

CRANE SAFETY IN **INDUSTRIAL AND CONSTRUCTION**

COURSE OUTLINE

- **We lift and move things every day.**
 - But sometimes "arm strength" just isn't enough, and it takes major lifting power to get the job done.
 - That's when we need to use cranes.
- **Their lifting capability can be indispensable, but it also creates potential hazards for the people who work with them.**
- **Over the years, different types of cranes have been created to meet the requirements of different types of lifting, and operating, environments.**
 - Although the equipment may share many similarities, it's important to understand their differences as well, in order to use them safely.
- **Most industrial cranes fall into three basic categories:**
 - Overhead cranes.
 - Jib cranes.
 - Boom cranes.
- **"Overhead cranes" are typically attached to support platforms or the walls of buildings.**
 - The hoist cable and hook of these cranes move along a track called a "bridge", usually in a straight line.
 - Their tracks are usually fixed in place.
- **Most "jib cranes" are also fixed in place, but they can have a greater range of motion because their horizontal arm can pivot from side to side.**
 - The arm is locked in a horizontal position so its vertical angle can't be changed.
- **"Boom cranes" are similar to jib cranes in that their hoist cable and hook hang from an arm that can pivot, but the angle of a boom crane arm can be adjusted.**
 - The length of some booms can be changed as well.
- **While this makes boom cranes more versatile, it also means that more variables have to be taken into account to use the equipment safely.**

- Boom cranes such as "truck" or "tower" cranes are considered to be the most complicated type of lifting equipment.
- **According to the Bureau of Labor Statistics, more than 5 workers are killed every month while performing tasks associated with cranes, derricks and hoists, and many others are injured.**
 - A crane, a boom, or the load itself can fall on them.
 - They can be caught in a crane's moving parts, or be crushed between a load and a wall or other immovable object.
 - They can even be electrocuted if the crane gets too close to an overhead power line.
- **To address these hazards, the Occupational Safety and Health Administration (OSHA) has created safety regulations for cranes and similar equipment that is used in both general industry and construction.**
- **OSHA's Crane Standards establish policies as well as procedures that are intended to prevent incidents and protect the health and safety of employees who work with cranes. These rules cover:**
 - Assembly and disassembly of crane equipment.
 - Ground conditions that are required for safe crane operation.
 - Hand signals that should be used to communicate during crane operations.
 - How to work safely around power lines.
- **The OSHA Standards also establish the qualifications training that operators, signal persons, maintenance and repair personnel must have in order to work with cranes.**
- **All crane operators must be "licensed" by a government agency or be "certified" either by an accredited testing organization or audited employer program.**
 - OSHA also requires employers to "qualify" each operator by assessing their knowledge and ability.
- **"Signal persons" must be "qualified" by either a "third party qualified evaluator" or their employer's own "qualified evaluator", based on the criteria that OSHA specifies in the Standards.**
- **Employees who perform maintenance and repair tasks can only operate a crane as part of their work if:**
 - They are familiar with how that specific type of crane functions.
 - They are directly supervised by a "qualified" or "certified" crane operator.

- **Safe practices for crane operations begin with an inspection of the crane, well before you rig the load or fire up the equipment.**
 - Identifying problems before they turn into major malfunctions is a good way to prevent incidents and injuries.
 - The process begins with a thorough visual inspection.
- **Look for missing parts, signs of excessive wear, leaks, cracks and other damage.**
 - Then check the crane's fluid levels and refill them as needed.
 - Test the brakes and other controls to make sure that they are all functioning the way they should.
- **When you start up a crane, listen for any unusual noises.**
 - These can alert you to mechanical problems that you can't see.
- **When inspecting a crane's "hardware", pay special attention to the hook.**
 - If its safety latch is bent or broken, don't use it!
 - It could cause the load to slip off, dumping and damaging materials and possibly injuring a rigger or bystander.
- **Be on the lookout for damage to other parts of the hook as well. Replace it when:**
 - The opening has been stretched wider by fifteen percent or more.
 - It has been twisted out of alignment by more than 10 degrees.
- **After you have completed a general inspection, you should focus on special features of the particular type of crane you're working with.**
- **For example, overhead cranes are equipped with:**
 - "End stops", that prevent the cranes from running off the rails.
 - "Bumpers" that absorb the impact when the crane reaches the end of its travel.
- **These parts are prone to wear and tear, so make sure they are in place, undamaged and functional before starting work with an overhead crane.**
- **Before using a jib crane:**
 - Make sure you know the jib arm's range of motion, so you can prevent your hands, fingers or other body parts from being caught in the equipment, or being hit when it swings.
 - Test the "hoist brake" to ensure that it can safely stop and hold the load.

- **Your assistance can be very important in maintaining safety, even if you're not a crane operator.**
 - If something doesn't look right, you need to report it to the equipment operator or your supervisor.
- **Boom cranes offer their users great power and lifting capability, but to work with them safely you need to use caution and pay attention to detail.**
- **If things go wrong while a boom crane is making a lift, it's often because mistakes were made when the crane was being set up. Improper setup can:**
 - Cause the crane to dump the load.
 - Damage the crane and the materials being hoisted.
 - Tip the crane over.
 - Lead to worker injuries or even fatalities.
- **Before making a lift, you can guard against all of these hazards by:**
 - Making sure that the crane is level.
 - Consulting its load chart to determine its weight limits and proper boom adjustment.
- **A boom crane is equipped with "legs", called "outriggers", which are used to stabilize the crane and keep it level.**
 - Make sure the outriggers rest on solid ground after they have been extended.
 - If necessary, lay wood or metal plates down under the legs to ensure firm footing.
- **The "bubble level" that is mounted on the crane will also help you to adjust the outriggers properly.**
- **Once you have the crane set up correctly, you can prepare to lift the load.**
 - The crane's "load chart" will indicate how much weight the equipment can safely lift when the boom is set to various angles and lengths.
 - Never guess at these numbers!
- **A copy of the load chart should be permanently attached to the crane.**
 - Your supervisor may have a copy as well.

- **When you're calculating the weight of a load, remember to include all of the "lifting accessories," such as the rigging, block and hook.**
 - Then use the chart to determine the boom length and the angle that should be used for safe and efficient operation.
- **Once you have familiarized yourself with the crane you're going to use and have set it up correctly, you are ready to "rig" the load.**
- **First, make sure there's nothing in the area to get in the way of workers or equipment.**
 - Clear away boxes, tools, materials and debris that may be lying around.
- **When using a sling, choose the type that is best suited to lifting the load safely.**
 - Synthetic web slings will generally not mar or crush the load they carry.
 - Chain and wire rope slings have great strength for heavy lifting.
 - Metal mesh slings are designed to resist damage due to hot, abrasive or sharp-edged loads.
- **Always check a sling's load rating to make sure it can carry the amount of weight you plan to lift.**
- **The hitch that is used to connect the load to the crane hook should keep good control of the load.**
 - A "vertical hitch" is the simplest type, directly connecting the attachment point on a load to the crane hook.
 - A "basket hitch" cradles the load and distributes tension over more of the sling.
 - A "choker hitch" tightens on the load as it is lifted, exerting pressure over a full 360 degrees.
- **The crane should be positioned so that the hoist rope hangs straight down, directly over the center of the load.**
 - The load must be lifted straight up... and put down the same way.
 - Lifting "off center" could damage the crane or the load, or injure people who are working nearby.

- **Next, attach the load to the hook.**
 - Be sure to position the sling at the center of the hook, where it's strongest.
 - Never position the sling on the tip of the hook where the weight of the load can bend or weaken it.
- **At this point, the signal person should use standard hand signals to ask the operator to make a trial lift.**
 - The load should be raised about a foot off the ground to confirm that the rigging is secure and the load is under control.
 - If everything's okay, the lift can proceed.
- **As the load rises, pay close attention to the angle between it and the ground.**
 - A load is most secure when it's level.
 - A lift angle greater than 10 degrees could dump the load.
- **If the load angle appears to be too great, lower the load again and adjust the sling to better balance it.**
- **Once a load leaves the ground, the next challenge is to move or "travel" with it safely.**
- **With fixed equipment such as overhead and jib cranes, this can be accomplished by moving the hoist block or jib arm. Remember:**
 - If you need to change speed, do it gradually.
 - Sudden stops and starts can cause the load to swing or make it unstable.
- **While a mobile or "crawler" crane can swing its boom to move a load while staying in one place, sometimes the crane itself will "travel" with the load. In these cases, you should always:**
 - Drive the equipment steadily, at low speed.
 - Watch where you're going.
 - Keep an eye on the load.
- **An effective way to control a load while it's being moved is to attach one or more ropes called "taglines" to the hoist block or the load itself.**
 - Workers can use tension on the taglines to help guide a load smoothly and safely to its destination.
- **Never pass a load over a coworker, or let anyone walk underneath it**

- **To "land" a load safely when it has reached its destination, you should:**
 - Lower it slowly.
 - Stop a few inches above the ground to make sure everything is secure.
 - Then lower it the rest of the way.
- **Never leave a load "hanging".**
 - A suspended load is an accident waiting to happen.
 - Someone could walk or drive into it, or it could fall.
- **Once the load is on the ground, remember to remove the slings from the load and the hook.**
 - Slings that are left on the hook can snag on other objects when the hoist starts moving again.
- **You should also raise the hoist block high enough so that no one will hit their head on it or run into it with another piece of equipment.**

***** SUMMARY *****

- **It's important to understand the OSHA crane regulations, and how they affect you and your coworkers**
- **Always familiarize yourself with the type of crane that you will be using, before you use it.**
- **Make a visual inspection of a crane before working with it. Check the fluid levels and test the controls.**
- **Make sure boom cranes are properly set up before lifting a load.**
- **Rig every load securely. Keep the load angle under 10 degrees.**
- **Avoid sudden stops and starts while travelling with a load, and land every load that you lift.**
- **Now that you know the hazards that are associated with working with cranes, as well as the safe practices that can help you guard against them, you can help ensure that you and your coworkers go home safe at the end of every day!**