OVERHEAD CRANE SAFETY:

Safety Is In Your Hands

INTRODUCTION

Cranes are useful and powerful tools that need to be treated with respect. Any mistake with a crane, even a small mistake, can have serious consequences, including property damage, injury or loss of life. That's why knowing how to use the equipment properly and following established polices and procedure is so important.
That's the purpose of this program, to illustrate the basics of crane safety, because with an overhead crane, safety is in your hands.
Topics include safe operating procedures, pre-operating inspection, proper rigging and lifting, moving and placing a load safely.

PROGRAM OUTLINE

PERSONAL PROTECTIVE EQUIPMENT

• Proper attire for crane operation includes hard hat, safety glasses and gloves.
• Slings, chains and other things can be sharp or pinch and gloves will help protect your hands, but gloves should be removed before operating the pendant.
• For smooth operation, you'll need to have a good feel of the controls.
Gloves may hinder this feel.

TRAINING & TERMINOLOGY

• Remember, when you operate a crane, you are responsible for safe operation. You must be trained and authorized before operating any type of crane.
• Next, know the capabilities and limitations of the crane; know the weight and characteristics of what you'll be lifting; know the area in which the lift is to be performed.
• You'll also need to be familiar with some crane-related terminology for two reasons. You'll be able to discuss jobs with your co-workers and you'll be able to effectively communicate to maintenance issues that need to be addressed.
• The bridge is the main structure which spans the crane's work area. It also supports the trolley and hoists.
• The trolley is a carriage that contains the hoisting mechanism and moves from end to end on the bridge. The hoist is a mechanism used to raise or lower the load. The hoist and drum is a spool that winds or unwinds the hoist cable.
• The block is located at the end of the hoist cable with the load hook attached.

PRE-OPERATION INSPECTION

• The first step to ensure safe operation of all of these components is to perform a pre-operation inspection. This inspection should be performed at the beginning of each shift.
• First, move the crane to an area where the block will not hurt anyone or damage equipment should it happen to fail during the inspection.
• Conduct a visual walk around inspection of the crane. Check its general appearance.
• Inspect the alignment of the bridge, condition of the hoist cable, the hook and its safety latch, guards, lubrication and markings.
• Carefully check each function of the pendant control.
• Remember, the operator should be standing in the clear when all tests are performed.
• Move the bridge and trolley. Smooth? Any strange noises or indications of malfunctions or defects?
Screeching or squealing wheels may indicate a bridge that is not true.
• Raise and lower the hoist. Is everything operating smoothly?

• Check the limit switch. Remember, the limit switch is an emergency stopping device only. The limit switch should be tested with no attachments, if possible.
• Raise the block to a point just below the limit stop tripping weight. Slowly inch the block up by moving the control intermittently until the limit switch cutter weight has tripped the limit switch.
• If the hoist still moves at a point where no movement should be occurring, stop the hoist before the load block
is pulled into the hoist drum or hits the upper sheave unit.
• If at any time, you find a problem, defect or just something you think may be unsafe, don't use the crane.
Notify your supervisor or maintenance so it can be repaired or corrected before an accident or injury occurs.
• If your company requires an inspection form, please be sure to fill it out completely and legibly.

The hoisting drum shall have a minimum of 3 wraps left on the drum when the hook is in its lowest position.

You have completed your daily inspection and found the hook throat opening to be greater than 15 percent, you should Tag the crane out of service and report the defect to your supervisor

A hook with more than a 10 degree of twist shall be removed from service.

RIGGING SELECTION

• The proper selection and use of rigging is also important. The type of rigging used is determined by two things: the object being lifted and its weight.
• Check the load tag on the rigging to be sure it exceeds the capacity of the lift. Just like the components of the crane, all rigging should be inspected before use.
• Look for signs of wear, tear and other defects that could affect its capacity. Examples could include kinks, bird caging, cuts, fatigue, rot, aging, deterioration, holes and more.
• Inspect all sockets, chokers, handles and other connections. All defective slings must be repaired or removed from service.

PROPER SLING ATTACHMENT

• The sling should be attached to properly balance and lift the load without causing damage to it.
• Three key factors which can have a negative impact on the sling and affect its capacity include the load balance, angle and load movement.
• An unbalanced load can create a greater force on the sling than the actual weight of the load itself. The angle of the sling also reduces its capacity.
• The greater the sling angle, the less capacity. For example, a sling at a 10-degree

angle may have a 5,000 pound capacity.
• The same sling at a 70-degree angle may have a reduced capacity of 1,700 pounds. Quite a difference and a difference you need to be aware of before you lift anything.
• Never tie knots in slings. It can also reduce the capacity by up to 80 percent. Never attach one sling to another sling to lengthen its capacity.
• Slings should always be attached in a manner that provides control of the load. Never place your hands between the load and the sling while it is being lifted.
• Make sure you and your co-workers are properly positioned when lifting or moving a load to avoid being struck by the load.

Before Lifting

- The area should be checked for suitable signs and barriers
- There is no other works being carried out that could interfere with the lifting operation
- There is no unauthorised plant or personnel in the area
- All personnel involved in the operation are suitably trained and authorised to carry out the task
- Only trained and authorised slinger signallers should carry out the lifting operation.
- Risk assessments, method statements and lift plan for the operation acknowledged.
- Relevant test certificates (crane and accessories) and crane operator competence card checked.
- Slings checked and properly attached and secure to the load.
- Ensure the crane hoist rope is vertical before lifting, if not readjust as this may cause the load

to swing and put the load out of the cranes radius.

- Are the legs of the multi-leg slings equally loaded and within the recommended SWL for the angle applied.
- A line of communication (hand signals / radios) agreed and confirmed with the crane operator.
- Area the load is travelling free of people and hazards.
- Landing site prepared and ready for receiving the load.

- Weather conditions acceptable.

- If required, hand / tag lines attached and suitable.

If any of the above are not in place this could affect the integrity of the lifting operation

During the Lift

- Carry out initial test / trial lift of load to determine centre of gravity and ensure load secure and stable.

- Ensure a suitable amount of line / rope length as this will affect the load swing. (Longer the line length - slower and further the swing, Shorter the line length - faster and shorter the swing).

- Remain in full communication with the operator of the crane at all times.

- Give clear and precise instruction.

- Remain vigilant for any changes to the area the load will be travelling i.e. people, plant, obstructions.

- Lift / travel and lower load smoothly and maintain full control of the lift at all times.

Landing the load

- The landing site should be clear of all obstructions, level and capable of taking the weight and size of the load.

- Where necessary lower the load on to chocks to prevent crushing the slings and to enable easy removal.

- After removal of the slings from the load, ensure they are back-hooked to the master link to reduce the likelihood of fouling obstructions or striking personnel.

- Ensure when detaching the lifting accessories from loose bundles and similar items that suitable chocks are in place to prevent them rolling/ collapsing when released.

After the Lift

- After the lifting is complete, carry out checks to all the lifting accessories to ensure no damage has occurred to them during the work.

- Ensure correct storage and maintenance of the lifting accessories after use.

- Store accessories in dry conditions, preferably hung up and free from pollution and extremes of temperature.

- Clean and allow to dry naturally.

SAFE LIFTING OF THE LOAD

• A safe lift takes proper planning and careful execution.
• Aisle ways between equipment and stock must be a minimum three feet wide and should be kept clear so you can move freely about.
• Before a load is lifted, make sure it is within the capacity of the crane and all sling devices being used.
• Position the bridge directly over the load. Next, position the trolley over the load. The hoist line should be vertical when lifting.
• Lower the hook to a level that the sling can easily be attached with the safety clasp engaged. Never use a hammer or other means of force to attach a sling to a hook.
• After the slings are in place, slowly raise the hook until all slack has been removed from the sling and then stopped.
• A final inspection of the sling should be conducted. Make sure the sling is sitting in the center of the hook.
• Notify all co-workers in the area exposed to the lift. Always position yourself for the best view of the load as
possible without putting yourself in potential pinch points. Remember, an experienced operator is a smooth one.
• The pendant control moves the load in three directions: forward and backward, side to side and up and down.
• Avoid sudden starts and stops. This not only causes the load to swing, but places unnecessary stress on the
slings and the crane. This can lead to potential injury, property damage and increased maintenance for the crane.
• Maintain both hands on the pendant control. When you release the control button, the electric brake will automatically set.
• In order to drift into position, it is necessary to hold the device in the first position.
• Always lift the load straight up. Do not proceed to travel with the load until you have raised it to the
appropriate height to clear all potential obstacles.

MOVING & PLACING THE LOAD SAFELY

• Once again, notify all-co-workers in the area before moving the load.
• Good housekeeping procedures are important in areas where pendant-controlled cranes are used.
• The operator's attention is focused on the load. Check your intended path before moving the load.
• Keep a firm grip on the pendant control. Even though the dead-man switches stop the flow of energy to the
bridge and trolley should the pendant slip out of your hands, the load can still drift a short distance and endanger a co-worker or equipment.
• When traveling with a load, maintain a smooth, steady pace. Anticipate your stops and slow down gradually.
• Always face the load when traveling. Be aware of the pendant control wire getting caught on other objects too.
• The more experienced an operator you are, the smoother you operate the crane. The smoother the crane is, the safer it is.
• Whenever a load is picked up, stopped or moved or swung, there is an increased force placed on the sling and crane components.
• The more rapidly or suddenly these types of actions occur, the greater the force will be, as much as three times the normal load force. Be smooth; don't swing the load and go slowly.
• Never carry the load over co-workers. Allow them time to move out of the way.
• Place the bridge and trolley directly over the position you will set the load. Do not swing it into place.
• Slowly set the load down. Lower the hook to a height that the slings can be safely and easily removed from the hook.

STORING SLINGS & THE CRANE

• Remember to properly store all slings not being used. Do not swing or toss the pendant control out of your way when you are finished with it. Walk it back directly under the bridge.
• When the crane is not being used, it should be moved to a designated area or safely out of the way. Raise all hooks to an intermediate position. Place all controls in the off position.

Upper limit switch

Another common misconception about overhead cranes and Electric hoists is lifting until you hit the upper limit switch. Many operators are under the impression that lifting until they hit the limit switch will allow them to get as much height as possible to move materials. But, the problem here is that the upper limit switch is designed to prevent the hook assembly from colliding with the drum. It is a safety device, not an operational device. If the upper limit switch fails, the hook block and the drum will collide, which could cause the rope to fail and the entire load to fall.

For operators who need an operational upper limit switch, it is possible to install a second switch that's used in a fail-safe mode. This will ensure that if the operational upper limit switch fails and the second switch is struck, the Electric hoist will still shut off. When the upper limit switch fails, the Electric hoist is

automatically shut off. The Electric hoist is turned off in the up position, which is an indication that the operator needs to get help.

Side pulling

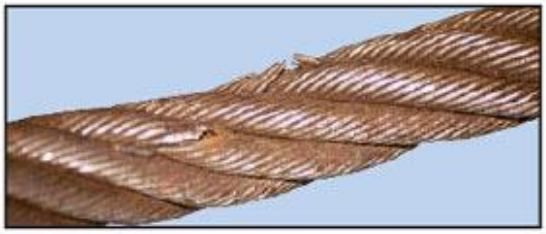
It’s a common misconception that as long your has enough rope, you can pull a small piece of steel from an adjoining bay without safety concerns. This misconception is amplified if the piece being moved is below capacity. This is a very dangerous practice. Electric hoists and overhead cranes are designed to lift straight up and lower straight down only. Side pulling the load can cause numerous problems that are hazardous to equipment and workers:

Pulling your Electric hoist at an angle can put lateral and vertical stresses on the overhead crane and Electric hoist, potentially causing catastrophic equipment failure, personal injury, or death.

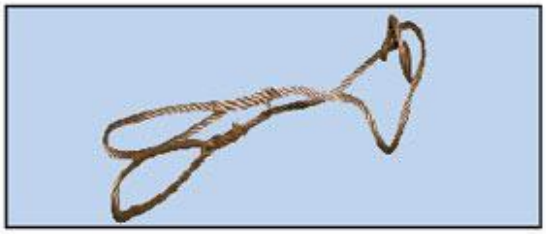
Side pulling can actually cause the wire rope on the Electric hoist to come out of its grooves, which results in a damaged rope that often ends up tangled around the shaft.

Side pulling causes stress on the system in unintended ways, depending on the structure of your system (side pulling puts pressure on vertical and horizontal beams, and most overhead cranes aren’t built to maintain that much stress).

Broken Wires



Kinked Wire

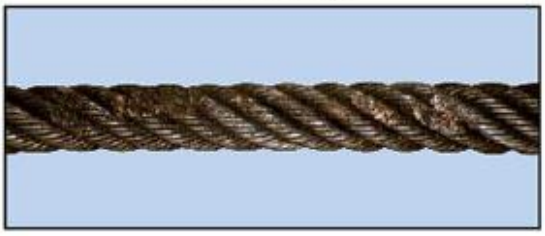


Abraded/Worn Wire

Popped Core

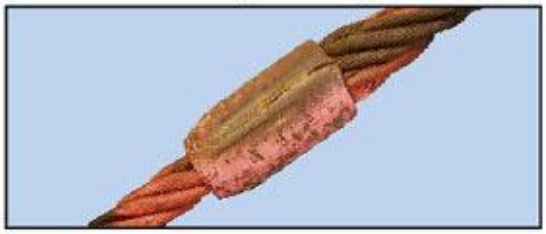
Corrosion

Heat Damage



Bird Caging

Damaged Fittings



A **sheave** or **pulley wheel** is a grooved wheel often used for holding a belt, wire rope, or rope and incorporated into a pulley. The sheave spins on an axle or bearing inside the frame of the pulley. This allows the wire or rope to move freely, minimizing friction and wear on the cable. Sheaves can be used to redirect a cable or rope, lift loads, and transmit power. The words *sheave* and *pulley* are sometimes used interchangeably.

SUMMARY

• Know the capabilities and the limitations of the equipment used. Inspect the crane and slings before you use them.
• Carefully plan each lift and perform it smoothly. Avoid sudden starts and stops.
• Always place the bridge and trolley directly over the load when raising or lowering it.
• Notify all co-workers in the area when making a lift.
• Properly store the crane and rigging when not in use.
• You've been entrusted with a serious responsibility: yes, operating a crane, but more than that, the safety of your co-workers.
• Operating a crane is a serious business and we expect you to treat it as such. Understand and respect the potential hazards.
• Always operate your equipment professionally and safely. If you're unsure about the safety of a particular task, stop and ask.
• Safety is in your hands.


Danger
Overhead crane
JLG LIFT
More tips on Crane Safte is at
www.cranesdq.com