

# **PRESENTER'S GUIDE**

## **"RIGGING SAFETY IN CONSTRUCTION ENVIRONMENTS"**

**Part of the Construction Safety Kit Series**

# **OUTLINE OF MAJOR PROGRAM POINTS**

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The following outline summarizes the major points of information presented in the program. The outline can be used to review the program before conducting a classroom session, as well as in preparing to lead a class discussion about the program.

- **Loads come in all shapes and sizes, including:**
  - Freight.
  - Equipment.
  - Building materials.
  
- **There are many different ways to rig these loads.**
  - If we miss a step in the rigging process, things could go seriously wrong.
  - We need to stay alert.
  - And follow safety rules.
  
- **Because of the hazards associated with working with cranes, OSHA has had "crane safety" regulations in force for some time.**
  - But until recently, they hadn't been changed for almost 40 years.
  
- **However, with the crane-related accidents in the construction industry increasing rapidly, in August of 2010 OSHA updated a number of provisions in the construction portions of the regulations.**
  - To be more in tune with today's sophisticated equipment and operating environments.
  
- **The crane regulations cover a number of areas, including:**
  - Ground conditions.
  - Assembly and disassembly.
  - Work around power lines.
  - And inspections.

- **They also address:**
  - Signaling.
  - Fall protection.
  - Work area control.
  - Operator certification.
  - Qualifications for "signal persons" and maintenance personnel.
  - And training.
- **While you should be familiar with all of the provisions of the crane regulations that affect you and the people that you work with, some of the recent changes in the regulations are particularly notable.**
- **Before a crane is positioned or assembled, it must be verified that the "ground conditions" are firm, drained and graded so that the crane can set up safely.**
- **Crane assembly, disassembly and set-up must be overseen by personnel who are "competent" and "qualified".**
- **There are new restrictions as to how far a crane must be from power lines when it is being assembled, operating or traveling.**
  - Generally it must be at least 20 feet away at all times.
  - But this can vary depending on the amount of current going through the lines.
- **By November 10, 2014 all crane operators must be "certified" by either:**
  - An accredited testing organization.
  - A licensed government agency.
  - Or a qualified employer program.
- **"Signal persons" must be "qualified" based on the criteria OSHA has specified in the regulation, by either:**
  - A "third party qualified evaluator".
  - Or their employer's own "qualified evaluator".

- **Maintenance employees can only operate a crane as they work on it if:**
  - They're familiar with how that specific type of crane functions.
  - Or they're directly supervised by a qualified or certified crane operator.
  
- **The first step in preventing rigging accidents is preparation.**
  
- **Communication is essential in a rigger's work.**
  - To move a load successfully, both the rigger and the crane operator need to use a number of hand signals.
  
- **To indicate to an operator that you want the hook on the crane lowered:**
  - Point downward.
  - Move your hand in small circles.
  
- **To indicate that the load should be hoisted:**
  - Raise your arm.
  - Point up.
  - Move your hand in small circles.
  
- **To indicate that you want the crane to stop:**
  - Extend one arm to your side with your palm facing down.
  - Move your arm back and forth horizontally.
  
- **To call for an emergency stop:**
  - Extend both arms out to the sides with palms down.
  - Move your forearms horizontally.
  
- **There are two other "special" signals that are used only when working with boom cranes.**
  
- **To indicate that you want the boom to be lowered:**
  - Extend your arm.
  - Close your fist.
  - Point your thumb down.

- **When you need the boom raised:**
  - Extend your arm.
  - Close your fist.
  - Point your thumb up.
- **Once you are comfortable that everyone can communicate effectively, check with the operator to make sure that the crane has been inspected.**
  - Both you and the operator should verify that the crane is ready to lift safely.
- **Also make sure that you both know the weight capacity of the crane.**
  - This will help you to not overload it.
- **Inspecting the hook is important too.**
  - Never use a hook with a broken or bent safety latch.
  - The sling could slide off of the hook and drop the load.
  - The load could be damaged.
  - An injury could even occur.
- **Keep in mind that hooks are made to carry loads at their centers.**
  - Never lift a load on the tip of a hook.
  - This can cause the hook to stretch and weaken.
- **Take the time to get another hook if:**
  - The opening is stretched more than 15% from its original size.
  - The hook is twisted more than 10 degrees.
- **Once the crane and hook have been inspected you can move on to picking out the proper sling for your job.**
- **Slings are used to carry a load. They can be made out of many different types of materials, such as:**
  - Chain.
  - Wire rope.
  - Synthetic fabrics.
  - Metal mesh.

- **When choosing a sling, consider the characteristics of the load, such as:**
  - Size.
  - Shape.
  - Temperature.
  
- **Knowing the temperature of a load is important because in extreme heat some slings may:**
  - Stretch.
  - Melt.
  - Break.
  
- **By selecting the right sling, you can make rigging and controlling the load a lot easier and safer.**
  
- **A chain sling should be used for lifting the heaviest loads.**
  - It also works well in a high temperature area (such as a steel mill).
  - It is less likely to be damaged by heat than any other type of sling.
  
- **Before using a chain sling, inspect it for cuts or worn links.**
  - By pushing the links together, and checking where "metal rubs metal", you can find hidden worn spots and other potential problems.
  
- **Synthetic slings are the most flexible, and are used when loads have to be protected from abrasion.**
  - Their light weight also helps to reduce riggers' fatigue and stress.
  
- **Metal mesh slings are best for lifting objects with sharp edges... such as plate steel... since the edges can not cut through the mesh.**
  - Metal mesh slings also make it easier to balance a load, because of their wide load-bearing surfaces.
  
- **The most widely used type of sling is the wire rope sling.**
  - These are commonly found at construction sites.
  - They are also used in other rugged environments.

- **Before working with a wire rope sling, inspect it for broken or significantly worn wires. Check for:**
  - Corrosion or broken wires on the end connections.
  - Kinks.
  - Crushed wires.
  - Unwinding strands.
  - If you find any of these conditions do not use the Sling, since it could be weakened.
  
- **Once you have picked out your sling, you are ready to attach the load.**
  - Start by determining which hitch to use.
  - A hitch is the way a sling is attached to the load and the hook.
  
- **There are three basic kinds of hitches:**
  - Vertical.
  - Basket.
  - Choker.
  
- **You can only use vertical hitches on loads equipped with lifting attachments, such as eye bolts or latches.**
  - To create a vertical hitch, attach the hoist hook to the sling.
  - Then connect the sling to the lifting attachment.
  
- **A choker hitch works particularly well with wide loads.**
  - Wrap the sling snugly around the load.
  - Then run one end of the sling through the shackle on the other end, and fasten it to the hook.
  
- **Sometimes a regular choker hitch is not tight enough.**
  - In these situations, you should use a double wrap choker hitch.
  - Wrap the sling around the load twice.
  - Then loop one end through the other.
  - Attach it to the hook.
  
- **The most commonly used hitch is the basket hitch.**
  - To form this hitch, cradle the sling around the load.
  - Then place both ends of the sling over the hoist hook.

- **When deciding which hitch to use, keep in mind that the same factors apply to both hitches and slings, and that both are affected by the load's:**
  - Weight.
  - Size.
  - Shape.
  
- **For example, a long metal pole... due to its length... would need a double wrap choker hitch to keep it in place.**
  - You would also want to use a synthetic sling.
  - Its flexibility and strength would help to keep the pole stable.
  
- **No matter which hitch you are using the hoist rope should only be used to lift and lower the hook. It is important not to wrap the hoist rope around the load. This could damage the:**
  - Rope.
  - Hook.
  - Load.
  
- **After selecting the sling and hitch, you still need to determine how to prevent the load from damaging the sling.**
  - The easiest way to do this is to place padding around the sling.
  
- **To protect both the sling and the load, place wood or other "softeners" between them.**
  - This will help prevent the sling from cutting into the load.
  - It also stops the load from causing wear and tear on the sling.
  
- **Sometimes a load needs more than one sling to keep it stable as it's being lifted.**
  - To figure out the safest way to rig the slings, look at "sling angles".
  
- **A sling angle is the angle between a sling and the load.**
  - By paying close attention to the sling angles for each sling, you can be sure that the load will be safe and secure when it is lifted.

- **The force exerted on each sling increases as its sling angle decreases.**
  - If this force exceeds the sling's weight capacity, the sling could break.
  - A sling angle of 90 degrees is ideal because it puts the least stress on the sling.
- **There are two ways to get a sling angle of 90 degrees:**
  - Use a lifting attachment.
  - Use a single sling employing one of the three common hitches.
- **Unfortunately, most loads do not have lifting attachments, and many loads require two slings.**
  - To find the right sling angle for two or more slings, ask your supervisor for a sling angle chart.
- **A sling angle chart lists various sling angle factors.**
  - If you are using two slings, multiply the sling angle factor by half the weight of the load.
  - This determines what the weight capacity of each sling needs to be.
- **For example, the sling angle factor for two slings attached to a load at angles of 60 degrees is 1.155.**
  - For a 1000 pound load you would multiply 500 pounds (half the load's weight) by 1.155.
  - This tells us that each sling would need to be rated for at least 578 pounds.
- **If the sling angle were 45 degrees, the chart would tell us that each sling would need to have a weight capacity of at least 707 pounds.**
  - Sling angles of less than 45 degrees should be avoided, because they put too much stress on the sling.
- **Keep in mind that the shorter the slings, the sharper the sling angles will be.**
  - So if you use slings that are too short, you could easily overload them, causing the slings to break.

- **You can catch sling angle problems and find the slings that are right for your lift if you:**
  - Take your time.
  - Consult a sling angle chart.
  
- **Cranes are only intended to lift straight up and down.**
  - A diagonal lift puts too much stress on the crane and could tip the crane over.
  - Before you lift, make sure that the crane is positioned directly over the load.
  - Outriggers should be extended and planted firmly on the ground.
  
- **While lifting, you also need to be careful of "accidental drops".**
  - Most often these are caused by having a bad "angle of load" (the angle between the load and the level ground).
  - Most drops occur when the load is not parallel to this "level ground".
  
- **Never let the angle of load exceed 10 degrees.**
  - More than that and the load could slip and fall.
  - People could be injured.
  - Material could be damaged.
  
- **While accidental drops are dangerous, the most common hazard that a rigger faces is electrocution.**
  - A frequent cause of electrocution is contact with overhead power lines or electrical equipment.
  
- **Before you start work:**
  - Make sure that you know the height of any power lines near your job site.
  - Know the location of all electrical equipment.
  - Be sure that the operator also knows to direct the crane away from any danger.
  
- **You should also keep an eye on the weather.**
  - You do not want to stand next to a crane or hold onto a tagline in a storm.
  - If you do, you could easily become a target for lightning.

- **Check the weather forecasts before going to work, so that you know if storms are likely.**
  - But keep in mind that forecasts can sometimes be wrong.
  - Check the sky periodically for signs of approaching storms.
  - That way you can stop working if there is the danger of lightning.
  
- **As the lift progresses you need to pay close attention to the load.**
  - Often it can shift and change the angle of the load.
  - Remember that the angle should never exceed 10 degrees from horizontal.
  
- **Once the load is in the air, the next step is to move it.**
  - To help control and position the load, it is often a good idea to use ropes or taglines.
  - By putting tension on the tagline, you can prevent the load from spinning, or help direct it toward its destination.
  - Taglines can also help you maneuver the load into tight places.
  
- **During the lift, stop periodically to make sure that the load is secure. As you travel with the load:**
  - Do not carry it above people.
  - Or allow anyone to walk under it.
  
- **When you come to a stopping point, remember that a suspended load should never be left unattended.**
  - It is an "accident waiting to happen."
  - Move to within a few inches of a good landing point.
  - Then slowly lower the load until it is "grounded".
  
- **Wearing the correct clothes and gear during rigging operations is also important. It can protect you from:**
  - Cuts.
  - Bruises.
  - Other, more serious injuries.
  
- **It is particularly important to wear heavy leather gloves.**

- They will protect you from rope abrasions and sharp objects.
- **You should also wear safety shoes with steel toes to protect your feet from:**
  - Heavy equipment.
  - Dropped loads.
- **A hard hat and safety glasses will help protect your head and eyes from falling or hanging objects.**
- **Sleeveless shirts can leave arms exposed to sharp objects and machinery.**
  - Make sure you are wearing a shirt with sleeves that can protect you from cuts and abrasions.
  - Don't forget to tuck your shirt tails in so they will not get caught on the sling or the load.
- **Rigging plays a pivotal role in crane operations.**
  - If a load is not rigged properly, the consequences can be devastating.
- **But by taking the proper precautions, you can get the job done safely!**

**\*\*\* SUMMARY \*\*\***

- **Know the OSHA crane regulations, and how they affect you and your coworkers.**
- **Before rigging a load, make sure that both you and the crane operator know the standard hand signals.**
- **Know the weight capacity of the crane... and the lifting accessories... that you are using.**
- **Familiarize yourself with the different types of slings and hitches that can be used to rig a load.**
- **Make sure that every load you rig is secure, and that the sling angles are safe.**

- **Never carry a load above other workers, or allow anyone to walk under a load.**
- **Be sure to wear the proper protective clothing and equipment for the job you are working on.**
- **Once you get the "hang" of it... it can be easy to rig a load safely!**