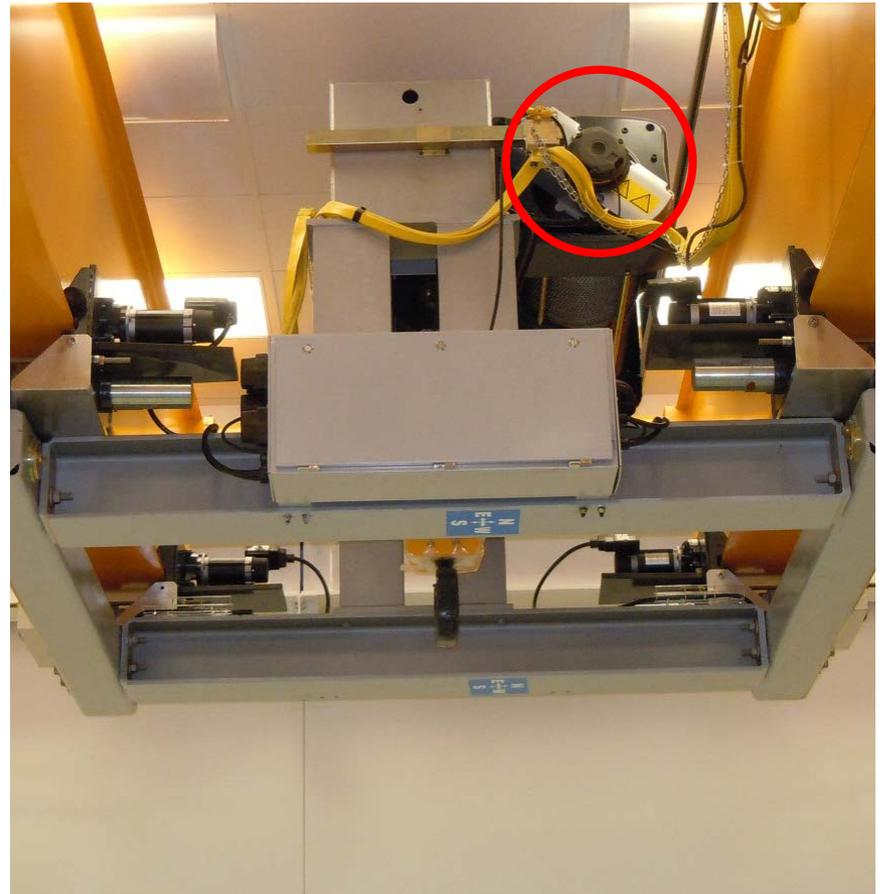
# More hoist definitions

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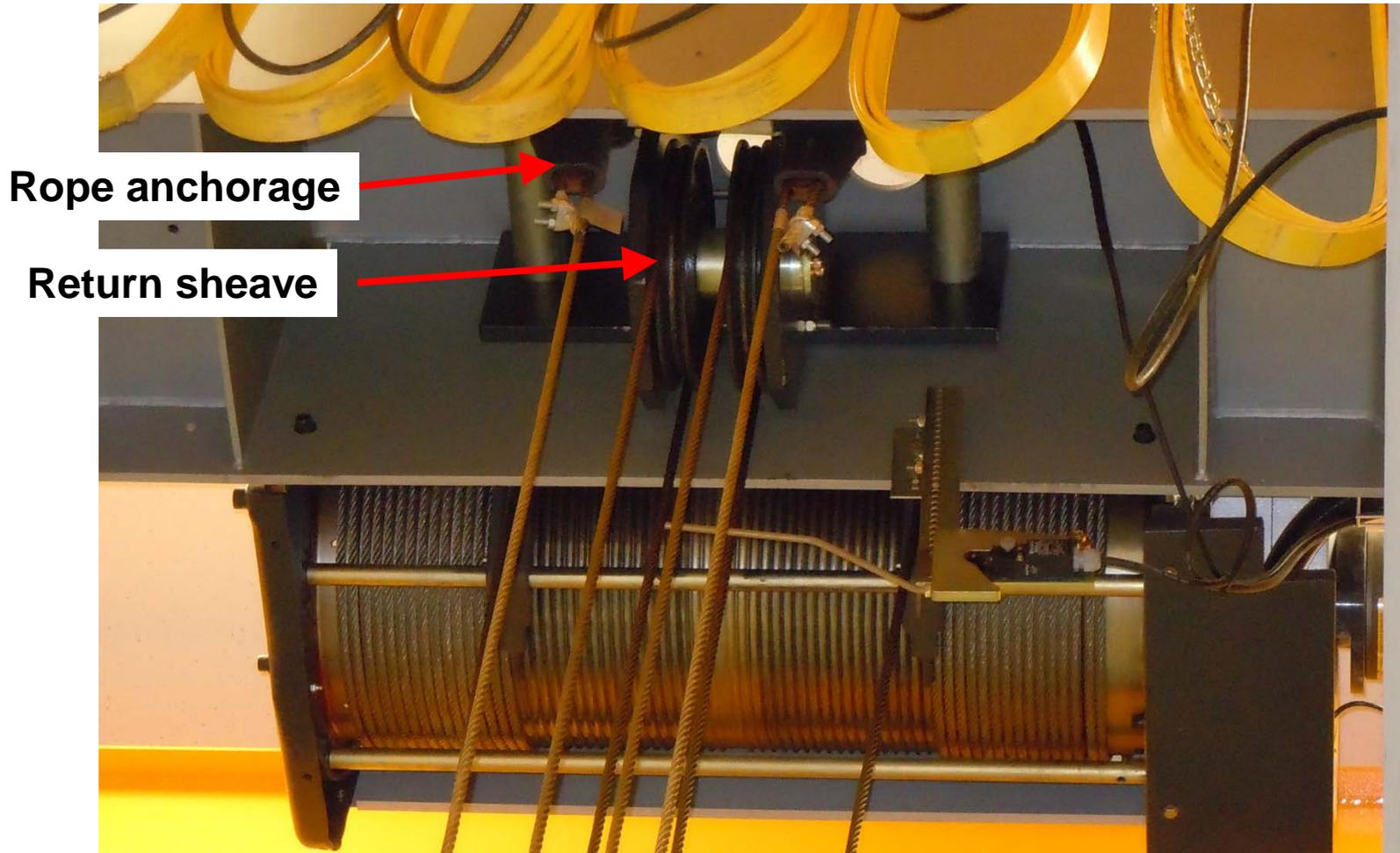
- ***Reeving:*** a system in which a rope travels around drums or sheaves
- ***Sheave:*** a grooved wheel or pulley used with a rope to change direction and point of application of a pulling force.
- ***Sheave, running:*** a sheave that rotates as the load block is lifted or lowered

# How is braking of the hoist accomplished?

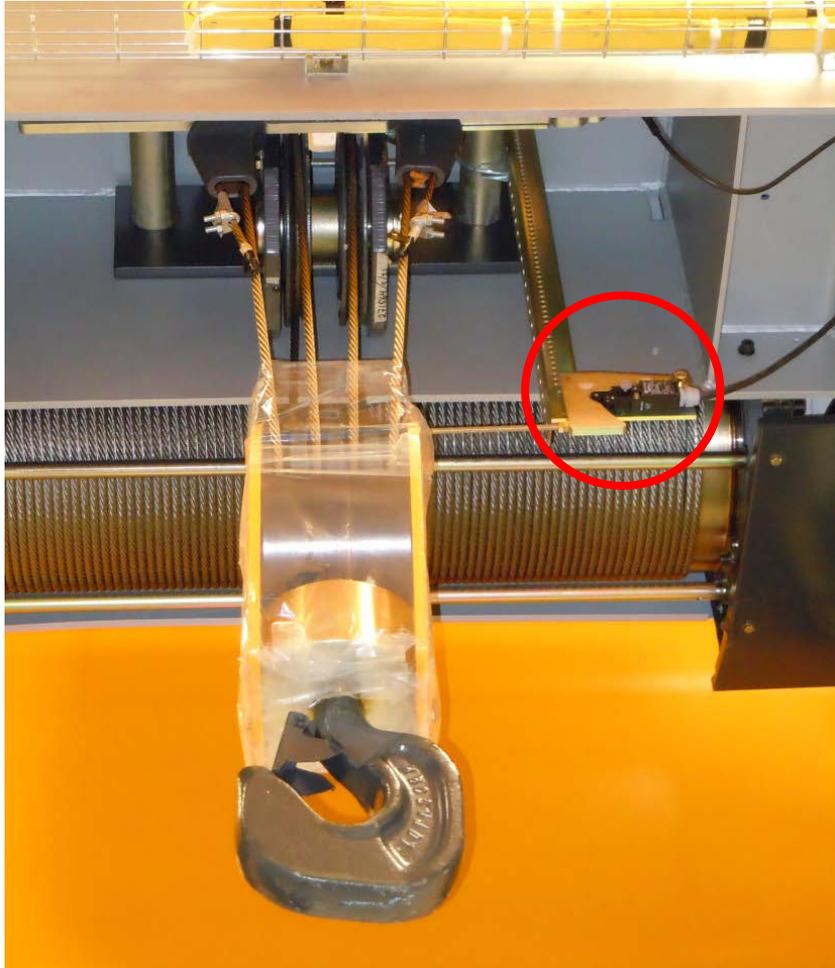
- The hoist drum has a motor with an integrated brake.
- Power must be applied to the brake to “disengage” the brake and allow drive to rotate.
  - In the event of a power failure or fault the brake is automatically engaged mechanically. This feature makes the drive fail safe.



# Reeving for a two rope four fall hoist

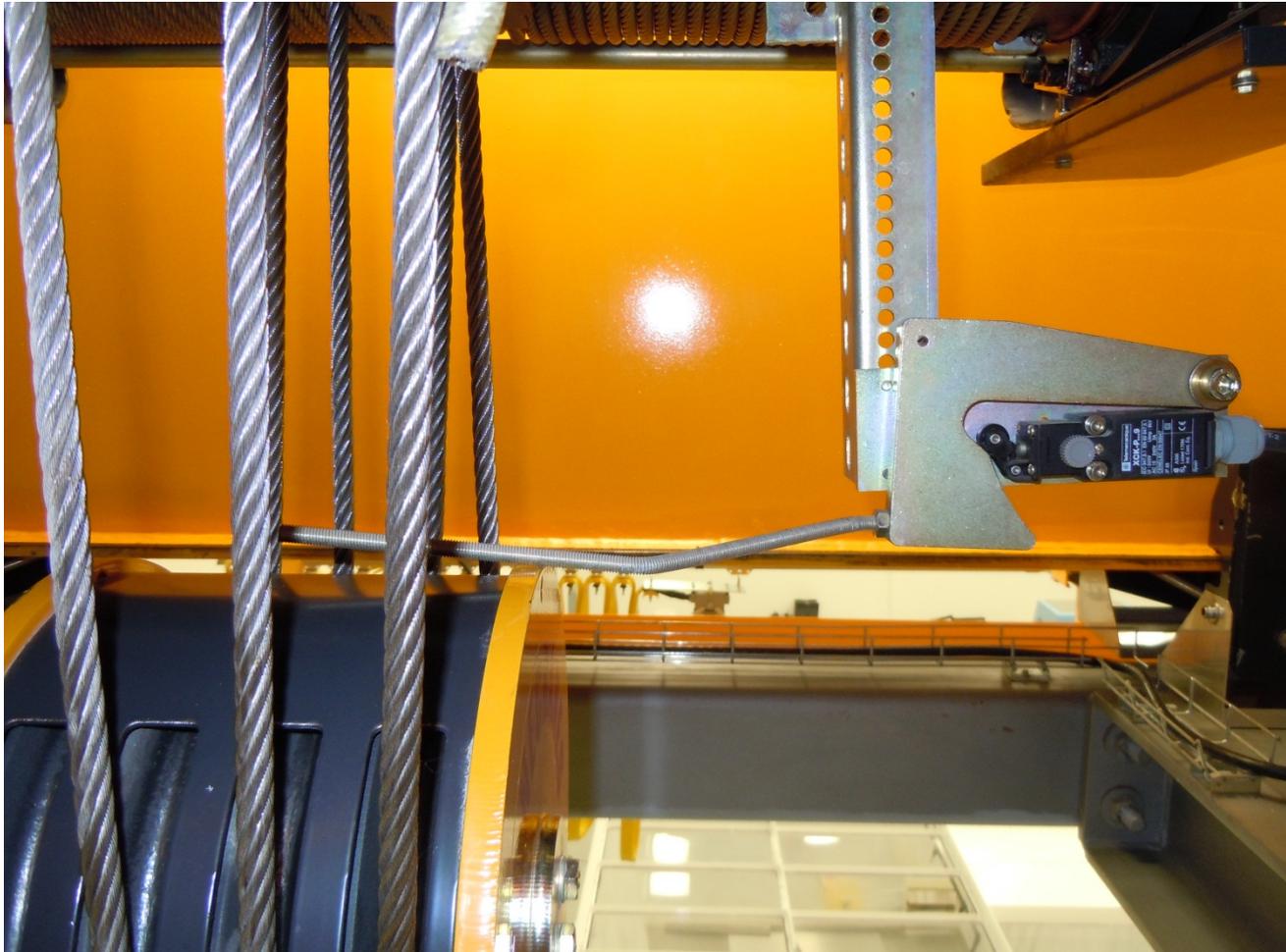


# Upper Limit Switch



- ***Limit device:*** a device that is operated by some part or motion of a power-driven hoist, trolley, or bridge to limit motion.
- The upper limit switch prevents the load block from approaching too close to the hoist reeving.

# The limit switch is actuated when it comes in contact with the top of the load block



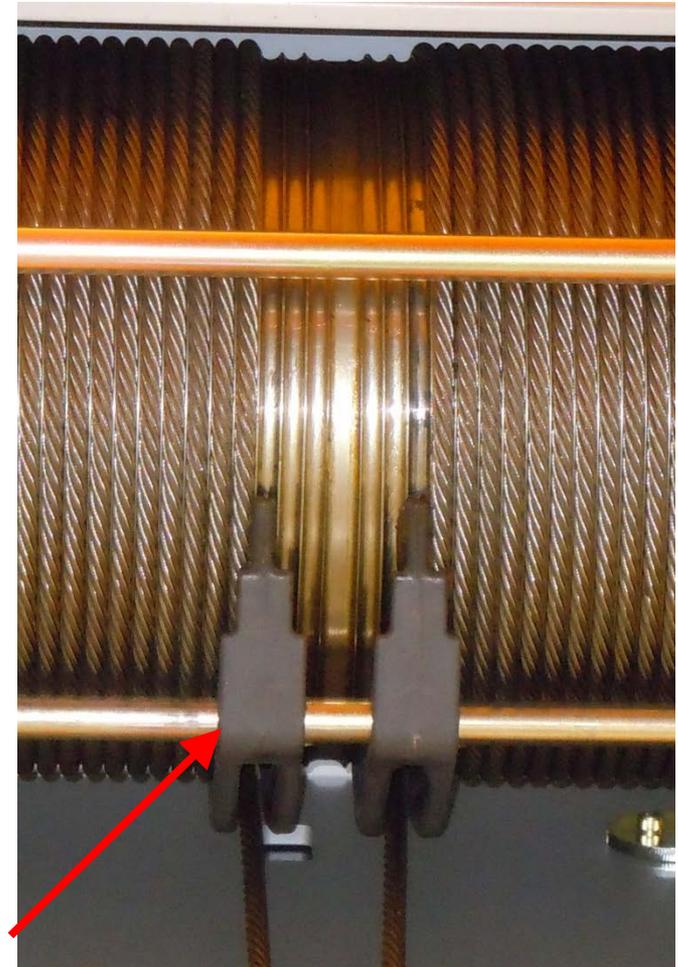
# Drums

- **Rope drums shall be grooved, except when the crane is provided by the manufacturer for a special application. This requirement does not preclude the use of multiple layer spooling. The grooves shall be free from surface defects that could cause rope damage. The cross-sectional radius at the bottom of the groove should be such as to form a close-fitting saddle for the size of rope used.**



# Sheaves

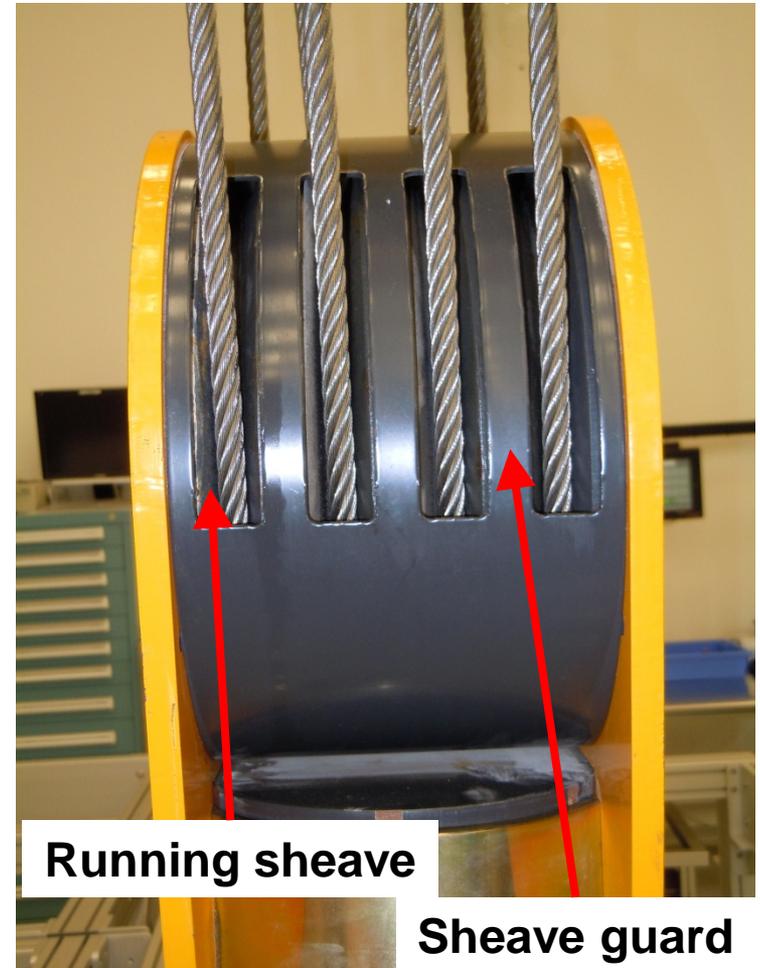
- (a) Sheave grooves shall be free from surface defects which could cause rope damage. The cross-sectional radius at the bottom of the groove should be such as to form a close-fitting saddle for the size of rope used. The sides of the groove shall be tapered outward and rounded at the rim to facilitate entrance of the rope into the groove. Flange rims shall run true about the axis of rotation.**



**Rope guide**

# Sheaves

- (b) Sheaves carrying ropes, which can be momentarily unloaded, shall be provided with close-fitting guards, or other devices, to guide the rope back into the groove when the load is reapplied.**
- (c) The sheaves in the bottom block shall be equipped with close-fitting guards that will minimize the possibility of ropes becoming fouled when the block is lying on the ground with the ropes loose.**
- (d) All running sheaves shall be equipped with means for lubrication. Permanently lubricated, sealed, or shielded bearings shall be acceptable.**



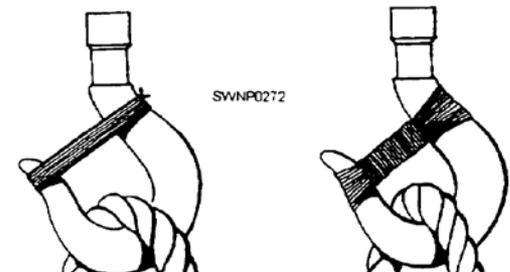
# Hooks

- Hooks shall meet the manufacturer's recommendations and shall not be overloaded. If hooks are of the swiveling type, they should rotate freely. Latch equipped hooks shall be used unless the application makes the use of the latch impractical or unnecessary. When required, a latch or mousing shall be provided to bridge the throat opening of the hook for the purpose of retaining slings, chains, or other similar parts, under slack conditions (see ASME B30.1)

**At LLE all crane operations require the use of a latch.**

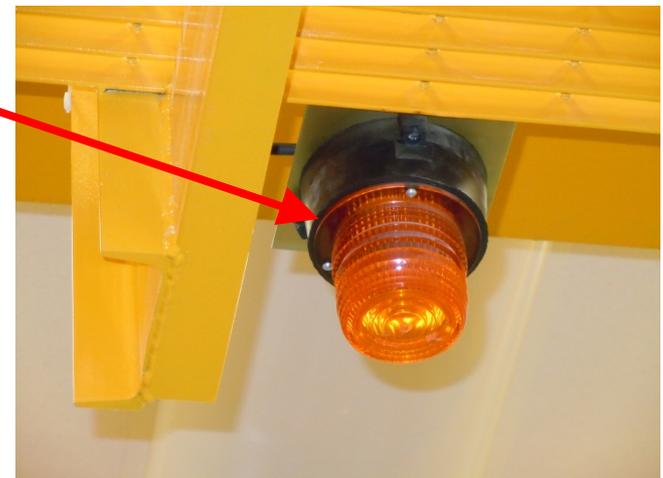


- ***Mousing***: a lashing, shackle, etc., for closing off a hook to prevent a load from slipping off



# Warning devices or means for a crane with a power – traveling mechanism

- One or more of the following devices shall be provided when required:
  - (a) manually operated gong
  - (b) power-operated bell, siren, or horn
  - (c) rotating beacon
  - (d) strobe light



# The manual

- **The crane manufacturer shall furnish with each crane at least one copy of the manual. The manual shall include general information applicable to the following:**
  - (a) installation**
  - (b) operation**
  - (c) inspection**
  - (d) testing**
  - (e) lubrication**
  - (f) maintenance**
  - (g) parts**
  - (h) wiring diagram (may be supplied separately)**
- **Personnel responsible for the supervision, installation, operation, inspection, or maintenance of the crane shall be familiar with the applicable contents of the manual furnished with the crane.**

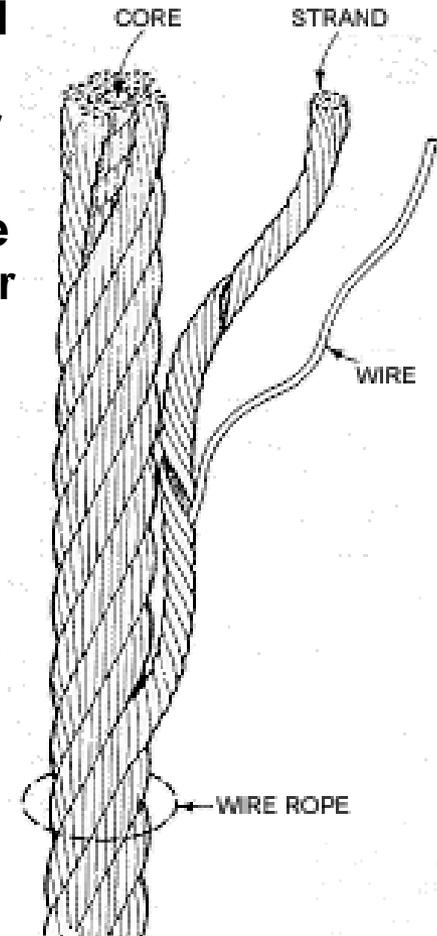
# Section III

## Wire Rope Tutorial

**This section covers the basics necessary to understand  
Rope Inspection, Replacement, and Maintenance**

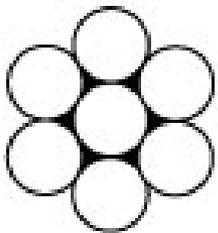
# Wire rope tutorial

- Usually a wire rope consists of a core member, around which a number of multiwired strands are "laid" or helically bent. There are two general types of cores for wire rope: fiber cores and wire cores. The fiber core may be made from natural or synthetic fibers. The wire core can be an Independent Wire Rope Core (IWRC), or a Strand Core (SC).
- The purpose of the core is to provide support and maintain the position of the outer strands during operation.
- Any number of multiwired strands may be laid around the core. The most popular arrangement is six strands around the core, as this combination gives the best balance.
- The number of wires per strand may vary from 3 to 91, with the majority of wire ropes falling into the 7-wire, 19-wire, or 37-wire strand categories.

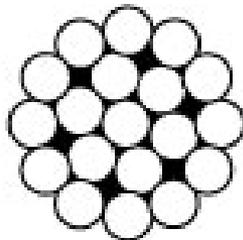


# Wire rope tutorial

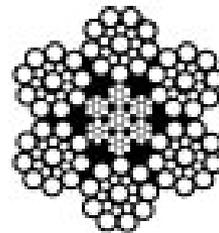
- A wire rope is a piece of flexible, multiwired, stranded machinery made of many precision parts.
- IWRC (independent Wire Rope Core) provides good crush resistance and increased strength.
- Fiber Core provides excellent flexibility.



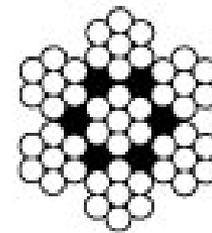
1X7



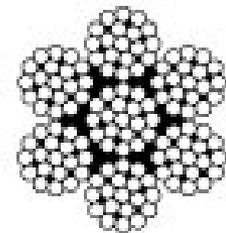
1X19



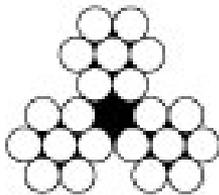
6X19 IWRC



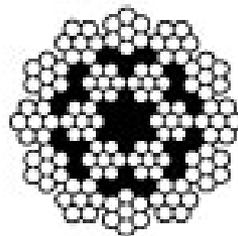
7X7



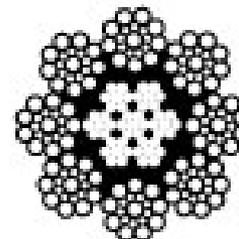
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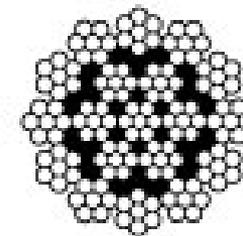
3X7



18X7



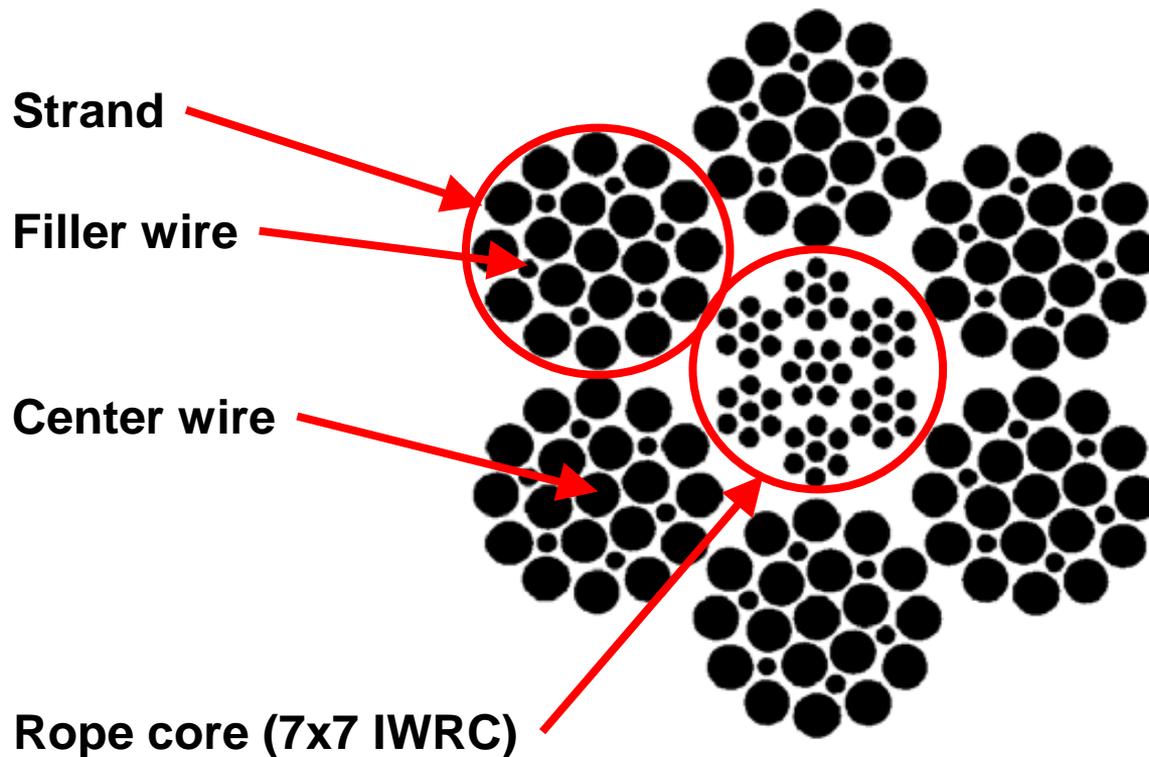
8XS(19) IWRC



19X7

# Anatomy of a 6x25 Filler Wire Internal Wire Rope Core (IWRC) wire rope

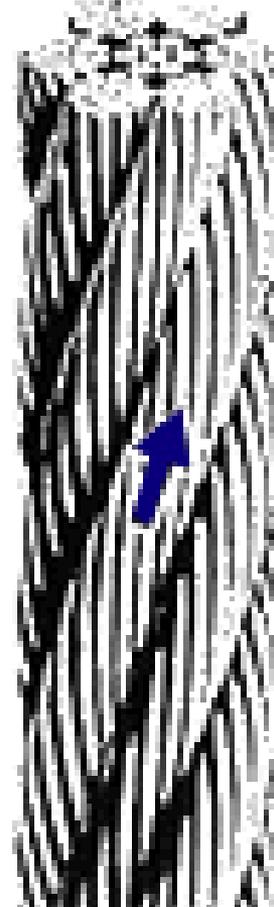
- Six refers to the number of strands in the rope and 25 refers to the number of wires per strand.
- Rope cores consist of either fiber (manmade or natural) or wire ropes.



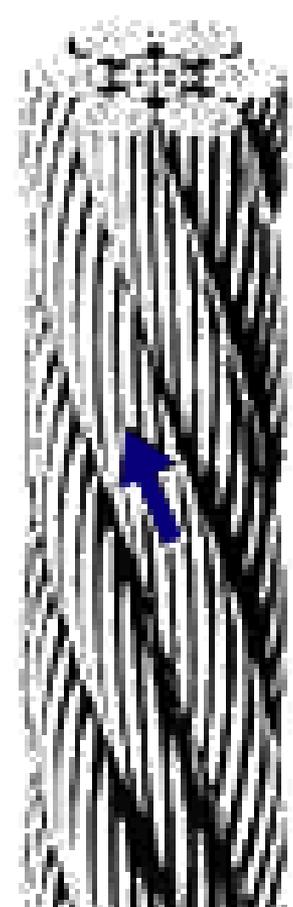
# What the "lays" of wire rope mean

- "Lay" of a wire rope is simply a description of the way wires and strands are placed during construction.
- Right lay and left lay refers to the direction of strands.
- Right lay means that the strands pass from left to right across the rope.
- Left lay means just the opposite: strands pass from right to left.

Right lay



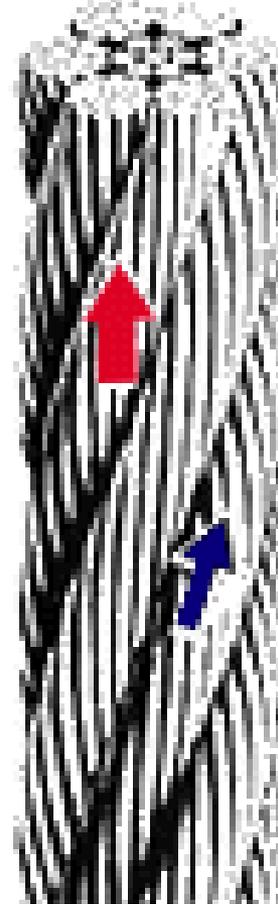
Left lay



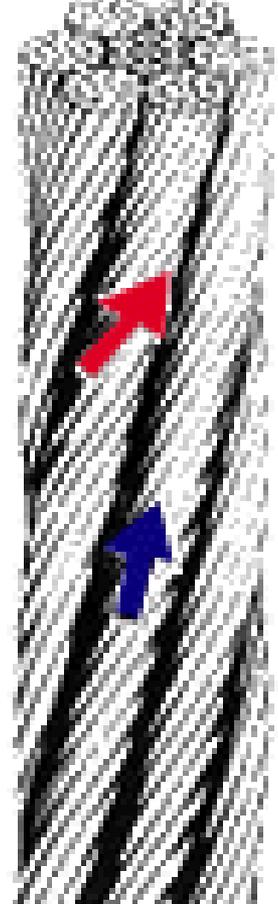
# What the "lays" of wire rope mean – cont.

- Regular lay and Lang lay describe the way wires are placed within each strand.
- Regular lay means that wire in the strands are laid opposite in direction to the lay of the strands.
- Lang lay means that wires are laid in the same direction as the lay of the strands.
- Most of the wire rope used is right lay, regular lay. This specification has the widest range of applications and meets the requirements of most equipment. In fact, other lay specifications are considered exceptions and must be requested when ordering.

Regular lay

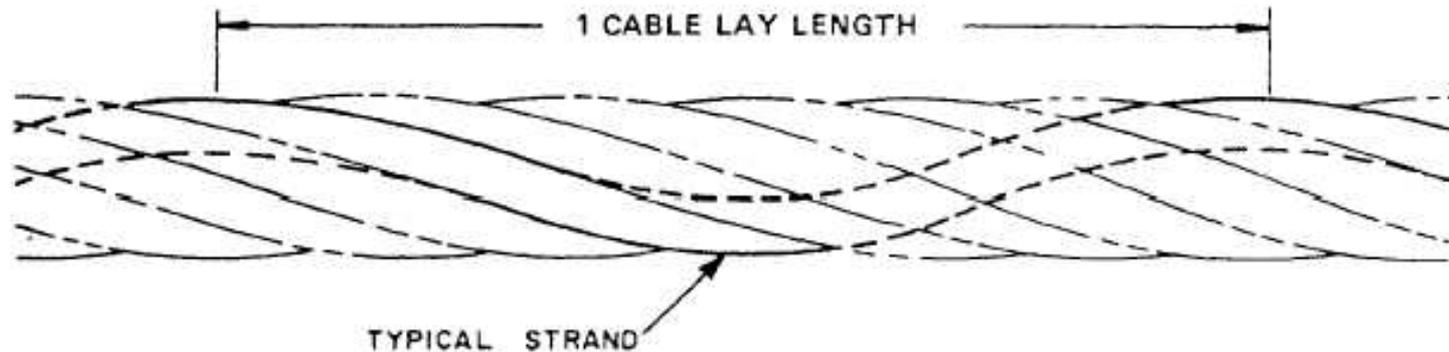


Lang lay



# Lay is also used as measure of length

- When a lay-length is used as a unit of measure, it refers to the linear distance a single strand extends in making one complete turn around the rope.
- Lay-length is measured in a straight line parallel to the center line of the rope, not by following the path of the strand.



- The appropriate time to replace a wire rope in service is frequently determined by counting the number of broken wires in the length of one rope lay.

# Wire rope defects

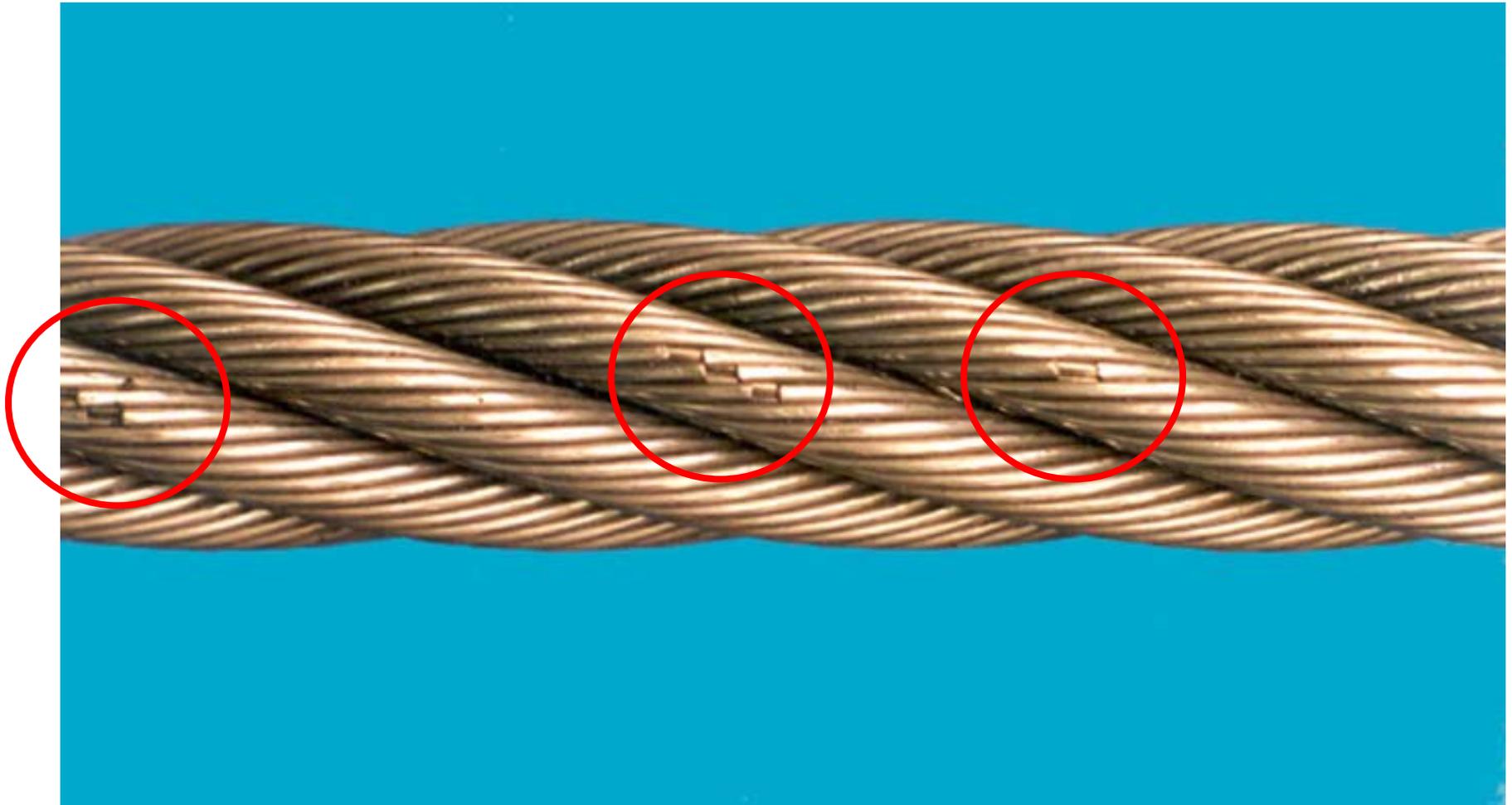
- **Wire rope defects consist of;**
  - **Wire breaks**
  - **Reduction in diameter from deterioration**
  - **External wear**
  - **Decreased elasticity**
  - **Corrosion (internal and external)**
  - **Deformation**
- **Wire rope defects reduce the load rating of the wire rope. An excessive number of defects create an unsafe condition**

# Allowable Wire Breaks

| ASME No. | Equipment                            | No. Broken Wires In Running Ropes In |            | No. Broken Wires in Standing Ropes In |            |
|----------|--------------------------------------|--------------------------------------|------------|---------------------------------------|------------|
|          |                                      | one rope lay                         | one strand | one rope lay                          | one strand |
| → B30.2  | Overhead and gantry crane            | 12*                                  | 4          | n/a                                   | n/a        |
| B30.4    | Portal, tower and pillar cranes      | 6*                                   | 3          | 3*                                    | 2          |
| B30.5    | Crawler, locomotive and truck cranes | 6*                                   | 3          | 3*                                    | 2          |
| B30.6    | Derricks                             | 6*                                   | 3          | 3*                                    | 2          |
| B30.7    | Base-mounted drum hoists             | 6*                                   | 3          | 3*                                    | 2          |
| B30.8    | Floating cranes and derricks         | 6*                                   | 3          | 3*                                    | 2          |
| A10.4    | Personnel hoists                     | 6*                                   | 3          | 2*                                    | 2          |
| A10.5    | Material hoists                      | 6*                                   | n/a        | n/a                                   | n/a        |

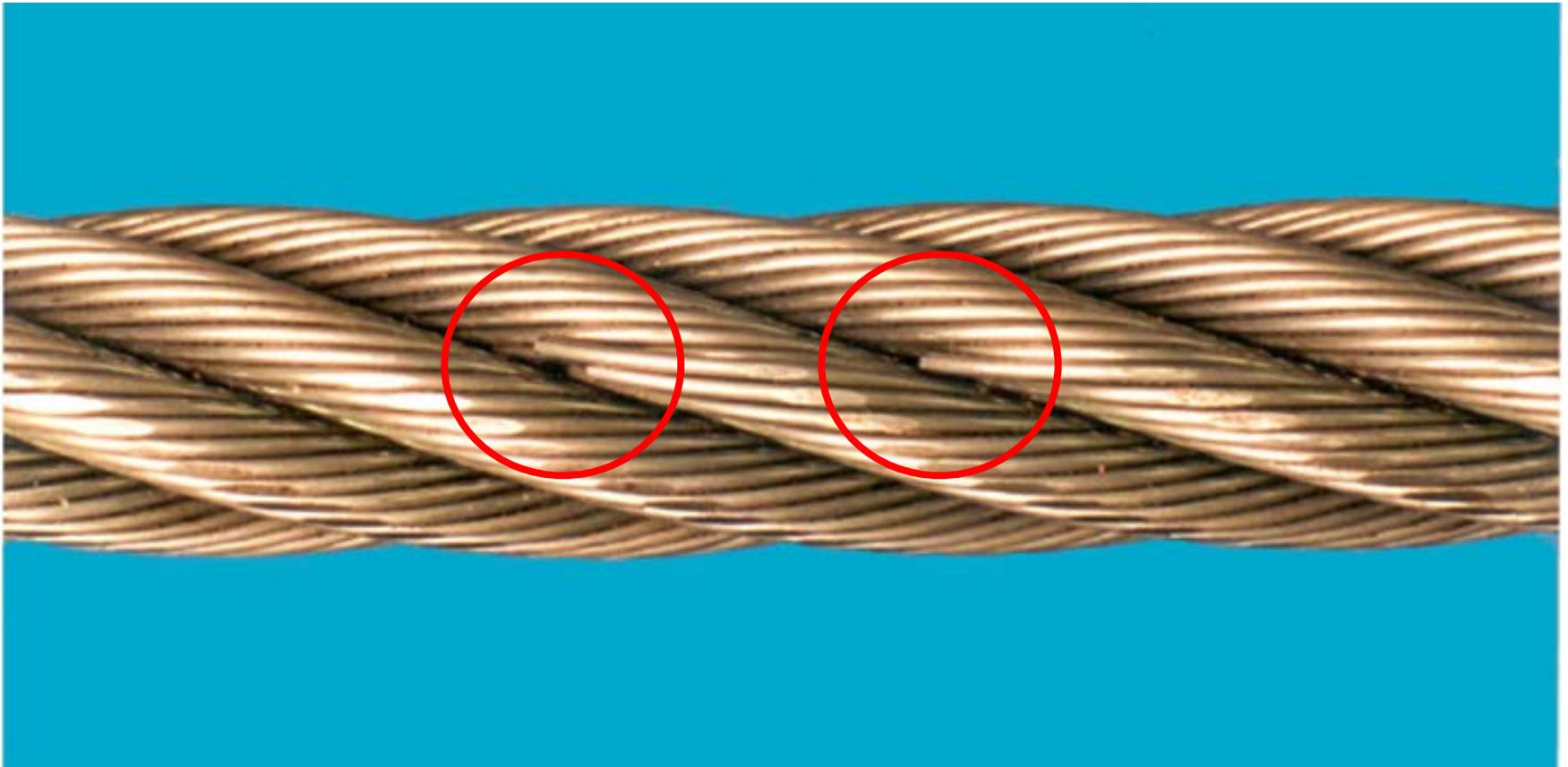
\*Also remove for one valley break.

# Crown wire breaks



# Valley wire breaks

- When one valley break is found the rope should be considered for discard.



# Reduction of rope diameter resulting from core deterioration

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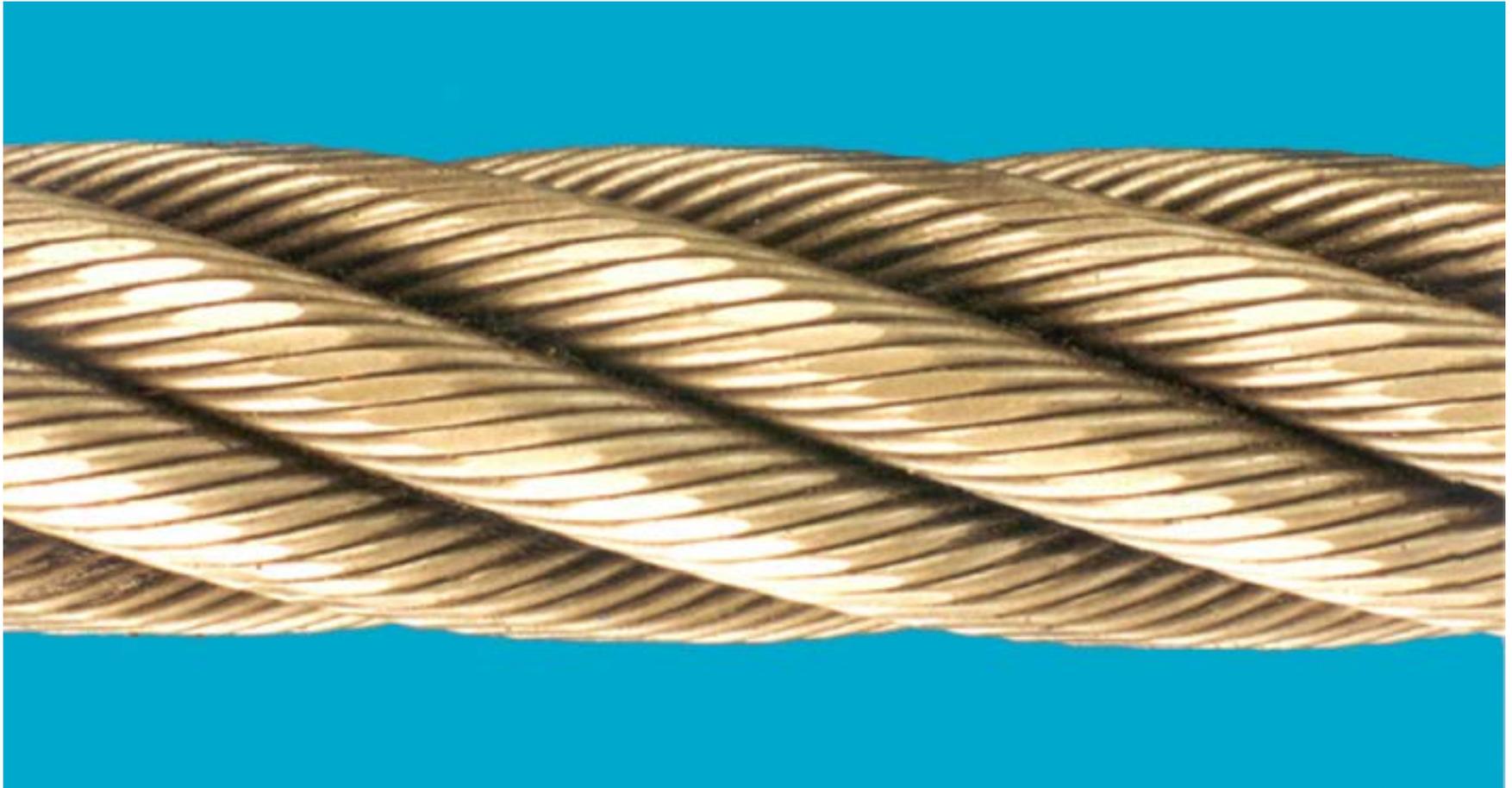
- **Reduction of rope diameter resulting from deterioration of the core can be caused by**
  - a) internal wear and wire indentation,**
  - b) internal wear caused by friction between individual strands and wires in the rope, particularly when it is subject to bending,**
  - c) deterioration of a fiber core,**
  - d) fracture of a steel core,**
  - e) fracture of internal layers in a rotation-resistant rope.**
- **If these factors cause the actual rope diameter to decrease by 3 % of the nominal rope diameter for rotation resistant ropes, or by 10 % for other ropes, the rope shall be discarded even if no broken wires are visible.**

# External wear

- **Abrasion of the crown wires of outer strands in the rope results from rubbing contact, under pressure, with the grooves in the sheaves and drums. The condition is particularly evident on moving ropes at points of sheave contact when the load is being accelerated or decelerated, and is revealed by flat surfaces on the outer wires.**
- **Wear is promoted by lack of lubrication, or incorrect lubrication, and also by the presence of dust and grit.**
- **Wear reduces the strength of ropes by reducing the cross-sectional area of the steel strands.**
- **If, due to external wear, the actual rope diameter has decreased by 7 % or more of the nominal rope diameter, the rope shall be discarded even if no wire breaks are visible.**



# Close up view of external wear



# Decreased elasticity

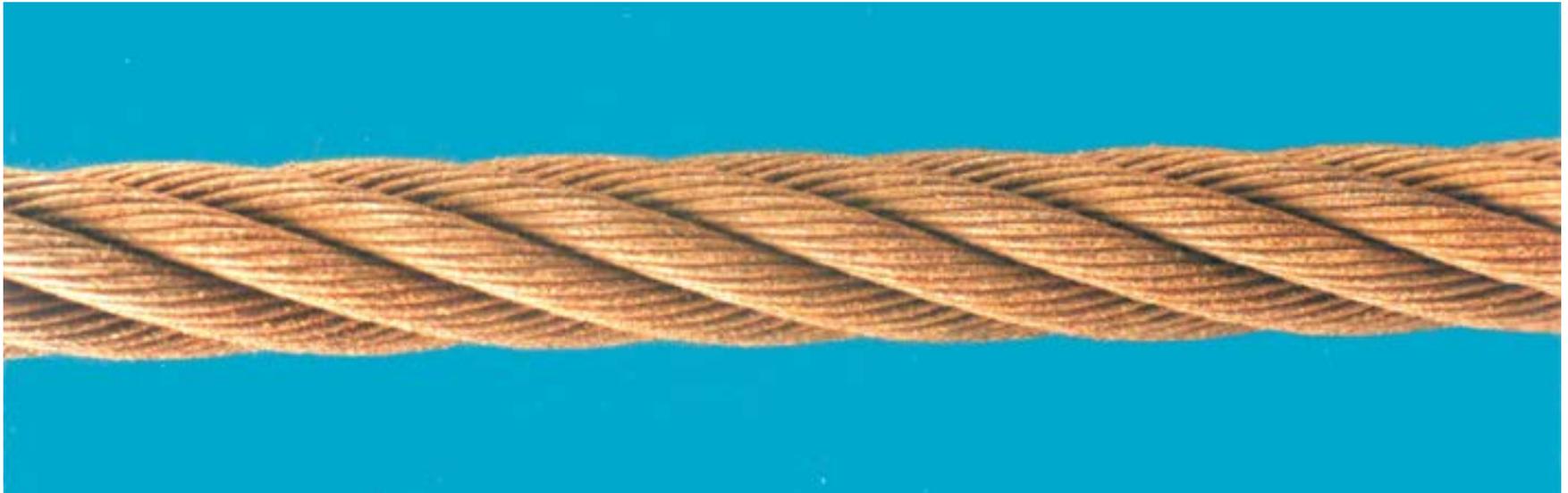
- **Under certain circumstances usually associated with the working environment, a rope can sustain a substantial decrease in elasticity and is thus unsafe for further use.**
- **Decreased elasticity is difficult to detect. If the examiner has any doubt, advice shall be obtained from a specialist in wire ropes. However, it is usually associated with the following:**
  - a) **reduction in rope diameter;**
  - b) **elongation of the rope lay length;**
  - c) **lack of clearance between individual wires and between strands, caused by the compression of the component parts against each other;**
  - d) **appearance of fine, brown powder between or within the strands;**
  - e) **increased stiffness.**

# Decreased elasticity

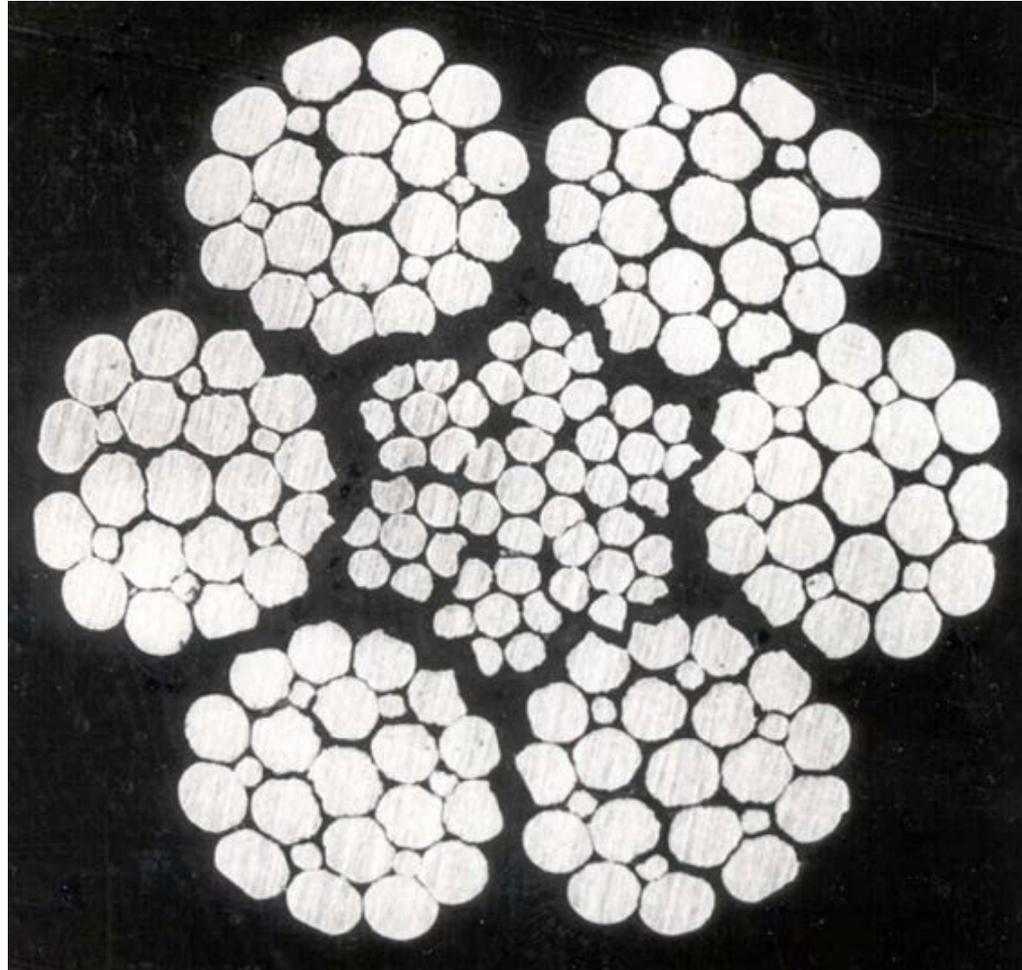
- **While no wire breaks may be visible, the wire rope will be noticeably stiffer to handle and will certainly have a reduction in diameter greater than that related purely to wear of individual wires. This condition can lead to abrupt failure under dynamic loading and is sufficient justification for immediate discard.**

# External corrosion

- **Corrosion occurs particularly in marine and polluted industrial atmospheres. It will diminish the breaking strength of the rope by reducing the metallic cross-sectional area, and it will accelerate fatigue by causing surface irregularities which lead to stress cracking. Severe corrosion can cause decreased elasticity of the rope.**
- **Wire slackness due to corrosion attack/steel loss is justification for immediate rope discard.**



# Internal corrosion is the difficult to assess since 80% of the wire rope is hidden from view

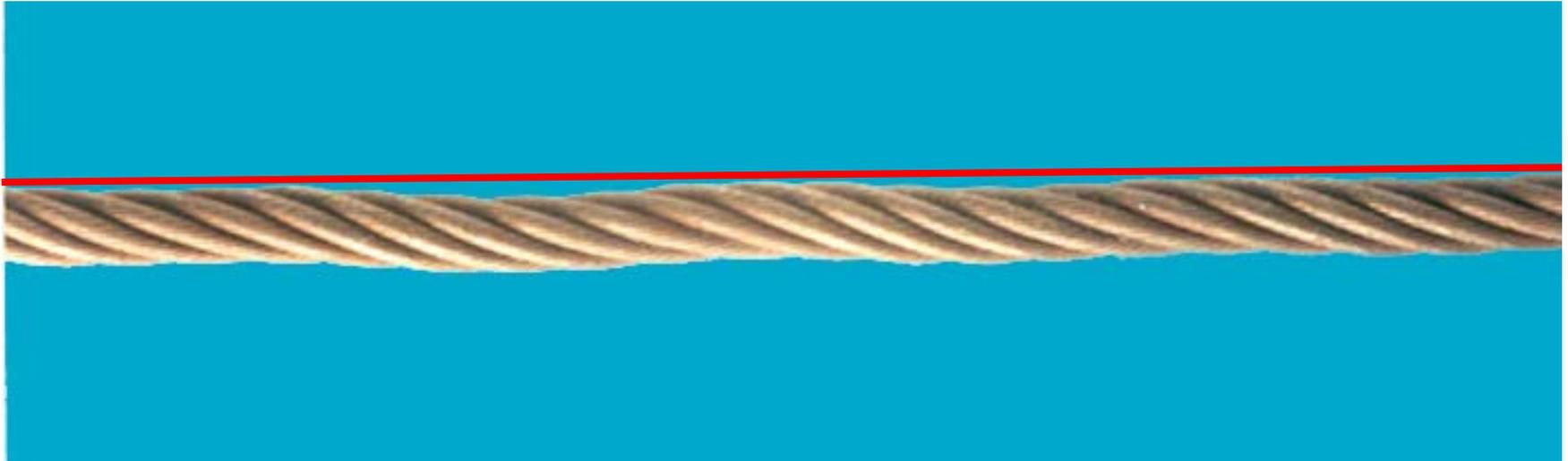


# Rope deformation or distortion

- **Distortions of a wire rope include;**
  - **Waviness**
  - **Basket or lantern deformation**
  - **Core or strand protrusion/distortion**
  - **Wire protrusion**
  - **Local increase in diameter of rope**
  - **Flattened portions**
  - **Kinks or tightened loops**
  - **Bends**
  - **Damage due to heat or electric arcing**

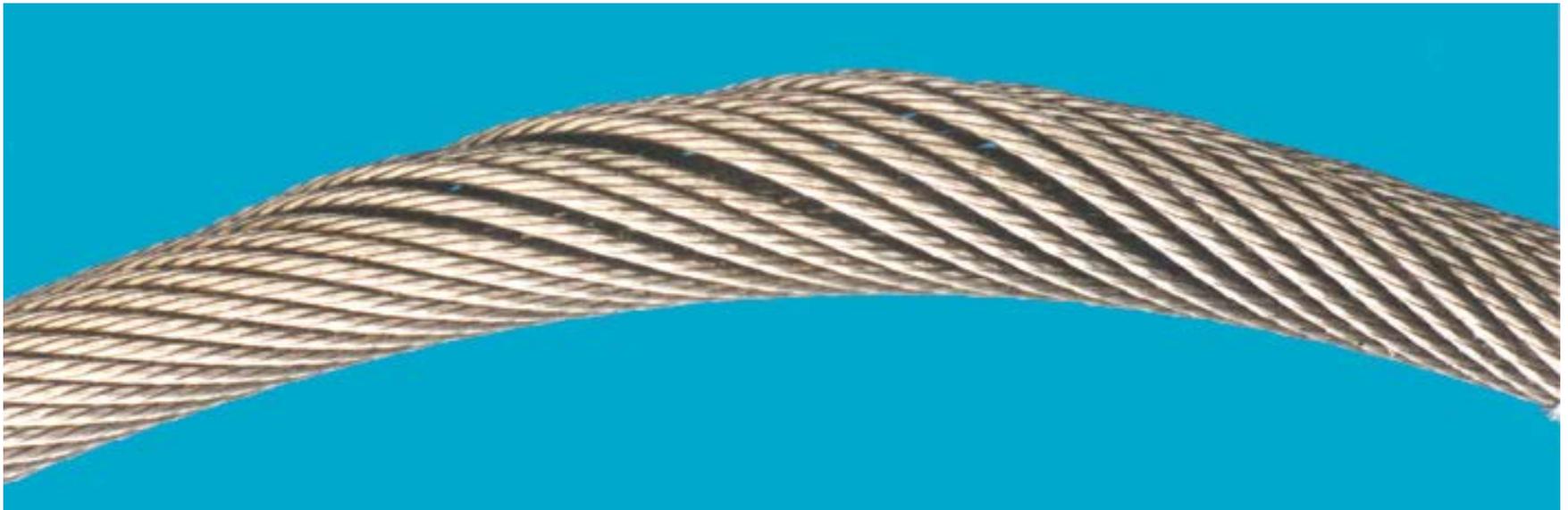
# Waviness

- **Waviness is a deformation in which the longitudinal axis of the wire rope takes the shape of a helix under either a loaded or unloaded condition. While not necessarily resulting in any loss of strength, such a deformation, if severe, can transmit a pulsation resulting in irregular rope drive. After prolonged working, this will give rise to wear and wire breaks.**



# Basket or lantern deformation (Birdcage)

- A birdcage develops when the outer layer of strands becomes longer than the inner layer or layers. The condition may occur as a result of incorrect fitting, tight sheaves, shock loading, incorrect use of a swivel or the application of a heavy load to a new rope before the strands have settled into position.
- Ropes with a basket or lantern deformation shall be immediately discarded.



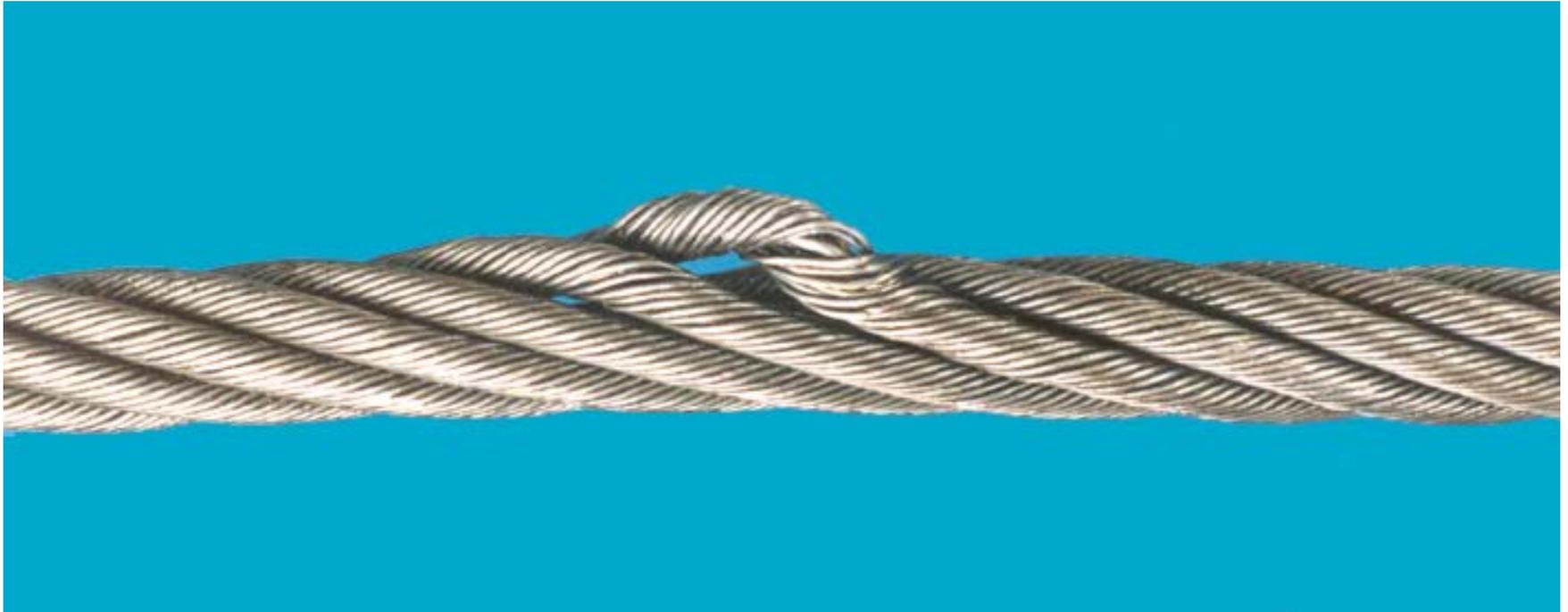
# Core protrusion/distortion

- **This feature is a special type of basket or lantern deformation in which the rope imbalance is indicated by protrusion of the core (or center of the rope, in the case of a rotation-resistant rope) between the outer strands, or protrusion of an outer strand of the rope or strand from the core.**

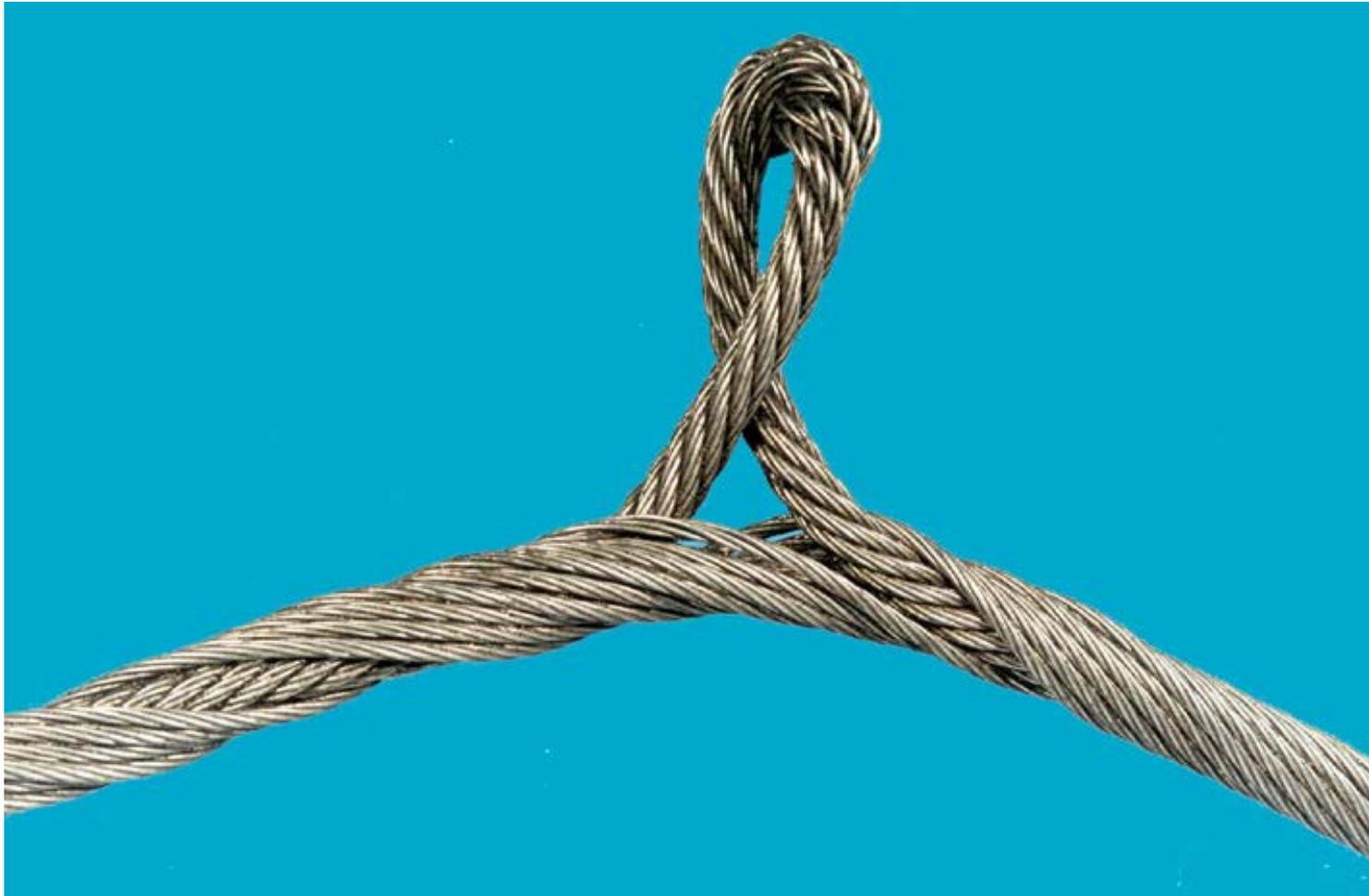


# Strand protrusion/distortion

- **Rope with core or strand protrusion/distortion shall be immediately discarded.**

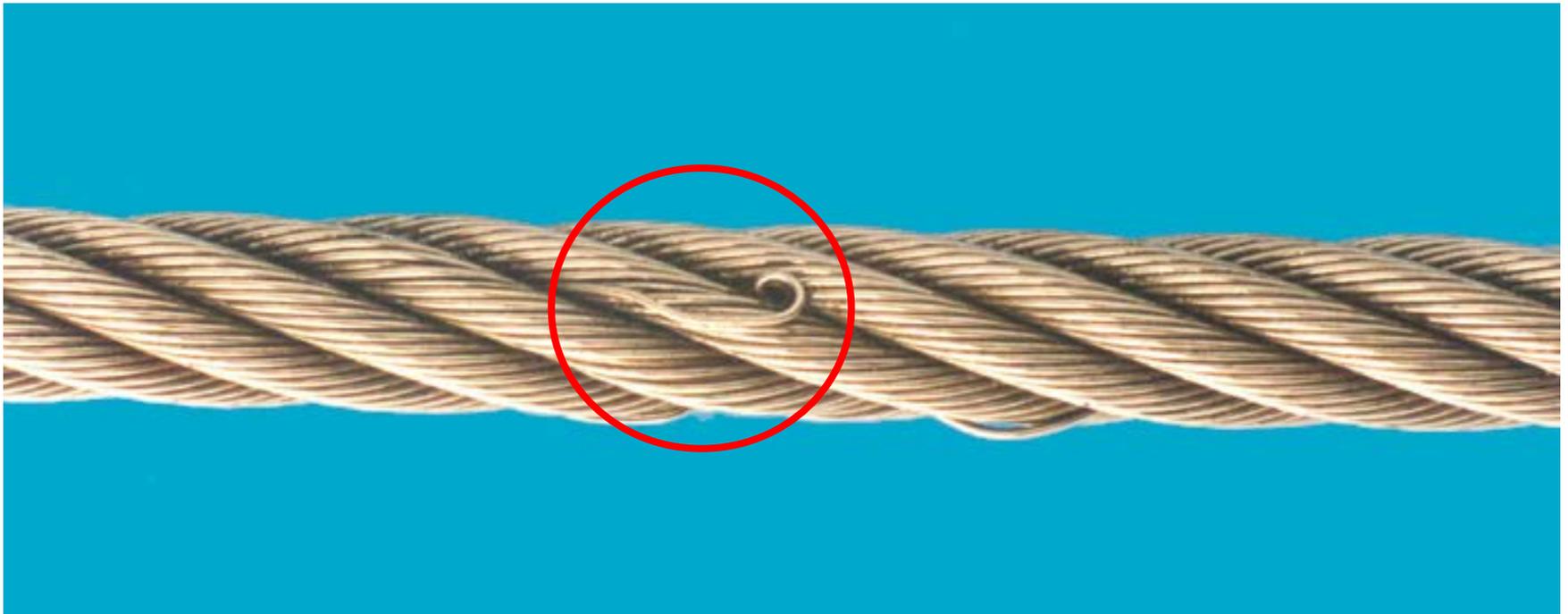


# Protrusion of inner rope of rotation-resistant rope



# Wire protrusion

- In wire protrusion, certain wires or groups of wires rise up, on the side of the rope opposite to the sheave groove, in the form of loops.
- Rope with wire protrusion shall be immediately discarded.



# Local increase in rope diameter due to core distortion

- **A local increase in rope diameter can occur and might affect a relatively long length of the rope. This condition usually relates to a deformation of the core (in particular environments, a fiber core can swell up owing to the effect of moisture) and consequently creates imbalance in the outer strands, which become incorrectly oriented.**
- **If this condition causes the actual rope diameter to increase by 5 % or more, the rope shall be immediately discarded.**

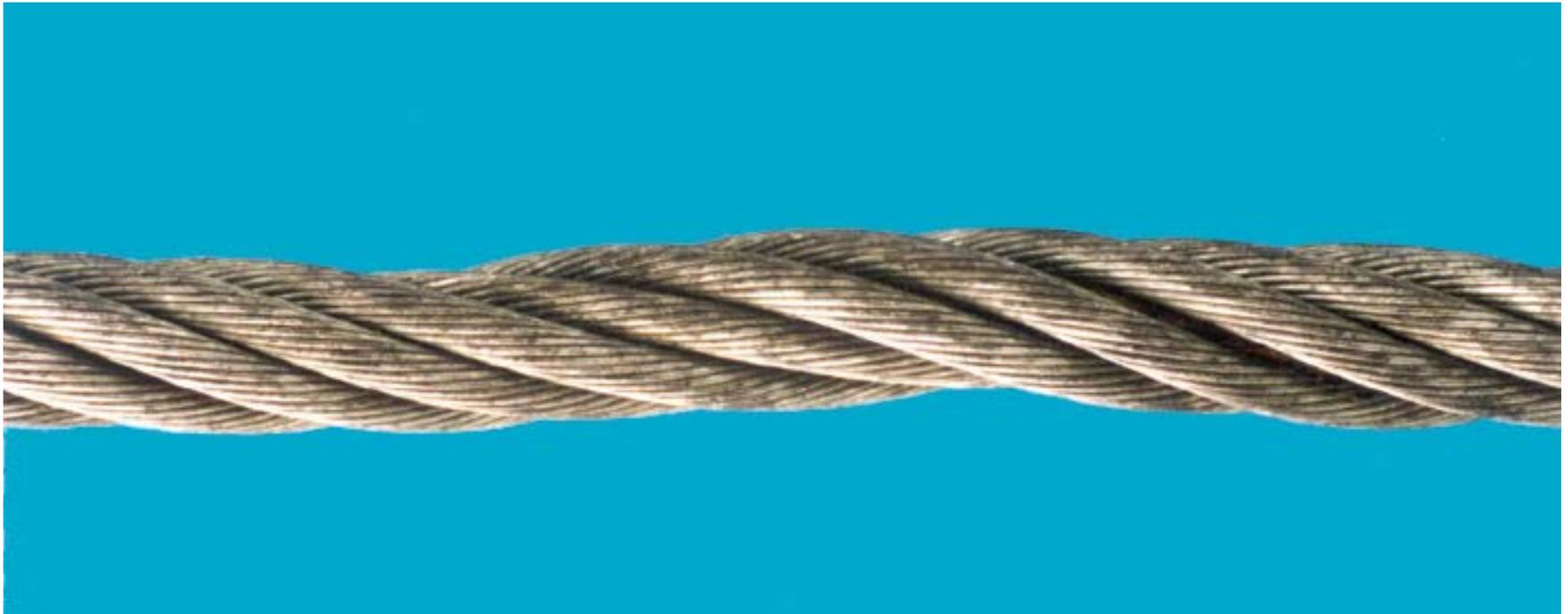


# Flattened portion

- **Flattened portions of rope which pass through a sheave will quickly deteriorate, exhibiting broken wires and may damage the sheave. In such cases the rope shall be discarded immediately.**
- **Flattened portions of rope in standing rigging can be exposed to accelerated corrosion, and shall be subject to inspection at a prescribed shortened frequency if retained in service.**



# Local reduction in rope diameter (sunken strand), is treated as a flattened portion



# Kink (positive)

- **A kink or tightened loop is a deformation created by a loop in the rope which has been tightened without allowing for rotation about its axis. Imbalance of lay length occurs, which will cause excessive wear, and in severe cases the rope will be so distorted that it will have only a small proportion of its strength remaining.**
- **Rope with a kink or tightened loop shall be immediately discarded.**



# Kink (negative)



# Kink



# Section IV

## Testing and maintenance

**This section covers the ASME requirements and the conforming LLE policies for Inspection, Testing, Maintenance, and Rope Inspection, Replacement, and Maintenance**

# Inspection Classification



- (a) *Initial Inspection.*** New, reinstalled, altered, repaired, and modified cranes shall be inspected by a designated person prior to initial use to verify compliance with applicable provisions of ASME B30.2. Inspection of altered, repaired, and modified cranes may be limited to the provisions affected by the alteration, repair, or modification, as determined by a qualified person.
- (b)** Inspection procedure for cranes in regular service is divided into two general classifications based upon the intervals at which inspection should be performed. The intervals in turn are dependent upon the nature of the critical components of the crane and the degree of their exposure to wear, deterioration, or malfunction. The two general classifications are designated as *frequent* and *periodic*, with respective intervals between inspection defined as follows:

**LLE policy is to have initial inspections performed by an external Certified Crane Inspectors**

# Inspection Classification

**(1) *Frequent Inspection.* Visual examinations by the operator or other designated personnel with records not required, as follows:**

- (a) normal service - monthly**
- (b) heavy service - weekly to monthly**
- (c) severe service - daily to weekly**

**(2) *Periodic Inspection.* Visual inspection of the equipment in place by a designated person making records of apparent external conditions to provide the basis for a continuing evaluation, as follows:**

- (a) normal service - yearly**
- (b) heavy service - yearly**
- (c) severe service – quarterly**

**LLE policy is to have frequent and periodic inspections performed by an external Certified Crane Inspectors (monthly and yearly).**

# Inspection Records

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- **Dated inspection reports or comparable records shall be made on critical items such as hoisting machinery, sheaves, hooks, chains, ropes, and other lifting devices as covered under Periodic Inspection. Records shall be placed on file.**

**Records for overhead crane inspections are maintained by the O&M group and are available for review by crane operators.**

# Testing – Operational Tests



- (a) New, reinstalled, altered, repaired, and modified cranes shall be tested by a designated person prior to initial use to ensure compliance.**
- (b) Tests shall include, as applicable, the following functions:**
  - (1) lifting and lowering**
  - (2) trolley travel**
  - (3) bridge travel**
  - (4) hoist-limit devices**
  - (5) travel-limiting devices**
  - (6) locking and indicating devices, if provided**
- (c) Operational testing of altered, repaired, and modified cranes may be limited to the functions affected by the alteration, repair, or modification, as determined by a qualified person.**

**All operational testing must be performed by a Certified Crane Inspector.**

# Maintenance Procedure

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- (a) The following precautions shall be taken before performing maintenance on a crane:**
- (1) The crane shall be moved to a location where it will cause the least interference with other cranes and operations in the area.**
  - (2) If a load is attached to the crane, it shall be landed.**
  - (3) All controllers shall be placed in the off position.**
  - (4) A lockout/tagout procedure shall be performed.**
  - (5) Warning signs and barriers shall be utilized on the floor beneath the crane where overhead maintenance work creates a hazard.**
  - (6) If the runway remains energized, stops or a signalperson(s), located full-time at a visual vantage point for observing the approach of an active crane(s), shall be provided to prohibit contact by the active crane(s) with the idle crane, with persons performing maintenance, and with equipment used in performing the maintenance.**

# Maintenance Procedure – cont.



- (7) A guard or barrier shall be installed between adjacent runways for the length of any established work area to prevent contact between persons performing maintenance and a crane on the adjacent runway.**
- (b) The following precautions shall be taken before performing maintenance on a crane runway, the runway support structure, the runway conductor system, or the areas of the building in the path of travel of the crane bridge or trolley:**
  - (1) A lockout/tagout procedure shall be performed**
  - (2) Warning signs and barriers shall be utilized on the floor beneath the area where overhead maintenance work creates a hazard**
  - (3) If the runway remains energized, stops or a signalperson(s), located full-time at a visual vantage point for observing the approach of an active crane(s), shall be provided to prohibit contact by the active crane(s) with persons performing maintenance and with equipment used in performing the maintenance.**

# Maintenance Procedure – cont.



- (4) A guard or barrier shall be installed between adjacent runways for the length of any established work area to prevent contact between persons performing maintenance and a crane on the adjacent runway.**
- (c) Only designated persons shall work on energized equipment.**
- (d) After maintenance work is completed and before restoring the crane to normal operation**
  - (1) guards shall be reinstalled**
  - (2) safety devices shall be reactivated**
  - (3) replaced parts and loose material shall be removed**
  - (4) maintenance equipment shall be removed**

**All maintenance is performed by a certified external vendor.**

# LLE overhead crane inspection and maintenance policies

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- **LLE policy is to have all inspections performed by an external Certified Crane Inspectors, monthly and yearly.**
- **Records for overhead crane inspections are kept and maintained by the O&M group and are available for review by crane operators.**
- **All operational and load testing must be performed by a Certified Crane Inspector.**
- **All preventive maintenance and maintenance (repairs) is performed by a certified external vendor.**
- **No LLE personnel are qualified or permitted to perform preventive maintenance or maintenance (repairs) on overhead cranes.**

# Rope Inspection, Replacement, and Maintenance – Frequent Inspection



## *(a) Frequent Inspection*

- (1) All ropes should be visually inspected by the operator or other designated person at the start of each shift. These visual observations should be concerned with discovering gross damage, such as listed below, that may be a hazard.**
  - (a) distortion of the rope, such as kinking, crushing, unstranding, birdcaging, main strand displacement, or core protrusion**
  - (b) general corrosion**
  - (c) broken or cut strands**
  - (d) number, distribution, and type of visible broken wires**
- (2) When such damage is discovered, the rope shall either be removed from service or given an inspection.**

**Any rope that does not appear to be in a new condition must be tagged out for inspection by an external Certified Crane Inspector**

# LLE Policies for Wire Rope

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- **All ropes should be visually inspected by the operator or other designated person at the start of each shift. These visual observations should be concerned with discovering gross damage that may be a hazard**
- **Any rope that does not appear to be in a new condition must be tagged out for inspection by and external Certified Crane Inspector**
- **All Periodic Inspection is performed by an certified external vendor**

# Section V

## Operation

**This section covers the ASME requirements and the conforming LLE policies for the operation of overhead cranes**

# Control configuration of overhead cranes at LLE



- **Omega Target Bay**
  - **Pendant and remote control. However, the pendant is rarely used**
- **Omega EP Laser Bay**
  - **Remote control only**
- **Omega EP Target Bay**
  - **Remote control only**

# Operators of Floor-Operated and Remote-Operated cranes

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- **Cranes shall be operated only by the following qualified personnel:**
  - (a) designated persons**
  - (b) trainees under the direct supervision of a designated person**
  - (c) maintenance and test personnel, when it is necessary in the performance of their duties**
  - (d) inspectors (crane)**

# Qualifications for Operators of Floor-Operated and Remote-Operated Cranes

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- **Personnel shall be required by the employer to pass a practical operating examination. Qualifications shall be limited to the specific type of equipment for which the operator is being examined.**

# Hoisting practices for operators



- **Operation of an overhead crane involves more than depressing the "UP" or "DOWN" control of a powered hoist.**
- **The equipment covered by the B30 Standard is subject to hazards that cannot be abated by mechanical means, but only by the exercise of intelligence, care, and common sense. It is therefore essential to have personnel involved in the use and operation of equipment who are competent, careful, physically and mentally qualified, and trained in the proper operation of the equipment and the handling of loads.**
- **Serious hazards include, but are not limited to, improper or inadequate maintenance, overloading, dropping or slipping of the load, obstructing the free passage of the load, and using equipment for a purpose for which it was not intended or designed.**

**Overhead crane operators are pivotal to ensuring that hoists are used correctly and loads moved safely**

# Conduct of Operators from ASME B30.2 Section 2-3.1.7



- (a) The operator shall not engage in any practice that will divert attention while actually engaged in operating the crane.**
- (b) When physically or otherwise unfit, an operator shall not engage in the operation of the equipment.**
- (c) The operator shall**
  - (1) be familiar with and understand hand signals**
  - (2) respond to signals from the person who is directing the lift or an appointed signalperson**
  - (3) be responsible for the lifts when a signalperson or crane follower is not required as part of the crane operation**
  - (4) open the magnet switch upon request from the person on the ground, who shall wait for a signal from the operator that the magnet is deenergized**
  - (5) obey a stop signal at all times, no matter who gives it**

# OSHA Conduct of Operators



- (d) Each operator shall be responsible for those operations under the operator's direct control. Whenever there is doubt as to safety, the operator shall consult with the supervisor before handling the loads.**
- (e) The operator shall activate the warning device on cab- and remote-operated cranes and, when provided, on floor-operated cranes**
  - (1) before starting the bridge or trolley motion of the crane**
  - (2) intermittently during travel of the crane when approaching persons in the path of the load**
- (f) Before leaving a cab-operated crane unattended, the operator shall land any attached load, place controllers in the off position, and deenergize the main switch (crane disconnect) of the specific crane. If all cranes on the runway are to be unattended for a period longer than one shift, the runway disconnect switch shall also be deenergized.**

# OSHA Conduct of Operators

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- (g) The operator shall not close the main switch (crane disconnect) until certain that no worker is on or adjacent to the crane. If there is a warning sign or lock on the device, it shall not be energized until the sign or lock is removed by the person who placed it there, or by an authorized person.**
- (h) Before closing the main switch (crane disconnect), the operator shall be sure that all controllers are in the off position.**
- (i) If power goes off during operation, the operator shall immediately place all controllers in the off position. Prior to reuse of the crane, operating motions shall be checked for proper direction.**
- (j) The operator shall be familiar with the equipment and its proper care. If adjustments or repairs are necessary, or any defects are known, the operator shall report the same promptly to the appointed person who shall be responsible for the operation and maintenance repairs of the crane. The operator shall also notify the next operator of any remaining uncorrected defects upon changing shifts.**

# OSHA Conduct of Operators



- (k) Contacts with runway stops or other cranes shall be made with extreme caution. The operator shall do so with particular care for the safety of persons on or below the crane, and only after making certain that any persons on the other cranes are aware of what is being done.**
- (l) Operators of outdoor cranes shall secure them when leaving.**
- (m) When the wind-indicating device of a cab-operated outdoor crane gives the alarm, crane operation shall be discontinued and the crane shall be prepared and stored for excessive wind conditions.**
- (n) Before the operator performs any maintenance work on the crane, the operator shall lock and tag the main switch (crane disconnect) (see para. 2-2.3.2 in ASME B30.2) in the deenergized position. If the crane is equipped with a lifting magnet and the magnet is not deenergized when the main switch (crane disconnect) is in the deenergized position, the operator shall also lock and tag the magnet disconnect switch in the deenergized position.**

# OSHA Conduct of Operators

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- (o) All controls shall be tested by the operator before beginning a new shift. If any controls do not operate properly, they should be adjusted or repaired before operations are begun.**
- (p) Persons boarding or leaving overhead cranes should do so only at authorized locations and designated boarding entrances.**
- (q) If the crane has more than one hoisting unit, the operator shall only lift loads, with two or more hoisting units, that are within the rated load of the crane.**

# Handling The Load – Load Weight



- (a) The crane shall not be loaded in excess of its rated load except for test purposes, as provided in Load Testing procedures, or for planned engineered lifts.**
- (b) The combined load applied to more than one hoisting unit shall not exceed the rated load of the crane when the crane has more than one hoisting unit.**

**An important aspect of maintaining safety of crane and rigging operations is knowing the weight of the load**

# Handling The Load – Planned Engineered Lifts



- **Lifts in excess of the rated load may be required from time to time on a limited basis for specific purposes such as new construction or major repairs. Every planned engineered lift exceeding the rated load shall be treated as a special and separate event.**

**All engineered lifts must be coordinated through ME**

# Attaching the Load

**(a) The hoist rope shall be free from kinks or twists and shall not be wrapped around the load.**

**(b) The load shall be attached to the load block hook by means of slings or other devices.**

**Only approved and rated rigging gear shall be attached to a load hook by a qualified rigger**

**(c) Care shall be taken to make certain that the sling clears all obstacles.**

# Moving the Load



- a) The appointed person directing the lift shall ascertain that**
  - (1) the load, sling, or lifting device is seated in the bowl of the hook**
  - (2) the load is secured, balanced, and positioned in the hook, sling, or lifting device before the load is lifted more than a few inches**
  - (3) the hoist rope is not kinked**
  - (4) multiple part lines are not twisted around each other**
  - (5) the hook is brought over the load in such a manner as to minimize swinging**
  - (6) the rope is seated in the drum grooves and in the sheaves, if there is or has been a slack rope condition**
- (b) During lifting, care shall be taken that**
  - (1) there is no sudden acceleration or deceleration of the moving load**
  - (2) the load does not contact any obstructions**

# Moving the Load

- (c) Cranes shall not be used for side pulls, except when specifically authorized by a qualified person who has determined that**
- (1) the various parts of the crane will not be overstressed**
  - (2) the hoist rope will not bear or rub against other members of the crane, such as the girders or trolley frame, except members specifically designed for such contact**
  - (3) such side pulls will not cause the hoist rope to be pulled out of the sheaves or across drum grooves**
  - (4) such side pulls will not result in excessive swinging of the load block or load**

**All side pulls must be coordinated through ME**

# Moving the Load

**(d) The operator shall not cause the crane to lift, lower, or travel while anyone is on the load or hook.**

**(e) The operator should avoid carrying loads over people.**

**LLE overhead crane operators shall not carry loads over people**

**(f) The operator of a floor-operated crane having a lifting magnet should exercise caution due to the hazard of possible falling metal.**

**(g) The operator shall check the hoist brake(s) at least once each shift if a load approaching the rated load is to be handled. This shall be done by lifting the load a short distance and applying the brake(s).**

**(h) The load shall not be lowered below the point where two wraps of rope remain on each anchorage of the hoisting drum unless a lower-limit device is provided, in which case, no less than one wrap shall remain.**

# Moving the Load



- (i) When two or more cranes are used to lift a load, one qualified person shall be in charge of the operation. This person shall analyze the operation and instruct other personnel involved in the proper positioning, rigging of the load, and the movements to be made.**
- (j) The operator shall not leave the position at the controls while the load is suspended over an area accessible to people.**

**No suspended load is ever to be left unattended by the crane operator**

**When landing a load, operators must be certain the floor can support the weight of the payload**

# Hoist-Limit Devices (Switches)



- (a) Prior to the initial use of any hoist during each shift, the operator shall verify operation of the upperlimit device under no-load conditions. If more than one upper-limit device is present, only the operation of the primary upper-limit device need be verified. Care shall be exercised; the block shall be inched into the limit or run in at slow speed. If the device does not operate properly, the operator shall immediately notify the appointed person.**
- (b) The hoist-limit device that controls the upper limit of travel of the load block shall not be used as an operating control in normal operation unless additional means are provided to prevent damage from overtravel.**

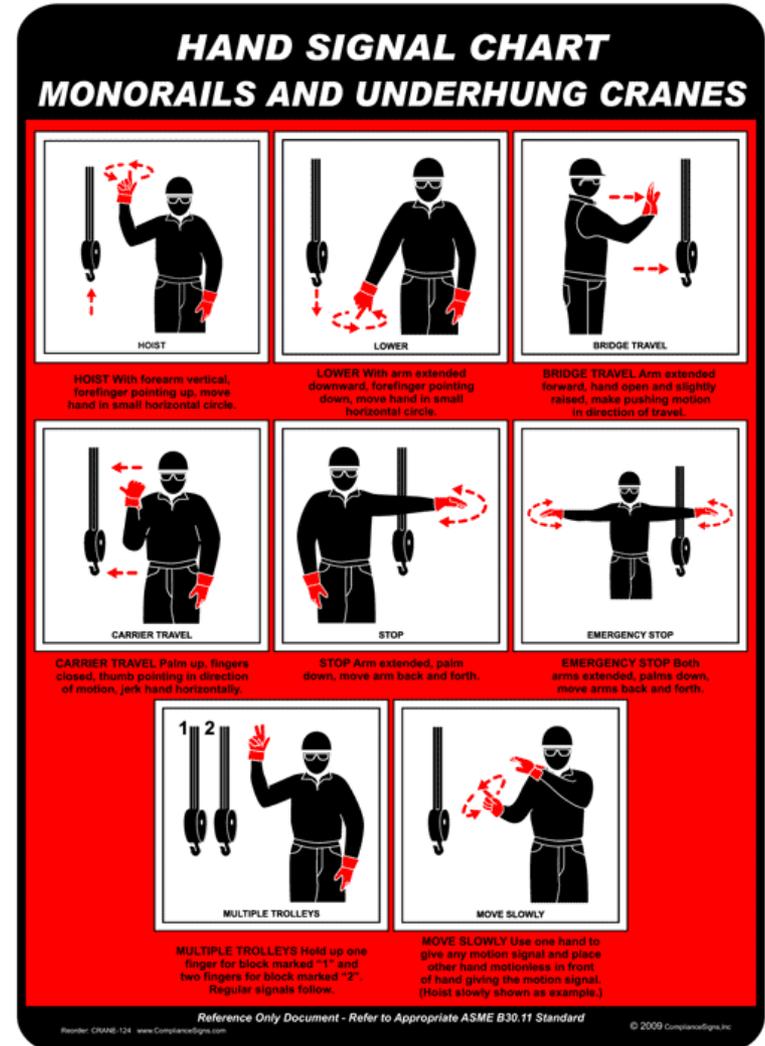
**Prior to the initial use of any hoist during each shift, the operator shall verify operation of the upperlimit device under no-load conditions**

# Posters containing complete hand signal information are posted near the overhead bridge crane disconnects



# Hand signals

- Complete knowledge of the hand signals is required for operation of the overhead cranes
- Complete knowledge of the hand signals is required for all riggers
- Stop and take the time to refresh your familiarity of the hand signals

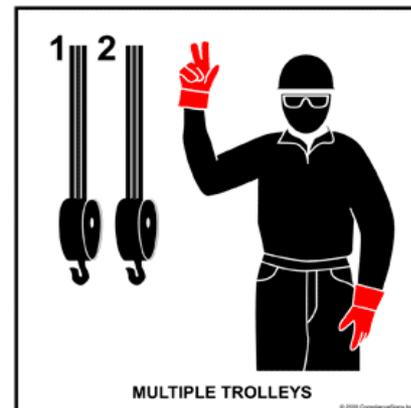
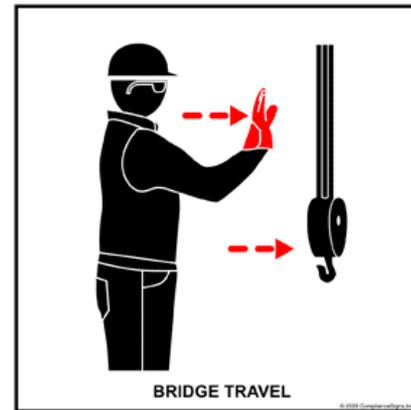
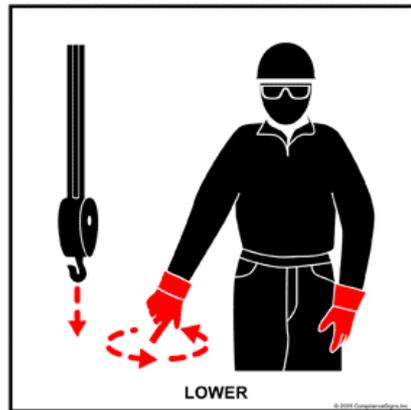


# Knowledge of hand signals is required

- Hand signals are not likely to be needed in most spaces because of close proximity and the use of radios
- However, all operators must know all of the listed/posted hand signals
- The hoist operator will only follow hand signals from a designated signalman (usually a rigger)
- Anyone may call for a stop or an emergency stop and it must be obeyed by the hoist operator



# Knowledge of these eight hand signals is required



# Hoist Lockout/Tagout

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- **Any overhead crane found to have a deficiency shall be de-energized and tagged out in accordance with LLE lockout/tagout procedures**

# LLE overhead crane operator policies



- **Operators must adhere to the OSHA “Conduct of Operators”**
- **Operators shall not exceed the capacity of the overhead crane**
- **All engineered lifts must be coordinated through ME**
- **Only approved and rated rigging gear shall be attached to a load hook by a qualified rigger**
- **Side pulls are not permitted at LLE**
- **LLE overhead crane operators shall not carry loads over people**
- **No suspended load is ever to be left unattended by the crane operator**
- **Prior to the initial use of any hoist during each shift, the operator shall verify operation of the upper limit device under no-load conditions**
- **Complete knowledge of the hand signals is required for operation of the overhead cranes**
- **Any overhead crane found to have a deficiency shall be de-energized and tagged out in accordance with LLE lockout/tagout procedures**

# Section VI

## Site specific procedures

# Parking the overhead cranes

- **OMEGA EP**
  - Park the low bay cranes to the south and the high bay crane to the north with the trolley for both to the east as shown below
  - Leave the load block high near the trolley



- **OMEGA**
  - Park the Target Bay crane to the east with the trolley to the south
  - Leave the load block high near the trolley

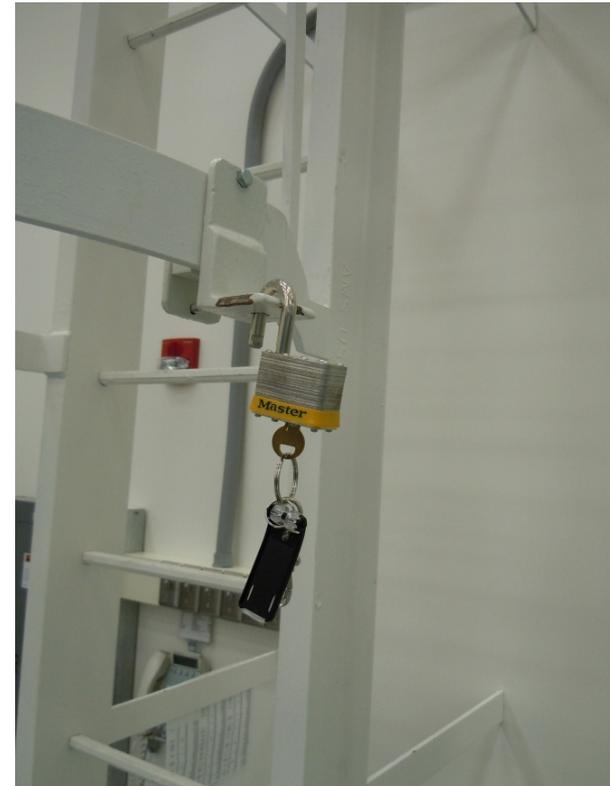
# Accessing the bridge

- **Access to all crane ladders requires key access. Keys are controlled by the Shot Directors for OMEGA and OMEGA EP and must be signed out. Obtain Shot Directors permission before accessing the bridge**
- **Align the bridge access hatch with the cage ladder**



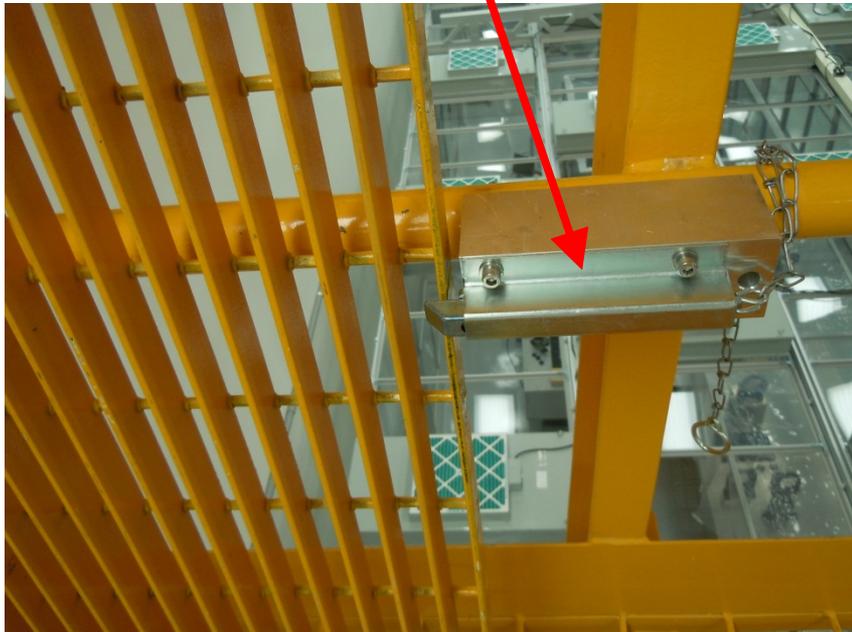
# Accessing the bridge – continued

- From the base of the ladder verify that the access hatch and cage ladder are aligned
- Shutoff the crane power using the remote
- Unlock cage ladder access leaving the key in the lock as shown



# Accessing the bridge – continued

- After accessing the bridge platform the access hatch must be closed by releasing the catch



- Exit the bridge in reverse order
- **Warning!!!** Make sure the access hatch is securely latched in the up position before attempting to mount the cage ladder and descend
- Remember to lock the crane ladder access and return the key to the Shot Director

# All crane deficiencies must be logged in the appropriate Material Deficiency Log (MDL)



- **During crane inspections and service calls, an LLE Overhead Crane qualified escort must accompany the crane service worker. The escort is responsible for:**
  - **Reviewing all crane entries listed in the MDL with the Shot Director (SD) and service worker**
  - **Updating the status of existing deficiencies and enter any new deficiencies in the MDL**
- **If the service worker identifies a safety deficiency, the escort must:**
  - **Tag out the crane if recommended by the service worker**
  - **Have the service worker explain the deficiency and recommended corrective actions to the Operations and Maintenance Manager and Mechanical Safety Officer**

**If an operator identifies a crane deficiency, it must be entered into the MDL**

# Overhead hoist Do's

- **Read and follow the manufacturer's instructions**
- **Visually inspect the hoist and support structure for any damage and remove from service if necessary**
- **Check the operation of the limit switches**
- **Check for damaged wire rope**
- **Check the wire rope for improper seating, twisting, kinking, wear, or other defects before operating the hoist**
- **Make sure the hook latch is closed before operating**
- **Center the hook over the load before operating**
- **Check the brake for excessive drift under load**
- **Be sure the load attachment is properly seated in the bowl of the hook**
- **Verify the landing area can support the load**

# Overhead hoist Don'ts



- **Never lift a load until all personnel are clear**
- **Do not let any unqualified personnel operate the overhead crane**
- **Never carry personnel on a load hook**
- **Do not operate a hoist if you are physically unfit**
- **Do not operate a hoist to the extreme limits of the wire rope**
- **Avoid sharp contact between multiple hoists or the end stops**
- **Never use the wire rope or chain as a sling**
- **Do not point load the hook**
- **Do not avert attention from the load during a lift**
- **Never leave a suspended load unattended**
- **Never attempt to repair a hoist**
- **Never exceed the load rating of the hoist or support structure**

# The overhead crane process

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1. Acquire remote control
2. Energize the crane
3. Inspect the crane
4. Test the controls
5. Test the upper limit switch
6. Inspect the load block, hook, and wire rope
7. Designate a signalman
8. Review the lift path
9. Attach the payload
10. Test lift the payload and adjust as the rigging as necessary
11. Lower the payload and test the load brake
12. Move the payload
13. Lower the payload
14. Secure the payload
15. Detach the payload
16. Park the crane
17. Deenergize the crane
18. Put the remote control away

# Safety is everyone's business and compliance with safety procedures is **MANDATORY**



- If an activity or practice seems unsafe, “Stop Work” and take the time to address concerns
- Only designated and qualified personnel may operate an overhead hoist
- No suspended load is ever to be left unattended by the hoist operator
- Operators are required to visually examine hoist equipment before using it
- No LLE personnel are qualified or permitted to repair a hoist
- Only approved rigging gear shall be attached to a load hook
- All engineered lifts must be coordinated through ME
- LLE hoist operators shall not carry loads over people
- Any hoist found to have a deficiency shall be de-energized and tagged out in accordance with LLE procedure